Cartesian Logic

AN ESSAY ON DESCARTES'S CONCEPTION OF INFERENCE

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Descartes's Conception of Inference

THE argument against syllogistic that Descartes pursues with most vigour is not one which turns on its circularity or unsuitability as a method of discovery, but rather one that shows it to be an impediment to the conduct of our reasoning. This is a completely different kind of argument from those that we have discussed up to now. In Rule 4 of the *Regulae*, we are told:

But if our method rightly explains how intellectual intuition should be used, so as not to fall into error contrary to truth, and how one must find deductive paths so that we may arrive at knowledge of all things, I cannot see anything else is needed to make it complete; for I have already said that the only way science is to be acquired is by intellectual intuition or by deduction. Method cannot be extended further so as to show how these operations themselves should be effected, because they are the most simple and primary of all, to the extent that, unless our understanding were already able to make use of them, it could comprehend none of the precepts of that very method, not even the simplest. As for the other operations of the mind, which dialectic claims to direct by making use of these two, they are quite useless here; rather they are to be accounted impediments, because nothing can be added to the pure light of reason which does not in some way obscure it. (AT x. 372-3.)

This 'light of reason', or 'light of nature' as it is called in Rule 10, apparently cannot mislead us, as 'none of the mistakes which men make . . . are due to faulty inference; they are caused merely by the fact that we build upon the basis of poorly comprehended experiences, or because hasty or groundless propositions are put forward' (AT x. 365).

What the light of reason does in the first instance is to allow us to grasp the truth of clear and distinct ideas. But of course on some occasions we have to connect such ideas inferentially, and then we require demonstration or deduction. Descartes's account of this process is, however, modelled upon intellectual intuition (*intuitus*):

Thus if, for example, I have first found out, by distinct mental operations, what relation exists between the magnitudes *A* and *B*, then what between *B* and *C*, between *C* and *D*, and finally between *D* and *E*, that does not entail that I will see what the relation is between *A* and *E*, nor can the truths previously learned give me a precise idea of it unless I recall them all. To remedy this I would run over them many times, by a continuous movement of the imagination, in such a way that it has an intuition of each term at the same time that it passes on to the others, and this I would do until I learned to pass from the first relation to the last so quickly that there was almost no role left for memory and I seemed to have the whole before me at the same time. (AT x. 521.)

One way in which this passage has been taken is as a claim that deduction has no real role to play in knowledge. Ian Hacking takes it in such a way, assimilating Descartes's view to that of the mathematician G. H. Hardy, who thought of proofs as 'gas, rhetorical flourishes designed to affect psychology . . . devices to stimulate the imagination of pupils'.[1]

Hacking supports his reading by appeal to the doctrine of eternal truths. This doctrine, first elaborated in three letters to Mersenne of 15 April, 6 May, and 27 May 1630, offers an account of God's grasp of truths. The second letter presents the essentials of the doctrine:

As for the eternal truths, I say once again that *they are true or possible only because God knows them as true or possible and are not known as true by God in such a way as would imply that they are true independently of Him.* If men really understood the meaning of their words they would never be able to say without blasphemy that the truth of anything is prior to the knowledge which God has of it, for in God willing and knowing are a

[1] I. Hacking, 'Proof and Eternal Truths: Descartes and Leibniz', in S. Gaukroger (ed.), *Descartes* (Sussex, 1980), 169-80. Hacking's interpretation is indebted to Y. Belaval, *Leibniz: Critique de Descartes* (Paris, 1960).

single thing so that *by the very fact of willing something He knows it and it is only for this reason that such a thing is true.* (AT i. 149.)[2]

The central claim is elaborated upon in the third letter in these terms:

You ask what necessitated God to create these truths: to which I say that He was no less free to make it untrue that all the lines drawn from the centre of a circle to its circumference are equal, than He was not to create the world. And it is certain that these truths are no more necessarily attached to His essence than other creations are. You ask what God did to produce them. I reply that *from all eternity He willed and understood them to be, and by that very fact He created them.* In God, willing, understanding, and creating are all the same thing without the one being prior to the other even *conceptually.* (AT i. 152–3.)

Hacking takes the doctrine of intuition and the doctrine of eternal truths together as illustrations of an underlying conception of the irrelevance of proof to truth. Construed in this context, the import of the doctrine of eternal truths is that eternal truths depend upon the will of God, who has no need of deduction (proof); he knows truths in virtue of having created them (i.e. willed them), so proof is clearly irrelevant. This doctrine then seems to mirror the doctrine of intuition which, on Hacking's interpretation, maintains that we need only intuition, and not deduction, in grasping truths.

There are a number of problems with this association of the two doctrines. In the first place, they are developed independently. The earliest appearance of the doctrine of intuition is Rule 3 of the *Regulae*, which dates from around 1619.[3] The doctrine of eternal truths, on the other hand, only makes an appearance in 1630, in the letters to Mersenne. Moreover, although the term *intuitus* tends to disappear after the *Regulae*, the doctrine itself does not— it is to be found as late as the 1640s in the *Search after Truth* (AT x. 521),[4] for example—yet this doctrine is not altered after 1630 in

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[2] In this, as in the next quotation, words in italics designate Latin phrases.
[3] On the question of dating cf. J.-P. Weber, *La Constitution du texte des Regulae* (Paris, 1964).
[4] This is a passage that I shall return to below. On the dating of the *Search after Truth* see F. Alquié (ed.), *Descartes: Œuvres philosophiques* (3 vols., Paris, 1963–73), ii. 1101–4.

any way which would suggest that it had a connection with the new conception of eternal truths. Secondly, while Descartes holds both doctrines after 1630, he *never* discusses them together or even in the same context. As well as the three letters to Mersenne of 1630, the doctrine of eternal truths is discussed or mentioned in letters to Mersenne of 17 May 1638 and to Mesland of 2 May 1644, in the *Replies to the Fifth and Sixth sets of Objections to the Meditations* and in the *Principles* (I, arts. 22–4 and 48–9). It is hard to believe that, if the doctrines were simply part of the one underlying conception, Descartes would have made no effort to discuss them together or indeed to make any explicit connection between them. Third, not only is there no textual reason to associate the doctrines in the way that Hacking suggests, there are other grounds for believing such an association to be mistaken. Hacking points out that Leibniz's God knows all truths because he knows all proofs, whereas we only know some because we only know some proofs, and we are in any case restricted in our grasp of proofs to those which are finite whereas God is not. But what is the parallel with Descartes here? Consider the doctrine of intuition. The parallel that suggests itself on the basis of this conception is one on which God has an intuitive grasp of all truths, but we only have an intuitive grasp of a few. We would then be able to conclude, as Hacking does, that, in general terms, proof is constitutive of truth for Leibniz and irrelevant to truth for Descartes. But the whole thrust of the doctrine of eternal truths is precisely that we *cannot* compare what knowledge for us consists in and what knowledge for God consists in. We are simply unable, on Descartes's view, to make any connection at all between our intuition and God's cognitive grasp.

In discussing the doctrine of eternal truths, Descartes never raises the question of deduction or proof, and this is the crucial point. He nowhere maintains that proof is irrelevant to truth for God. He does provide us with an account whereby God wills truths into existence, an account which, if construed in a logical context, does indeed have this as a consequence. But it is far from clear that Descartes thinks such questions can be construed in a

logical context, since it appears that we can say nothing at all about what God's grasp of truth consists in. Hence, if we are to understand the conception of inference that Descartes offers, we must focus our attention on what I have called the doctrine of intuition.

On the face of it, this is not a particularly attractive doctrine, and even if we dissociate it from the doctrine of eternal truths, it has two features which may appear to lend support to Hacking's low view of Descartes's general conception of inference. First, in the limiting case, deduction tends towards what is in effect the model for all reasoning, intuition. The point of the exercise seems to be to reduce out inferential steps altogether, so that one grasps the premisses and conclusion in the one intuition. The role of demonstration or proof on this conception is obviously problematic. Secondly, for Descartes, knowledge which we have in an intuition is an immediate grasp of clear and distinct ideas which Descartes construes explicitly as thoughts, thoughts which are grasped in the first instance in their own right without any reference to whatever extra-mental correlates they may have. So not only is deduction construed (in some way that we have yet to elucidate) in terms of intuition, but intuition, and hence deduction, is construed psychologistically. Psychologism has not generally been taken seriously as a basis for logic since Frege's famous attack on it,[5] and its faults now seem as obvious to us as the faults of syllogistic seemed to Descartes.[6] What we need to come to terms with in understanding Descartes is not just his psychologism, however, but more importantly the issues that underlie his advocacy of psychologism. Psychologism is simply the form taken by Descartes's attempt to provide what, I shall argue, is a cognitive basis for inference. To appreciate what is at issue here we need to take a broad view of the development of conceptions of inference up to Descartes's time. I shall look first briefly at Aristotle's conception of inference, and at how the Aristotelian conception comes to be transformed in the early Middle Ages, and then at the

[5] G. Frege, *The Foundations of Arithmetic* (Oxford, 1959), §§26–7.
[6] But cf. B. Ellis, *Rational Belief Systems* (Oxford, 1979).

views of Descartes's immediate predecessors and contemporaries. Although this means ignoring the very important Stoic and Terminist conceptions of logic, as well as many other less important theories, I believe the selection provides us with a broad outline of the central development, which I shall argue lies in a shift from discursive to facultative conceptions of inference. Seen in this light, Descartes is the first to make a serious attempt to come to terms with a novel and important but especially intractable problem about the cognitive basis of inference.

CONCEPTIONS OF LOGIC BEFORE DESCARTES

Aristotelian syllogistic was misunderstood in many respects in the seventeenth century, by both its detractors and its ever-decreasing number of advocates. The charges of circularity and question-begging which were levelled against the syllogism, for instance by Descartes and Locke, depended to a large extent upon its being taken as an instrument of discovery, which, as we have seen, is something that Aristotle never intended. For Aristotle, the demonstrative syllogism in particular was primarily a didactic and expository device which provided an explanation of a conclusion which was known in advance. The procedure for yielding such conclusions was provided not by syllogistic, the concern of which was formal and systematic presentation, but by the topics. As we have seen, the topics work by supplying strategies for classifying or characterizing problems in such a way that they can be solved using set techniques of argument or disputation which are initially developed in the context of dialectical argument, where they function somewhat like the Sophists' procedures, and which help one to discover what distinctions are to be made, what route is to be followed, and so on, if one is to get one's opponent to yield to the case one is defending. But as Aristotle becomes progressively more concerned with the formal properties of arguments and with scientific demonstration, the topics come to be supplemented by a formal account of the structure of arguments: syllogistic. They

retain their role as an instrument of discovery, but are superseded in many other respects by syllogistic.

