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The Cambridge History of Seventeenth-Century Philosophy

Volume II

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 **CAMBRIDGE**
UNIVERSITY PRESS

1998

28

THE COGNITIVE FACULTIES

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During the seventeenth century the major cognitive faculties – sense, imagination, memory, and understanding (or intellect)¹ – became the focus of argument in metaphysics and epistemology to an extent not seen before. The theory of the intellect, long an important auxiliary to metaphysics, moved to the centre of metaphysical dispute, especially concerning the scope and powers of the intellect and the existence of a ‘pure’ intellect. Rationalist metaphysicians such as Descartes, Spinoza, and Malebranche claimed that intellectual knowledge, gained independently of the senses, provides the framework for constructing a new theory of nature. Other writers, including Hobbes and Gassendi, denied the existence of a distinct intellectual faculty, and so challenged the metaphysicians’ abilities to perceive the essences of substances directly. The theory of the senses, which had long been a part of philosophical discussion, took on a new urgency, for adherents of the new corpuscularian philosophy needed to replace the dominant Aristotelian theory of real sensory qualities and sensible species. The revival of scepticism and a renewed interest in method also brought the faculties into prominence, for sceptical challenges typically were directed towards the faculties of sense and understanding, and the theory of method was conceived as providing instructions for the proper use of one’s cognitive equipment.

The theory of the faculties, then, is an important key to theories of knowledge in the seventeenth century. Indeed, rather than speak of seventeenth-century epistemology, it would be less anachronistic and more informative to speak of theories of cognition. The familiar (and over-stated) point that epistemology became fundamental to metaphysics during that century² can then be recast as the point that the theory of faculties became central in metaphysical dispute. Evidence for this change includes several works of general philosophical scope that contain ‘understanding’ in the title³ or in which the theory of the faculties provides an organising principle.⁴

Following a survey of Renaissance and late scholastic theories of the faculties, succeeding sections of this chapter examine the cognitive faculties in connexion with scepticism, the search for new methods, the new corpuscularian philosophy,

rationalist metaphysics, Cambridge Platonism, Locke and Berkeley, and the theory of cognition considered generally.

1. THE FACULTIES IN RENAISSANCE AND LATE SCHOLASTIC PHILOSOPHY

The seventeenth century inherited a general classification of the cognitive faculties or powers. In the common scholastic Aristotelian terminology, the intellectual powers were separated from the sensory, and the latter were divided into internal and external senses. The external senses are the familiar five: vision, hearing, smell, taste, and touch. There was disagreement over the number of internal senses, but a basic list would include memory, imagination, common sense, and estimation (or cogitation).⁵ Memory was ascribed both to internal sense and to the intellectual faculty; it was ascribed to the latter to account for memory of concepts and to allow for personal immortality. The faculty of imagination was said to receive images from the senses and produce images of objects that are not actually present, as when one imagines the face or voice of a friend ('image' suggests sight, but imagination extends to other senses). The common sense was viewed as the Aristotelian *koine*; it cognises and compares the deliverances of the individual external senses. The 'estimative' or 'cogitative' power was ascribed to animals – to whom intellection was denied – in order to account for discriminative powers extending beyond the proper and common sensibles, and for the ability to act appropriately in novel circumstances; it was included among the sensory powers of the human soul.

1. *Platonist versus Aristotelian theories*

The most general division in sixteenth- and early seventeenth-century writings on the faculties falls along Platonic and Aristotelian lines. The Platonist tradition includes Augustine and Renaissance Platonists such as Ficino and Giovanni Pico della Mirandola, while the Aristotelian includes Thomas Aquinas, Duns Scotus, and the authors of the late scholastic revival, notably, Toletus, Suárez, the Coimbra commentators, and Rubius. The two traditions, examined from the perspective of this discussion, differ primarily over the ontology of sense and intellect and the respective rôles of these faculties in the acquisition of knowledge.

Platonist authors maintained that the intellect can operate independently of the senses. By this they meant not merely that we can think without using the sensory faculties at the same time, but, more fundamentally, that the intellect can contemplate intelligible objects which are unavailable to the senses. The primary

objects of such intellectual knowledge are spiritual or immaterial beings: God, souls, and immaterial Forms or archetypes. According to Ficino, universal Forms inhabit four worlds, including the human intellect and the prime intellect; he designates the latter as the seat of 'the first, intelligible, and ideal species', these being 'the preeminent objects for the intellectual eyes of all minds'.⁶ He and other Platonists also held that reason and intellect reside in a separate rational soul, which is joined to the fleshly body through an intermediate body, a 'delicate and airy body which physicians and philosophers call spirit'. Between this 'intervening spirit' and the rational soul humans have a sensitive soul, shared with the beasts, which is the seat of sense and imagination. The sensitive soul causes error by diverting the rational soul from its intelligible objects.⁷ The Platonist thinkers also held that the rational soul is 'impassible' (not susceptible to change) and thus cannot be affected by the body. This tenet flirted with the unorthodox position that the body is the mere instrument of the soul in the sense that the soul resides in it as does a captain in a ship.⁸ Although Aristotelians, too, believed that a 'higher' being such as the human intellect cannot be causally affected by corporeal things acting alone (including the bodily states), they did not agree, as the Platonists maintained, that the intellect can operate independently of the body even in the acquisition of natural knowledge, by apprehending Forms or archetypes in the mind of God or ectypes residing in human minds.

Aristotelian authors denied that the soul is a separate substance joined to bodily substance and operating independently of the senses. Ontologically, they maintained that the soul of a living human being is the 'form' (see Chapter 23) of the body (although it can exist as a separate form after death), and they denied that the rational and sensory souls are distinct (a position attributed to Plato). They assigned intellection and sentience to a unitary human soul simply as powers.⁹ Epistemologically, they held that all knowledge arises through the senses, including the knowledge of both nature and God. Orthodox Aristotelians argued that (in this life) every act of thought, including intellection, requires a material phantasm. At the same time, the intellect was not unimportant in the Aristotelian account of cognition, for it was uniquely responsible for abstracting 'intelligible species' (which are universals or common natures; see Chapter 8) from the sensible forms or species of particular bodies as received by the senses.¹⁰

Scholastic Aristotelian discussions of the faculties occupied a large literature full of lively and often incisive argumentation. Perhaps because Aristotelian theory asserted that all human knowledge (or at least all 'natural' knowledge) derives from the senses, the entire chain of cognition from the external senses through the internal senses to the intellect was the object of extensive scrutiny and debate.

These discussions are found primarily in the *De anima* commentaries and associated disputations.¹¹ As did textbook treatments of Aristotelian philosophy, these works discussed the soul and its powers under the rubric of physics, the rationale being that the soul is the form of a corporeal being, the human animal; even the soul considered as a separable, immaterial substance was treated as a subject of physics, though many contended that the separable soul was properly the subject of metaphysics.¹² The faculty of the intellect and its various operations, together with the rôles of the senses, imagination, and intellect in the abstraction of intelligible species, were also discussed (albeit briefly) in commentaries on Aristotle's logical works.¹³

Leaving aside their subtle differences, the *De anima* writings of Suárez, the Coimbrans, Toletus, Rubius, and the textbooks of Eustachius a Sancto Paulo and Keckermann, among others, suggest the following generalised Aristotelian account of the chain of cognition. Cognition is a process by which the knower comes to be in a way like the known thing. The process begins when the form of a sensible quality of an object alters the sense organ, as in taste and touch, or an intervening medium, as in vision, hearing, and smell.¹⁴ Eventually, whether in the medium or in the senses, the sensible quality produces an 'intentional species',¹⁵ or 'sensible species',¹⁶ or just 'species',¹⁷ which was said to 'represent' the quality in the object. The species is received by the sensory power without literally rendering the power coloured or warm or odorous; following Aristotle, its reception was described as that of a 'form' or 'species' 'without matter'.¹⁸ Upon receiving a species (passively), the sensory power is actualised to its characteristic sensory activity (and it is to that extent active); in the act of sensing, a kind of identity arises between the sensory power and the object sensed, which identity permits the power to be 'directed toward' or 'attentive of' the object, and so to cognise it. Each sense discriminates its 'proper sensible' – colour in the case of vision, odour in olfaction, and so on – and some, including touch and vision, discriminate common sensibles such as shape, size, and number. The 'common sense' discriminates among the objects of the special senses (e.g., it discriminates white from sweet). The species received by the external senses are retained as 'phantasms' in the internal senses. These phantasms are corporeal in nature; that is, they are states of the corporeal organs informed by the sensitive power of the soul. The cognitive acts of the sensitive power of the soul are adequate for the perception (by the 'estimative power') of potential benefits and harms afforded by the external bodies represented through the phantasms. Cognition of the natures or essences of bodies requires intellection. The immaterial intellect 'illuminates' the phantasm and abstracts the essence or 'common nature' of the represented

thing. The intellect knows by means of the phantasm present in a bodily organ, but, being immaterial, and not being the form of any bodily organ (even while remaining a power of the form of the human body), it does not receive the corporeal phantasm into itself. Rather, the 'agent intellect', 'together with the phantasm', produces an (immaterial) intelligible species in the 'patient' or 'possible' intellect. Reception of the phantasm by the patient intellect completes the act of understanding.¹⁹ Finally, intellectual operations can be divided into three types: simple apprehension (of a form or forms), judgement (which entails predication), and discursive reasoning (as in a syllogism). Aristotelians ascribed these acts to the intellect alone, restricting the will primarily to sensory and intellectual desire.²⁰

2. The senses: Intentional species and the visual pyramid

The notions of sensible and intentional species generated extensive discussion in the scholastic literature. Stringent theoretical demands were placed on these notions by the broader Aristotelian theory within which they functioned. The positing of species was driven by the Aristotelian theory that, in knowing, the soul must become 'like' the object known. This posit was constrained by the belief that the sensory soul does not unite with objects themselves nor take on, in the ordinary way, the qualities of things (such as heat or colour). An intentional species, in order to mediate cognition of an object, must be 'like' or 'similar to' a quality in the object without, as received by the sensory power, itself being a perceivable instance of that quality. Furthermore, it must mediate cognition of the object without violating the principle that species are that 'by which' objects are cognised, but not that which is itself cognised.²¹

Intentional species establish contact between the cogniser and the cognised by representing external objects; the representative relation arises from a *similitudo* between species and object.²² Although textbook authors such as Eustachius and Keckermann expressed this relation by calling species 'images' of objects, Toletus, Suárez, and Rubius were careful to observe that species could not be 'formal images', 'pictures', or 'formal similitudes' of objects; they argued that, so understood, species would displace external objects as the objects of perception.²³ In either case, it is difficult to understand how something can have a similitudo with a quality, without itself being a perceivable instance of that quality. It might appear that the designation of species as 'intentional' solves this problem by rendering them mind-dependent and thereby placing the similitudo in the eye of the beholder. But among scholastic Aristotelian authors the term 'intentional' did not always suggest mind dependence. Intentional species, in particular, were accorded mind-independent reality, as was their similitudo with qualities. Further, inten-

tional species, in the medium as well as in the external and internal sense organs, were said never to be without conditions of materiality, even while being forms 'without matter' (that is, forms that are not conjoined to matter in the usual way).²⁴ The being of such species, although denominated as 'intentional' by Toletus, Suárez, and Rubius, was considered by them to be a species of *real being* (rather than merely *rational being*).²⁵ Intentional species of colour are really there in the air or in some other medium, and they have a kind of similitude with the colours of objects, even if they do not instantiate those colours in the usual way and so cannot themselves be sensed (effecting no sensible species of their own). As a modifier of 'species', the term 'intentional' suggested two things: that such species serve to represent a distal object so that, when received by the sensory power, they direct that power towards the object; and that their corporeal being in the medium and organs is attenuated by comparison with qualities in objects.²⁶

The denomination of intentional species as images was subsequently ridiculed by Descartes, who boasted that his optical theory dispensed with 'all those little images flitting through the air, called *intentional species*, which so worry the imagination of Philosophers'.²⁷ This criticism distorts the late scholastic understanding of optical theory and intentional species. The commentators who called species 'images' were not positing coherent images that fly through the air, like Epicurean *eidola*; rather, they adopted the perspectivist analysis of the transmission of colour through the medium. According to perspectivist theory, which was worked out in the technical optical literature²⁸ and summarised in the *De anima* tracts,²⁹ from each point on an illuminated object, rays of light are transmitted in all directions. Because the rays proceed from each point on the object in right lines to all points in the medium (barring opaque obstructions), all points of the object are represented at any point in the medium. At the eye – or at the crystalline humour – only rays normal to the surface are sensed; this selective receptivity establishes a point-for-point mapping between points on the object and points on the surface of the crystalline. This means that a cross-section of a 'visual pyramid' – a pyramid with its base on a distant object and its apex inside the crystalline – is received and sensed by the eye. This cross-section is transmitted along the optic nerve into the brain and to the common sense. It has the characteristics of a two-dimensional picture or image of the object at the base of the pyramid. It is to this extent geometrically equivalent to the retinal image as described by Kepler and Descartes (but without being inverted). It thus was accurate for Descartes to say that the scholastics were committed to images being conveyed into the brain, in the sense that a two-dimensional pattern is so con-

veyed; but Descartes, too, was committed to such a transmission.³⁰ Descartes's criticism of the imagistic character of intentional species, to the extent that it reflects a proper understanding of previous optical theory, over-generalises from the legitimate differences between his sensory theory and the scholastics' regarding colour as a 'real quality', the scholastic theory having the implication, rejected by Descartes, that there is something in the object 'similar to' the colour we experience phenomenally.

3. The intellect and its immateriality

The immateriality of the rational soul and of its intellectual power received special attention in the *De anima* commentaries and related treatises.³¹ Much was at stake in these discussions, including the intelligibility of the Aristotelian account of the chain of cognition, the plausibility of personal immortality, and the possibility of natural cognition of God and other immaterial entities.

The notion that intelligible species are received into the intellect raised difficult questions concerning the interaction between the states of the sensory faculties (which are corporeal) and the immaterial intellect. According to standard Aristotelian theory, the act of intellection is completed when an intelligible species is received by the possible intellect, having been 'abstracted' from the corporeal phantasm. The language of abstraction may suggest that the sensible species (or at least the universal form or common nature found in it), having been 'purified' by the light of the agent intellect, is simply absorbed into the possible intellect. And yet it cannot be so. The sensible species (and any form found in it) is always bound up with material conditions. Aristotelian authors generally agreed that a phantasm, because it is corporeal, cannot by itself act on the possible intellect (an immaterial power of the soul), let alone be absorbed by it. The agent intellect, being immaterial itself, can so act, but not on its own accord; it must be determined in its action by a phantasm. Consequently, the agent intellect was considered the primary cause, and the phantasm was variously designated a 'material', 'instrumental', or 'partial' cause of the formation of intelligible species.³² The coming into being of intelligible species is an act of the agent intellect, which was said to be capable of 'making all things'; the species is created in the patient intellect, which is capable of 'becoming all things'. The 'making' of the agent intellect, while dependent on a material phantasm, also requires a disposition on the part of the intellect. Aquinas had asserted that the light of the human intellect is a 'participated likeness' of the 'uncreated' (divine) light that contains the eternal types.³³ Later authors agreed that the intellect cannot literally receive phantasms, and

indeed that it must 'make' the intelligible species. They nonetheless maintained that the intellect is a 'tabula rasa' (containing no innate species) and that phantasms derived from sense play an essential rôle in the creation of intelligible species.³⁴

No question was more widely disputed in the *De anima* commentaries and the attendant literature than the ontology of the agent and patient intellects. That is to say, is the individual human soul, considered as the form of the human body, adequate by itself to perform the acts of understanding that humans do perform? The orthodox position – which had been held by Thomas and Scotus, and was affirmed by the Coimbrans, Toletus, Suárez, and Rubius – was that the individual human soul can function on its own and requires no help from a separate intellectual substance or from direct divine illumination.³⁵ Others disagreed. Augustinians maintained that the human soul by itself is incapable of grasping the forms or ideas of things without illumination from God.³⁶ Avicenna and Averroes had held that the agent intellect, or both the agent and possible intellect, exist separately from the individual human soul; according to their doctrine, individual sensitive souls inform individual human bodies, but all humans share a single intellect.³⁷ Zabarella repudiated Averroes while contending that the agent intellect is none other than God. In common with the Alexandrist tradition, he maintained that the 'organic soul' – the vegetative and sensitive soul – is the form of the material body, arising naturally from the potentiality of the matter of the body in humans just as it does in beasts; furthermore, an agent intellect must be posited to explain the act of abstraction, and it must be identified with the 'most intelligible' substance, namely, God, a position Zabarella attributed to Plato and Aristotle.³⁸ Earlier in the century, Pomponazzi reasoned that when the nature of the human soul is examined from the point of view of the philosopher who uses 'natural' arguments (arguments based upon natural reason, apart from faith and revelation), the most important arguments pertain to the 'mode of operation' of intellect and specifically to whether the immaterial objects of intellection demand an immaterial agent. In his view, the soul considered as subject is immaterial and independent of the body, but it requires the body as its object of thought; because of the latter requirement, he concluded that 'the human intellect in all its operations is the act of an organic body.' This led him to the further conclusion that the soul considered absolutely is material and mortal.³⁹ His position was perceived as one to be avoided.

