

# Exchange of papers between Leibniz and Clarke

G. W. Leibniz and Samuel Clarke

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[Brackets] enclose editorial explanations. Small ·dots· enclose material that has been added, but can be read as though it were part of the original text. Occasional •bullets, and also indenting of passages that are not quotations, are meant as aids to grasping the structure of a sentence or a thought. Every four-point ellipsis . . . . indicates the omission of a brief passage that seems to present more difficulty than it is worth. Longer omissions are described, between [brackets], in normal-sized type.

The first paper is from a letter Leibniz wrote to Caroline, Princess of Wales, who showed it to Samuel Clarke. All the ensuing documents were sent to the princess, who passed them on. In the present version, Clarke's 'this learned author' and Leibniz's 'the author' are replaced by 'Leibniz' and 'Clarke' respectively; and Sir Isaac Newton loses his title. Clarke gave each of his sections the number of the Leibniz section he is replying to. Indications of which Clarke section(s) Leibniz is commenting on are editorial additions except in Leibniz's fifth paper, where he supplied them. Pages of this version are referred to in <angle-brackets>. Clarke first published this 'collection of papers' (not 'correspondence', not 'letters') in 1717, using his own fairly good translations of Leibniz's papers.

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## Leibniz's first paper (November 1715)

Natural religion seems to be greatly on the decline in England, where many people hold that human souls are made of matter, and others contend that God himself is a corporeal being, i.e. a body.

2 Locke and his followers aren't sure whether the soul is material and naturally perishable.

3 Newton says that space is an organ—like a sense-organ—by which God senses things. But if God needs an organ to sense things by, it follows that they don't depend entirely on him and weren't produced by him. [Clarke translates Leibniz as speaking of how God 'perceives' things; but the verb Leibniz uses is *sentir*, a cognate of *sens* ('sense'), so that 'sense' seems right. In his 87 on page 43, Leibniz says that this verb shouldn't be used for what God does unless it is purged of its implication of passivity; and it's just a fact about word-usage at that time that the tie between •sensing and •being acted on was much stronger and more obvious than any tie between •perceiving and •being acted on.]

4 Newton and his followers also have a very odd opinion

regarding God's workmanship. According to them,

God's watch—the universe—would stop working if he didn't *re-wind* it from time to time! He didn't have enough foresight to give it perpetual motion. This machine that he has made is so imperfect that from time to time he has to *clean* it by a miraculous intervention, and even has to *mend* it, as a clockmaker mends his work.

The oftener a clockmaker has to adjust his machine and set it right, the clumsier he must be as a clockmaker! In my view, the world always contains the same amount of force and energy, which changes only by passing from one material thing to another in accordance with the laws of nature and the beautiful order that God has pre-established. And I hold that when God works miracles, he does it not to meet the needs of nature but to meet the needs of grace. Anyone who thinks differently must have a very mean notion of the wisdom and power of God.

## Clarke's first reply (26 November 1715)

1 Some people in England (and in other countries!) reject natural religion or get it all wrong; that is very true, and much to be lamented. But. . . this is largely due to the false philosophy of the materialists—a philosophy that clashes more directly than any other with the mathematical princi-

ples of philosophy. It's also very true that some people say that the souls of men are bodies, and others say this even about God himself; but those who do so are the great enemies of the mathematical principles of philosophy—principles that prove that matter (or body) is the smallest and most

inconsiderable part of the universe.

**2** Locke did write some things implying that he wasn't sure whether the ·human· soul was immaterial or not; but the only people who have followed him in this are some materialists, who are enemies to the mathematical principles of philosophy, and who accept little or nothing from Locke except his errors.

**3** Newton doesn't say that space is the organ God uses to perceive things by, or that God needs any medium by which to perceive things. Quite the contrary! His view is that because God is omnipresent—·present everywhere·—he perceives all things just by being ·immediately present to them, i.e. by being exactly where *they* are, wherever in space that might be; and for this he doesn't need the help of an organ (or anything else) to ·mediate between himself and the things he perceives. Trying to make this easier to grasp, Newton illustrates it by a comparison:

The mind of man is immediately present to the pictures or images of things that are formed in the brain by means of the sense-organs, and it ·immediately· sees those pictures.

and similarly:

God is immediately present to all things in the universe, and immediately sees those things.

(Whereas God immediately perceives the things, the human mind perceives the pictures *as if they were* the things.) In the human case, Newton regards the brain and sense-organs as the means by which ·those pictures are formed, *not* as the means by which ·the mind perceives those pictures once they have been formed. And in God's case, Newton doesn't regard things as if they were pictures that had been

formed by certain means or organs; he regards them as real things that God himself ·has formed and ·sees in all the places where they are, without the help of any intermediary. This comparison is all that he means when he supposes infinite space to be (as it were) the *sensorium* of ·God·, the omnipresent being.<sup>1</sup> [In one of its two main meanings, 'sensorium' stood for the part of the brain where sensory images (or their material counterparts or underlays) occur. There was no standard view about *what* part of the brain this was; but it was assumed that there must be one—sensory images had to have their brain counterparts *somewhere*, and 'sensorium' was the name of the appropriate 'somewhere'.]