The pioneering work of Łukasiewicz[7] and others showing, from the perspective of modern logic, the formidable formal strengths of Aristotelian syllogistic, has tended to open up a gulf between the early dialectical concerns of the central Books II to VII of the *Topics* and the concerns of the mature *Analytics*, and this shift of interest is very easily seen as a shift from a concern with discursive reasoning to a concern with 'pure' patterns of inference. But Aristotle's syllogistic grows out of the dialectic of the *Topics* and the *De sophisticis elenchis*, and it retains important traces of its dialectical origins. Kapp has given a particularly insightful account of this discursive context of syllogistic reasoning in his now classic article on syllogistic in Pauly–Wissowa's *Real-Encyclopädie*.[8] Kapp's argument is that the syllogism should be seen as a real process in which two people participate. We have already noted that the conclusions of Aristotelian syllogisms are not sought but are given before the construction of the syllogism. What is sought is the premisses which will yield those conclusions in the requisite way. The path to be followed in such a search is clearly the reverse of syllogistic inference. If, following Kapp, we let A seek the premisses, then upon finding them by this reverse path A is in a position to construct a syllogism, and to present this syllogism to B who, in grasping that syllogism, moves inferentially from premisses to conclusion. The process described in Aristotle's definition of the syllogism—namely, that certain things (the premisses) being stated, something other than what is stated (the conclusion) follows of necessity from the truth of those things alone (*An. Pr. A*1, 24^b 18–22)—occurs as an intellectual process in B. But the syllogism itself is not to be identified with B's mental activity: A and not B is responsible for the syllogism which B grasps. That syllogism is therefore in an important sense independent of B, who can only accept or reject it. In other words, the

[7] J. Łukasiewicz, *Aristotle's Syllogistic* (Oxford, 1957).

[8] Translated into English as 'Syllogistic', in J. Barnes, M. Schofield, and R. Sorabji (eds.), *Articles on Aristotle*, i: *Science* (London, 1975), 35–49.

context of syllogistic is a thoroughly discursive one. This is true not only of paradigmatic case of the dialectical syllogism—where A and B are opponents, and where the point of the exercise is for A, by employing dialectical skills, to get B to accept something contentious—but equally so of the demonstrative syllogism, where A and B are teacher and pupil respectively, the point of the exercise now being for A to convey information to B in the most effective and economic way.

The fact that it is the topics that provide the discursive model for syllogistic is interesting in the light of their subsequent history. The topics underwent a number of changes after Aristotle, with Themistius and Cicero providing their own systems of topics, and Boethius providing what was to be the definitive system of antiquity as far as the Middle Ages was concerned. Yet while there is on the face of it a fundamental gulf separating Aristotle and Boethius—their lists of topics differ considerably and are organized in different ways, as well as offering different procedures by which to find arguments by means of these topics[9]—there is one crucial question on which they are in agreement, and which distinguishes the topical systems of antiquity from those of the Middle Ages. The topics were above all dialectical in antiquity. They are explicitly concerned with the art of disputation in Aristotle, and this concern is retained throughout antiquity. Boethius' account of the topics, for example, is firmly within the context of arguing by question and answer, and in developing arguments for and encouraging belief in conclusions. There is a stark contrast between this and the medieval approach. The difference is apparent in the very earliest extant medieval logical text—Garlandus Compotista's *Dialectica*, composed probably in the early eleventh century—where the focus is not upon the discovery of arguments but upon their confirmation, with a special emphasis on enthymemes.[10] The context of disputation is merely

[9] Cf. E. Stump, *Boethius' De topicis differentiis* (Ithaca, 1978), 159–261, on the changes in the topics in antiquity and the early Middle Ages. On the development of the use of the topics in rhetoric in this period see E. R. Curtius, *European Literature and the Latin Middle Ages* (Princeton, 1973).

[10] See E. Stump, 'Garlandus Compotista and Dialectic in the Eleventh and Twelfth Centuries', *History and Philosophy of Logic*, 1 (1980), 1–18.

perfunctory, as indeed it is also in the case of the standard medieval account of the topics, that provided two centuries later by Peter of Spain in his *Tractatus*. Peter does not conceive of the topics in terms of questions or of inducing one's opponents to believe something, but rather in terms of supplying explanations and justifications of correct but enthymematic inferences.[11]

Peter of Spain's work lies at the heart of subsequent developments in logic up to Descartes, and the two most influential conceptions of logic in the sixteenth and early seventeenth centuries can be distinguished in terms of the attitude that they take to Peter of Spain. The humanist view, which in this period takes the form of Ramism, takes its starting-point from Agricola's rejection of Peter's conception of logic. The scholastic view of logic, on the other hand, which in this period principally takes the form of the Jesuit theory of *directio ingenii* or 'directions for thinking', is a development, albeit a considerably revised one, of Peter's account. These are not the only views which flourished in the period but *regressus* theory, for example, had no influence in the seventeenth century, and little outside Padua in the sixteenth century, and the only other influential school—the so-called 'systematics' (Keckermann, Buscherus, Libavius, Alsted, and Timpler)[12]—were concerned to reform scholastic logic in the light of Ramist criticisms, so need no separate attention here.

The humanist interpretation of logic has two landmarks which deserve our attention: Rudolph Agricola's *De inventione dialectica libri tres*, first published in 1515 but circulated in manuscript form from the 1480s, and the writings of Peter Ramus, and his collaborator Omar Talon, from the 1540s onwards. The *De inventione dialectica*, although undeniably indebted to earlier humanist writings, was virtually synonymous with logic or dialectic in the first part of the sixteenth century, and with the derivative works of Melanchthon and Caesarius it quickly replaced Peter of

[11] Cf. Stump, *Boethius' De topicis*, pp. 235–6.

[12] On the 'Systematics' see W. S. Howell, *Logic and Rhetoric in England, 1500–1700* (Princeton, 1956) and W. Risse, *Die Logik der Neuzeit*, i: *1500–1640* (Stuttgart and Bad Cannstatt, 1964).

Spain and Paul of Venice as the standard textbook on dialectic, being overshadowed in the later sixteenth century only by Ramus' work, which owes a great deal to Agricola. Logic or dialectic must be understood broadly here. As a component of the *trivium*, dialectic was theoretically an equal partner with grammar and rhetoric, but it was usually defined in such broad terms that it overshadowed the other two. Peter of Spain and Lambert of Auxerre, enlarging on the Aristotelian definition (*Top. A*2, 101[b] 3), define it as 'the art of arts, the science of sciences, possessing the path to the principles of all methods'. Agricola's conception of dialectic is a development of Peter of Spain's[13] and it involves dialectic taking over everything except actual delivery from rhetoric, which in turn is reduced to ornamentation. Parallel with this there is what can only be called a homogenization of dialectic. Aristotle had distinguished between various forms of syllogism—dialectical, eristic, demonstrative—and had conceived of discourse being directed towards scientific, dialectical, rhetorical, and other ends, and Aquinas had elaborated upon the different forms of argumentation and the different ends of discourse. But as far as scholastic thinking about dialectic was concerned, it was Peter of Spain's broad conception, not that of Aristotle or Aquinas, that held sway, and the humanists capitalized on this broad undifferentiated conception. For Agricola, all dialectic, which now effectively comprises a general theory of discourse, has a single aim, and that aim is teaching. Cicero had distinguished teaching, moving, and pleasing as the three objectives of discourse (*Opt. Gen.* II), but Agricola points out that we can teach without moving or pleasing but not vice versa (*De inv. dial.* Bk. I, ch. i), and concludes that teaching is the only universal and intrinsic function of speech (Bk. II, ch. iv). There is no shortage of precedent in antiquity for this view. The later Stoics, for example, held firmly to the view that the function of literature is pre-eminently didactic, and Seneca and

[13] Cf. W. J. Ong, *Ramus, Method, and the Decay of Dialogue* (Cambridge, Mass., 1958), chs. 4 and 5.

others developed a mimetic theory of literature and poetry on this basis.[14]

On Agricola's account, whether our immediate ends are rhetorical or scientific or whatever, we are always ultimately engaged in teaching. Indeed, one looks in vain for the logic of discovery or 'invention' mentioned in the title of Agricola's work: the whole purpose of logic or dialectic is the ordering of material so as to convey it to an audience. Ramus draws on this conception and gives the topics the central role of sorting ideas into appropriate groups, but the topics in turn are conceived in a completely pedagogic fashion. The structure of knowledge is dictated in Ramus by the pedagogic classification of the arts and sciences; as Ong puts it, 'Ramus assumes that the primary units which the mind "contains" are the objects in the curriculum',[15] that is the curriculum subjects. In this respect, Ramism can be seen as an extreme version of Aristotle's mature preoccupation with the question of organizing and presenting already attained knowledge, an attitude reinforced in both cases by a belief that learning is virtually complete and remains only to be recovered and conveyed. That much of this learning had become lost and needed rediscovering was a prominent theme in writers such as Ramus and Melanchthon. Moreover, once the learning had been recovered, it was a question not merely of presenting it, but of presenting it persuasively, and this itself was a topic to which much attention had to be devoted.[16] It remains the case, nevertheless, that what is centrally at issue is the presentation of something that had been known in antiquity, and there was no question of discovering something which had never been known. Indeed, in his earlier writings, Ramus' thinking has an explicitly Platonist ingredient, whereby ideas in the mind are prior to the empirical world,

and there is even a hint of the Platonic doctrine of recollection.[17]

There is no role for demonstration, if by this we mean logical inference, on this conception. The 'principles of the arts', Ramus tells us, 'are definitions and divisions; outside of these, nothing': to 'demonstrate' something is simply to define it.[18] Even geometry, on Ramus' view, consists not of demonstrations properly speaking but of definitions and rules. Because Ramus treats knowledge in terms of mapping ideas accurately according to their definitions in the mind, his treatment of reason effectively reduces it to the operation of memory and classification, and the problem of 'method' and that of memory and classification become identical. There had been a very active medieval concern with memory which continued to flourish in the sixteenth century, according to which the topics were construed in terms of places (*loci*, the Latin translation of the Greek τόποι) in the mind where ideas were to be found by employing mnemonic devices displaying the structure of those places.[19] But this is too arbitrary for Ramus, because the mnemonic systems, which typically worked with an image of a city or a building intimately known to the subject, so that items in that city or building could be associated with items of knowledge, need in no way reflect the pedagogic ordering of knowledge. It is also too complex for him, and, taking his cue from Quintilian, he abolishes the *loci* and images and replaces them with the division and definition of one's subject-matter.[20]

In sum, there are three elements in the humanist reformulation of logic or dialectic. The first is the extension of the scope of dialectic to cover everything except actual delivery and grammar, thereby transforming what in antiquity was a theory of inference into a general theory of discourse. In Ramus, this general theory of discourse, guided by the all-encompassing 'method' that it

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[14] Cf. M. L. Colish, *The Stoic Tradition from Antiquity to the Early Middle Ages* (2 vols., Leiden, 1985), i: 56–60.