These disagreements over the ontology of the intellect reveal a deeper common assumption, that an immaterial agency is required for the apprehension of universals, or of immaterial beings such as God and the soul. Corporeally based faculties – including the individual soul when considered as a form actualising the

potentiality of bodily organs, as in the case of the sensitive and imaginal powers – were judged inadequate to such cognitive tasks. While the orthodox Aristotelian position that the intellect is a power of the form of the human body and always operates with a corporeal phantasm may seem contrary to this common assumption, it is not; orthodox Aristotelians held that the intellect is not itself the form of any bodily organ and that it operates as an immaterial intellectual power.⁴⁰

Those who posited an immaterial human intellect disagreed over its adequacy for cognising wholly immaterial substances, such as God and the soul. Aristotelians commonly held that human beings do not have direct natural cognition of such substances. The Aristotelian dictum that all thought requires a phantasm, combined with the position that there are no phantasms of God and the soul, entailed that in this life God and the soul are known only by their effects – God through created things, the soul through its cognitive acts as directed towards the body – and only confusedly, at that. As Toletus expressed it, an embodied intellect 'cannot naturally possess clear and distinct cognition of immaterial substance'. Aquinas, the Coimbrans, Rubius, and Eustachius expressed similar positions.⁴¹ Platonists of course turned the Aristotelian account on its head, contending that knowledge arises in the first instance from the intellect, which directly perceives immaterial Forms or Ideas.⁴² Others combined an Aristotelian account of sensory and intellectual cognition of nature with a Platonic or Augustinian account of knowledge of God and the soul. Albert the Great was known to have ascribed knowledge of nature to abstraction from sensibles and knowledge of God and the soul to intellectual intuition without a phantasm.⁴³ The question of whether human beings enjoy immediate cognition of immaterial substance through the intellect remained a central problem of metaphysics through the time of Kant.

II. THE COGNITIVE FACULTIES AND SCEPTICISM

The sixteenth century saw increased interest in ancient sceptical arguments, both Academic and Pyrrhonian, as vetted in Cicero's *Academia*, Diogenes Laertius's *Lives*, and the writings of Sextus Empiricus (see Chapter 32). Among the various arguments, some proceeded by attacking human knowledge at its sources, in the faculties of sense and intellect.

Seventeenth-century philosophers used scepticism primarily to curb the pretensions of metaphysics. Montaigne's follower Charron used sceptical arguments to undermine confidence in theoretical knowledge in order to direct readers to the 'proper' study of humankind, humankind itself. Charron adopted a modified

version of the Aristotelian conception of the soul and its faculties, recognising vegetative, sensitive, apprehensive or imaginative, appetitive, and intellectual faculties; he then further subdivided the faculties of the human mind to include imagination or apprehension, reason, ratiocination, wit, judgement, understanding, and volition.⁴⁴ He observed that human beings, although naturally desiring knowledge, cannot reach genuine first principles because of deficient cognitive faculties.⁴⁵ Charron decried the 'faultiness and incertitude' of the senses, alluding to standard arguments, including cases of illness, in which things appear 'other than they are'; failures of sight at great distance, as when the sun appears much smaller than reason considers it to be; contradictions between senses which must be adjudicated by reason, as in the case of the infamous half-submerged stick; and examples in which animals surpass humans in sensory acuity.⁴⁶ While affirming the immateriality and immortality of the rational soul, he observed that it must operate by means of a bodily instrument, and that variations in this instrument dispose individuals to be better or worse reasoners. Because of bodily conditions, one cannot simultaneously achieve excellence of understanding, imagination, and memory. The understanding, he reasoned, operates best when the brain is dry, imagination when it is hot, and memory when it is wet; but wet is directly contrary to dry, while heat dries the brain and agitates the animal spirits excessively, thereby harming memory and disrupting the operation of the understanding.⁴⁷ Furthermore, humans should be humble about their rational powers, for beasts do reason, and there is greater distance between the rational ability of the best and worst human thinker than there is between humans and beasts – although humans are separated from beasts by their immaterial intellectual power, which is distinct from the merely discursive rational power shared with beasts.⁴⁸ Alluding to the great diversity in human opinions, Charron concluded that first principles cannot be found by humans on their own and are known only to God (who sometimes reveals them). Human beings should use their faulty cognitive faculties to cultivate such instrumental knowledge as they can glean and should spend the larger part of their study time in pursuit of moral wisdom.⁴⁹

Other authors, including Sanchez, Mersenne, Gassendi, and Glanvill, used sceptical arguments to attack Aristotelian metaphysics in order to replace it with a more epistemically modest attitude towards natural human knowledge of nature. Sanchez, whose *Quod nihil scitur* appeared in 1581 and was reprinted in 1618 and after, argued that the Aristotelian quest for 'scientific' knowledge should be replaced by a search for empirical learning derived from actual experience with things.⁵⁰ He divided all knowledge into two kinds:

One kind is perfect, the kind by which a thing examined from all sides, both inside and outside, is understood [*intelligitur*]. And this is scientific knowledge [*scientia*], such as we should now like to acquire for Man – but science itself wishes otherwise. The other kind is imperfect, the kind by which a thing is apprehended by any means at all and after any fashion whatever. This is the kind with which we are familiar.⁵¹

'Scientific knowledge', or cognition properly so called, is beyond the limited intellectual and sensory capacities of humankind. The intellect must rely on the senses for its information; all cognition of external objects is sense-based. But the senses perceive 'only the outward appearances of things'; the natures of things 'can by no means be grasped by the senses', which cognise only 'accidents' such as colour, size, and shape, and even those imperfectly.⁵² Further, the understanding depends on the instrument of the body for all acts of cognition. But in order to achieve the perfect cognition that constitutes science, this instrument would need itself to be perfect, which it never is, or, if it were for an instant, could not remain.⁵³ Sanchez finally commends the investigator to the investigation of nature under the guidance of 'experience' and 'judgement'. This investigation is tempered by realisation that 'nothing is known', but it nonetheless can result in the acquisition of a body of experience that guides one's interactions with things.⁵⁴

Several seventeenth-century promoters of the new philosophy used sceptical arguments to challenge the adequacy of the faculties for achieving metaphysical knowledge. To this end, Mersenne, Gassendi, and Glanvill present sceptical critiques of the senses and intellect (and, to lesser extent, the imagination). Gassendi and Glanvill, harsh critics of Aristotelian philosophy, placed metaphysical knowledge in general beyond the pale of human faculties. The senses received the greatest attention, perhaps because, as Gassendi put it, 'the mind reasons only from those things that have appeared to the senses', or, as Glanvill had it, 'the knowledge we have comes from our senses.'⁵⁵ Though each contended that the understanding is incapable of achieving metaphysical knowledge (of the essences of things), they agreed in recommending the careful use of the understanding to sort through sensory appearances in order to frame useful (and possibly true) hypotheses for explaining those appearances; Gassendi preferred atomistic hypotheses, and Glanvill commended the aetherial philosophy of Descartes, endorsing a corpuscular account of sensory qualities.⁵⁶ Gassendi thereby rejected the position of his early *Exercitationes*, according to which only appearances can be known, now affirming that the intellect brings its own criterion to judgement and that it may indeed come to know things beyond the appearances, by inferring from 'indicative' sensory 'signs' to 'hidden' natural causes.⁵⁷

Previously, Mersenne, in his *La vérité des sciences* of 1625, had defended Aristotelian and other types of philosophy against sceptical attack. His defence was measured, and his examples of metaphysical and physical knowledge were modest, including the principle of contradiction and the maxim that natural bodies are moveable; but he also defended a common-sense version of the law of cause.⁵⁸ He classified the ten modes and other standard sceptical arguments by their relations to a cognitive faculty: the sceptic uses sensory phenomena to question sensory phenomena, intellectual to question intellectual, or sensory intellectual.⁵⁹ In 1625 Mersenne asserted that the senses are not deceived when used under proper conditions; and he held that although 'the understanding receives nothing except by the senses', nonetheless it is possessed of an indigenous 'spiritual and universal' or 'natural' light, which is undeceived in its proper operations, and by which it goes beyond the senses.⁶⁰ He conceded in effect that current knowledge consists largely of mere phenomenal regularities and does not penetrate to essences but contended that such knowledge suffices for 'science'; moreover, the understanding, when used properly, might attain knowledge of essences.⁶¹ In the *Questions* of 1634 he expressed the more circumspect opinion that human knowledge will be limited to surface effects until God chooses to reveal the rational principles and modes of action of things.⁶² As Gassendi and Glanvill later would assert, he held that mathematical knowledge is most resistant to sceptical challenge, appealing to the examples not only of arithmetic and geometry but also of 'subalternate' (or mixed-mathematical) sciences such as optics and astronomy.⁶³

In contrast to these authors, Descartes employed sceptical arguments in the *Meditationes* to make evident the intellect's ability to grasp the essences of things. Like Mersenne and Gassendi, he was interested in establishing that some knowledge exists despite the sceptic's challenge, but unlike them, he claimed that the intellect can know the essences of things by direct intuition (independent of the senses). Furthermore, he used sceptical arguments to reveal this pure use of the intellect. As he repeated often, a chief use of the sceptical doubt in the *Meditationes* was to lead the mind 'away from the senses' and so prepare it for the contemplation of intelligible things.⁶⁴ Indeed, the process of doubting carried out in the First Meditation may be seen as an exercise intended to allow the reader to discover that, contrary to Aristotelian doctrine, there can be thought without a sense-based image, thought that arises through use of the intellect alone.⁶⁵ Once discovered, the pure faculty of the intellect is put to use in contemplating God, the soul, and the essence of matter considered as pure extension or pure continuous quantity. Here scepticism is used not to curb the pretensions of metaphysics, but to reveal

an underutilised route to metaphysical knowledge through proper use of the intellectual faculty.

III. THE COGNITIVE FACULTIES AND THE QUEST FOR NEW METHODS

Among those seeking a new philosophy, many proposed that a new logic, new organon, or new method was needed to properly direct the cognitive faculties of the investigator.⁶⁶ Aristotelian logic commonly was understood by late scholastic commentators to be an aid or instrument to the natural power of the human understanding; its study was not considered a necessary condition of right understanding and correct discursive reasoning, these being natural acts of the human intellect. But the study of logic was considered the surest means to the proper and effective use of the natural cognitive powers, which otherwise easily fall into error.⁶⁷ Several of the new philosophers accepted this conception of the rôle of logic or method, while finding one or another defect with Aristotle's *Organon* as an instrument of cognition. Among those who made method a central issue, their largest differences concerned the natural power of the human faculties and the need for an elaborate method, or set of logical precepts, for guiding the understanding.

Francis Bacon was pessimistic about the natural powers of the human faculties and believed that an assisting method was needed to attain truth. He signaled his intention to provide a new lesson in the proper direction of the faculties by entitling his major work on 'method' (his term) a *Novum Organum*. Of the four 'Idols' that hinder truth and promote error, those of the tribe have their foundation 'in human nature itself', including the false 'measure' provided by the human senses and the false and distorting 'mirror' of the human understanding. Bacon further characterised the unguided senses as dull, incompetent, and deceitful,⁶⁸ but his most extensive criticism was reserved for the understanding, which, he said, even in a 'sober, patient, and grave mind' is, when left on its own, 'a thing unequal, and quite unfit to contend with the obscurity of things'.⁶⁹ Indeed, he characterised the unguided understanding as prone to hasty generalisation, mistaken impositions of order and regularity on nature, unreasonably intransigent opinions, excessive influence from present instances, an unwillingness to let explanations end, infection by affections and desires, and flights of abstraction.⁷⁰ Nonetheless, Bacon maintained that, by means of a previously unseen synthesis between experience and understanding, his method could lead the cogniser to a knowledge

of true natures or forms of things.⁷¹ To counteract defects of sense, he proposed the collection of systematic natural histories drawn from every conceivable source; as an aid to memory, these histories must be carefully arranged in tabular form; to curb the natural proclivities of the understanding, they must be examined under the firm control of Bacon's inductive method. Only through such 'ministrations' to the faculties can scientific knowledge of nature be attained.⁷²

In contrast, Descartes and other rationalist metaphysicians devised methods that played to their conception of the natural strength of the human intellect. Descartes's new method for directing the mind was largely inspired by geometrical and mathematical reasoning; it enjoined the investigator to break problems into small steps, proceed from the simple to the complex, make thorough reviews, and build certain and evident cognition by 'intuition and deduction' (in the language of the *Regulae ad directionem ingenii*) or by 'clear and distinct' mental perception. In the *Regulae*, Descartes contends that an important step in comprehending a method is to survey the 'instruments of knowledge', the most basic of which is the intellect, to which may be added imagination and sense-perception.⁷³ He returns to this theme of testing the instruments of cognition in the *Meditationes*,⁷⁴ where through careful scrutiny the intellect is established not only as the arbiter of sensory cognition but as a faculty capable of attaining truth independent of the senses. With respect to metaphysical knowledge, at least, the key to Descartes's method of discovery is the preparation of the intellect to perceive the 'primary notions' of metaphysics, which are by nature as evident or more evident than geometrical notions, but which will not be perceived by the intellect unless the mind has been properly withdrawn from the senses. There is no need for an elaborate method once the primary notions have been found, although inattentive minds may require a methodical presentation of the first truths, by the 'method of synthesis'. The operations of the intellect in perceiving such truths are natural to it and cannot be taught; if chained together in small steps, they cannot lead to error.⁷⁵

Later rationalist metaphysicians, despite differences with Descartes on the ontology of the intellect and its ideas, followed him in seeking simple methodological precepts that aid the natural strength of the knowing power. Spinoza, whose few sustained remarks on method come in his *Tractatus de intellectus emendatione*, maintained that the intellect must look to its own operations to discover the 'way and method' of finding the truth. The key to this 'method' is the true idea itself, which is the criterion or 'standard' for all knowledge; the mind must first discover the true idea – the idea of God or Nature – and then 'deduce' all of its other knowledge from this idea.⁷⁶ Malebranche devoted one of six books of *De la*

recherche de la verité to method, the previous five having covered sense, imagination, intellect, and will. The central rule of this method is to follow clear and distinct perceptions: 'We must give full consent only to those propositions that appear so evidently true that we cannot withhold our consent without feeling inner pain and the secret reproaches of reason.'⁷⁷ He offered tips on how the senses, imagination, and passions may be employed to aid rather than hinder the intellect, but he expected little from formal rules of method:

We should not expect anything very extraordinary here, or anything that surprises and taxes the mind very much. On the contrary, in order for these rules to be good, they must be simple and natural, few in number, very intelligible, and interdependent. In a word, they should only guide our minds and regulate our attention without dividing it, for experience shows clearly enough that Aristotle's logic is not very useful because it occupies the mind too much and diverts attention that it should have brought to bear upon the subjects it is examining.⁷⁸

His proffered rules emphasise clarity of reasoning, distinctness of conception, and simplicity and clarity of ideas. Arnauld and Nicole, in *La logique, ou L'Art de penser*, also charge errors largely to 'hastiness of thought and lack of attention'; these are to be remedied by reflecting on the mind's natural operations. Logic consists of such reflections. It is useful because it ensures right reasoning by drawing attention to the mind's proper use, provides a systematic analysis of error, and leads to knowledge of the mind's true nature.⁷⁹ Rules of reasoning are not, however, what Arnauld and Nicole considered most useful in their logic. They maintained that 'most human errors derive not from being misled by wrong inferences but rather from slipping into false judgements from which one draws bad conclusions.' To remedy this failing, they offered some gleanings from Descartes's and Pascal's unpublished papers.⁸⁰

Among sense-oriented philosophers, Gassendi and Hobbes produced their own logical tracts as guides to correct thinking, whereas Locke repudiated logic but did not forsake the goal of helping his readers towards a proper use of their understandings. Gassendi's and Hobbes's logics were in many ways traditional, being divided into four parts, respectively, concerning terms or concepts, propositions, syllogisms, and method. However, they departed from Aristotelian theory and from each other in their conceptions of universals and the intellect. Gassendi, having denigrated logic in his early *Exercitationes*, adopted aspects of Aristotelian logic in the late *Institutio logica*. In particular, he taught that the 'mind' (*mens*) 'abstracts' general ideas by examining singular ideas individually, 'separating out that which all have in common, at the same time disregarding or ignoring mutual

differences', thereby forming a 'universal and general idea', which, as in the case of *man*, represents not any particular man but "man" in general or in common'.⁸¹ In the *Physica* he equated *mens* with the rational soul (and its two faculties, intellect and will), and he argued that intellect must be distinct from imagination and sense because it forms ideas (such as universals, or the 'intelligible magnitude' of the sun as opposed to its imagined size) for which imagination is inadequate.⁸² In both places he departed from the usual Aristotelian teaching by contending that the intellect directly cognises singulars, and apprehends universals only through reflection and comparison. Hobbes, by contrast, rejected any rôle for a faculty of understanding in the use of abstract and universal terms. He reduced universals to concrete 'signs' for a class of objects: 'the name "universal" is not the name of anything existing in nature, nor of an idea or of some phantasm formed in the mind, but is always the name of some vocal sound or name.' This rejection of genuine universals fit hand in glove with his denial of incorporeal agencies and an intellectual faculty. Universal or common names are connected in the imagination and memory with various 'images and phantasms of individual animals or other things'; consequently, 'there is no need to understand the force of a universal with any faculty other than the imaginative one.'⁸³ The term 'dog' is universal just in so far as various images of particular dogs evoke it. The fact that different dogs can evoke a single word is to be explained by 'their similitude in some quality, or other accident', and this similitude itself consists in the power to produce a certain conception in a perceiver, such as the power to produce the sensation of heat.⁸⁴ Finally, Locke, in opposition to both Gassendi and Hobbes, simply dismissed logic by charging that it promotes the abuse of words, and he gave only brief consideration to the rôle of the faculties in the acquisition and ordering of knowledge. He focused instead on the use and abuse of words, and he analysed the various forms that knowledge and judgements take in themselves.⁸⁵

IV. THE FACULTIES AMONG THE NEW CORPUSCULARIANS

Among those seeking a 'new' philosophy, corpuscularians (whether atomists or divisibilists) of necessity had to provide a new theory of at least one cognitive faculty, the senses, to replace the Aristotelian theory with its commitment to real qualities and sensible species. Some, like Galileo, while adopting the language of faculties and even envisioning an explanation of sensory qualities through matter in motion, never made the theory of the faculties central to their enterprise.⁸⁶ For others, a new theory of the senses, and perhaps of the relation of sense to

understanding, was at the core of their new corpuscularian theory of nature. Such was the case with Descartes, Hobbes, and Gassendi.