**4** Among humans, the maker of a machine is rightly regarded as skillful in proportion to how long a machine that he has made will work properly without any further tinkering by him. Why? It's because he exercises his skill only in constructing, adjusting, or putting together certain moving parts—such as weights and springs—whose source of motion is a set of forces that are entirely independent of him; he arranges them in various ways, but he didn't *make* them. But with regard to God, the case is quite different: as well as assembling things into structures, he is himself the author and continual preserver of their basic forces or powers of motion. So the fact that nothing happens without his continual regulation and oversight is a ·true glory of his workmanship and not ·something that detracts from it. The idea that the world is a great machine that goes on without intervention by God, like a clock ticking along without help from a clockmaker—that's the idea of *materialism* and *fate*. Under cover of declaring God to be a *supra-mundane intelligence* [= 'a thinking being who is above the world'], it aims to exclude providence and God's government from the world. And the reasoning that will lead

<sup>1</sup> The passage referred to is as follows: 'The sensory [= 'sensorium'] of animals is the place ·in the brain· to which the sensing mind is present, and into which the sensible species of things [roughly = 'whatever it is that perceived things transmit to the sense-organs'] are carried through the nerves and brain, so that they can be perceived there because of their immediate presence to that mind.'

a philosopher to maintain that

From *the beginning of creation*, everything has happened without any regulation or intervention by God, will enable a sceptic to argue back further, maintaining that From *all eternity* things have gone on as they now do, without any real creation or any creator, depending on nothing but an all-wise and eternal 'Nature'.

Suppose a king had a kingdom in which everything continually went on without his regulation or interference—without his attending to and ordering what is done in his realm—it

would be a 'kingdom' only in name, not in reality, and this 'king' wouldn't deserve that title. 'Well, there's no smoke without a fire'! If someone claims that in an earthly government things can go on perfectly well without the king's ordering or dealing with anything, we can reasonably suspect him of wanting to get rid of the king altogether. Similarly, anyone who maintains that the world can continue to run its course without the continual direction of God the supreme governor has a doctrine that does have the effect of excluding God from the world.

## Leibniz's second paper

To Clarke's 1 <page 1>

I agree. . . that the principles of the materialists contribute greatly to the spread of impiety. But I see no reason to add that the mathematical principles of philosophy are •opposite to those of the materialists. Really they are •the same, with just this difference:

The materialists who follow Democritus, Epicurus and Hobbes confine themselves altogether to mathematical principles [i.e. to physics, with no admixture of anything else], and hold that nothing exists but bodies; whereas the Christian mathematicians [i.e. Newton and his followers] allow that there are also immaterial substances.

What ought to be set up against materialism, therefore, are not •mathematical principles (taking this phrase in its usual sense) but rather •metaphysical principles. Pythagoras, Plato, and Aristotle had some knowledge of metaphysical

principles, but I claim to have established them in my book *Theodicy*; it is written in an informal manner for the general reader, but my proof is perfectly rigorous. The great foundation of mathematics is the principle of contradiction or identity, i.e. that *a proposition can't be true and false at the same time*, so that A is A and can't be not-A. This principle is all we need to demonstrate every part of arithmetic and geometry, i.e. to demonstrate all mathematical principles. But, as I pointed out in *Theodicy*, the move from mathematics to natural philosophy [here = 'physics'] requires a further principle, namely the principle of the need for a sufficient reason, which says that *for anything that is the case there's a reason why it should be so rather than otherwise*. That is why Archimedes, wanting to move on from mathematics to natural philosophy in his book on equilibrium, had to use a special case of the great principle of sufficient reason. Suppose you have a perfectly symmetrical balance and

that you put equal weights in its two pans. Nothing will move; and Archimedes saw why—it's because *no reason* can be given why one side should go down rather than the other. Using just that one principle—that there has to be a sufficient reason why things should be as they are and not otherwise—we can demonstrate the existence of God and all the rest of metaphysics and natural theology. We can even demonstrate, in a way, principles of natural philosophy that don't depend on mathematics—I mean the dynamic principles, i.e. the principles of force.

**2** Clarke goes on to say that according to Newton's physics matter is the most inconsiderable part of the universe.<sup>2</sup> That is because Newton admits empty space as well as matter, and holds that matter fills up only a very small part of space. But Democritus and Epicurus maintained the same thing, except that they may have believed there to be *more* matter in the world than Newton will allow; and as to that, I think their opinion is preferable to his, because the more matter there is the more opportunity God has to exercise his wisdom and power. And that is just one of several reasons that I have for holding that there is no empty space at all.

**To Clarke's 3 <2>**

**3** In the Appendix to his *Optics* I find Newton saying explicitly that space is the sensorium of God; and 'sensorium' has always signified the organ of sensation. If he and his friends now see fit to mean something different by it, I shan't object.