[15] Ong, *Ramus*, p. 197.

[16] On themes cf. M. Fumaroli, *L'Âge de l'éloquence* (Geneva, 1980) and C. Vasoli, *La dialettica e la retorica dell'umanesimo: Invenzione e metodo nella cultura del XV–XVI secolo* (Milan, 1968).

[17] The first (1543) version of the *Dialecticae institutiones* has explicitly Platonist elements, which are discarded from the second (1546) version onwards. On the development of Ramus' doctrines, cf. Ong, *Ramus*, chs. 8–12.

[18] *Arist. anim.* (1543), fos. 58 and 60. Cited in Ong, *Ramus*, p. 188.

[19] Cf. F. A. Yates, *The Art of Memory* (Harmondsworth, 1978).

[20] Cf. P. Rossi, *Clavis universalis* (Milan and Naples, 1960), 135 ff., esp. p. 140; also Yates, *The Art of Memory*, ch. 10. Division and definition are versions of the Platonic procedures of διαίρεσις and ὁρισμός.

employs, covers without distinction geometry, natural philosophy, poetry, military strategy, biography, and so on.[21] The second is the gradual destruction of the differentiations within logic, so that the distinctions between probabilistic and conclusive inference, inferences designed to convince opponents and those designed to convince pupils, inferences directed towards practical ends and those directed towards knowledge, all of these distinctions tend to become obliterated, and dialectic tends to be construed in terms of a single aim: teaching. Thirdly, the space traditionally occupied by inference now comes to be occupied by classificatory and mnemonic devices, as knowledge comes to be conceived in a thoroughly pedagogic fashion. Once we conceive of proof as a means of getting others to grasp what we already know, the move to conceiving of dialectic in purely pedagogic terms is a natural one. The point of the exercise is then to be able to reconstruct and find one's way around an already constituted body of knowledge, and for this one needs to be familiar with the structure (i.e. classification) of knowledge. Then, when we are faced with a new problem—in natural philosophy, geometry, public speaking, military strategy, metaphysics, or whatever—we can establish a connection between that problem and the storehouse of ancient wisdom which we have access to via the procedures of division and definition, which replace the cumbersome old mnemonic devices. Such procedures effectively take the place of syllogistic in that they lead us to knowledge. They are aids to knowledge and are in no way constitutive of knowledge, just as syllogistic was conceived in the Middle Ages and Renaissance as an aid to knowledge, albeit an unsuccessful one on the humanist view, and therefore to be replaced by something more efficient.

CONCEPTIONS OF COGNITIVE GRASP BEFORE DESCARTES

It is crucial that we understand this conception of logic as an aid to knowledge if we are to appreciate how the humanists could

[21] See Ong, *Ramus*, p. 30.

conceive of replacing the Aristotelian *organon* with classificatory and mnemonic schemes. The idea of the *organon* providing an aid to knowledge is not one peculiar to the humanists, and it is premissed on an assumption widely held in the Middle Ages and Renaissance: that reasoning is the exercise of one's faculties, and that logic and inference have to be understood in terms of the mode of operation of those faculties. The question turns on the traditional distinction between the incorporeal intellect, and powers such as imagination (*phantasia*), reason (*cogitatio*), and memory (*memoria*), which were associated with the functioning of specific localized corporeal organs. There were two issues in dispute here from late antiquity onwards: (1) whether these corporeal faculties exhausted the workings of the mind or whether there was also an incorporeal intellect, and (2), if there were such an intellect, what its relation to the corporeal faculties was. We can distinguish three broad categories of reply to these questions. The first is naturalism, which allows only an embodied intellect. The second we can call transcendentalism; it holds that there is a complete separation between the intellect and the corporeal faculties. The third attempts to compromise between these two, and the most coherent such attempt was Aquinas's doctrine of analogy.

The problem derives in large part from Aristotle. Both Plato and Aristotle had taken the problem of accounting for change as one of their central concerns, and each had formulated a response to the Parmenidean denial of the existence of, and intelligibility of, change. Plato had postulated a transcendent realm of unchanging Forms beyond the sensible realm of nature: accepting Parmenides' dictum that what changed was unknowable, he argued that the real objects of knowledge are Forms, of which the sensible world is merely an imperfect reflection. Aristotle, gradually rejecting his erstwhile Platonism, came to argue that forms do not constitute a realm separate from that of the sensible world, but rather underlie the sensible world: they inhere in matter rather than inhabiting a realm that transcends that of matter. But Aristotle offers different accounts of this doctrine at different places, and even his

terminology reflects two different conceptions. His discussion of change, for example, is sometimes couched in the vocabulary of the form (εἶδος), and sometimes in the vocabulary of 'actuality' (ἐνέργεια). In the former case, it is hard to avoid thinking of the forms as being somewhat like Plato's unchanging Forms: they are essentially principles of structure imposed on matter. In the latter case, however, we are presented with a much more organic conception of an essentially active internal principle directing what occurs in substances. Moreover, while Aristotle does occasionally consider the soul to be (at least in part) immortal and separable from the body, this view is at odds with his more usual conception of the soul in terms of a functional organizing principle of the body, and with his view that the soul is the form of the body, since he insists in a wide range of contexts that forms are always forms *of* something.

This latter conception was that stressed by Aristotle's successors in the Lyceum, but it was the Stoics who most thoroughly rid Aristotelianism of any dependence on transcendent forms. The Stoic doctrine of *pneuma* appears to have been largely taken over from Aristotle's account of how the *pneuma*, which is carried in the seminal fluid, transmits the soul (νοῦς) from parent to offspring (*GA* II, 736ᵃ 24 ff.).[22] This account is generalized by the Stoics to provide a thoroughly naturalistic account of the transmission of reason (λόγος), not just from one generation to the next, but from person to person, and between the person and the rest of the cosmos. On the Stoic account, a tension in the *pneuma* and its surrounding passive matter constitutes organic systems of increasing complexity. Man is one such system, and like the others he is a mixture of *pneuma* and passive matter. The *pneuma*, which is mixed with blood, circulates through an intricate internal system which has its centre in the directive faculty (ἡγεμονικόν) and terminates in the five senses and the speech and genital organs. There is input into the system through the sense organs and output through the speech organs and genitals, the former emit-

[22] See the commentary in D. M. Balme, *Aristotle's De partibus animalium I and De generatione animalium I* (Oxford, 1972), 156–65.

ting external discourse (λόγος) which reflects man's internal reasoning, the latter the 'seeds of reason' (λόγοι σπερματικόι) whereby one animal generates soul in another. The medical writers, with whom the notion of *pneuma* as a vital spirit linking organism and soul originated, also adopt a radically naturalistic perspective. The powers of imagination, reason, and memory were commonly thought to have their site in the cerebral ventricles, for example, and the physicians argued that damage to these could be associated with specific cognitive and psychological disorders.

Naturalism was to undergo a revival in the Renaissance, but the source was neither the Stoics nor even the medical tradition so much as Alexandrian Aristotelianism. Alexander of Aphrodisias' naturalistic interpretation of Aristotle had been dismissed as offering a crude biological reductionism by many medieval and Renaissance writers, but when the actual text of Alexander was made known in the 1480s such a view was no longer easy to sustain. The Alexandrian interpretation of Aristotle was taken up and developed by Pomponazzi in his *De immortalitate animae* of 1516. Pomponazzi argued there that each living human body has an individual soul, that this soul is the material form of the body, that it is generated by the parents and does not arise as a result of a special act of creation (as Aquinas had argued), and finally that it is not capable of existing without the body. Like Alexander, but contrary to the medical tradition, Pomponazzi is careful to argue that knowing does not take place in any localized part of the body, but rather in the body as a whole, since the intellect includes all the powers of the body. This account, he maintains, is consonant with Aristotle and natural reason, but he concedes, principally on theological grounds, that the soul must participate in immortality to some extent, although such an idea cannot be grasped in terms of natural reason.[23]

[23] On Pomponazzi's account see C. Trinkaus, *In Our Image and Likeness* (2 vols., London, 1970), vol. ii, ch. XI; also Randall's intro. to the translation of the *De immortalitate* in E. Cassirer, P. O. Kristeller, and J. H. Randall (eds.), *The Renaissance Philosophy of Man* (Chicago, 1948), 257–79. On the contrast between the Alexandrian and Averroist interpretations of Aristotle, see H. Skulsky, 'Paduan Epistemology and the Doctrine of One Mind', *Journal for the History of Philosophy*, 6 (1968), 341–61.

A diametrically opposed position can also be developed on the basis of a reading of Aristotle. Whereas Pomponazzi's naturalism denies the immortality of the soul because of the close association of the soul and the body, the transcendentalist position accepts the immortality of the soul by denying it any close association with the body. Aristotle maintains that part of the soul ($\psi\upsilon\chi\dot{\eta}$) does not perish (e.g. *Metaph. Λ*, 1070^a 21–6) and that what cannot perish cannot have been generated (e.g. *Cael.* II, 282^a 31), as well as stating explicitly that reason ($\nuο\hat{υ}s$) is eternal (*de An.* III, 430^a 17). This 'part of the soul' or 'reason' must be independent of particular bodies, which are subject to generation and corruption, and on the transcendentalist interpretation this is taken to imply that it is independent of any matter. Now Aristotle is explicit that whatever is independent of matter and not individuated by it can only be one in number (*Metaph. Λ*, 1075^a 5–10). This is how the Averroist doctrine of 'one mind' comes about. On the Averroist conception—which we find in Averroës and his Arab followers, in Siger of Brabant and others in the thirteenth and fourteenth centuries, and in Nifo in the sixteenth century—the human being is a composite of animal body, which is a mixture of the four elements, and 'cogitative soul'. The cogitative soul is the material form of the body and provides it with powers of sensation and imagination. It comes into being with the body and dies with it. But, it is argued, there must also be a soul which, in true Aristotelian fashion, understands things by taking on, or becoming, their forms. Such a soul cannot be the form of any particular body, Averroës maintained, and it is something which all men partake of in so far as they are engaged in knowing. In the cognitive process this rational soul or intellect combines with the individual person's cogitative soul to form the speculative or theoretical intellect, by which that person thinks and knows. The upshot of this account is that there is a single intellect in mankind, and this enjoys an impersonal immortality.