1. Descartes: *The senses and the intellect*

Descartes adopted various strategies to justify his corpuscularian philosophy and its new theory of the senses. In his early writings he used the new theory of the senses itself as an entry into a new theory of nature; later, he used the deliverances of the intellect to frame a new theory of both nature and the senses.

In *Le monde*, the *Météores*, and the *Dioptrique*, Descartes presented a corpuscularian theory of the senses without the benefit of metaphysical justification (as also in the *Regulae*, XII, published posthumously). Such justification as was given rested on empirical adequacy and conceptual clarity, as Descartes observed in his correspondence.⁸⁷ His strategy was to undercut the Aristotelian theory of vision by presenting a corpuscular theory in which the transmission of forms without matter would play no rôle. This corpuscular theory of the senses would then become the Trojan horse by which a general corpuscular theory of nature would enter the mind of the reader. Thus, the *Traité de la lumière* (which forms the first part of *Le monde*) opens with a chapter entitled 'On the Difference between our Sensations and the Things That Produce Them'; in an obvious attack on the Aristotelian theory, it argues that the objects that produce sensations of light need not be 'similar to', or 'resemble', those sensations. The second chapter extends the attack to fire and heat, and, though readers are rhetorically permitted to imagine that heat and light come from the 'form of fire' or the 'quality of heat', the chapter makes clear that such forms or qualities are insufficient to explain the observed phenomena and are superfluous given the existence of an adequate, corpuscularian, account.⁸⁸ Subsequent chapters extend this theory of the material basis of qualities, leading ultimately to a corpuscularian description of the earth and the solar system. In the second part of *Le monde* (entitled *Traité de l'homme*), Descartes developed a corpuscular and mechanistic description of human physiology, and especially of the cognitive faculties, including the senses, imagination, and memory; he proposed a mechanistic explanation for association, and a brain-trace explanation for memory (later supplemented by a noncorporeal memory, residing in the soul itself).⁸⁹ The *Dioptrique* and *Météores* present allegedly adequate and clear corpuscular accounts of still more phenomena without, as Descartes observed, invoking the 'forms' or 'species' of scholastic philosophy.⁹⁰ But they present no direct argument for the corpuscular basis of the account; early on, each work simply introduces certain 'hypotheses', about light and about matter in general, which restrict the proffered explanations to the properties of size, shape,

and motion. In the *Discours* Descartes claims that these general hypotheses are justified indirectly, through their explanatory success. He also intimates that a deeper justification is possible, without revealing it there.⁹¹

In the *Meditationes* and *Principia* Descartes sought to provide a metaphysical justification for his corpuscular physics by appealing to the deliverances of the pure intellect. In opposition both to the Aristotelians and to Hobbes and Gassendi (in their *Objectiones*),⁹² Descartes contends that there can be thought without phantasms, and indeed without any activity in the corporeal imagination – a position that was in broad agreement with Platonic and Augustinian theories of cognition. The pure deliverances of the intellect – otherwise known as the clear and distinct perceptions of the understanding – are the source of the basic tenets and distinct perceptions of the understanding – are the source of the basic tenets of metaphysics, including knowledge of the essences of substances (material and mental alike). Having perceived through the intellect that the essence of matter is pure extension, or continuous mathematical quantity,⁹³ Descartes was in a position to imply in the *Meditationes*, and to develop more extensively in the *Principia*, an account of the senses according to which colour and other sensory qualities in bodies (sounds, odours, tastes, tactile qualities) consist only in certain arrangements of corpuscles possessing the properties of size, shape, motion, and position. That is, he could now rule out, on metaphysical grounds, the Aristotelian doctrine that colour as experienced in sensations is ‘wholly similar to’ colour as a quality of bodies.⁹⁴

Descartes’s mature theory of the faculties and their relations can be gleaned from the *Meditationes* and *Principia*, supplemented by the *Dioptrique* and *Traité de l’homme*. As had the Aristotelians, Descartes opposed positing faculties as entities distinct from the soul; rather, they are powers of the soul (some of which depend on the body, too). But Descartes’s theory diverged sharply from that of the Aristotelians. He designated external sense perception, imagination, memory, and pure intellection as modes of a single power of perception (i.e., as operations of the intellect, considered generally). Of these faculties, sense perception, imagination, and memory depend on mind–body interaction, but pure intellect (and will) can operate without any corresponding change in bodily state.⁹⁵ Although Descartes casts doubt on the deliverances of the senses early in the *Meditationes* and *Principia*, in the Sixth Meditation and in the later *Principia* he constructs a positive rôle for the senses, in serving to detect ambient benefits and harms, and also in discovering empirical facts of use in the science of nature.⁹⁶ In the Sixth Meditation he forges a radical distinction between (pure) intellect and imagination, contending that geometrical figures can be understood independently of the imagination. He argues that both material and immaterial substances can be

understood by the intellect in total independence of sensory images or experience.⁹⁷ His basic theory of the faculties, including the radical distinction between imagination and pure intellect, was adopted by a host of later Cartesians, including Clauberg, La Forge, Le Grand, and Régis.⁹⁸

The sixth set of *Responsiones* perspicuously summarises Descartes’s theory of the processes underlying sense perception.⁹⁹ He distinguishes three grades of sense: ‘The first extends only to the immediate effects on a bodily organ by external objects; this can consist in nothing but the motion of the particles of the organ, and any change in shape and position resulting from this motion.’ As Descartes explained in the *Traité de l’homme* and *Dioptrique*, in the case of vision these effects are caused by the round globules that constitute light pressing on the fibres of the optic nerve, thereby producing a motion in the fibres that causes the pores lining the interior cavity of the brain to open and allow animal spirits to flow rectilinearly from the pineal gland (the seat of mind–body interaction) to the these open pores, so that a perspective image, corresponding to the image received in the eye, is formed on the surface of the gland.¹⁰⁰ This brings us to the second grade, which ‘comprises all the immediate effects produced in the mind as a result of its being united with a bodily organ that is so affected’. In the case of vision, this second grade extends only to the perception of light and colour, with the qualification that the colour patch is bounded (which implies it has size and shape); it also includes bodily sensations of pain, pleasure, thirst, and hunger, as well as sensations of sound, taste, smell, heat, cold, and the like, all of which arise from the union of mind and body (see Chapter 25).

The first two grades pertain properly to the sensory faculty. The third grade, which ‘includes all of the judgements that we have been accustomed to make from our earliest years about things outside us, on the occasion of motions in a bodily organ’, properly belongs to the intellect, but because the judgements take place habitually, without being noticed, people commonly believe that the results of such judgements belong to sense. Presumably, Descartes would include the ‘natural’ inclination to suppose that colour is a real property of bodies among such judgements. In the sixth *Responsiones* he refers to the *Dioptrique* for his account of size and distance perception, observing that there he shows ‘how size, distance and shape can be perceived simply by rationally deriving any one from the others’, for instance, by calculating size from visual angle plus distance. This statement makes it seem as if according to Descartes, the perception of size or distance always results from an unnoticed act of judgement. In the *Dioptrique* he indeed does explain how size can be judged from distance plus visual angle (‘the size of the images objects imprint in the fund of the eye’); but he also indicates that

distance can be known from an act of triangulation, 'an action of thought which, although only a very simple [act of the] imagination, nonetheless comprises reasoning quite similar to that used by surveyors when they measure inaccessible places'. This 'calculation' might simply be an unnoticed judgement, as in the sixth *Responsiones*; but its description as a 'simple imagination' suggests another possibility: that the corporeal processes of the body that underlie imagination are so constructed as to yield the results of this 'calculation' through their mechanical interaction, in such a way that variations in a brain state that are correlated with distance directly cause the mind to perceive distance, just as (he explains) certain brain changes causally linked with the accommodation of eye also cause us to perceive distance.¹⁰¹ In the *Traité de l'homme*, composed while the *Dioptrique* was in progress, Descartes described a mechanical contrivance by which distance would be represented directly by the variation in a single brain state (the 'tilt' of the pineal gland) yoked to accommodation and convergence; this mechanism permits a psychophysiological explanation of the perception of distance, without unnoticed judgements.¹⁰² Finally, in the continuation of the passage from the sixth *Responsiones*, he distinguishes those unnoticed judgements that typically do accompany the use of the senses from acts of mature reflection by which the trustworthiness of the senses is adjudicated. Presumably, such mature judgements include not only compensation for illusions, as in the example given (of a stick in water), but also the metaphysical judgements that the sensory qualities are not 'similar to' qualities in objects and that the latter qualities arise from the size, shape, and motion of the small corpuscles of which bodies are composed.

2. Hobbes: Intellect is imagination

Much as Descartes began philosophising about nature in *Le monde* with a discussion of sensory qualities, it appears that Hobbes began serious thought about natural philosophy by considering the senses. By his own account, on a trip to the continent in the mid-1630s he was amazed to discover that various learned individuals could not agree on an explanation of the basic operation of the senses; upon considering the matter, it 'luckily' occurred to him that the senses operate by motion.¹⁰³ In a manuscript of 1646 he wrote, concerning vision, that 'that which I have written of it is grounded especially upon that which about 16 years since I affirmed . . . , that light is a fancy in the mind, caused by motion in the brain, which motion again is caused by the motion of the parts of such bodies as we call *lucid*.'¹⁰⁴ As this doctrine developed in various works composed during the 1630s and 1640s (some published in Hobbes's lifetime, others later),¹⁰⁵ it emerged

as the radically materialist thesis that not only are light, heat, and other corporeal qualities nothing but motion, and not only do the nerves and brain operate by motion, but sensation itself is nothing but bodily motion. As he put it, 'Sense, therefore, in the sentient, can be nothing else but the motion of some parts existing inside the sentient; and the parts so moved are parts of the organs by which we sense.'¹⁰⁶ Hobbes could have derived his doctrine of the subjectivity of perceived qualities such as light, colour, and heat from contact with works by Bacon, Galileo, or Descartes; his radical materialism was more singular, and it provoked strong reaction during and after his lifetime.¹⁰⁷ He extended his materialistic account of sense to the other faculties. The resulting account of the faculties formed part of a package of doctrines often discussed in close proximity, including the assertion that the word 'universal' names only other words or names, the reduction of understanding and reason to sense and imagination, the belief that all knowledge arises from the senses, and the denial of incorporeal substances.

An exposition of Hobbes's doctrine of the faculties should begin with light and its reception by the sense of vision and continue on to sensation, imagination, and memory, following Hobbes's own order. By the mid-1630s, Hobbes had adopted the theory that light is an undulation in a medium of fine matter.¹⁰⁸ He explained vision as the consequence of motions set up in the 'organ of sense', which in his earlier writings extended to the optic nerves and brain, and later included the heart.¹⁰⁹ According to his mature analysis, visual 'phantasms' arise when motion induced in the nervous system by light reaches the heart and provokes an outward counter-reaction, namely, a pressure in the animal spirits outward from the heart. In a bit of reasoning that may seem like a pun, Hobbes explained that this outward pressure results in the externalisation of visual phantasms; motions in the internal fabric of the body constitute the apparition of an object present before the eyes. He gave no further analysis of this phenomenon, which he described as the most wondrous of all natural phenomena.¹¹⁰ Turning to imagination, Hobbes characterised it as decaying sense. He explained the persistence of images in the sensory apparatus using a principle also invoked by Descartes: that bodies tend to remain in their state of motion or rest until acted on by other bodies; once it is set in motion by an impinging object, the internal fabric of the sense organs will continue in motion in the absence of the object, until a subsequent impingement. Consistent with his general dictum that all phantasms or images have their origin in the senses, he held that the images of imagination are copies or compositions from previous sensory phantasms. He considered memory to be a species of imagination, and dreams to be images that arise through inward agitation of bodily

parts; in each case, the images must originate in previous sensory phantasms. Finally, he discussed both regulated and unregulated 'traynes of thoughts', or associations of successive images.¹¹¹

Hobbes wrote with apparent contradiction on the status of reason. In *De corpore*, published in 1655 but begun much earlier (ca. 1640), Hobbes wrote that 'philosophy, that is, *natural reason*, is innate in every man; for each and every person reasons continuously to some purpose and in some things.'¹¹² Yet in the *Leviathan*, published in 1651, he had stated that 'Reason is not as Sense, and Memory, borne with us; nor gotten by Experience onely, as Prudence is; but attained by Industry; first in apt imposing of Names; and secondly by getting a good and orderly Method.'¹¹³ The seeming contradiction is due to different degrees of terminological nicety. For in *Leviathan*, Hobbes distinguished between the faculty of understanding, which humans share with beasts, and the faculty of reason, which is acquired. Understanding arises in creatures endowed with imagination when the imagination is trained to use 'voluntary' signs, as when a dog learns to come when called by its master; the understanding is the imagination 'raysed' to the use of signs. Although reason also involves the use of signs, such use is marked with the logical strictness characteristic of speech; it is unique to humans, inasmuch as it is unobserved among beasts.¹¹⁴ In *De corpore*, when Hobbes wrote that reason is innate, he was making a point that he repeated in *Leviathan*: that men left to themselves can achieve a modicum of reasoning, or what he would later call understanding. When in *Leviathan* he restricted reason to the logical reckoning of speech, he likewise was making a point contained in the other work: that right reasoning or true philosophical science comes only with the cultivation of method.¹¹⁵ Such methodical reasoning is required in philosophy, for philosophic knowledge must be ordered into a deductive system. Nonetheless, as Hobbes protested to Descartes, philosophical reasoning is nothing but trained imagination; it consists only in sense-driven internal vibrations.¹¹⁶

Hobbes's investigation of the senses itself of necessity relied on the senses. Hobbes knew that such an investigation required the formation of hypotheses about the microstructures of bodies, sensory media, and the sense organs, nerves, brain, and heart. He couched his hypotheses in the vocabulary of matter in motion. Given his denial that the understanding is a faculty autonomous from the senses, he could not, like his contemporary foe, Descartes, appeal to pure intellect to justify his choice of the corpuscularian hypothesis; he was thus restricted to his own version of Descartes's other justificatory strategy, which appealed to the (as he supposed) conceptual clarity and empirical adequacy of mechanistic explanations. Hobbes at first simply presented his mechanistic approach by way of definition:

philosophy is knowledge of effects from causes or 'generations'; it excludes theology, the study of angels, and indeed the discussion of anything which is not a body or the disposition of the body, all on the grounds that they cannot be explained through the composition and division of their parts (the only 'causal' explanation Hobbes acknowledges).¹¹⁷ But he realised that such definitions, and the implied choice of explanatory principles, themselves required support. He presented it as self-evident that all change is motion caused by motion through impact,¹¹⁸ and therefore that all substance is corporeal and that there are no species nor any substantial forms.¹¹⁹ To support the claim that we have no ideas of incorporeal beings, he observed that all ideas arise from the senses and that the senses can be affected only by bodies in motion.¹²⁰ If this pattern of reasoning, from matter in motion to the operation of the senses and back again, be a circle, it is perhaps one of those circles large enough to achieve philosophical stability.