Despite its clearly Aristotelian origins, Randall has pointed to a strongly Platonic element in this approach, namely the view that a mind that can grasp eternal and unchanging truths must itself be

eternal and unchanging, and not bound by the limits of any particular body.[24] This intellect comes to be seen as the intellect of the human species in the development of Averroism in the later Middle Ages and Renaissance, and this is what lies behind the view that, if truth is to be kept alive and accessible, it must be kept alive in individual minds, and that this is what the teacher passes on to the pupil. Here, of course, we have a characteristically humanist theme, and Averroism gradually comes to take on a number of humanist overtones, for instance the view that knowledge is not a fragmentary individual possession but something both essentially collective and transmitted from antiquity.

The Averroist account was subjected to a number of criticisms from the thirteenth century onwards. The most cogent of these originate with Aquinas who, in his *De unitate intellectus, contra Averroistas*,[25] staunchly opposes the idea of the indivisibility of the intellect and its independence from the body. An indivisible intellect, he argues, would have the absurd consequence of making Socrates and Plato the one person, whereas a completely independent intellect is intuitively implausible since it would mean that the soul and the body would be no more intimately connected than oxen and a cart, and there would in effect be two people (one corresponding to the cogitative soul and the other to the rational soul or intellect) in every individual.

Whereas the Alexandrian naturalists had integrated the soul or intellect and the body, they had done so at the price of denying (or at least failing to account for) the immortality of the soul. And whereas the Averroist transcendentalists had guaranteed the immortality of the soul, this was at the price of denying personal immortality. Aquinas wanted to secure the Christian doctrine of personal immortality, and this required him to give a new account of the relation between the intellect and the cognitive powers of the corporeal faculties. His solution is to argue that the material on

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[24] Cf. Randall, intro. to *De immortalitate*, in Cassirer, Kristeller, and Randall, *Renaissance Philosophy of Man*, pp. 262 ff., to which my account in this paragraph is indebted.
[25] See Thomas Aquinas, *On the Unity of the Intellect Against the Averroists*, ed. and trans. B. H. Zedler (Milwaukee, 1968). The editor's intro. provides a good summary of the issues.

which the intellect works must derive from our corporeal faculties: the body, via the senses, provides the *phantasiai* which are the basis of all knowledge. But Aquinas draws a sharp distinction between the kinds of cognitive grasp afforded us by the intellect or understanding (*intellectus*), and the reasoning (*ratio*) which is the cognitive activity of our corporeal faculties. The *intellectus/ratio* dichotomy is a complex one in Aquinas, but the general thrust of the distinction is to mark out a form of direct intuitive grasp of truth from a limited, piecemeal, and often unreliable form of cognitive activity, which is the only route we have to understanding, but which is far from being an infallible route to such understanding. Moreover, and this is an even more important point, when it does lead to understanding, *ratio* annihilates itself: it has served its purpose and disappears in favour of true knowledge, which is conceived on an intuitive basis.[26] So the central contrast is between direct intuition on the one hand, and the ratiocinative processes of imagining, remembering, and inferring on the other.

On the face of it, the notion of *intellectus* here seems somewhat like Aristotle's *νοῦς*, which is also a cognitive grasp somehow qualitatively different from the actual procedure which enables us to come by that grasp. But there is a crucial difference. For Aristotle, the knowledge which constitutes *νοῦς*, is not independent of the procedure that yields it. In the case of explicitly syllogistic knowledge, for example, there may be many syllogisms which yield a proposition, and many that yield it in a formally valid way, but only one will yield it in such a way that the attribute is shown to inhere in the subject universally and necessarily, and unless we can construct that syllogism we will not have true understanding. There can be little doubt that Aquinas wishes to adopt an Aristotelian solution to the problem, but the constraints he is operating under render this impossible. These constraints are, on the one hand, the belief in the existence of pure spirits— God and the angels—who know and understand, but who have no

²⁶ The standard account of this question remains J. Peghaire, *Intellectus et ratio selon S. Thomas d'Aquin* (Paris and Ottawa, 1936).

corporeal faculties. On the other hand, the medical tradition from Galen onwards had shown that damage to the brain and nervous system affected the workings of reason, so it was known that our reasoning was in some way connected with the functioning of the cerebral organs. One could yield to one or the other of these constraints, either by maintaining that knowledge and reason were purely functions of the cerebral organs, so that knowledge for us and knowledge for God, who knows without recourse to a corporeal organ, would be quite different; or one could separate our intellect and our corporeal organs as much as possible, holding, on neo-Platonist grounds for example, that true understanding transcended anything we could achieve merely on the basis of the exercise of corporeal faculties. The first of these is clearly heir to the tradition of the *via negativa*, and the second to the tradition of *via affirmativa*. Aquinas offers a third option, still within the tradition of the latter, but which attempts to capture the idea that while we cannot attain to knowledge without the use of our corporeal faculties the successful exercise of those faculties yields something which is not wholly different from the understanding available to pure spirit, and the connection between the two is captured not in terms of identity but in terms of analogy.

I shall return to this aspect of Aquinas's account below. For the moment what I want to stress is that all responses to the question, except Alexandrian naturalism, locate the cognitive processes in a corporeal organ, and understand the exercise of cognition in terms of the functioning of that organ. This view had considerable precedents in antiquity: going beyond Galen, Poseidonius of Byzantium, as a result of research into brain injuries, had not only associated reasoning with corporeal organs but had actually located reason inside the middle ventricle, and Nemesius, an influential Christian Platonist working at the beginning of the fifth century, had placed perception in the anterior ventricles, reason in the middle, and memory in the posterior ventricle. Even Augustine had accepted a ventricular account, suggesting that the posterior ventricle was the seat of motion, while memory resided

in the middle ventricle.[27] Neither Thomists nor Averroists seem to have had any doubts about the ventricular theory, and only the Alexandrian naturalists, who (unlike some of the medical writers) were aware of the danger of biological reductionism if they tried to provide the intellect with a specific location, denied the theory. The vast majority of thinkers, who separated the intellect from basic reasoning and cognitive processes, had no qualms about offering a ventricular theory of the latter.

This had an important impact on how inferential reasoning was construed. It leads to such reasoning being explicitly conceived in terms of the exercise of a corporeal faculty, a conception that ties logic and inference closely to one's understanding of a psychological process. Nowhere is this more evident than in the logic textbooks of late scholasticism.[28] The most authoritative textbooks in the late scholastic tradition were those of Franciscus Toletus (*Introductio in dialecticam Aristotelis*, 1561) and Petrus Fonseca (*Institutionum dialecticarum libri octo*, 1564), both of which were reprinted many times up until the mid-seventeenth century. They were standard texts in Jesuit schools and the former was almost certainly amongst the textbooks from which Descartes learned his logic at La Flèche.[29] More sophisticated than the Ramist textbooks and less concerned with reducing logic to pedagogic devices, they offered a version of Aristotelian/Thomist logic which construed its subject matter as a practical enterprise based on Aristotelian/ Thomist psychology. Logic on this conception is an explicitly

[27] Good summaries of these developments are provided in W. Pagel, 'Medieval and Renaissance Contributions to the Knowledge of the Brain and its Functions', in F. N. L. Poynter (ed.), *The History and Philosophy of Knowledge of the Brain and its Functions* (Oxford, 1958), 95–114, and in E. R. Harvey, *The Inward Wits* (London, 1975). For more detailed accounts see J. Pigeaud, *La Maladie de l'âme* (Paris, 1981), and G. Verbeke, *L'Évolution de la doctrine de pneuma du Stoïcisme à S. Augustin* (Paris and Louvain, 1945).

[28] Cf. W. Risse, *Die Logik der Neuzeit*; and esp. his 'Zur Vorgeshichte der cartesischen Methodenlehre', *Archiv für Geschichte der Philosophie*, 45 (1963), 269–91. My summary in the following paragraph is based largely on pp. 284–9 of this paper. See also ch. 1 of E. J. Ashworth, *Language and Logic in the Post-Medieval Period* (Dordrecht, 1974). On the texts, W. Risse, *Bibliographia logica: Verzeichnis der Druckschriften zur Logik mit Angabe ihre Fundorte*, i: *1472–1800* (Hildesheim, 1965) is invaluable.

[29] See E. Gilson's discussion of the authors whom Descartes would have studied at La Flèche, in his *La Liberté chez Descartes et la théologie* (Paris, 1913), 5–33.

normative theory of thought, a theory of the regulation of the functions of cognition. Toletus and Fonseca were not the only commentators to treat logic in these terms, but they were easily the most influential, and through the efforts of Fonseca's followers at Coimbra, who developed a full-scale treatment of logic as a practical theory concerned with guiding acts of the understanding, the approach had become one with a wide circulation by the end of the sixteenth century. A few examples will suffice to give the flavour of this development. Suarez (*Disputationes metaphysicae*, 1597) distinguishes metaphysics, which deals with being as such, and logic, which directs acts of the understanding, and is therefore concerned with the process of knowing and not with what is known. Josephus Blanch (*Commentarii in universam Aristotelis logicam*, 1612) considers this process as a real psychological thought process, and Antonius Casilius (*Introductio in Aristotelis logicam*, 1629) presents it as an *actio vitalis*, thereby effectively tying logic to medical theory. Chrysostomus Cabero (*Brevis summularum recapitulatio*, 1623) poses the question of inference in terms of whether logic exercises a natural constraint or norm which is morally binding on thought. Finally, Raphael Aversa (*Logica*, 1623) takes a step which is latent in this whole development and, construing logic in a way suggestive of medical conceptions of the healthy functioning of the body, maintains that logic is that ability which remedies the natural weaknesses of reasoning by establishing rules for coming by knowledge.

Here we have, in general terms, the immediate context in which Descartes's conception of inference must be placed. This context is not that of ancient syllogistic, or medieval logic, which had come to an end by the 1530s at the very latest,[30] but rather one shaped by Ramism and late scholastic psychologism.

[30] Cf. E. J. Ashworth, 'The Eclipse of Medieval Logic', in N. Kretzman, A. Kenny, and J. Pinborg (eds.), *The Cambridge History of Later Medieval Philosophy* (Cambridge, 1982), 787–96.

THE NATURAL LIGHT OF REASON

The framework for Descartes's conception of inference, shaped as it is by Ramism and late scholasticism, has a number of significant features. On the one hand, there are two conceptions which the Ramists and the late scholastics held in common. They conceive of inference as an aid to knowledge, that is, it is not constitutive of knowledge in any sense. Secondly, inference is conceived as a function of corporeal faculties, on a par with memory and imagination. On the other hand, there are specific claims that distinguish the two schools. The Ramists maintained that rules of inference were to be replaced by or reduced to classificatory techniques. The late scholastics argued that inference is a psychological process to be distinguished from understanding, which is dependent upon that psychological process but is something over and above it. Bearing in mind this quite specific context, Descartes's own views can be summarized in three points. First, scientific knowledge is arrived at by 'intuition' and 'deduction', and there is no need for syllogistic or rules of inference. Second, these operations require no explication since they are simple and primitive. Third, the pure light of reason is in any case only obscured by attempting to supplement it in any way. Let us look at these in turn.

Descartes claims that his method explains how scientific knowledge is arrived at by 'intuition' and 'deduction'. This method was as much as anything else an alternative to Ramism, although the opposition was not made explicit by Descartes: it was left to Arnauld's *Port-Royal Logic* to do this.[31] Ramus, as we have seen, construed method in pedagogic terms and, having defined dialectic in the traditional way as 'the art of disputing well', divorced the method regulating dialectic from empirical considerations, tying it instead to classification and memory. Descartes, on the other hand, wants method to serve as a logic of discovery, and he wants it to be empirical. Ramus' method refers all questions back to an already

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[31] On this whole question see Howell, *Logic and Rhetoric in England*.

existing storehouse of knowledge, whereas Descartes is reluctant to accord the contents of this storehouse the title of knowledge at all. Descartes's concern, then, is to develop a method which will enable us to come by new and genuine knowledge. This method is not unlike the Aristotelian topics in one respect, in that it purports to provide us with a procedure for formulating questions relevant to the enquiry at hand. Moreover, Descartes is not as hostile to experimentation and induction as his more programmatic statements might suggest, and these can be incorporated into the method. Descartes's conception of method is, however, far too abstract to provide us with any secure guidance at this level. All that it tells us is that the route to be followed is that of 'intuition' and 'deduction'. As regards the latter, it might appear that Descartes is inconsistent in maintaining on the one hand that deduction is part of the process of attaining scientific knowledge, and on the other that we require no rules of inference. But Descartes does think of deduction as being something that requires no regulation. In Rule 2 of the *Regulae* we are told that mistakes in reasoning are never due to faulty inference, the implication being that the latter is just not possible, and in the *Replies to the Second Set of Objections to the Meditations* it is maintained that 'the proper deduction of consequences . . . may be performed by anyone, even the inattentive, provided they remember what has gone before'. (AT vii. 157.) Descartes uses the Latin terms *deducere* and *demonstrare* and their French equivalents *déduire* and *démontrer* with abandon, and they may mean explanation, proof, induction, or justification, depending on the context.[32] The shared core of meaning here is no more specific than the comparison of one item with another, or the relating of one item to another. That this is indeed the intended core of Descartes's conception is made clear in Rule 14 of the *Regulae*:

In every train of reasoning it is merely by comparison that we attain to a precise knowledge of the truth. Here is an example: all *A* is *B*, all *B* is *C*,

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[32] For details see D. M. Clarke, *Descartes' Philosophy of Science* (Manchester, 1982), 63–74 and 207–10.

therefore all A is C. Here we compare with one another what we are searching for and what we are given, viz. A and C, in respect of the fact that each is B, and so on. But, as we have pointed out on a number of occasions, because the forms of the syllogism are of no aid in perceiving the truth about things, it will be better for the reader to reject them altogether and to conceive that all knowledge whatsoever, other than that which consists in the simple and pure intuition of single independent objects, is a matter of the comparison of two things or more with each other. In fact practically the whole task set the human reason consists in preparing for this operation; for when it is open and simple, we need no aid from art, but are bound to rely upon the light of nature alone, in beholding the truth which comparison gives us. (AT x. 439–40.)

The difference between intuition and deduction lies in the fact that whereas the latter consists in grasping the relations between a number of propositions, intuition (*intuitus*) consists in grasping one proposition or in grasping a necessary connection between two propositions, and it is equated with clear and distinct perception. As Descartes describes it in Rule 3 of the *Regulae*:

By *intuitus* I understand not fluctuating reliance on the senses, nor the misleading judgement of an imagination which puts things together in the wrong way, but the apprehension which the mind, pure and attentive, gives us so easily and so distinctly that we are thereby freed from all doubt as to what it is that we are apprehending. (AT x. 368.)[33]

In the limiting case, as we have seen, deduction reduces to intuition: we run through the deduction so quickly that we no longer have to rely on memory, with the result that we 'have the whole in intuition' before us at a single time. So in the limiting case, knowledge consists not in intuition and deduction as such, but simply in intuition.

Notice, however, that as well as consisting in a grasp of a necessary connection between two limiting terms, which is what deduction reduces to, intuition can also consist in a grasp of a single proposition. On the face of it, it might seem that the first alone is relevant to Descartes's conception of inference. But the

[33] See D. M. Clarke, *Descartes' Philosophy of Science* (Manchester, 1982), pp. 58–63 for an invaluable discussion of *intuitus*.

second is if anything even more revealing for, given the way in which Descartes presents the distinction between intuition and deduction, the obvious model is a geometrical one, in which we grasp certain axioms, and so on, and deduce from these geometrical theorems. One problem with axiomatic systems—whether in geometry, logic, or any other formalized domain—is that one might be misled into thinking that axioms are indispensable, serving a special role for which rules of inference alone would be inappropriate. Since Gentzen, we know this to be false, and the various forms of 'natural deduction' and other axiomless systems have distinct advantages over axiomatic systems.[34] Descartes saw matters very differently. It is not just a case of axioms being necessary; Descartes clearly thinks that for something to be an axiom it must have special intrinsic properties, such as self-evidence and indubitability, which enable it to play the role it does. Propositions meeting these requirements are grasped by intuition, not deduction, and form the basis for any subsequent deduction. Although *intuitus* disappears from Descartes's vocabulary in his later writings, this general conception does not, and indeed its crowning achievement is the *cogito*. The *cogito* is effectively an intuition of a basic premiss which, because of its indubitability and self-evidence, can be grasped independently of anything else, including rules of inference. It forms the starting-point for knowledge and the paradigm for knowledge in that, while it is a grasp of a single proposition, to get to other propositions one grasps necessary connections between this and the others, remembering that, in the limiting case, this grasp should itself take the form of an intuition.

In construing deduction in terms of intuition rather than rules of inference, one thing that Descartes is doing is ruling out any attempt at analysing inferential steps: in the limiting case, there are no such steps. Inference cannot be analysed on Descartes's view because it is simple and primitive. He gives us no details of what

[34] See W. Kneale, 'The Province of Logic', in H. D. Lewis (ed.), *Contemporary British Philosophy, Third Series* (London, 1956), 235–62, and I. Hacking, 'What is Logic?', *Journal of Philosophy*, 76 (1979), 285–319.

he has in mind here, but he makes the same kind of claim about truth in a letter to Mersenne of 16 October 1639, and here he does spell out what he means. Discussing Herbert of Cherbury's *De veritate*, which replies to scepticism by providing a general account of truth, on the grounds that if we understand what truth is we will be able to show that scepticism rests upon a misunderstanding of truth, Descartes writes:

In general [the author] takes a very different path in this book from the one I have followed. He examines what truth is; I have never had any doubts about this, because it seems a notion so transcendentally clear that nobody can be ignorant of it. There are many ways of examining a balance before using it, but there is no way to learn what truth is, if one does not know its nature. For what reason could we have for accepting anything which could teach us the nature of truth if we did not know that it was true, that is to say, if we did not know truth? Of course it is possible to tell the meaning of the word to someone who did not know the language, and tell him that the word *truth*, in its strict sense, denotes the conformity of thought with its object, and that when it is attributed to things outside thought, it means only that they can be the objects of true thoughts, whether in our minds or in God's. But we can give no definition of logic which will help anyone to discover its nature. And I believe the same holds of many other things which are very simple and known naturally, such as shape, size, movement, place, time and so on. For if you try to define these things you only obscure them and cause confusion ... The author takes universal consent as the criterion of his truths; whereas I have no criterion for mine except the light of nature. (AT ii. 596–7.)

That is to say, while we can define truth, such a definition could not be explanatory, for nothing can be clearer than truth: we can explain what the word means in the sense of explaining that this is the word that we use of a certain phenomenon, but not in the sense of giving an account of that phenomenon in other terms which are better understood. The argument requires careful wording however. Descartes is not making the specious claim that if the *analysans* is to capture all and only what is meant by the *analysandum* then the *analysandum* must tell us the same thing as

the *analysans*, in which case we have learned nothing. Rather, the reasoning behind the claim is that unless we had a prior understanding of truth, we could not understand a definition of it, for we would have to be able to grasp that the definition itself was true if we were to understand it. Unless we had already grasped the difference between truth and falsity, it would be wholly obscure what role definitions could play. If one takes Descartes's own example, the conformity of a thought with its object, whether one construes that object as being an intentional object or whether, as with the correspondence theory of truth, one takes it as a real object (or state of affairs), then Descartes is surely right. To say that truth consists in such a relation is to say that it is true that it consists in that relation. This is not the way to enlightenment about what truth consists in.

Nevertheless, to say that truth is primitive and simple is not to say that we have a primitive and simple way of determining, for any sentence, whether it is true. This is where the problem in the closely related case of inference arises. The parallel between inference and truth is not one of analogy. If it were, then Descartes could simply deny that one can define inference in terms which are better understood. But he does not do this. Quite the contrary, he effectively provides just such a definition in maintaining that, in the limiting case, inference comes down to the intuitive grasp of a necessary connection between premiss and conclusion. What Descartes denies is that this grasp can be justified, on the grounds that anything which would justify it would have to presuppose it. It is here that we have the parallel with truth, and in fact it turns out to be more than merely a parallel, for our intuitive and instantaneous grasp of inferential connection is an intuitive and instantaneous grasp of a truth. But how do we know that what we grasp is in fact a truth? To say that the 'light of nature' or 'light of reason' must be our guide is unhelpful without some specification of how this 'light' works. Does it enable us to recognize some intrinsic quality possessed only by truths, or perhaps to partition propositions on the basis of some other criterion?