3. Gassendi: Between material and immaterial faculties

Although at the outset of his philosophical career Gassendi was not immersed in questions about the operation of the senses – his earliest philosophical writings were directed against the Aristotelians – he spent part of the 1630s investigating the theory of vision.¹²¹ His findings about light and vision agreed with the corpuscularianism of his two contemporaries, Descartes and Hobbes, though Gassendi adopted an Epicurean, 'atomistic' version (he posited indivisible particles moving in a void). Consonant with his commitment to Epicurean philosophy, he interpreted Epicurean simulacra in terms of the transmission of particles in rays from each point of an illuminated object so as to permeate the medium with images, which can be received at the retina.¹²² His early attempts to follow the atomic philosophy, as far as the fallible natural light of the human mind could trace it, led him to a materialist conception of the minds of human and beast alike, a position that he qualified through the religious teaching that humans possess immaterial souls.¹²³ In his final work, the *Syntagma*, he advanced arguments for the immateriality of the human mind based on the light of natural reason.¹²⁴

Gassendi's early theory of the faculties is similar in its materialism to that of Hobbes, and indeed his theory of the senses and imagination remained so into the *Syntagma*. Gassendi rejected sensory species, partly on the grounds that as 'forms without matter' they would be incorporeal and hence could not act on corporeal organs of sense.¹²⁵ He developed atomistic accounts of the five external senses, and of the nervous processes that properly constitute a 'sensing'.¹²⁶ He reduced the variety of internal senses to one, the imagination, conceived as a wholly corporeal power.¹²⁷ In the early theory, expressed in the *Disquisitio*, he held, like

Hobbes, that all human cognition can be achieved through the senses and imagination alone, without the activity of an incorporeal agent. In keeping with the background of traditional assumptions surveyed above, he therefore denied that the human mind has ideas of putatively immaterial substances, including the mind itself, God, and angels, and he rejected Descartes's distinction between the intellect and the imagination.¹²⁸ His refusal to countenance non-imagistic objects of thought was exemplified in his response to Descartes's distinction between two ideas of the sun – one from the senses, and one known through reasoning, without an image. According to Gassendi, we have only one idea of the sun, that derived from ordinary sense experience, and to the extent that we have an idea of the sun in its proper magnitude, we form this idea by enlarging the first idea so as to take the distance into account.¹²⁹

Gassendi reversed his denial that the imagination/intellect can grasp incorporeal things in the section of his *Syntagma* on the human soul. There he argued that humans have both a lower and a higher soul; the lower one, shared with beasts, is material, and carries out its operations through sense and imagination. The higher one is immaterial.¹³⁰ Strikingly, Gassendi argued for the existence of the immaterial soul by countering the very objections he had made to Descartes – as one of Descartes's disciples was quick to notice.¹³¹ He argued that, according to the light of natural reason, it is necessary to posit an immaterial soul to carry out the intellectual operations of grasping universals and other incorporeal things, including God, angels, and the human mind itself; indeed, he now argued that of the two ideas of the sun – sensory and astronomical – the second cannot be grasped by the imagination but requires an immaterial intellect. He did not precisely reverse his position, for he did not describe these intellectual operations as did Descartes: he did not posit an intuitive apprehension of God, the soul, and universal essences. The Gassendist intellect, whether reduced to imagination or not, remained a discursive intellect. According to his later position, the astronomical idea of the sun cannot be known by the senses alone, but it is known discursively. At the same time, Gassendi now argues that because such discursive powers go beyond what the imagination could achieve in itself, they require an immaterial agency.¹³²

The change in Gassendi's position exemplifies a generally accepted conception of the relations among the intellect, imagination, and the objects of cognition: those, like Descartes, who distinguish an immaterial intellect from the imagination, also affirm its ability to cognise immaterial substances and the essences of things; those, like Hobbes, who reduce intellect to imagination deny that immaterial substances or universal essences can be directly cognised. Gassendi simply

adopted first one, then the other position. Differences over the status of the intellect also led to different justificatory strategies for the corpuscular theory of the senses. Descartes could appeal to the deliverances of pure intellect to justify his physics of matter and motion. Hobbes and the early Gassendi could not and thus were left with the less direct (but philosophically longer lived) strategy of attempting to justify their corpuscularian position on its comparative merits, without the benefit of a previously established, absolute standard of comparison.

V. THE FACULTIES AMONG RATIONALIST METAPHYSICIANS

The post-Cartesian rationalists of the seventeenth century differed among themselves, and often from Descartes, on the ontology of mind, body, and their relation, but they shared a core position on the cognitive faculties, which underlies their grouping as 'rationalists' as opposed to 'empiricists'. They all affirmed that the intellect can operate independently of the senses, and that in so doing it achieves fundamental knowledge of intelligible objects, including the essences of things. They limited the rôle of the senses to detecting benefits and harms in the ambient environment or to determining empirical facts of use in the science of nature.

1. Spinoza and Leibniz

In contrast to most major philosophers of the seventeenth century, Spinoza and Leibniz did not give the theory of the faculties philosophical prominence. Together with many others, they were philosophers of substance. But whereas others focused the beam of metaphysical scrutiny on the faculties by which substance allegedly is known, Spinoza and Leibniz began their philosophical arguments directly from statements or assumptions about substance itself. In this regard their approach to metaphysics was like that of the major ancient and mediaeval philosophers.

Spinoza's conception of mind and body as two aspects of a single deterministic order left no room for a unitary soul in possession of various faculties or powers. Given this metaphysics, talk of an array of faculties has to be regarded as a way of talking of the array of ideas, and of the relation of some of them to the array of things. One kind of example is supplied by the absorption of judgement into the idea: 'an idea, insofar as it is an idea, involves an affirmation or negation.'¹³³ More generally, Spinoza reduced the mind to a collection of ideas, or a single complex idea, identified by the fact that it is the idea of a particular human body.¹³⁴ He nonetheless used the language of the faculties in distinguishing sense, imagination,

and intellect, and he gave an account of the bodily counterparts for the first two. Sensations have their counterpart in bodily states caused by the impingement of external objects on the sense-organs, and they represent those objects in virtue of the principle that the idea of the cause is implied in the idea of the effect. Within his double-aspect theory of mind-body relation, there is no genuine causation between material sense-organs and independent ideas. Rather, sensory ideas are simply one sort of idea found in the idea that constitutes the human mind – the sort that have as a bodily counterpart some activity in the liquid and soft parts of the body (presumably, animal spirits and the brain), whose current state (in veridical perception) is partly caused by external objects. Spinoza also sketched a material basis for the associative connections formed by the imagination.¹³⁵ His strict parallelism further implied that purely intellectual ideas must have their bodily correlates, but he did not characterise these correlates in the *Ethica*.

Spinoza displayed his admiration for the intellect over the senses and imagination in ranking three kinds of knowledge.¹³⁶ The first and lowest kind arises in a disordered manner from the senses, or from hearsay, and is mediated by the imagination. The second kind arises from reason and includes the 'adequate' ideas by which the mind apprehends attributes and modes that are common to everything, as are the ideas of extension and motion in the case of bodies. These adequate ideas of common properties must be distinguished from the confused ideas that are called universals, such as the ideas of *man*, *horse*, or even *being* that arise when the images of individual humans, horses, or things (respectively) are confusedly melded together in the imagination. Accordingly, the 'universals' of scholastic Aristotelianism are produced not through intellectual abstraction, but by imaginal confusion.¹³⁷ Finally, Spinoza described a third type of knowledge, denominated as 'intuitive', which 'proceeds from an adequate idea of the formal essence of certain attributes of God to the adequate knowledge of the essence of things'.¹³⁸ Knowledge of this last kind was the ultimate aim of the *Ethica*. As befit his methodological strategy simply to find and follow adequate ideas, Spinoza had little to say about how intuitive knowledge is possible.

For Leibniz, as for Spinoza, the theory of the faculties did not produce significant argumentation and original thought. In general, Leibniz adopted a simplified Aristotelian division of the faculties and their objects into the external senses, the internal sense (the imagination or common sense), and the intellect.¹³⁹ Ontologically, his mature doctrine of individual substance and 'pre-established harmony' precluded a real causal interaction between mind and body, and hence a genuinely interactionist explanation of sense-perception, imagination, or memory.¹⁴⁰ Leibniz focused not on the physiology and ontology of the faculties, but

on the epistemic status of their objects. By the external senses we know sensible qualities such as light, colours, and odours; such qualities are cognitively 'clear' (i.e., recognisable) but 'confused' (their content is not further distinguishable). The common sensibles, such as number and shape, are 'found in' the objects of more than one sense, shapes being 'common to colours and tactile qualities'; they are cognised by the imagination or common sense, and are clear and distinct. The common sensibles are the objects of the mathematical sciences, both pure and mixed, though the demonstrations of mathematics require the intellect. Finally, the understanding cognises some objects that are purely intelligible and do not fall under the senses, such as the mind itself, and Leibniz claims to glean from contemplation of the mind the basic notions of metaphysics, including *substance*, *cause*, *effect*, *action*, and *similarity*.¹⁴¹

Leibniz strictly distinguished between sense, imagination, and memory on the one hand, and the pure understanding, on the other. Both beasts and humans have imagination and memory and are capable of forming connections between repeated instances of successive perceptions; upon subsequent occurrences of the first perception, a strong imagination of the other will arise, as when a dog whines in the presence of a stick used previously to punish it. These associative connections (based on habit) guide most human actions, when we act like 'mere empirics'.¹⁴² Expectations arising from memory and imagination are distinct from those originating in reason. When we expect daylight after night because of mere past experience, memory and imagination are at work; but when we understand the cause of this succession as does the astronomer, we rely on the intellect or understanding. More generally, Leibniz accorded to the understanding two functions that could not be carried out by sense, imagination, and memory. First, the understanding grasps intelligible objects as mentioned. Second, the understanding serves to move from imperfect or finite experiences to necessary and universal truths. Leibniz argued from the actuality of human knowledge of necessary truths in the sciences, to the reality of the intellect as a faculty.

It is generally true that we know [necessary truths] only by this natural light, and not at all by the experiences of the senses. For the senses can indeed make known in some fashion what is, but they cannot make us know what must be or cannot be otherwise. . . . This [further] consideration [from geometry] also shows that there is a *light which is born with us*. For since the senses and induction can never teach us truths that are fully universal, nor what is absolutely necessary, but only what is, and what is found in particular examples, and since we nonetheless know the universal and necessary truths of the sciences – in which we are privileged over the beasts – it follows that we have drawn these truths in part from what is within us.¹⁴³

This natural light is responsible not only for our knowledge of the axioms of mathematics and other necessary truths but also for our ability to draw universal conclusions from a finite number of experiences, as is the case when we judge under what conditions iron will and will not sink in water.

2. Malebranche: Sense, judgement, and pure understanding

Among Cartesians, Malebranche developed the theory of the faculties the most extensively and with the greatest originality. He differed from other major Cartesians and from Descartes himself in that his aims were primarily spiritual, rather than theoretical or metaphysical. In his major work, *De la recherche de la vérité*, the theory of the faculties provided the organising framework for a diagnosis of the human bent towards error and sin. By making the 'science of man' primary, he hoped to discover how fallen humankind could avoid the errors that divert human thought from its natural object, God.¹⁴⁴

Malebranche adopted Descartes's division of the faculties into sense, imagination, and pure understanding, his distinction between intellect and will, and his assignment of judgement to the latter. Through the pure understanding we perceive spiritual things, universals, common notions, and God, as well as ourselves upon self-reflection. By the pure understanding the soul 'even perceives material things, extension with its properties; for only pure understanding could perceive a perfect circle, a perfect square, a figure of a thousand sides, and similar things'. Such perceptions are called 'pure intellections', or 'pure perceptions' because 'the mind has no need to form corporeal images in the brain to represent all these things.' Malebranche explained the faculty of imagination by appeal to material images in the brain. The object of imagination is limited to material things: 'since one cannot form images of spiritual things, it follows that the soul cannot imagine them; and this should be noted well.' Finally, the soul has sensations of external objects, either when they make impressions upon the body, or when, 'in their absence, the flow of animal spirits makes a similar impression in the brain'.¹⁴⁵ Of course, the rôle of the brain in imagination and sensation must be understood according to Malebranche's occasionalism, and the soul's ability to exercise pure understanding according to his doctrine that we 'see' intelligible ideas in God (ideas of extension only, for we cognise the soul or God not through ideas, but by their own immediate presence).¹⁴⁶

Malebranche's elaboration of the relationship between sense and understanding is the most distinctive aspect of his doctrine of the faculties. In the *Recherche*, Descartes's 'three grades of sense' became four, with grade one being partitioned into extra-bodily and bodily stages. Malebranche described his third stage as a

passion, or sensation, which occurs in the soul itself on the occasion of brain motions.¹⁴⁷ He altered his description of the fourth stage between the first and second editions of the *Recherche*. At first he described the fourth stage as a rapid, habitual judgement that goes unnoticed and so is regarded as a sensation, even though it actually is a judgement – a description that accords with Descartes's third grade of sense. In subsequent editions, however, Malebranche attributed these 'natural judgements' to God rather than to the human mind; God causes sensations in us corresponding to appropriate optical calculations (e.g., of the size, shape, and distance of objects). Such natural judgements include the belief in real qualities – a naturally arising belief that is, according to Malebranche, followed by a free judgement of the human mind to the same effect, a judgement he hoped to eradicate from his readers.¹⁴⁸ The reassignment of the natural judgements to God makes him an implanter of false conclusions into human minds without their complicity. Malebranche forestalled the theodical question of deceit by observing that these judgements serve only the proper function of the senses, which is to guide the body away from harms and towards benefits.¹⁴⁹ He justified the revised doctrine theoretically by arguing that the finite human mind could not carry out the variety of instantaneous judgements required merely to calculate the size and distance of objects in the field of view. When we open our eyes on a country field, we immediately see a determinate landscape, despite the myriad detail. Thus, God's agency – albeit limited to presenting sensations that accord with such calculations as could be made from the inaccurate perspective projections produced by the imperfect optical apparatus of the human body – is required by the most ordinary of perceptual acts.¹⁵⁰

Descartes's writings had left unanswered the question of whether sensations are bare signs for their external causes, without intelligible content, or are confused intellectual apprehensions of those causes (i.e., of matter in motion), sometimes seeming to support the former,¹⁵¹ sometimes the latter.¹⁵² Malebranche denied all intellectual content to sensations. They are not properly deemed confused ideas, for they are not ideas at all; rather, they are modifications of the soul. Unlike ideas, we do not see them in God, but God causes them to occur in the soul in accordance with His general decrees about the relation between bodily states and the arousal of sensations. By contrast, our pure conceptions of bodies – in terms of size, shape, and motion – are ideas that we 'see' in God, by passively receiving them in accordance with His general decision to reveal appropriate ideas to the faculty of understanding on the occasion of the will's desire to judge of them.¹⁵³

Visual perceptions contain both sensations (of light and colour) and ideas (of intelligible qualities, such as size, shape, and motion). The former exist only in

our souls, the latter are in God. We 'spread' or 'project' our sensations of colour onto ideas of shape as revealed by God.¹⁵⁴ This projection itself can only be a 'natural judgement'. Malebranche's fourth stage of sense, then, includes not only judgements that objects have a determinate size and distance but also projective judgements that render these shaped objects phenomenally coloured. The content of the perception of shape stems from an idea in God, that of the experience of colour from a sensation produced in us. The natural judgements of stage four thus must serve to explain, as far as can be, how colour sensations in us become phenomenally united with ideas of shape in God.

VI. THE FACULTIES AND THE CAMBRIDGE PLATONISTS

The Cambridge Platonists valued reason as the image of God in man and as the sure route to knowledge of the divine.¹⁵⁵ Yet they differed from Renaissance Neoplatonists in restricting the immediate object of reason to modes of the human mind (rather than Forms in the divine mind). They gave little systematic attention to the theory of cognition in itself, but discussed the cognitive faculties in the service of other aims, such as refuting the materialism of Hobbes, defending an argument for the existence of God, or diagnosing the contributions of the various faculties to enthusiasm.¹⁵⁶

More responded to Hobbes's materialistic account of the faculties by trying to show that mere matter could not perform our known mental functions. Of all the matter of the brain, he found the fluid animal spirits to be the most plausible candidate for a materialistic seat of sensation. But he argued that 'no *Matter* whatsoever is capable of such *Sense* and *Perception* as we are conscious to our selves of'. If sensing is performed wholly by the 'common percipient' or 'sensorium' of the brain, then sensory images are found either in one point, or in every point, or in a point-for-point correspondence across the sensorium. If the first be the case, the point receiving the images surely could not subsequently, through material means alone, put the body into motion in reaction to the image received; if the second, the same problem arises on a point-by-point basis; if the third, the unified experience of the whole image goes unexplained.¹⁵⁷ More further argued the unsuitability of fluid, viscous, or hard matter for receiving material images and preserving them, as would be required by imagination and especially memory, or for creating, altering, and experiencing images through imagination and inventive reason.¹⁵⁸ Against Hobbes's claim that 'second notions', including logical and mathematical conceptions, could be seated in matter alone by being equated with mere names or words, he contended that some common and therefore mental

basis is required for them, because names differ among languages, but speakers share a common mental content.¹⁵⁹

In his positive account of the faculties, More devoted great effort to proving that the soul 'is not confined to the Common *Sensorium*, but does essentially reach all the Organs of the Body,' and that it has its chief seat in the 'purer Animal Spirits of the fourth Ventricle of the Brain'.¹⁶⁰ His discussion of the operation of the faculties was perfunctory. In opposition to Descartes and his followers, More argued that the qualities and images of things are sensed by the soul as present in the sense organ, and that this sensing is then conveyed, via the animal spirits (the soul's instrument), to the 'Centre of Perception' in the brain, where perception itself occurs.¹⁶¹ Imagination exercises its function at the seat of the soul in the fourth ventricle of the brain. Memory requires the brain as its instrument, but not for the storage of images which the soul directly consults. Indeed, in remembering we experience only a state of the soul: 'it is plain that the *Memory* is in the *Soul*, and not in the *Brain*.' More therefore conjectured that the soul itself, through its noncognitive 'plastick power', uses marks in the brain as a kind of 'brachygraphie' or shorthand for things to be remembered. In his positive account of reason or understanding, More simply stated that '*Reason* is so involved together with *Imagination*, that we need say nothing of it apart by it self'.¹⁶² But he elsewhere ascribed to reason the ability to go beyond mere images in grasping geometrical, mathematical, and logical concepts, and in the ideas of immaterial beings including God.¹⁶³ In doing so, however, it does not contemplate Forms or essences exterior to itself, but uses its natural capacities and innate notions or ideas.¹⁶⁴

Cudworth discussed the faculties in defending arguments for the existence of God against the atheistic charge that only material things are humanly cognisable because we know only by way of the senses. But, he countered, 'there is a Higher Faculty in the Soul, of *Reason* and *Understanding*,' beyond sense and imagination. Such a faculty must be acknowledged first on the grounds that without it, we could not form theories of the senses that deny real qualities to external objects and reduce them to 'Magnitude, Figure, Site, Motion, and Rest'. Of the latter, we have not only 'sensible phantasms', but also 'intelligible ideas', though we are likely to confound the two. Of some things, including the meanings of words, our own mind, and God, we have no 'Genuine Phantasm', but only a 'Sence' or 'Intelligible Notion'. The perception of principles, such as that 'Nothing can not act', also depends on understanding rather than sense.¹⁶⁵

Cudworth used such differences to justify a sharp contrast between the cognitive functions of the senses and intellect. The mind in sensing is partly passive and partly active. It is passive in receiving impressions from the body, active in forming

the experienced quality (such as ideas of heat, light, and colours). These sensations are not for knowing truths, or the natures of external things, but for the 'use of the body' (quoting Plotinus).¹⁶⁶ The intellect is for knowing truths and essences, and in doing so it goes beyond the materials of sense. Through the intellect we come to know eternal verities, pertaining to perfect geometrical figures that do not exist in nature and to possibilities that are not actual. To explain such abilities of the human intellect, Cudworth infers the existence of a higher type of mind that contains the archetypes of these thoughts. A mere finite mind, he reasoned, could not generate the possibilities that it knows; these must first be seen by the mind of an 'infinitely fecund' being who really could generate all things. All finite minds, then, 'derive from' and 'participate in' the one infinite mind, 'being as it were Stamped with the Impression or Signature of one and the same Seal'.¹⁶⁷ According to Cudworth, as for More, these eternal verities and other truths have their presence as ectypal ideas that are innate in human minds,¹⁶⁸ and not, as with Ficino and Pico, as Forms in the mind of God apprehended there by lower minds.