The extent to which Descartes's account here is psychologistic

is open to question. He is certainly not maintaining that logical relations are to be construed ultimately as psychological relations, as the late scholastics occasionally did. He is completely opposed to that kind of psychologism. The whole thrust of his argument is to deny that truth and inference can be explained in reductive terms, whether psychological, medical, physiological, or whatever. But there is still a grey area. Consider his remark in a letter to Regius (24 May 1640) that 'our mind is of such a nature that it cannot help assenting to what it conceives clearly' (AT iii. 64). What our mind conceives clearly and distinctly is what it conceives by the light of nature or the light of reason. There can be no doubt that one thing that is being claimed here is that, when the mind conceives something clearly and distinctly, it has compelling and incontrovertible evidence for the truth of what it conceives. But what is he claiming over and above this? He is certainly not maintaining that my conceiving something clearly and distinctly makes it true. What I conceive must already be true, in that we cannot grasp truth in terms other than clarity and distinctness. Clarity and distinctness are constitutive, for us, of what truth consists in. This makes Descartes's account of truth epistemic, but it does not make it psychologistic. The suggestion of psychologism in Descartes's account comes from the fact that when we grasp something clearly and distinctly, it is our grasp that is clear and distinct, not what is grasped. 'I can establish as a general rule', he tells us in *Meditation III*, 'that all things which I perceive very clearly and distinctly are true' (AT vii. 35). In other words, the grasp of a truth is manifested in some sort of psychological clarity experienced by the knowing subject. The question is whether one wants to call this 'psychologism': it is not psychologism in the sense in which many eighteenth- and especially nineteenth-century writers on logic and mathematics were psychologistic. But whatever one calls it, it is a difficult and problematic conception.

The problems come to the fore when we consider another aspect of Descartes's account. As I have indicated, Descartes rejects any attempt to elucidate truth, holding it to be primitive and incapable of further elucidation. This approach rules out any attempt to

provide a reductive account of truth, such as that offered by psychologism, but it also rules out any non-reductive attempt to elucidate the nature of truth. This is going too far. There are many questions that we can ask about truth with a view to elucidation which do not involve our falling into circularity or reductionism at all. We can ask whether there are any expressions extensionally equivalent to '. . . is true' and what these have in common with that expression, we can ask what truth consists in, or what it is that distinguishes true sentences from false sentences, or what we recognize as tests for truth, or what the connection between truth and other semantic notions is, or whether something can be neither true nor false, and so on. Truth must be taken as primitive in some contexts, but not in all, and this much can surely be accepted with accepting reductionism. Descartes's account blocks off further elucidation because it establishes the primitiveness of truth in too strong a way. Consequently, when we are asked to justify something fundamental, such as an inferential principle, we are forced back ultimately on to a form of psychological clarity experienced by the knowing subject.

The point can be brought out in a rather striking way by comparing Descartes and Aristotle. It is interesting to note just how wide the gulf is between Descartes's solution to the problem and the paradigmatic discursive justification of an inferential principle: Aristotle's justification of the law of non-contradiction. In *Metaphysics* Γ4, Aristotle points out that proofs must come to an end somewhere, otherwise we could be involved in an infinite regress. Hence there must be something that we can rely upon without proof, and he takes as his example the law of non-contradiction.[35] The law is justified by showing that an opponent who denies it must, in denying it, actually assume its truth, and by showing that arguments which apparently tell against it—for example the Protagorean relativist arguments which deduce from the fact that a thing may seem sweet to one person and bitter to another that it is both sweet and bitter (i.e. both sweet and not

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[35] See the discussion in ch. 6 of J. Lear, *Aristotle and Logical Theory* (Cambridge, 1980).

sweet)—cannot be sustained. It is here that the discursive concep-
tion of inference shows its mettle, and Descartes can offer nothing
analogous. It is something ambiguously psychological—the 'light
of reason' or the 'light of nature'—that stops the regress in
Descartes's conception.

There is another aspect of Descartes's argument, however. In
rejecting the idea that inference is to be guided by rules, what he is
concerned with is the rules of reasoning offered by Ramus' method
and the Jesuit 'directions for thinking' (*directio ingenii*). His
argument is that we cannot be taught what an inference is: we
cannot be taught to reason. Descartes, of course, offers his own
'rules for the direction of the mind' and 'discourse on the method
of rightly conducting reason', but these presuppose not only that
one can reason but that one never in fact makes mistakes of
inference, as we have seen, and hence tend to be negative, often
consisting of little more than trivial hints about how to avoid
various errors due to inattentiveness, unnecessary complexity, and
so on. Unlike the Ramist and Jesuit theories, they are not designed
to instruct one how to think. This is evident, for example, from his
remarks in the *Search after Truth by the Light of Nature*, written in
the 1640s:

I cannot prevent myself from stopping you here, ... [to] make you
consider what common sense can do if it is well directed. In fact, is there
anything in what you have said which is not exact, which is not
legitimately argued and deduced? And yet all the consequences are drawn
without logic or a formula for the argument, thanks to the simple light of
reason and good sense which is less subject to error when it acts alone and
by itself than when it anxiously tries to follow a thousand diverse rules
which human art and idleness have discovered, less to perfect it than to
corrupt it. (AT x. 521.)[36]

In rejecting 'rules of inference' Descartes is not concerned with
logical laws as such, but with rules which purport to teach one how
to think properly. The broad way in which dialectic had been

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[36] Cf. also Descartes to Mersenne, 27 Feb. 1637 (AT i. 349), where Descartes insists that
the aim of the *Discourse on Method* is not to teach method but to describe it.

conceived in the Renaissance led to a conflation of these two. In
the 'Conversation with Burman', Descartes says that his criticisms
of logic (in the *Discourse on Method*) are really criticisms of
dialectic, rather than criticisms of logic proper:

This really applies to Dialectic, which teaches us how to hold forth on all
subjects, rather than to Logic, which provides demonstrative proofs on
all subjects. In this way it undermines good sense, rather than building
on it. For in diverting our attention and making us digress into the stock
arguments and headings, which are irrelevant to the thing under
discussion, it diverts us from the actual nature of the thing itself. (AT v.
175.)

While this explicit distinction is an afterthought on Descartes's
part, the implicit distinction is there in the earlier writings. It is an
important distinction, and if we adhere to it we can separate out
with greater precision the issues to which Descartes's criticisms
are directed.

We can distinguish between the question of the justification of
basic logical principles and the justification of particular infer-
ences, and we can break this last question down into two further
ones: what inferences do we count as canonical, and what is the
relation of other inferences to these? In putting the question in this
way, a direct comparison with Aristotle is possible. In the *Prior
Analytics*, Aristotle classified syllogisms into three figures, and the
following can serve as examples of the general forms:

Barbara (Figure 1)	*Cesare* (Figure 2)	*Darapti* (Figure 3)
A holds of all B	N holds of no Ξ	Σ holds of all P
B holds of all Γ	N holds of all M	Π holds of all P
A holds of all Γ	Ξ holds of no M	Σ holds of some Π

Aristotle maintains that first-figure syllogisms are perfect or
complete (τέλειος), whereas those of the second and third figures
are not, and he provides techniques for converting the latter into
the former. Second- and third-figure syllogisms can be formally
valid, yet Aristotle is not completely satisfied unless they can be
converted into a canonical first-figure form. The reason for this, as

Patzig has argued in detail, is that there is an obvious transitivity of connections in the first-figure syllogism which is lacking in the others.[37] We can, as it were, see at a glance that the syllogism is valid. Is this very different from Descartes's procedure? Descartes tells us that in the case of lengthy inferences we must go through the inferential steps more and more quickly so that in the end we grasp the premisses and conclusion in one instantaneous step. In doing this we assimilate inference to the canonical case of *intuitus*. There are differences, of course. Descartes is not concerned with inferences which are problematic for reasons other than their length, whereas for Aristotle the number of steps in an inference is not a logical problem. A much more important difference, however, lies in the criteria by which canonical forms are singled out. Aristotle's aim is to find an argument-form which proves irresistible to an opponent, and this parallels his account of the justification of basic principles, which as we have seen is conceived on similarly discursive lines. Descartes's criterion is provided in both cases by some form of psychological clarity experienced by the knowing subject. But there is some common ground of problems between Aristotle and Descartes, despite the fact that these problems are posed in a discursive context in the one case and in a 'psychological' one in the other. This 'psychological context' requires further classification before we can assess it fully, but two points can be made which may go some way to dispelling the idea that the resort to posing questions of inference in such a context is totally damning.

First, there is the question of the respective merits of the facultative and discursive models where questions of the logic of discovery are concerned. Questions of discovery are intimately tied to general questions of inference in the seventeenth century, and Aristotelian syllogistic was rejected largely because it was expected to, and failed to, provide a logic of discovery. This expectation was mistaken—if the seventeenth-century natural philosophers were

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[37] Cf. G. Patzig, *Die aristotelische Syllogistik* (Göttingen, 1963), *passim*. I have ignored many details, such as the fact that some non-categorical first-figure syllogisms are not 'perfect', because these have no bearing on our present concerns.

looking for a method of discovery in Aristotle they should have turned their attention not to syllogistic but to the topics—but mistaken or not it spelled the end of syllogistic. Now in the context of deductive inference, the choice is basically that between convincing oneself, on the facultative model, and convincing others, on the discursive model. There is no clear advantage for one side or the other here. But in the context of discovery, there is an immense advantage for the facultative conception. The discursive conception requires common ground between oneself and one's opponents, and in seventeenth-century natural philosophy that would not have been at all forthcoming. In other words, the case against conceiving of inference in a discursive way links up strongly with the case against appealing in one's enquiries to what is generally accepted rather than to what is the case. It is, of course, from this that the immense polemical strength of Descartes's attack on syllogistic derives.

Second, Descartes managed to pose questions central to the nature of inference which are literally inconceivable in Ramist thought, with its inability to give any account of relations between propositions not germane to pedagogical classification, and in late scholastic thought, where a psychological reduction robs inference of any specifically logical features. Of central importance here is the issue of logic, and inference generally, as an 'aid to knowledge'. Both the Ramists and the late scholastics, as I have indicated, are committed to a conception of logic/dialectic as an aid to knowledge, that is, as something not constitutive of knowledge in its own right. By making inference in the limiting case a form of intuition, which for him is knowledge *par excellence*, Descartes takes the ground from under this conception. The result is that he can raise questions of inference in a rudimentary but recognizably logico-philosophical context. The difference between Descartes and his contemporaries is that, for Descartes, inference is not something that our corporeal organs engage in so that the information provided thereby can be passed on to the incorporeal intellect, which unfortunately cannot get its information in any other way. Rather, this is what our intellect, when it is acting

through an *intuitus*, *tells* us is knowledge. Descartes is able to effect this radical rethinking of inference because of his doctrine of eternal truths, to which we now turn.

ETERNAL TRUTHS: A HUMAN MODEL FOR COGNITION

At a first glance, the doctrine of eternal truths appears to threaten, rather than complement, the doctrine of intuition. It commits one to the view, for example, that there is, at least at one level, no real distinction to be made between necessary and contingent truths for, even though Descartes is not claiming that we could actually conceive of a world in which necessary truths are false, the fact is that no truths are necessary as far as God is concerned, and the effective upshot of this is that, for God, all truths are contingent. And since, after all, it is God who provides us with our truths in the first place on Descartes's view, this is somewhat disconcerting. Moreover, if God is free to change all truths at will, then even those truths which we grasp in an *intuitus* are called into question. On the face of it, the doctrine of eternal truths has the potential to bring down Descartes's whole conception of knowledge, and *a fortiori* of inference. If we are to throw light on the bearing of this doctrine on the issue of inference, there are two questions that we must answer. First, what motivates Descartes to adopt a doctrine so counterintuitive that not one of his predecessors, contemporaries, or successors was even tempted by it? Secondly, to what extent is our grasp of truths, whether inferential or not, affected by the fact that the cognitive faculties that enable us to exercise that grasp do not allow us to comprehend those truths in a way which could register any understanding of their creator's comprehension of them?

Marion has recently shown in detail that Descartes's doctrine of eternal truths is a reaction to two currents of thought about the relation between our knowledge and God's knowledge.[38] The

[3?] J.-L. Marion, *Sur la théologie blanche de Descartes* (Paris, 1981). The two currents are discussed on pp. 27–159 and pp. 161–227 respectively.

principal figure in the first current, which is that of scholastic philosophy, is Suarez, and the evidence indicates that much of Descartes's account is specifically directed against Suarez.[39] Suarez's account is a revision of Aquinas's doctrine. Aquinas had developed the standard scholastic compromise on the question of whether attribution of properties to God and creation was univocal or equivocal. Starting from a theologically motivated assumption of equivocality, he develops an account in which this equivocality is bridged by conceiving of the relation between creation and God analogically. Underlying this analogical conception is the doctrine of exemplarism, according to which divine ideas are exemplars or patterns, on the models of which God created the world, but such exemplars are imperfectly exemplified in creation. Marion shows how the ontological basis of exemplarism subsequently comes to be replaced by an epistemological emphasis, so that eternal truths, for example, are no longer construed as exemplars proper, patterns on which creation is modelled, but rather as objects to be known by both God and us. In this way exemplarism becomes transformed into the problem of whether our ideas can represent these eternal truths, and in this changed context a new problem comes to the fore, which undermines the basis for the Thomist doctrine of analogy. It is Duns Scotus who points out that, in so far as we are concerned in metaphysics with the question of being-*qua*-being, analogy is not enough: we must have a single unitary conception of being that is logically prior to the distinctions between (and any analogies between) created and uncreated being, and finite and infinite being. Suarez, on the basis of this type of argument, takes univocity as his starting-point and deploys analogy in a restricted range. In particular, he is happy to allow that there are general constraints on representing objects to any intellect, whether human or divine. While a full comparison with Aquinas is not possible here, because of the shift of context from an ontological concern with exemplarism to an epistemological concern with representation, there is one central overwhelming difference

[39] See ibid. pp. 27–8.

between Aquinas and Suarez which, for our limited purposes, can be abstracted from context, and this is that whereas Aquinas conceives of our knowledge of eternal truths and God's knowledge of these truths on the basis of analogy, Suarez conceives of them on the basis of univocity. And Descartes conceives of them on the basis of equivocality. In fact his doctrine is advocated as a response to the problematic and unstable nature of Suarez's compromise. Although eternal truths are understood univocally and hence are the same for God as they are for us, Suarez tells us explicitly that we can have no insight into how God knows them to be true. This is what Descartes specifically objects to. Here his position is indeed the exact contrary of Leibniz, in the sense that Descartes and Leibniz can be seen as taking up different horns of Suarez's dilemma. Descartes's understanding of eternal truths as equivocal turns on his accepting that we cannot have any insight into how God knows them to be true, so we cannot then say that such truths are the same for God as they are for us. Leibniz's position can be understood as the exact opposite of this, as an advocation of univocity on the basis that he takes as given that eternal truths must be the same for us and for God, and hence we must have some insight into how God knows them to be true: and we do have such insight, in that we can say that God knows them to be true because he knows their proofs. The second current of thought that Descartes is reacting against is really the precursor of this Leibnizian view. This second current is the nascent tradition of mathematical physics, and Kepler, Mersenne, and Galileo all take the view that our grasp of mathematical truths is no different from that of God.

It would take us too far from our topic to attempt to follow through the theological, metaphysical, and other considerations underlying all these different accounts. The crucial point is that the context in which Descartes's account is formulated is in the first instance not mathematical or logical but theological: it is a response to a clearly unstable conception of eternal truths, a conception which pulls us in two opposing directions, complete univocity and complete equivocality.[40]

[40] Marion (ibid. pp. 455–6), perhaps inspired by Gilson in this respect, argues that the

There is an epistemological side to the question, however, which turns on Descartes's conception of what truth consists in and how we recognize it. Descartes maintains, in the letter to Regius cited above, that 'our mind is of such a nature that it cannot refuse to assent to what it conceives clearly'. What the mind cannot refuse to assent to here is the truth of what it so conceives. Consequently, Descartes's claim is:

A: If *p* is conceived by me clearly and distinctly, I cannot refuse to assent to the truth of *p*.

Now if I cannot refuse to assent to the truth of *p*, this is presumably because I am justified in assenting to the truth of *p*, and surely I am only justified in assenting to the truth of *p* in the case where *p* is true. Fleshing *A* out in this way we arrive at:

B: If *p* is conceived by me clearly and distinctly, *p* is true.

In the *Reply to the Second Set of Objections*, however, Descartes makes a claim that appears to be a direct contradiction of *B*. He writes:

For what difference would it make to us if someone pretended that this truth, of which we are so strongly persuaded, appears false to God or to the angels, and hence is, in absolute terms, false? Why should we concern ourselves with this absolute falsity, when we neither believe it nor have the least suspicion of it? For we are supposing a belief or conviction so strong that nothing can remove it, and this conviction is in every respect the same as absolute certainty. (AT vii. 145/ix₁. 113–14.)

In short, I might be certain of *p* notwithstanding the absolute falsity of *p*. If we equate certainty with the having of clear and distinct ideas, then there is clearly a discrepancy between this absolute falsity claim and *B*.

original Thomist solution, which depends on the doctrine of analogy, is the path that Descartes should have taken. I find this baffling since so much of his account shows how the shift from an exemplarist to a representational context robs analogy of its original value and motivation. To keep the analogy we would have to return to exemplarism, and it is difficult to imagine what grounds anyone could have for suggesting that this would be a move in the right direction, although Hobbes, Locke, Malebranche, and Vico all at times hold something akin to exemplarism: see my 'Vico and the Maker's Knowledge Principle', *History of Philosophy Quarterly*, 3 (1986), 29–44.

One way in which the discrepancy can be overcome is to say that Descartes's claim is not B but:

C: If p is conceived by me clearly and distinctly, p is certain.

This is compatible with A, which we know Descartes holds, and also with the absolute falsity claim. But C is ambiguous as it stands. It can mean either of the following:

C':   If p is conceived by me clearly and distinctly, p is something of which I am certain.

C'':   If p is conceived by me clearly and distinctly, p is something of which I am entitled to be certain.

C' says nothing about our grounds for belief, but merely identifies the psychological state I am in when I have a clear and distinct conception. It is compatible with p being false. But there can be no doubt that Descartes means something stronger than this: it is clear that he *is* concerned with our grounds for belief. C'', on the other hand, does concern our grounds for belief, but we must be careful not to make it too strong. One might be tempted, for example, to argue that the only thing that can entitle me to be certain of p is its truth. To be certain of p is, after all, to be certain of the truth of p, and Descartes himself talks of 'this *truth* of which we are so strongly persuaded'. But to say that it can only be the truth of p that entitles me to be certain of p is too strong. For to argue in this way is to make C'', and hence C, equivalent to B. Clearly C'' will only be a successful interpretation if it maintains its epistemic character. We can do this by taking our entitlement to certainty to derive not from truth but from something like maximal evidence. A clear and distinct conception would then derive from the scope and nature of the evidence for p, and if all the relevant evidence pointed to p, and if this evidence were complete, we could say that we are entitled to be certain of the truth of p, even though p may not in fact be true.

But matters are not as straightforward as this, for there are instances in which Descartes is clearly maintaining B. It is of

paramount importance here that we distinguish two kinds of certainty: what Descartes calls moral certainty and what (in the Latin edition of the *Principles*) he calls absolute certainty. Moral certainty is described in Principle 205 of Part IV of the *Principles*. It is 'a certainty that suffices for the conduct of our life, though if we regard the absolute power of God, what is morally certain may be uncertain' (AT ix_2. 323). As examples of areas in which only moral certainty is possible, he gives his own accounts of magnetism, fire, and matter theory. Two features of moral certainty are worth noting briefly. First, in describing moral certainty here, Descartes makes no mention of our grasping things clearly and distinctly. Rather, he appears to equate moral certainty with something like inference to the best explanation. In the light of this, there must be some question as to how far the doctrine of clarity and distinctness applies to moral certainty, and my discussion of clear and distinct conceptions in what follows in this chapter will be restricted to the context of absolute certainty. Secondly, the only thing that Descartes mentions as potentially undermining moral certainty is the 'absolute power of God'. This is a much stronger form of certainty than that which we would normally associate with 'moral certainty', and it goes beyond anything that would be needed merely for 'the conduct of our life', since it would appear that the only type of doubt that it is subject to is hyperbolic doubt.