VII. THE COGNITIVE FACULTIES IN LOCKE AND BERKELEY

Locke and Berkeley formulated arguments that draw upon or illustrate common assumptions about the faculties, especially about the rôle of understanding in grasping essences. Discussion of the Molyneux problem raised the question of whether the idea of extension is common to the perceptions of touch and sight.

1. *Locke: Limits of the understanding*

Although Locke's *Essay* was, from its inception, conceived as a book about the human understanding, it was organised around the notion of ideas rather than that of faculties.¹⁶⁹ Its discussion of the faculties arises during Locke's endeavour to produce a general catalogue of simple ideas; having considered various simple ideas received from the external senses, Locke turns to those that arise from 'reflection' – the ideas of the mind's 'powers' to operate on its own ideas. Familiarly enough, Locke divides the 'powers' or 'faculties' of the mind into understanding and will.¹⁷⁰ His list of the 'faculties of the mind' is only partly familiar: without claiming to be exhaustive, it includes perception, retention (divided into contemplation and memory), discerning, comparing, composing, enlarging, and abstracting; elsewhere, he lists reasoning, judging, and knowing as modes of understanding.¹⁷¹ Like Hobbes and the early Gassendi, Locke did not commit himself to a faculty of pure understanding, capable of cognition

independently of the senses and imagination; but unlike them, he did not explicitly reduce understanding to sense and imagination, nor did he promote a materialistic theory of cognition.

In effect, Locke argued that the human mind lacks certain cognitive powers that previous authors had attributed to pure understanding. His contention that all ideas arise from experience, by either sensation or reflection, committed him to denying the claim of the Cartesians – and of the Cambridge Platonists as well – that the understanding has access either to innate ideas or to pure conceptions that are perceived independently of the senses.¹⁷² He was no less at odds with the Aristotelian account of the understanding. Although he shared with the Aristotelians the dictum that there is 'nothing in the intellect that was not first in the senses', he rejected their claim that the human intellect abstracts the real essences of substances from sensory particulars. Locke's discussion of abstraction and general ideas sometimes seems to follow that of 'the schools', as when he says that people make a general idea of *Man* by abstracting so as to 'leave out of the complex *Idea* they had of Peter and James, Mary and Jane, that which is peculiar to each, and retain only what is common to them all', and when he subsequently equates general ideas with 'essences' or 'species'.¹⁷³ But whereas the Aristotelian act of abstraction was conceived as a true grasping of an essence or common nature, Locke explains the production of general ideas as merely 'the workmanship of the understanding'.¹⁷⁴ The activity of the understanding in framing abstract ideas of simple properties such as 'white' comes to no more than ignoring what is particular in some specific idea of white, and noting its similarity to other such ideas; in the case of substances, it comes to no more than the grouping of several simple ideas together, as a 'pattern' for sorting subsequent groups of simple ideas. Locke explicitly denies that when he speaks of general ideas as 'essences', he has in mind a 'real essence' in which all individuals in a species 'partake', for he denies that we have knowledge of such essences.¹⁷⁵

2. *Berkeley: Against intelligible extension and common sensibles*

Berkeley employed the theory of the faculties in promoting and defending his immaterialism. He adopted the now standard division between will and understanding, and divided the origins of occurrent ideas among sense, memory, and imagination.¹⁷⁶ He restricted the scope of pure intellect. Humans know immaterial substances via the intellect – though by way of 'notion'¹⁷⁷ rather than 'idea' – but the intellect does not perceive intelligible extension.¹⁷⁸ This attack on intelligible extension was part of a more general challenge to the existence of matter and the intelligibility of its concept. If successful, it would trim the sails of

rationalist metaphysical friends of matter. It would not bother matter's empirical friends, who claimed only that we perceive the sensible extension of matter by both sight and touch. But Berkeley challenged them as well: he denied that visible and tangible extension are instances of a single, common property of being determinately extended, and therefore that the term 'extension' names an ideational content common to the proper objects of touch and vision.

Berkeley's position on sensible extension entailed that all previous theories of vision were in error with respect to spatial perception and the common sensibles. Every author considered thus far held that the ideas of shape, size, and motion received by vision and touch are 'common' – that is, that the idea of a square as known by touch is of an identical type with the idea of a square as received by sight (even if the shape is exhibited with different phenomenal qualities, e.g., colour and texture). The typical and natural explanation of this fact was that one and the same shaped thing causes, or occasions, both ideas, and has its shape represented by both. Berkeley denied that mind-independent material objects exist and that a common ideational content is found in the ideas of sight and touch. The *New Theory of Vision* presents his most extensive arguments for the latter. That work does not endorse immaterialism, and its treatment of the perception of distance and magnitude can be considered independently of immaterialist motivations. But the motivation for treating the problem of 'common sensibles' so extensively – the discussion fills more than one third of the work – becomes intelligible only when its connexion with belief in material objects is made plain. If Berkeley could successfully show that there is no intrinsic connexion between visual and tactual ideas of size, shape, and motion, he would thereby eliminate one of the central arguments for positing a single, material cause of visual and tactual ideas. He would, of course, need to explain why visual and tactual ideas of shape seem similar, but his account of vision was admirably suited to this task: it taught that when a mature perceiver 'sees' distance, size, and shape, this seemingly visual experience is mediated by tactual ideas that have come to be associated (through 'suggestion') with the properly visual ideas that constitute the immediate objects of sight, in such a way that the perceiver no longer notices the visual magnitude and shape but accepts the associated tactual ideas as the object of sight.¹⁷⁹

3. Molyneux's question

In March 1693 William Molyneux wrote to Locke posing his famous question: whether a newly sighted blind person, who could recognise the shapes of objects by touch, would be able at first to do so by sight alone, when presented with a

globe and a cube of similar sizes. Molyneux argued that even though the person can distinguish the figures by touch, 'yet he has not yet attained the experience, that what affects his touch so or so, must affect his sight so or so.' Locke agreed, and invited the reader to consider the extensive rôle of 'experience, improvement, and acquired notions' in perception. He held that as a result of judgements made habitual by experience, visual sensations are altered from two-dimensional images to experiences of three-dimensional shapes. A sphere placed before the eyes at first produces only the idea of 'a flat Circle variously shadow'd' (and a cube might produce a variously shadowed hexagon); by 'an habitual custom' of judgement, we subsequently frame the idea of a sphere (or cube).¹⁸⁰ Locke considered these unnoticed judgements to be unique to vision among the senses.¹⁸¹

Whether Locke should in fact have agreed with Molyneux's negative reply depends on how one interprets the question posed. If all that is required of the newly sighted is to discriminate one figure from another, then Locke's principles suggest an affirmative reply. Locke held that determinate ideas of such determinables as 'extension, figure, motion, and rest' are 'convey[ed] into our Minds' by both sight and touch. He also attributed to all human minds a native power for discerning sameness or difference of ideas.¹⁸² He should therefore expect a newly sighted person to succeed in discriminating between the visual ideas presented by a sphere and cube, that is, the plane figures of a circle and hexagon.

But Molyneux's task demanded more than mere discrimination of plane figures. He asked whether the newly sighted could 'distinguish and tell, which is the Globe, which the Cube'. Locke's negative answer to this question depends on his belief that the newly sighted would not have acquired the unnoticed judgements that account for perception in three dimensions. He does not say why this lack would preclude success, but he apparently ruled out the possibility that the perceiver could complete the task by noting the similarity between a visually given circle and a tactual sphere (by contrast with a tactual cube). Locke could not, with consistency, argue that the perceiver must learn the connection between identical determinate visual and tactual shapes, because that would have violated his conception that the same determinable, shape, is perceived by both touch and vision.

Leibniz, in his *Nouveaux essais*, agreed with Locke and Molyneux that, if the newly sighted person is not informed that a sphere and a cube lie before him, 'it will not at first occur to him that these types of pictures, which will strike him in the fund of his eyes, and which could have come from a flat painting on the table, represent bodies.' But Leibniz thought that if a newly sighted blind person versed in optics were told which figures to look for, he could discern globe and cube (say, by counting angles on the cube), and that, if given sufficient time, he would,

without such prompting, 'by dint of reasoning about the light rays in accordance with optics, be able to understand by the lights and shadows that there is something blocking the rays, and that it must be precisely the same thing that resists his touch'. He explained that the newly sighted can be expected to have this facility because the geometrical figures of touch and sight 'ultimately rest on the same ideas, even though they have no images in common'.¹⁸³ Leibniz apparently held that the existence of intelligible ideas of extension (denied by Locke) facilitates the task of comparison. But notwithstanding this disagreement over shared intelligible – as opposed to 'common sensory' – ideas of extension, Locke and Leibniz agree in making the problem turn on the psychological difficulty of the task involved. Neither has a principled reason for denying that the newly sighted could recognise plane or even volumetric visual shapes; they predict failure because of expected difficulty in inferring without practice from two-dimensional images to solids.

By contrast, Berkeley interpreted Molyneux's question so that it applied to plane figures such as squares, and he nonetheless answered it negatively,¹⁸⁴ arguing from his principle that shape is not 'common' to visual and tactual ideas. The immediate visual sensation, or 'proper object of vision', does, on Berkeleyan principles, contain 'visible figures' corresponding to Locke's plane circle and hexagon.¹⁸⁵ But these 'figures' are not, perforce, species of common sensibles. That is, the immediate idea of shape received by vision is not part of the same species of idea, 'ideas of shape', as the immediate ideas of shape received through touch. The phenomenal sameness that we experience arises only in the case of what Berkeley termed the mediate object of vision, which includes the tactual ideas of three-dimensional objects, fused into the visual ideas of light and colour by the associative process of suggestion.¹⁸⁶

VIII. PHILOSOPHY AND THE THEORY OF COGNITION

The cognitive faculties were often at the center of philosophical innovation in the seventeenth century. Corpuscularians of necessity framed new theories of sense and imagination; the theory of the intellect was at the crux of metaphysical disputes about the nature of the mind, its ability to know the essences of material things, and to cognise immaterial things. Nonetheless, it would be a distortion to say that the theory of cognition, or the theory of knowledge, dominated and controlled early modern philosophy.

It has been common to mark the seventeenth century as the time when the 'theory of knowledge' attained a central place in philosophy: scepticism and the

theory of ideas are alleged to have created the modern epistemological problematic, and epistemology to have become the independent arbiter of metaphysics. Examination of the actual works of those credited (or charged) with the 'epistemological turn' – Descartes, Locke, and Berkeley – suggests otherwise. It is true that Descartes employed sceptical arguments in his *Meditationes*, and that they were presented as a test of the possibility of human knowledge. But these arguments were part of a calculated strategy for purging the senses and uncovering the pure intellect; Descartes's 'Archimedean point', from which he sought metaphysical knowledge, was not founded on the theory of cognition but on the cognitive results of intellection. Malebranche, Locke, and Berkeley were also intensely interested in the power and scope of the intellect. Their projects differ from previous philosophy, and from the direction taken by Spinoza and Leibniz, in that they made the investigation of the knower a fundamental part of the evaluation of metaphysical knowledge. But the theories of cognition, or theories of knowledge, that they developed were not intended to provide independent grounds for adjudicating metaphysics. In Malebranche, the theory of the faculties was itself embedded in a metaphysical theory of the relation between the intellect and the essences of things. Locke, with his project 'to examine our own Abilities, and see, what Objects our Understandings were, or were not fitted to deal with',¹⁸⁷ fits most nearly the picture of epistemology made the autonomous adjudicator of philosophy. But rather than treat the theory of the faculties as an independent ground from which to judge other cognitive claims, Locke examines the senses and intellect by way of internal tests of the faculties against specific metaphysical claims made by others and finds, often grudgingly, that our perception and knowledge fall short of real essences. Berkeley adopts a similar attitude in examining the cognitive basis for knowing material substance, though his discoveries of failure are not presented grudgingly.

It is also a mistake to posit a close relation between seventeenth-century theories of cognition as employed in metaphysical disputes and naturalistic theories of cognition that developed in the eighteenth century and afterwards. It is not that nothing in the writings of Descartes, Hobbes, Malebranche, Locke, or Berkeley could, with hindsight, properly be described as naturalistic psychology; indeed, portions of their theories of the senses and imagination constitute the modern foundation of naturalistic theories of cognition. Furthermore, it may be noted that Descartes's writings of the 1630s, and Hobbes's writings on the faculties in general, employed the strategy of attempting to win support for the corpuscular philosophy by appealing to the 'physics' of sensory stimulation, and that Berkeley attempted to undermine that philosophy through his 'psychology' of sensory

perception; to this extent, their works contain an early form of 'naturalised' epistemology. But none of these authors attempted to make the results of an empirically based, natural-scientific theory of cognition the ultimate arbiter of metaphysics or other branches of knowledge. Indeed, in the mature work of Descartes, as in that of Malebranche and Berkeley, the understanding operating in isolation from the senses frames the metaphysical theory of the real. Even Hobbes, within his justification of a mechanical approach to nature, treated as basic the appeal to the 'evidence' of certain claims, as did Locke in his account of knowledge in its various degrees.

At the opening of the seventeenth century, the deepest and most widely shared assumption about the faculties was that an immaterial agency is required for the cognition of immaterial objects. Hobbes made use of this assumption, to the extent that he hoped his argument that all the objects of knowledge are material would remove what had been recognised as the strongest reason for affirming the immateriality of the intellect. The assumption held sway well into the eighteenth century. Indeed, Hume's attack on the view that the mind is able to perceive 'necessary connections', or active powers and agencies, may well have been directed towards a philosophical audience who believed that only an immaterial agency could perceive such connexions or agencies. Kant may have first broken the grip of the assumption. He sought to establish an account of human understanding that precluded its reduction to sense and imagination and that allowed for the cognition of necessary laws, and he endeavoured to do so without appealing to the ontology of the intellect or its objects. It is to Kant that one must look to find the origin of philosophical theories of cognition – or of the conditions on knowledge – that are independent of metaphysics, and so to identify the force behind the 'epistemological turn'. Although earlier philosophers, including Descartes, Locke, and Berkeley, had conceived the project of investigating the knower in order to determine what can be known, it was Kant and not they who molded that investigation, for a time, into the paramount project of theoretical philosophy.

NOTES

- 1 Another major faculty, the will, is examined in Chapter 33. It enters the present chapter through its rôle in judgement.
- 2 R. Rorty 1978, chaps. 1, 3; cf. Ayers 1985.
- 3 Spinoza, *De int. emen.*; Locke, *Ess.*; Leibniz, *Nouv. ess.*; Berkeley, *Pr. Hum. Kn. Descartes, Disc.*, uses 'raison' in its title.
- 4 Explicitly in Charron *Sag.*, bk. 1; Herbert of Cherbury 1633; Hobbes 1969, p. xiv; and Malebranche, *Rech.*; implicitly in Descartes, *Meds.*

- 5 Eustachius a Sancto Paulo 1638, pt. 3, 'Physica', III.3, disp. 3 q1 (p. 264); Thomas Aquinas, *Summa th.*, I q78 a4, end; Steneck 1974.
- 6 Ficino, *Commentarium in Phedrum*, chap. 11 (Ficino 1981, pp. 120–1; see also pp. 122–3). Pico della Mirandola in *Heptaplus*, 4th exp., chap. 2, 5th exp., chap. 6 (Pico della Mirandola 1942, pp. 274, 304), writes that the human intellect partakes of the angelic, which contemplates the intelligible forms (3rd ex., chap. 2, Pico della Mirandola 1942, pp. 252–5; Pico della Mirandola 1965, p. 109).
- 7 *Heptaplus*, 4th exp., chap. 1, Pico della Mirandola 1942, p. 270 (Pico della Mirandola 1965, p. 119); 5th exp., chap. 6 (Pico della Mirandola 1942, p. 304; 1965, p. 135); Ficino, *Commentarium in Phedrum*, chaps. 7–9 (Ficino 1981, pp. 96–111).
- 8 Ficino, *Theologia Platonica*, Bk. 18, chap. 4 (Ficino 1964, pp. 193–5; Ficino 1981, pp. 234–5); Marcantonio Genua placed the rational soul in the body not as its informing form, but as a captain in a ship; see Kessler 1988, pp. 524–5.
- 9 *Collegium Conimbricense* 1600, II.1, q6 a2, concl. 1 (p. 96); II.3, q1 a1 (pp. 133–4); Eustachius a Sancto Paulo 1638, 'Physica', III.1, disp. 1 q6–7 (pp. 182–5); III.4, disp. 1 q2–3 (pp. 279–82); Melanchthon, *Liber de anima* (Melanchthon 1834–60, vol. 13, pp. 9–20); Suárez, *De anima*, I.4.4, I.6.15, I.11.4 (Su. *Op. omn.* 3, pp. 493a, 510a, 553b); Toletus 1594, II.1, q1, concl. 4 (fol. 40rb); II.3, q7, concls. 3–4 (fol. 62vb). See also Thomas Aquinas, *Summa th.*, I q75 a4; q76 a1; q76 a3; q78 a1; Thomas Aquinas 1968b and 1984, q1–2, 11; and on Duns Scotus, Bonansea 1983, pp. 11–36.
- 10 *Collegium Conimbricense* 1607, 'In Isagogem Porphyrii', pref., q5 a2 (pp. 133–5); Eustachius a Sancto Paulo 1638, 'Physica', III.4, disp. 2 q4–7 (pp. 287–93); Suárez, *De anima*, IV.3–6 (Su. *Op. omn.* 3, pp. 722–38); Toletus 1596, 'In librum Porphyrii', q2 (p. 27b). See also Thomas Aquinas, *Summa th.*, I q76 a5; q84 a7; q85 a1; q85 a3; and on Duns Scotus, Wolter 1990, chaps. 2, 5. These authors differed on whether knowledge pertains only to universals or includes particulars.
- 11 Thomas Aquinas 1968b; Duns Scotus, *Super libros Aristotelis De anima* (Duns Scotus 1891–95, vol. 3, pp. 472–642); *Collegium Conimbricense* 1600; Melanchthon, *Liber de anima* (Melanchthon 1834–60, vol. 13, pp. 5–178); Rubius 1620; Toletus 1594; Zabarella 1606. Aristotle's *De anima* was itself organised as a treatment of the faculties (primarily, sense and understanding), on which see Kahn 1966.
- 12 Textbooks: Eustachius a Sancto Paulo 1638, pt. 3, 'Physica', III.3–4 (pp. 228–308); Keckermann, *Systema physicum*, III.15–IV.6 (Keckermann 1614, cols. 1512–1621); Melanchthon, *Initia doctrinae physicae* (Melanchthon 1834–60, vol. 13, p. 197). Toletus 1594, proem, q2, concl. 3 (fol. 4), subsumed the soul in all of its operations under physics; *Collegium Conimbricense* 1600, proem, q1 a2 (pp. 7–9) and Rubius 1620, proem, q1 (pp. 10–12), subsumed the study of the soul considered as separated from the body under metaphysics, while appending treatment of the separable soul to their *De anima* commentaries.
- 13 In the logical commentaries the most extensive discussion of the intellect and its abstractive powers occurred in the part on Porphyry's *Isagoge*, printed as an introduction to Aristotle's *Categories*: e.g., *Collegium Conimbricense* 1607, q5 a1–2 (pp. 131–5); Rubius 1641, chap. 1, q5 (pp. 37–8); Toletus 1596, q2 (pp. 26b–29a).
- 14 On the external and internal senses, corporeal phantasms, and the estimative power (which sometimes was considered distinct from imagination, and sometimes not), see *Collegium Conimbricense* 1600, II.5–III.3; Eustachius a Sancto Paulo 1638, 'Physica', tr. III; Keckermann, *Systema physicum*, III.16–29 (Keckermann 1614, cols. 1518–86); Melanchthon, *Liber de anima* (Melanchthon 1834–60, vol. 13, pp. 108–22); Rubius 1620, II.5–III.3; Suárez, *De anima*, Bk. III (Su. *Op. omn.* 3); Toletus 1594, II.5–III.3.

- See also Thomas Aquinas, *Summa th.*, I q78 a3-4; Duns Scotus, *De anima*, q1-10 (Duns Scotus 1891-5, vol. 3).
- 15 Eustachius a Sancto Paulo, 'Physica', III.3, disp. 1 q2 (pp. 230-3); Rubius 1620, II.5-6, q5 (pp. 309, 327). Suárez explains the term 'species intentionales': 'species quidem quia sunt formae representantes: intentionales vero non, quia entia realia non sint, sed quia notioni deserviunt, quae intentio dici solet' (*De anima*, III.1.4, Su. *Op. omn.* 3, p. 614a). He further observes that (sensory) intentional species are 'material' and 'divisible' (III.2.16, p. 619b), even if those of vision are the 'most perfect' because of their subtlety, and those of hearing are 'in a way, spiritual', having the subtlety of air (III.29.1, Su. *Op. omn.* 3, p. 700a).
- 16 Toletus 1594, II.12, q33 (fol. 109ra-110ra).
- 17 *Collegium Conimbricense* 1600, II.5-6, q2 a2 (pp. 173-5).
- 18 *Collegium Conimbricense* 1600, II.5-6, q2 a2-3 (pp. 172-80); Eustachius a Sancto Paulo 1638, 'Physica', III.3, disp. 1 q2; Rubius 1620, II.5-6, q5 (pp. 327-8); Suárez, *De anima*, III.2.9 (Su. *Op. omn.* 3, p. 618a); Toletus 1594, II.12, q34 (fol. 111ra). See also Thomas Aquinas, *Summa th.*, I.78.3; 84.1; Duns Scotus *De anima*, q5 (Duns Scotus 1891-5, vol. 3, pp. 491b-494a). On species as 'forms without matter', see Simmons 1994.
- 19 *Collegium Conimbricense* 1600, II.1, q1 a6 (pp. 62-3); q6 a2 (pp. 95-8); III.5, q1-6 (pp. 369-408); Eustachius a Sancto Paulo 1638, 'Physica', III.1, disp. 1 q5 (p. 182); III.4, disp. 2 q7-8, 10 (pp. 290-5, 298); Rubius 1620, III.4-5 (pp. 633-735); Suárez *De anima*, IV.2, IV.8.8 (Su. *Op. omn.* 3, pp. 715b-721b, 743a); Toletus 1594, III.4, q10; III.5, q13; III.7, q21. See also Thomas Aquinas, *Summa th.*, I q78 a1; q84 a6-7; 1968b [1984], q4, ad 1; *Quaestiones disputatae de veritate*, q10 a6 ad 7 (Thomas Aquinas 1882- , vol. 22, p. 314a); Duns Scotus, *De anima*, q17 (Duns Scotus 1891-5, vol. 3, pp. 580a-582a); *Ordinatio* I, d3, pt. 3, q3 (Duns Scotus 1950-, vol. 3, pp. 330-8).
- 20 *Collegium Conimbricense* 1607, pt. 2, 'De interpretatione', chap. 1, q5 a2 (pp. 56-8); chap. 4, q4 a1-2 (pp. 119-27); 'De posteriori resolutione', I.1, q3 a4 (pp. 423-4); but the will can influence the intellect when it is not determined by 'evident cognition', as in matters that depend on faith alone, 'De posteriori resolutione', I.26, q1 a4 (pp. 634-5). Eustachius a Sancto Paulo 1638, pt. 1, 'Dialecticam', I.1, disp. 1 q1 (pp. 110-12); pt. 3, 'Physica', III.4, disp. 1 q11 (pp. 299-300). Toletus 1596, 'Quaestiones in communi', q6 (pp. 18b-19b). The intellectual acts described as the 'simple apprehension' of a universal might be quite complex, involving comparisons with other forms in the possible intellect (e.g., Suárez, *De anima*, IV.3.21-26, Su. *Op. omn.* 3, pp. 728b-730b; Suárez 1964, sec. 6); for a comparison of Aquinas, Scotus, Ockham, and Suárez on this point, see Ross in Suárez 1964, pp. 23-7. Some authors denominated a fourth intellectual operation, ordering or method, which involves structuring an argument or text larger than a syllogism (de Launay 1673, diss. 1, chap. 2, p. 17).
- 21 *Collegium Conimbricense* 1600, II.5-6, q2 a2, p. 175; III.6-8, q3 a2 (p. 431); Eustachius a Sancto Paulo 1638, 'Physica', III.3, disp. 1 q2 ad 4 (p. 232); Rubius 1620, II.5-6, q3; Suárez, *De anima*, III.1.4-5; 1.8, 2.1-15 (Su. *Op. omn.* 3, pp. 614, 615, 616a-619b); Toletus 1594, II.12, q33 (fol. 109vb). See also Thomas Aquinas, *Summa th.*, I q84 a2; q85 a2.
- 22 All of the late scholastics canvassed herein say that the species 'represents' or 'is a representation of' an external object, and that it is, in one sense or another, a 'similitude' of the object: *Collegium Conimbricense* 1600, II.6, q2, a2, p. 173: '[Facultem] ab obiecto per sui similitudinem sensui impressam; datur ergo obiecti similitudo, siue species in sensu'; p. 174: 'species candoris, verbi gratia, non est ipse candor materialiter, sed id, quod candorem representat'; Eustachius a Sancto Paulo 1638, 'Physica', III.1,

- disp. 1 q2, pp. 230-1: 'cum oculus percipit colorem distantem, aiunt philosophi in oculo esse seu recipi similitudinem quam ipsius coloris, hoc est, qualitatem quam ab ipso colore per intermedium aerem propagata, & in ipso sensu visus recepta vim habeat ipsum colorem representandi'; Keckermann, *Systema physicum*, III.16 (Keckermann 1614, col. 1522); Rubius 1620, II.6, q3 (p. 324); Suárez, *De anima*, III.2.9 (Su. *Op. omn.* 3, p. 618a); Toletus 1594, II.12, q33 (fol. 109ra). See also Thomas Aquinas *Summa th.*, I q84 a7 ad 2; q85 a1-2; q85 a8 ad 3; *De veritate*, q8 a11 ad 3 (Thomas Aquinas 1882- , vol. 22, pp. 256b-257a); Duns Scotus, *De anima*, q5, resol. (Duns Scotus 1891-5, vol. 3, p. 494a).
- 23 Toletus 1594, II.12, q33, 'sense of the question': 'species est rei simulachrum quoddam, & imago, obiectum representans' (fol. 109ra); but, q33, concl. 2: 'species non est imagines rerum formales' (fol. 109vb-110ra), and q34, concl. 3: '[species] non est similitudo formalis subiecti' (fol. 111rb). Suárez, *De anima*, III.2.11-15, 20-6 (Su. *Op. omn.* 3, p. 622b) denies that we see species, or that impressed species represent by way of formal similitude, like 'pictures'; characterises species as 'effective' rather than 'formal' representations (vol. 3, p. 620b); and admits an 'intentional' similitude between species and object (vol. 3, p. 622a). Rubius 1620, II.5-6, q6, pp. 329-32, denies that 'impressed species' in the medium and organs are formal similitudes and images, but allows that when 'expressed' in the act of sensation, they are such. These authors (like many others) repudiated previous denials that species need be posited, especially by Durandus a Sancto Porciano 1571, II, d3, q6 and IV, d49, q2 (fol. 139va, 413rb-vb), but also by William of Ockham, *Quaestiones in librum sententiarum*, III, q2-3 (William of Ockham 1967-86, vol. 6, pp. 43-129); Toletus 1594, II.12, q34 (fol. 111rb); Rubius 1620, II.5-6, q3 (pp. 321-5); Suárez, *De anima*, III.2.9-15 (Su. *Op. omn.* 3, pp. 618a-619b). On the denial of species by Ockham and others, see Tachau 1988.
- 24 *Collegium Conimbricense* 1600, II.5-6, q2 a2 (p. 176); Eustachius a Sancto Paulo 1638, 'Physica', III.3, disp. 1 q2, 5; Keckermann, *Systema physicum*, III.16, 20; IV.4 (Keckermann 1614, col. 1518-22, 1526-9, 1603); Rubius 1620, II.5-6, q3-7; Suárez, *De anima*, III.1.4, 2.1-26, 2.8.1-3, 2.9.1-2 (Su. *Op. omn.* 3, pp. 614a, 616a-622b, 696b-698a, 700); Toletus 1594, II.12, q33-34 (fol. 108r-112r). See also Thomas Aquinas, *Summa th.*, I q78 a3; q84 a2; q85 a2; Duns Scotus, *De anima*, q4-6 (Duns Scotus 1891-5, vol. 3, pp. 488a-498a).
- 25 Toletus 1594, II.12, q34, concl. 2, fol. 110vb: 'Species habet esse intentionale in medio, & in organo. Pro sensu Conclusionis notandum, quod esse intentionale tripliciter sumatur. Vno modo, vt distinguitur contra esse reale, & sic logicae proprietates, quae non sunt in rebus, nisi sola Intellectus consideratione, dicuntur habere esse intentionale: & sic species non dicitur habere esse intentionale, sed reale: est enim, qualitas quaedam in subiecto existens'; Suárez, *De anima*, III.1.4; 2.1 (Su. *Op. omn.* 3, pp. 614a, 616a); Rubius 1620, II.5-6, q4-5, pp. 326, 328 (he grants them a degree of 'corporeal being'). In his logic Toletus contrasted 'ens reale' with 'ens rationis', not 'intentionale' (1596, 'In librum Categoriarum', 'De praedicamentis in communi', q1, concl. 2, p. 191a); so did *Collegium Conimbricense* (1607, 'In Isagogem Porphyrii', pref., q6, a1-2, pp. 137-44). Ockham, as might be expected, denied that intentional being can be a species of real being: 'illa species non habet esse intentionale vel spirituale, quia hoc dicere includit contradictionem, quia omne ens extra animam est vera et verum esse reale habet suo modo' (William of Ockham, *Quaestiones in librum sententiarum*, III, q2 (William of Ockham 1967-86, vol. 6, p. 60)).
- 26 Rubius 1620, II.5-6, q5: 'adnotare oportet species istas intentionales sic vocatas, quia cognitionibus (quae intentiones, hoc est, quasi attentiones animae ad cognoscenda

objecta vocantur) deseruiunt id peculiare habere, quod licet ab obiectis procedant tanquam a principiis efficientibus praecipuisque causis, indifferenter procedunt a qualitatibus actiuis physica activitate, & actione, & etiam ab his, quae nullam actiuitatem physicam, seu naturalem habent, non enim sunt qualitates actiuae physica actiuitate albedo, nigredo, raritas, densitas, & similes, quia nunquam producunt, imo nec producere posse censetur alias sibi similes, nec dissimiles, & nihilominus producunt effectiue species intentionales in sensibus, atque etiam in medio' (pp. 327-8); q.4: 'species sensibiles habere esse corporeum, & non spirituale: sed non corporeum naturale: sed a naturali valde degenerans; & ideo vocatur intentionale, & reuera est esse quoddam diminutum, & respectu esse naturalis obiecti longe inferius; & propterea non est sensibile, quamuis sit medium, vt sentiatur obiectum: itaque esse speciei est proportionatum ad vniendum obiectum potentiae, non tamen vt sentiatur tanquam obiectum' (p. 326). Suárez, III.1.4 (previously quoted), 2.25-6 (Su. *Op. omn.* 3, pp. 614a, 621b-622b); Toletus 1594, II.12, q34, concl. 2 (fol. 110vb-111rb). See also the use of 'intentional' in *Collegium Conimbricense* 1600, II.5-6, q2, 22-3 (pp. 176, 177); and Eustachius a Sancto Paulo 1638, 'Physica', III.3, disp. 1 q2 (pp. 230-1).

27 AT VI 85.

28 Treatises on optics or *perspectiva* were taught in the Arts faculty at the master's level as part of an advanced course in the mathematical division of speculative philosophy, although a summary treatment sometimes was given as a supplement to the traditional quadrivium (Feingold 1984a, pp. 35, 41-2, 47-8; Freedman 1985, chaps. 3, 6-7). The optical literature was largely inspired by Alhazen 1989 (his *Perspectiva*, translated from the Arabic in the thirteenth century and printed in 1572 under the title *Opticae thesaurus*), which advances a broad conception of 'optics' as a full theory of vision, including what would now be denominated as physical, physiological, psychological, ontological, and epistemological aspects. Alhazen himself drew on an older literature including Ptolemy's *Optica* (Ptolemy 1989), but Alhazen's work was much more widely circulated in the Latin West than was Ptolemy's. Ptolemy, like Plato and Galen, adopted an extramission theory, according to which the visual power extends outward from the eye to 'touch' the seen object. Alhazen championed the intromission view, which had become standard by the late sixteenth century (although extramission theories were still discussed). Works by Pecham (1970) and Witelo (1535) drew heavily on Alhazen and were widely circulated through the sixteenth and into the seventeenth centuries. On the optical tradition and literature, see Lindberg 1967; 1970, pp. 24-32; and 1976, chaps. 5-7. Roger Bacon's synthesis of previous optical work accepted many features of Alhazen's geometrical analysis but combined them with Ptolemy's extramission theory; see R. Bacon 1900, pt. 5. His writings were known to Pecham and Witelo, but his influence on them was not as great as Alhazen's (Lindberg 1976, pp. 116-20).