These two points are important if we are to understand the contrast between moral and absolute certainty, and why in the case of the latter Descartes appears to maintain B. Absolute certainty is unequivocally spelled out in terms of clarity and distinctness, and it is exempted from hyperbolic doubt. It is described in Principle 206 of Part IV of the *Principles* as follows:

The other kind of certainty is that we have when we judge it to be impossible that something should be other than it is. It is based on a very secure metaphysical principle, that, as God is supremely good and the source of all truths, since it is he who has created them, it is certain that the power or faculty that he has given us of distinguishing the true from the false does not mislead us when we use it properly, and so long as it

shows us distinctly that a thing is true. This certainty extends to everything that is demonstrated in mathematics; for we see clearly that it is impossible that the sum of two and three should be more or less than five, or that a square have only three sides, etc. (AT ix$_2$. 324.)

Descartes then goes on to include in this list the existence of the external world, what can be known about this world by the principles of mathematics, and his accounts of the transmission of light and perception.

God's guarantee means that when we are absolutely certain of p, it is the case that we have a clear and distinct conception of p, and that p is true. Our having a clear and distinct conception of p and its being true are connected, but how? It is not our having the clear and distinct conception that makes p true: rather, it is our clear and distinct conception that (in the case of absolute certainty) enables us to grasp the truth of p. What then does make p true? I think there is now general agreement that, for Descartes, it is p's corresponding to reality that makes it true.[41] Problems arise, however, when we ask how God guarantees that what we conceive clearly and distinctly is true. On the face of it, there does not seem to be a great problem. God creates truths, he creates our means of recognizing truths, and he makes sure that the two match one another (at least in the case of absolute certainty). But this kind of approach is not open to Descartes.

To see why, let us begin by imagining a more conventional God than Descartes's. This conventional God is omniscient. He knows, for example, all the truths of mathematics. This is not because he makes them true, however, but because he finds them to be truths. There is an objective realm of things which are true, which God, being omniscient, has complete and immediate access to. We can grasp at least some of these truths, and we can know that what we have grasped are in fact truths in some cases because we have a

[41] H. G. Frankfurt, *Demons, Dreamers, and Madmen* (Indianopolis, 1970) attributes a coherence theory of truth to Descartes, but in his 'Descartes on the Consistency of Reason', in M. Hooker (ed.), *Descartes* (Baltimore, 1978), 26–39, he retracts this and opts for the more usual correspondence view. Cf. also C. Larmore, 'Descartes' Psychologistic Theory of Assent', *History of Philosophy Quarterly*, 1 (1984), 61–74.

clear and distinct idea of them, and because God has guaranteed that this clear and distinct idea enables us to identify truths. What we are imagining here is that truth consists in correspondence to reality, that we have an epistemic criterion which, with a divine guarantee, enables us to recognize some truths, and that God presumably has some other (epistemic?) criterion: or perhaps that he does not need such a criterion, he just grasps truths. So far so good. But of course this is not Descartes's God. It is the God of Kepler, Mersenne, and Galileo, who were arguing that, at least in the case of mathematics, we have the same kind of knowledge as God does, only in a reduced degree.[42] God knows all mathematical truths whereas we only know some, but those we do know we know in the same way as, and with the same certainty as, God. Descartes absolutely denies this, as we have seen.

We must therefore revise our picture to take account of Descartes's postulation of equivocality, and his corresponding view that God is not omniscient but cognitively omnipotent: he knows all truths because he creates them. But this is not a change of detail, it alters everything. I have said that, for us, what makes p true is its correspondence to reality, and we recognize the truth of p by the criterion of clear and distinct ideas. But the distinction between what makes something true and how we recognize its truth is not as sharp as it may seem. This can be shown if we consider the situation of a cognitively omnipotent God. The problem is that we cannot understand what makes something true for such a God because we cannot understand how he recognizes truth. More precisely, it is not possible for us to understand in what sense what a cognitively omnipotent God has created can be, for him, truths. While *we* can regard what he has created as truths, it is far from clear that he can regard them as such. Our ability to designate something a truth depends upon an understanding, albeit only implicit, of what truth consists in, of what we need a notion of truth for and what we use it for. This understanding depends upon our grasp of how truth is manifested and how we

[42] For a full discussion and references for Kepler, Mersenne, and Galileo see J.-L. Marion, *Sur la théologie blanche*, pp. 161–227.

test for it; upon our grasp of the systematic difference between our employment of true sentences and false sentences; upon our grasp of the point of separating out inference patterns which are truth-preserving rather than those that preserve some other property. A cognitively omnipotent God might well be able to divide sentences into those that *we* would regard as true and those that *we* would regard as false, but they might as well be designated 'T' and 'F', or '1' and 'o', unless he possessed an independent understanding of truth, an understanding which took the form of a grasp of the point of the exercise. For a God who created truths by fiat, such that something is true if and only if it results from such a fiat, such an independent understanding would be wholly irrelevant, and it is the very irrelevance of such an understanding that shows that it is not *truth*, in the sense in which we understand it, that, as far as the cognitively omnipotent God is concerned, he is creating.

In other words, because we have no epistemic grasp of truth-for-God, that is, no way of relating it to what the point of the exercise is for us, we have no grasp of truth-for-God. It is simply not something we can recognize as *truth*: it is something else, we know not what. This poses an immense problem for the idea that our knowledge could have a divine guarantee, for God would be being asked to guarantee something that would surely make as little sense to him as truth-for-God does to us. The equivocality argument, if carried through to its proper conclusion, not only ultimately undermines the idea of a 'good' God—for there is no reason at all why 'good' should not be subject to the same equivocation as every other term—but also *undermines any intelligible connection between God and us*.

Descartes does not, of course, take equivocality this far, although this is where the argument leads. Nevertheless, what he ends up advocating in fact achieves the same epistemological result. But complete equivocality, and an equivocality bridged by divine guarantee, ultimately results in such a radical distancing of God from anything we can say about our knowledge and reasoning processes that God's knowledge and reasoning processes effectively become irrelevant in any account we might give of ours. This

is a revolutionary move, for it means that human knowledge can no longer be modelled in any way on divine knowledge. For Descartes, our knowledge is not knowledge in reduced degree, as those figures at the forefront of the scientific revolution—Kepler, Galileo, and Mersenne—thought, but rather knowledge of a completely different kind from God's, since our route to that knowledge must of necessity be different from God's. Employing this conception, Descartes is able to give an uncompromising answer to the traditional cognitive problem of how to reconcile the belief that our reasoning is in some way a function of our cerebral organs, on the one hand, and a belief that there are pure spirits, such as God and the angels, who reason yet have no corporeal faculties, on the other. His answer is flatly to deny that we can say anything about those creatures who reason without recourse to corporeal faculties. In this he is surely right.

Another consequence of this conception is that it enables Descartes to naturalize cognition and epistemology generally; not to the extent of advocating a materialist theory of mind, as one commentator has argued,[43] but to a very considerable extent none the less.[44] This is made possible by dissociating our knowledge from God's, and Descartes can thereby free himself of the constraint of trying, *per impossibile*, to model human knowledge on a wholly inappropriate divine prototype. This of course leaves the problem of how creatures with our corporeally limited and constrained cognitive faculties can have any confidence that those corporeal faculties actually yield knowledge. Descartes's answer to this problem is given concisely in the *Third Meditation*:

. . . God might have endowed me with a nature such that I may have been deceived even concerning things which seemed to me most manifest. And whenever this view of the sovereign power of a God comes into my thought, I must confess that it is easy for him, if he so wishes, to cause me

[43] H. Caton, *The Origin of Subjectivity* (New Haven, 1973).

[44] For details see C. Larmore, 'Descartes' Empirical Epistemology', and N. L. Maull, 'Cartesian Optics and the Geometrization of Nature', both in S. Gaukroger (ed.), *Descartes* (Sussex, 1980), 6–22, 23–40; also J. W. Yolton, *Perceptual Acquaintance from Descartes to Reid* (Oxford, 1984), ch. 1.

to err even in matters which I believe I have the greatest evidence. But, on the other hand, whenever I direct myself towards the things that I believe I conceive very clearly, I am so persuaded by them that I cannot resist saying this: Whoever deceives me, he can never cause me to be nothing while I think I am something, or, it being true now that I exist, some day cause it to be true that I have never existed, or that two and three makes less than five, for anything else that I see clearly cannot be other than I conceive it. (AT vii. 36/ix[1]. 28.)

We simply do not need God's knowledge as a model, only God's guarantee for our knowledge, and this is not such a high price to pay when we realize that it takes us away from a conception of knowledge which is inappropriate and unrealizable.

Descartes played a critical role in what I have identified as the transition from discursive to facultative conceptions of inference, and he did this by providing an account of how inference can both be constitutive of knowledge and yet a cognitive process in which our corporeal faculties engage. It is by rejecting the notion that inference is an aid to knowledge that he is able to do this, and this rejection depends upon his being able to treat our cognitive faculties as being productive of knowledge in their own right, which in turn is only possible if we do not model them on God's faculties. This last point is secured via the doctrine of eternal truths, which thereby plays a fundamental role in Descartes's conception of inference.

This approach is taken further in Leibniz. His univocal model of reasoning should not be seen as something which simply contradicts Descartes's equivocal model; rather, it builds upon it and goes beyond it in certain crucial respects. In attempting to understand proof in terms of intuition, so that we can move directly from premisses to conclusion in the one step, Descartes is raising an issue which Leibniz will deal with much more successfully in his account of algebra as a system in which 'we cannot err even if wish . . . the truth can be grasped as if pictures on paper with the aid of a machine' (GM i. 84). What Leibniz is doing here is getting rid of the need to reflect on each step in a proof by making one's traversal of these steps not instantaneous, as was

Descartes's solution, but mechanical, something which requires no thought yet compels intellectual assent. Moreover, Leibniz, apparently taking it as given that we cannot say anything about cognitive processes different from ours, proceeds to ascribe to God a reasoning process modelled upon our own. We can have an understanding of God's grasp of truth because we can provide a mechanical model for such a grasp.[45] Before we can explore this issue, however, we need to examine the very different roles that Descartes and Leibniz give to algebra, and to analysis and synthesis.

[45] The idea of modelling God on human beings is not peculiar to his logic. It is a characteristic feature of his account of ethics and politics also, where God effectively functions as a philosopher-king. Cf. S. Brown, *Leibniz* (Sussex, 1984), 191.