29 *Collegium Conimbricense* 1600, II.7, q5-7; Suárez, *De anima*, III.18.9-13 (Su. *Op. omn.* 3, pp. 672a-673b); Toletus 1594, II.7, q16, fol. 8[4]va: 'In hac visionis natura Perspectivi suam doctrinam fundant. Nam, quia non videmus nisi recte opposita, dicunt nos per rectas lineas videre; & quia quae videntur, aliqua per lineam directam centro pupillae videntur: aliquae partes vero per lineas lateraliter directas: dicunt, quod videmus per triangulum, seu per pyramidem, quam vocant visualem'; II.12, q34, concl. 4, fol. 112ra: 'Quod de his diximus, etiam intellige de specie producta ab obiecto, vg. colore: cum enim ipsa sit species diffusa, sic ut lumen, quaelibet pars producitur a toto obiecto, ad quod recte, & absque impedimento opponitur. . . . Dicunt etiam, species multiplicari, cum una etiam sit: quia quaelibet pars totum facit cognoscere: totum, inquam a quo dependet, & a quo producta est, & quod oculo opponitur recta: ob id dicitur, multas

species vnus diffundi per medium.' But textbook treatments spoke as if images pass through the air and enter the eye: Abra de Raconis 1646, pt. 1, 'Logica', I.2.2, sec. 2, q4, 22, p. 259: 'species intentionales rerum visibilium sunt ipsae earum imagines, quae in oculo receptae'; Eustachius a Sancto Paulo 1638, 'Physica', III.3, disp. 2 q7, p. 246: 'visio fieret . . . receptis ab obiecto imaginibus seu speciebus intentionalibus'; Keckermann, *Systema physicum*, III.20 (Keckermann 1614, col. 1534 sub).

30 AT VI 128-30; XI 174-6; Hatfield and Epstein 1979.

31 *Collegium Conimbricense* 1600, III.4-8 (pp. 360-459); 'Tractatus de anima separata' (pp. 499-596); Pomponazzi 1516; Rubius 1620, III.4-5 (pp. 633-735); 'Tractatus de anima separata' (pp. 758-94); Thomas Aquinas 1968a; 1968b [1984], q3-5, 11-13; Toletus 1594, III.4-7 (fol. 129r-168v); Zabarella 1606, III (cols. 655-982).

32 Aquinas had specified that the agent intellect creates the intelligible species, while denying that the form in the phantasm is 'transferred' to the intellect: 'Sed virtute intellectus agentis resultat quaedam similitudo in intellectu possibili ex conversione intellectus agentis supra phantasmata, quae quidem est repraesentativa eorum quorum sunt phantasmata, solum quantum ad naturam speiei. Et per hunc modum dicitur abstrahi species intelligibilis a phantasmatis; non quod aliqua eadem numero forma quae prius fuit in phantasmatis, postmodum fiat in intellectu possibili, ad modum quo corpus accipitur ab uno loco, et transfertur ad alterum' (*Summa th.*, I q85 a1 ad 3; see also q84 a6). The position that the corporeal phantasm, being material, cannot itself be received into or affect the immaterial intellect was accepted by all of the *De anima* commentators here canvassed, but they disagreed on how to characterise the causal rôle of phantasms in the production of intelligible species; Suárez argues for 'material' causation by 'exemplar' (Suárez, *De anima*, IV.2.10-12 (Su. *Op. omn.* 3, pp. 719a-b)); the Coimbran text says the phantasm 'co-operates' to 'excite' the intellect into production (*Collegium Conimbricense* 1600, III.5, q6, pp. 407-9); Rubius 1620 designates the phantasm an 'instrumental' cause ('elevated' by another power) and the agent intellect the 'principal' or 'primary' cause of the production of an immaterial intellectual species in the possible intellect (III.4-5, 'Tractatus de intellectu agente', q3, pp. 646-52); Eustachius describes the phantasm as a 'material' or 'dispositive' as opposed to 'efficient' cause (Eustachius a Sancto Paulo 1638, 'Physica', III.4, disp. 2 q7, pp. 292-3). See also Duns Scotus, *Ordinatio*, I, d3, pars 3, q3 (Duns Scotus 1950-, vol. 3).

33 Thomas Aquinas, *Summa th.*, I q84 a5: 'anima humana omnia cognoscat in rationibus aeternis, per quarum participationem omnia cognoscimus. Ipsum enim lumen intellectuale, quod est in nobis, nihil est aliud quam quaedam participata similitudo luminis increati, in quo continentur rationes aeternae'; he explicitly distinguishes this position from Platonism and other positions in which the eternal types are beheld by the human intellect independently of the senses, or are known innately. See also *Summa th.*, I q79 a3-4; Thomas Aquinas 1968b [1984], q5, resp. and ad 6; Thomas Aquinas 1882-, vol. 22, pt. 2, q10, a6 (trans. 1952-4).

34 *Collegium Conimbricense* 1600, III.4-5, q1 a2, 'nuda tabula' (pp. 372, 374); Eustachius a Sancto Paulo 1638, 'Physica', III.4, disp. 2 q7, 'tabula rasa' (p. 291); the agent intellect 'makes' (*fabricare*) intelligible species (pp. 291-2); Rubius 1620, III.4-5, 'Tractatus de intellectu agente', q1-2; Suárez, *De anima*, IV.2.7-18; 7.3; 8.7-8; Su. *Op. omn.* 3, pp. 718a-721b, 739, 742b-743b); Toletus 1594, III.4, q9 concl. 1 (fol. 131v-132r); III.5, q13, concl. 1, 7-8 (fol. 141v, 142vb). See also Thomas Aquinas, *Summa th.*, I q79 a2; q84 a3; Duns Scotus, *Ordinatio*, I, d3, pars 3, q2; and q3, n3, ad 1 (Duns Scotus 1950-, vol. 3, pp. 322-4, 335).

35 Thomas Aquinas, *Summa th.*, I q76 a2; q79 a4-5; Thomas Aquinas 1968b [1984], q3-5;

- Duns Scotus, *De anima*, q13 (Duns Scotus 1891-5, vol. 3, p. 546); *Collegium Conimbricense* 1600, III.5, q1, a1-2 (pp. 369-74); Rubius 1620, 'Tractatus de intellectu agente', q4 (pp. 652-3); Suárez, *De anima* IV.8.4-8 (Su. *Op. omn.* 3, p. 741a-743b); Toletus 1594, II.1, q2 (fol. 40vb-48vb); also, Keckermann, *Systema physicum*, IV.4 (Keckermann 1614, col. 1604-5).
- 36 Theories of cognition specifying the necessity of divine illumination in all knowledge, together with direct knowledge of the soul and, through it, God, were known from the works of Augustine, Roger Bacon, and Bonaventure; Owens 1982, pp. 442, 449-51.
- 37 The assertion that the agent, or agent and possible, intellects are one was widely cited and discussed in connection with Avicenna and Averroes, e.g., *Collegium Conimbricense* 1600, III.5, q1 a1 (p. 370); Toletus 1594, II.1, q2 (fol. 41); III.4, q10 (fol. 133ra-134ra); III.5, q14 (fol. 143ra-143rb).
- 38 Zabarella, *Liber de mente agente*, chap. 13 (Zabarella 1606, cols. 935-7). Zabarella's compatriots Telesio and Campanella held that the lower soul actually is material, asserting that the *spiritus* in the brain - considered by many to be the instrument of the sensitive soul - is the sensitive soul itself. On the organic soul in the sixteenth century, see Park 1988; on the concept of 'spirit' in Renaissance physiology in comparison with Descartes's 'animal spirits', Hall 1969, vol. 1, pp. 198-9, 258-9; Hatfield 1992.
- 39 Pomponazzi 1516, chap. 9 (Pomponazzi 1948, pp. 316-18); in chap. 15 he affirms human immortality by appealing to revelation.
- 40 *Collegium Conimbricense* 1600, II.1, q6 a2: 'Negari non potest, animam intellectivam esse veram, ac propriam hominis formam, eiusque corpus vt talem informare' (p. 96); but also q1 a6: 'anima intellectuua habet operationes elevatas supra naturam & conditionem corporis ac materiae' (p. 63); Rubius 1620, III.4-5, 'Tractatus de intellectu agente', q4 n63 (p. 652); 'Tractatus de intellectu possibili', q1: 'intellectus possibilis non est potentia organica' (p. 661); Toletus 1594, III, q9 concl. 2 (fol. 132rb); q10 concl. 3: 'Intellectus est vis non organica animae informantis corpus' (fol. 134va). See also Thomas Aquinas, *Summa th.*, I q78 a1; q85 a1.
- 41 Toletus 1594, III.7, q23 concl. 3: 'Intellectus in corpore non potest habere naturaliter claram & distinctam cognitionem substantiae immaterialis' (fol. 168ra); concl. 4: 'Substantiae immateriales a nobis confusum in hoc statu cognoscuntur' (fol. 168rb); III.7, q21 (fol. 164v, 165r). Eustachius a Sancto Paulo 1638, pt. 3, 'Physica', tr. 4, disp. 2 q4-5, 7, 10 (vol. 3, pp. 287-9, 290-3, 298); Rubius 1620, III.4-5, 'Tractatus de intellectu agente', q2-3 (pp. 637-46); 'Tractatus de intellectu possibili', q5-6 (pp. 680-9); also *Collegium Conimbricense* 1600, III.5, q3, a2, (pp. 383-4); q5, a2 (pp. 402-3); III.8, q7, a2 (p. 449); q8, a2 (pp. 453-5); the Coimbra text states the conclusion clearly only as regards the soul (p. 449). Thomas Aquinas, *Summa th.*, I q87 a3; I q88; Thomas Aquinas 1984, q16. Scotus held that for embodied souls knowledge of God starts from phantasms, but he granted the embodied soul intuitive knowledge - not mediated by phantasms - of its own mental operations: Bonansea 1983, pp. 99-105; and Wolter 1990, pp. 109-22.
- 42 Ficino, *Theologia Platonica* Bk. 17, chap. 3 (Ficino 1964, p. 159 (Ficino 1981, pp. 230-1)); Pico della Mirandola, *Heptaplus*, 4th exp., chaps. 1-2 (Pico della Mirandola 1942, pp. 270-6).
- 43 On Albert, see Park 1981. See also the position attributed to Alexander of Aphrodisias, Themistius, and Averroes in Toletus 1594, III.7, q23 (fol. 167).
- 44 *Sag.*, I.8 (Charron 1635, p. 32); *Sag.*, I.14 (Charron 1635, pp. 50-1).
- 45 *Sag.*, I.14 (Charron 1635, p. 55).
- 46 *Sag.*, I.10 (Charron 1635, pp. 37-8).

- 47 *Sag.*, I.13 (Charron 1635, pp. 43-6).
- 48 *Sag.*, I.34 (Charron 1635, p. 99).
- 49 *Sag.*, I.14, 40, 61 (Charron 1635, pp. 55, 144, 197-8).
- 50 Sanchez 1581, 1618, 1988.
- 51 Sanchez 1581, p. 55 (as in Sanches 1988).
- 52 Sanchez 1581, pp. 51, 56-7, 59-67.
- 53 Sanchez 1581, pp. 68-77.
- 54 Sanchez 1581, p. 90.
- 55 *Exercitationes paradoxicae adversus Aristoteles*, II.6 (Gassendi 1658, vol. 3, p. 201b, sub (Gassendi 1972, p. 94)); *Syntagma*, pt. 1 (Logica), II.v (Gassendi 1658, vol. 1, p. 81a (Gassendi 1972, p. 333)); Glanvill 1661, chap. 22, p. 218; Glanvill 1665, chap. 26, p. 160.
- 56 *Syntagma*, pt. 1 (Logica), II.v; pt. 2 (Physica), sec. 1, III.viii in Gassendi 1658, vol. 1; Glanvill 1661, chap. 4, pp. 28-31; chap. 21, pp. 211-12; chap. 24, p. 250; 1665, chap. 21, p. 135; 1676, essay 1, p. 21.
- 57 *Exercitationes*, II.6.6, 8 (Gassendi 1658, vol. 3, pp. 203a-206b, 207b-210b); *Syntagma*, pt. 1 (Logica), II.v (Gassendi 1658, vol. 1, pp. 80b-86a (Gassendi 1972, pp. 329-49)).
- 58 Mersenne 1625, I.5, pp. 49-56; I.9, pp. 107-13; I.10, pp. 125-6; I.13, pp. 176-8.
- 59 Mersenne 1625, I.11, pp. 132-3; I.12, pp. 157-8; I.14, p. 186.
- 60 Mersenne 1625, I.2, p. 18; I.15, pp. 191-5; I.16, pp. 212-13, 221-2.
- 61 Mersenne 1625, I.2, pp. 14-15; I.5, pp. 50-2; I.10, pp. 126-7; I.11, pp. 150-1; I.16, p. 222.
- 62 Mersenne 1634, q2, p. 11; also, Letter [p. v]: 'il semble que la capacité des hommes est bornée par l'écorce, & par la surface des choses corporelles, & qu'ils ne peuvent penetrer plus avant que la quantité, avec une entiere satisfaction.'
- 63 Mersenne 1625, I.16, p. 224; II.1, pp. 225-34; Gassendi, *Exercitationes*, II.6.8 9 (Gassendi 1658, vol. 3, pp. 208a-209b (Gassendi 1972, pp. 106-7)); *Disquisitio metaphysica*, VIII.1 (Gassendi 1658, vol. 3, p. 384a (Gassendi 1972, pp. 264-5)); *Syntagma*, pt. 1 (Logica), II.v (Gassendi 1658, vol. 1, pp. 83b-84a (Gassendi 1972, pp. 339-41)); Glanvill 1661, chap. 24, p. 236; Glanvill 1665, chap. 24, p. 153; Apology, p. 174. On Mersenne, see Dear 1988.
- 64 AT VII 12, 34, 52-3, 130-1, 162, 171-2.
- 65 Hatfield 1986; 1993; Rozemond, 1993.
- 66 Of the several notions of method extant in the seventeenth century (see Chapter 7 in this book), the focus here is on method as the means for directing the cognitive faculties in the pursuit of truth.
- 67 *Collegium Conimbricense* 1607, proem, q6 a2 (pp. 58-60); Rubius 1641, proem, q1 (pp. 2a-3a); Toletus 1596, proem, q1 (pp. 4b-7a); Eustachius a Sancto Paulo 1638, pt. 1, 'Dialecticae', proem, q4 (pp. 10-11).
- 68 *Nov. org.* I 41, 50.
- 69 *Nov. org.* I 21.
- 70 *Nov. org.* I 20, 45-9, 51.
- 71 *Nov. org.* I.19, 95; II.1-11.
- 72 *Nov. org.* II.10.
- 73 AT X 398: 'instrumenta sciendi'.
- 74 In casting his work as meditations, Descartes adopted a literary mode sometimes aimed at the faculties, and particularly at purging the senses, redirecting the imagination and understanding, and training the will: Ignatius of Loyola, *Exercitia spiritualia*, secs. 1, 3, 10, 20, 45-54, 65-70 (Ignatius of Loyola 1969, trans. in Ignatius of Loyola 1950), and François de Sales, *Introduction à la vie dévote*, II.iv-v (François de Sales 1969, vol. 1, p. pp.

- 85-7, trans. in François de Sales 1613); on Descartes's use of the meditative mode, Hatfield 1986, Rorty 1986b.
- 75 AT VII 155-9; also AT VII 4-5, 9-10, 38-9, 135-6.
- 76 Spinoza, *De int. emend.*, Geb. II 13-19 (Spinoza 1985, pp. 16-23).
- 77 Malebranche, *Rech.* VI.1.1, Mal. OC II 246 (Malebranche 1980a, p. 409).
- 78 Malebranche *Rech.* VI.2.1, Mal. OC II 295 (Malebranche 1980a, p. 437).
- 79 Arnauld and Nicole 1668, 1st disc., pp. 9-13; intro., pp. 39-41 (Arnauld and Nicole 1964, pp. 9-11; 29-30).
- 80 Arnauld and Nicole 1668, 1st disc., pp. 14-15 (Arnauld and Nicole 1964, pp. 12-13).
- 81 Gassendi 1981, I.4 (pp. 86-7).
- 82 Gassendi, *Syntagma*, 'Physica', sec. 3, memb. 2, IX.2, 4, 5 (Gassendi 1658, vol. 2, pp. 440a-41b, 460a, 461b).
- 83 Hobbes, *De corp.*, pt. 1, 'Logica', ii.9, Hobbes 1981, pp. 204-7.
- 84 *Lev.* iv (Hobbes 1991, p. 26); *De corp.*, pt. 1, 'Logica', ii.7 (Hobbes 1981, pp. 202-3); on accidents and similitude, see his account of abstract names, 'Logica', iii.3-4 (Hobbes 1981, pp. 226-31).
- 85 Locke, *Ess.*, III.x.6-7; III and IV, passim.
- 86 Galilei, *Dialogo sopra i due massimi sistemi del mondo*, 2d Day (Galilei 1890-1909, vol. 7); *Il saggiaiore*, sec. 48 (Galilei 1890-1909, vol. 6, pp. 347-51 (Galilei 1960a, pp. 308-13)); Hatfield 1990.
- 87 AT I 410-11, 420-4, 562-4; II 197-200 (trans. in Descartes 1984-91, vol. 3). For discussion, Clarke 1982, sec. 22; Hatfield 1985, 1989.
- 88 Descartes 1979, pp. 1-3, 6-9.
- 89 AT XI 177-9 (*Traité de l'homme*); Descartes 1972, pp. 87-90. AT III 48, 84-5, 143, 425, 598; IV 114; V 220-1.
- 90 AT VI 112, 239; also *ibid.*, p. 43 (*Discours*, v).
- 91 AT VI 76-7.
- 92 Hobbes and Gassendi in AT VII 178, 266-7, 269, 329-32.
- 93 AT VII 63-90 (Meds. V-VI); *Princ.*, II 3-4.
- 94 AT VII 81-3 (Med. VI); *Princ.* I 66-71, IV 198-200. Hatfield 1986, p. 68; but cf. Garber 1992a, chap. 4. Descartes clearly intends to exclude colour, and other such qualities, as 'real qualities' through an opposition with genuinely geometrical modes of extension.
- 95 *Princ.* I 32; AT II 598 (to Mersenne, 16 Oct. 1639); AT VII 56-7, 78-9 (Meds. IV, VI); see also AT X 415-17 (*Regulae*, XII). In making the immaterial mind the seat of sensations Descartes denied the materialist equation of sensation with brain activity, e.g., by Hobbes (AT VII 178) and Gassendi (VII 268-9). As noted previously, he also recognised a wholly noncorporeal form of memory.
- 96 AT VII 77-83; *Princ.* IV 197-200.
- 97 AT VII 72-3; also VII 28, 31, 34, 53, 139, 178, 358, 384-5, 387.
- 98 Clauberg, *Physica*, "Theoriae corporum viventium", xxxiii-xxxix (Clauberg 1691, vol. 1, pp. 196-203); La Forge 1974, pp. 150, 159, 170, 173, 255, 262-5, 285, 292-4; Le Grand, 'Institution', IX.v.1-13 (Le Grand 1694, pp. 329a-30b); Régis, 'Metaphysique', Bk. 2, I.1.1-iii.1 (Régis 1691b, vol. 1, pp. 296-303).
- 99 AT VII 436-9.
- 100 AT XI 151, 170-7 (*De l'homme*), which alone contains the details of pineal flow; VI 81-93, 115-30 (*Dioptrique*, i, v-vi).
- 101 AT VI 137-8 (*Dioptrique*, vi).
- 102 AT XI 159-61, 183 (*De l'homme*); Descartes 1972, pp. 61-3, 94.

- 103 Hobbes, *Lat. Works*, vol. 1, pp. xx-xxi.
- 104 Hobbes, *Eng. Works*, vol. 7, pp. 468 (*Minute or First Draught of the Optiques*); see also Hobbes in AT III 342. Despite these claims, Hobbes may have given extensive attention to natural philosophy and its foundations only in response to Descartes's *Discours* and *Essais* (especially the *Dioptrique*): Tuck 1988; also Brandt 1928, chap. 4. At the end of the 1646 ms. Hobbes wrote that if his writing 'bee found true doctrine, (though yett it wanteth polishing), I shall deserve the reputation of having beene the first to lay the ground of two sciences; this of *Optiques*, the most curious, and that other of *Natural Justice*, which I have done in my book DE CIVE' (Hobbes, *Eng. Works*, vol. 7, p. 471).
- 105 On the order of Hobbes's compositions and publications, see Tuck 1988; cf. Brandt 1928, chap. 5-6, and the preface by Tönnies in Hobbes 1969.
- 106 Hobbes, *De corp.*, IV.xxv.2 (*Lat. Works*, vol. 1, p. 31); see also *Lat. Works*, vol. 5, pp. 254, 258 (*Objectiones*); *Elements of Law*, I.ii.8 (Hobbes 1969, pp. 5-6); *Lev.* i (Hobbes 1991, pp. 13-14).
- 107 On influences, see Brandt 1928, pp. 55-84, and Tuck 1988, pp. 28-37; on the reception of Hobbes's works, see Henry More, *Immortality of the Soul*, I.ix-x, II.i-ii (More 1662d, pp. 38-43, 58-77); Cudworth 1678, p. 761 (sub); Mintz 1962.
- 108 Hobbes *Excerpta de tractatu optico*, ms., i.4-10 (Hobbes 1969, pp. 212-15); *Tractatus opticus*, published 1644 (*Lat. Works*, vol. 5, p. 217-18); Brandt 1928, p. 48; Tuck 1988, p. 28.
- 109 Brain: *Elements*, I.ii (Hobbes 1969, pp. 3-7); *Tractatus opticus* (*Lat. Works*, vol. 5, pp. 220-1). Heart and brain: *Excerpta de tractatu optico*, iv.1, 11-16 (Hobbes 1969, pp. 216-17, 218-23); *Lev.* i (Hobbes 1991, pp. 13-14); *De corp.*, IV.xxv.2-4 (*Lat. Works*, vol. 1, p. 318-20).
- 110 Hobbes, *De corp.*, IV.xxv.1 (*Lat. Works*, vol. 1, p. 316): 'Phaenomenon autem omnium, quae prope nos existunt, id ipsum to phainesthai est admirabilissimum, nimirum, in corporibus naturalibus alia omnium fere rerum, alia nullarum in seipsis exemplaria habere'; trans. *Eng. Works*, vol. 1, p. 389.
- 111 *Elements*, I.iii (Hobbes 1969, pp. 8-12); *De corp.*, IV.xxv.7-9 (*Lat. Works*, vol. 1, p. 322-8); *Lev.* ii-iii (Hobbes 1991, pp. 15-22).
- 112 *De corp.*, I.i.1 (Hobbes 1981, 172-3): 'philosophia, id est, ratio naturalis, in omni homine innata est.'
- 113 *Lev.* v (Hobbes 1991, p. 35).
- 114 *Lev.* ii, iii, v (Hobbes 1991, pp. 19, 23, 31-2, 35-6).
- 115 *De corp.*, I.i.1-2, ii.1 (Hobbes 1981, pp. 172-7, 192-5).
- 116 Hobbes, *Lat. Works*, vol. 5, p. 258; also in AT VII 178.
- 117 *De corp.*, I.i.8 (Hobbes 1981, pp. 188-9).
- 118 *De corp.*, I.vi.5-6 (Hobbes 1981, pp. 294-7); *De corp.*, II.ix.9, IV.xxv.2 (*Lat. Works*, vol. 1, pp. 111-12, 317-19).
- 119 *Lev.* i, iv, xxxiv, xlvi (Hobbes 1991, pp. 1-2, 30, 269-70, 463-4).
- 120 *Elements*, I.xi.5 (Hobbes 1969, pp. 55-6); *Lev.* xxxiv (Hobbes 1991, p. 274).
- 121 Gassendi 1658, vol. 3, pp. 420-77; Bloch 1971, chap. 1.
- 122 *Epistolae quatuor de apparente magnitudine solis humilis et sublimis*, II.iv, viii-xii (Gassendi 1658, vol. 3, pp. 424b-25a, 427a-30a), which postulates an uninverted retinal image; *Syntagma*, pt. 2, 'Physica', sec. 3, VII.v (Gassendi 1658, vol. 2, pp. 377b-82b), which has the image inverted.
- 123 *Disquisitio metaphysica*, IV.iii.4 (Gassendi 1658, vol. 3, p. 369a (Gassendi 1962, pp. 442-3)).

- 124 *Syntagma*, pt. 2 (Physica), sec. 3, III.iv, IX.ii-iii (Gassendi 1658, vol. 2, pp. 255-9, 440-54).
- 125 *Epistolae quatuor*, II.v (Gassendi 1658, vol. 3, p. 425a-b); *Syntagma*, pt. 2, 'Physica', sec. 3, VI.i, VII.v (Gassendi 1658, vol. 2, pp. 337b, 375a).
- 126 Five senses: *Syntagma*, pt. 2, 'Physica', sec. 3, VII (Gassendi 1658, vol. 2, pp. 353-97, 375a). Material sensory soul: *Syntagma*, pt. 2, 'Physica', sec. 3, VI.iii (Gassendi 1658, vol. 2, p. 345a-b); also *Disquisitio metaphysica*, II.vi (Gassendi 1962, pp. 148-65); Gassendi in AT VII 268-9.
- 127 *Syntagma*, pt. 2, 'Physica', sec. 3, VIII.ii, iv (Gassendi 1658, vol. 2, pp. 402b-403a, 409-14).
- 128 *Disquisitio metaphysica*, III.iv; vi.1, 4; VI.i (Gassendi 1962, pp. 236-61, 278-85, 288-93, 518-33).
- 129 *Disquisitio metaphysica*, III.iii.2 (Gassendi 1962, pp. 224-7, 232-7).
- 130 *Syntagma*, pt. 2, 'Physica', sec. 3, IX.i (Gassendi 1658, vol. 2, p. 425b).
- 131 La Forge 1974, p. 263.
- 132 *Syntagma*, pt. 2, 'Physica', sec. 3, IX.ii, XIV.ii (Gassendi 1658, vol. 2, pp. 440-6, 629a-b).
- 133 *Eth.* II prop. 49.
- 134 *Eth.* II props. 13, 15.
- 135 *Eth.* II props. 13-29.
- 136 *Eth.* II prop. 40; also *De int. emen.*, Geb. II 10-27.
- 137 In the *De int. emen.*, Spinoza strictly distinguished imagination from intellect, Geb. II 31-3.
- 138 *Eth.* II prop. 40.
- 139 'Lettre touchant ce qui est independant des sens et de la matiere,' (Ger. VI 499-502 (Leibniz 1989, pp. 186-8)).
- 140 *Disc. mét.* sec. 14; 'System nouveau de la nature et de la communication des substances,' (Ger. IV 483-5); *Mon.* secs. 7-16.
- 141 'Ce qui est independant' (Ger. VI 501-2); Leibniz to de Volder, 1699, (Ger. VI 194 (Leibniz 1969, p. 522)).
- 142 *Mon.* sec. 28; *PNG* sec. 5.
- 143 'Ce qui est independant' (Ger. VI 504-5 (Leibniz 1969, pp. 550-1; Leibniz 1989, pp. 189-91)).
- 144 *Rech.*, pref., I.i.1 (Mal. OC I 20-6, 39-40 (Malebranche 1980a, pp. xxv-xxix, 1-2)).
- 145 *Rech.*, I.iv.1 (Mal. OC I 66-7 (Malebranche 1980a, pp. 16-17)).
- 146 Malebranche adumbrates his occasionalism early (*Rech.*, I.ii.1, Mal. OC I 50, n. (Malebranche 1980a, p. 7, n.)), and explains it together with the doctrine that we see all things in God (*Rech.*, IIIB.vi-vii, Mal. OC I 437-55 (Malebranche 1980a, pp. 230-40)). See also *Rech.*, Eclaircissement X (Mal. OC III 127-61 (Malebranche 1980a, pp. 612-32)); *Ent. mét.* II.ii-iii, IV.x-xi (Malebranche 1980b, pp. 44-5, 86-91).
- 147 *Rech.*, I.x.6-xiii (Mal. OC I 129-54 (Malebranche 1980a, pp. 52-66)).
- 148 *Rech.*, I.vii.4; ix.3; x.6; xiv.2 (Mal. OC I 96-7, 119-20, 130, 158-60 (Malebranche 1980a, pp. 34-5, 46-7, 52-3, 68-9)).
- 149 *Rech.*, I.v; vii.5 (Mal. OC I 69-78, 97-100 (Malebranche 1980a, pp. 19-24, 35-6)).
- 150 *Rech.*, Eclaircissement xvii, secs. 26, 41-3 (Mal. OC III 327, 341-8 (Malebranche 1980a, pp. 733-4, 743-8)).
- 151 *Resp.* IV, AT VII 233; *Princ.* IV 197.
- 152 AT VII 41-4 (Med. III), leaves open the possibility that sensations confusedly represent the actual character of their external causes. *Rech.*, IIIA.1.3 attributes the position that

- sensation proper contains judgement to Augustine, Descartes, and their followers (Mal. OC I 386-7 (Malebranche 1980a, pp. 200-1)); Rodis-Lewis cites La Forge as a follower (Mal. OC I 519, n. 308).
- 153 *Rech.* III.ii.vi, Mal. OC I 445 (Malebranche 1980a, p. 234).
- 154 *Recherche*, Eclaircissement x (Mal. OC III 152 (Malebranche 1980a, p. 626)); *Ent. mét.* III.i-vii, V.ii-vi (Malebranche 1980b, pp. 56-61, 106-13).
- 155 Cudworth, *True Intellectual System*, I.v.1 (Cudworth 1678, p. 733; pp. 638-9); More, *Antidote Against Atheism*, I.xi.12, I.vi-vii (More 1662c, p. 36, 18-21); Benjamin Whichcote and John Smith, in Patrides 1969, pp. 57, 129; 53-6, 143-4.
- 156 Enthusiasm: More, *Enthusiasmus triumphatus*, secs. 3-10 (More 1662e, pp. 2-7).
- 157 More, *Immortality of the Soul*, II.ii.3-6, II.vi.4 (More 1662d, pp. 67-8, 85-6).
- 158 More, *Immortality*, II.ii.7, II.vi.6-7 (More 1662d, pp. 68, 86-7); *Antidote*, I.xi.2-11 (More 1662c, pp. 33-6).
- 159 More, *Immortality*, I.ii.10 (More 1662d, p. 69): 'it is plain, that there is a settled Notion distinct from these Words and Names, as well as those corporeal Phantasmes impressed from the Object'
- 160 More, *Immortality*, II.xi.1-3, II.vii-x (More 1662d, pp. 106, [8]8-105).
- 161 More, *Immortality*, II.x-xi.2 (More 1662d, pp. 101-6).
- 162 More, *Immortality*, II.xi.3-4 (More 1662d, pp. 106-7).
- 163 More, *Immortality*, II.ii.9 (More 1662d, p. 69); *Antidote*, I.iv.2-3, viii.12-14, xi.13 (More 1662c, pp. 14-16, 24-5, 36).
- 164 More, *Antidote*, I.iii.3, v, vii (More 1662c, pp. 13, 17, 20-1).
- 165 *True Intellectual System*, I.iv.1 (Cudworth 1678, pp. 634-8).
- 166 *Eternal and Immutable Morality*, III.ii.1; i.3; generally, III.i-iv (Cudworth 1845, vol. 3, pp. 561, 558, 557-77).
- 167 *True Intellectual System* I.iv.1 (Cudworth 1678, pp. 732-3, 736-8); also *Immutable Morality*, IV.i-vi (Cudworth 1845, vol. 3, pp. 577-646).
- 168 *True Intellectual System* I.iv.1 (Cudworth 1678, p. 737); *Immutable Morality*, IV.i.1: 'the intelligible forms by which things are understood or known, are not stamps or impressions passively printed upon the soul from without [by the senses], but ideas vitally protended or actively asserted from within itself' (Cudworth 1845, vol. 3, p. 578); *Immutable Morality*, iv.12: 'all understandings are not only constantly furnished with forms and ideas to conceive all things by, and thereby enabled to understand all the clear conceptions of one another, being printed all over at once with the seeds of universal knowledge, but also have exactly the same ideas of the same things' (Cudworth 1845, vol. 3, p. 628). On Cudworth, see Passmore 1951.
- 169 On the development of the title, beginning with 'Sic Cogitavit de Intellectu humano', see Locke 1975, p. xiii. The four books of the *Essay* examine the origin of knowledge and ideas (Bk. I), catalogue the variety of ideas (Bk. II), investigate the relation between ideas and words (Bk. III), and analyse the relations between ideas constitutive of knowledge and related cognitive states (Bk. IV).
- 170 *Ess.* II.xxi.5-6.
- 171 *Ess.* II.vi.2; ix-xi; xxi.20.
- 172 *Ess.* II.i.2-4. In 'Ce qui est independant' (Ger. VI 501-2; Leibniz 1989, p. 188) Leibniz held that we know immaterial substance through acquaintance with our own minds; Locke held only that we experience the mind's operations, not that we come thereby to perceive the mind to be an immaterial substance (*Ess.* II.i.4; xxxiii.5-6; IV.iii.6).
- 173 *Ess.* III.iii.7; 12.
- 174 *Ess.* III.iii.14.

- 175 *Ess.* III.iii.13-17. Ayers 1991, vol. 2, chaps. 3-7.
176 *Pr. Hum. Kn.*, secs. 1, 27, 30.
177 *Pr. Hum. Kn.*, secs. 27, 140, 142; *Three Dialogues*, III (Berkeley 1948-57, vol. 2, pp. 232-4).
178 3 *Dial.*, I (Berkeley 1948-57, vol. 2, pp. 193-4); see also *Pr. Hum. Kn.*, intro., secs. 7-8.
179 *New Th. Vis.*, secs. 9-11, 25, 50-1.
180 *Ess.* II.ix.8.
181 *Ess.* II.ix.9. Locke does not say why touch, which perceives both its proper objects (such as heat, cold, and solidity, *Ess.* II.iii.1) and the 'Ideas of divers senses' (space, extension, figure, rest, and motion, *Ess.* II.v), does not yield similar judgements; presumably he believed that three-dimensional perception is immediately given with touch and so does not require unnoticed judgements.
182 *Ess.* II.v; II.xi.1.
183 *Nouv. ess.* II.ix.8.
184 *New Th. Vis.*, sec. 133.
185 *New Th. Vis.*, sec. 70, 121; *Theory of Vision Vindicated*, sec. 51; Atherton 1990, pp. 97-8.
186 *New Th. Vis.*, secs. 17, 25, 49, 53, 121-36; *Pr. Hum. Kn.*, secs. 43-4.
187 *Ess.*, epistle, Locke 1975, p. 7.