**4** Clarke supposes that the ·mere· *presence* of the soul is sufficient to make it aware of what happens in the brain. [The verb phrase 'to be aware of' translates *s'apercevoir de*. Clarke always translates this by 'perceive', but that is wrong. In these papers Leibniz hardly ever uses *percevoir* = 'perceive', and not once does he speak of

what God perceives. It is always what God 'senses', 'is aware of', or (once) 'discerns'.] But this is just what Malebranche and all the Cartesians deny; and they are right to do so. For x to represent what happens in y, mere *presence* isn't enough; there has to be something that explains what x and y have to do with one another—either •one acts on the other, or •both are acted on by a single cause. ·Of course mere presence isn't enough·. According to Newton, ·a region of· space is intimately *present* to the body that it contains and that has the same shape and size as it does; would he infer from this that space is aware of what happens in a body and remembers it when the body has moved on? ·And when it comes to the presence of *the soul*, the trouble is even worse·. The soul is indivisible; ·it has no size·; so if we try to tell a story about its 'presence' in the body, it could be present only at a point; so how could it be aware of what happens outside that point? I claim to be the first person to show how the soul becomes aware of what happens in the body.

**5** The reason why God is aware of everything is not just his •presence but also his •activity; he preserves things by an action that continually produces whatever is good and perfect in them, ·and of course he is aware of what he is doing·. But the correspondence between soul and body can't be ·even partly· explained by their being *present* to each other, because neither of them has any immediate influence over the other.

**To Clarke's 4 <2-3>**

**6** When we commend a machine, that is primarily because of what •it does, not because of what •caused it; and what this reflects in the designer of the machine is his •skill, not his •power. So the reason Clarke gives for praising God's

<sup>2</sup> Actually, he says that 'mathematical principles' have that consequence, but it's really Newton's system that he is talking about. Mathematical principles, ·properly so-called·, have nothing to say about this.

machine—namely, that he made it entirely, without bringing in any materials from outside—isn't good enough. How *does* God surpass every other machine-maker? Well, Clarke's reason is a *part* of the story: God makes the whole thing, whereas others have to be given materials to work upon; so he surpasses them in power. But God's excellence also has another source, namely his wisdom, which shows in his machine's lasting longer and moving more regularly than machines made by anyone else. When you buy a watch you don't care whether the watchmaker made every part of it himself or got the parts from elsewhere and merely assembled them to make the watch—provided the watch goes right! Even if the workman had a God-given ability to create the matter that the wheels are made of, what you as the buyer of the watch will want to know is whether he had a different God-given ability, namely the gift of assembling the parts to make a watch that runs properly! Similarly, someone looking for reasons to be pleased with God's work will want a better reason than the one that Clarke has produced. His supposed reason is really just a dodge that he was forced into by his refusal to credit God's machine with the absolute regularity that is its chief glory.

7 God's skill has to be infinitely superior to that of a human workman. The mere facts about what he produces do show God's power, but don't adequately convey his wisdom. Those who think otherwise—acknowledging the power but not properly admitting the wisdom of the source of things—will fall into exactly the same error as the materialists and Spinoza, though they try to keep them at arms' length.

8 I'm not saying that the material world is a machine (a watch, say) that runs without God's intervening, and I have pretty strongly insisted that the things he has created need his continual influence. But I do say that the material world

is a watch that runs without needing to be *mended* by God; otherwise we would have to say that God changes his mind! In fact, God has foreseen everything; and for anything that might go wrong he has provided a remedy in advance. There is in his works a harmony, a pre-established beauty.

9 This opinion doesn't exclude God's providence or his government of the world; on the contrary, it makes it perfect. A true divine providence requires perfect foresight—and also provision in advance for any remedies that will turn out to be needed. Otherwise God must be lacking either in the wisdom to foresee things or the power to provide for them in advance. He'll be like the God of the Socinians [fore-runners of the unitarians], who 'takes each day as it comes', as Jurieu says. In fact the Socinians' God doesn't even 'foresee things' going wrong, whereas the Newtonians I am arguing with say only that he doesn't provide against them, and so has to fix them as they occur. Even this strikes me as a great lack; it implies that God is lacking either in power or in good will.

10 I don't see anything wrong with my saying that God is *intelligentia supramundana* [4 on page 2]. Will those who criticize this say that he is *intelligentia mundana* [= 'a thinking being who is in (or of) the world'], i.e. the soul of the world? I hope not! But they had better watch out that they don't carelessly end up in that position.

11 Clarke's example of a kingdom in which everything goes well without the king's getting involved in any way is irrelevant to our present topic; because God continually preserves everything and nothing can exist without him. *His* kingdom is not a kingdom in name only and not in reality! Another example: A king takes care to have his subjects well brought up, providing for their needs so that they keep their abilities and good dispositions—doing this so thoroughly that he

never needs to *fix* anything that has gone wrong. Is *he* 'a king only in name'?

**12** A final point: If God has to mend the course of nature from time to time, he must do it either •supernaturally or •naturally. If •supernaturally, this is appealing to miracles in order to explain natural things; and that amounts to

a *reductio ad absurdum* of this hypothesis [i.e. it refutes the hypothesis by showing that something absurd follows from it], for once you let in miracles *anything* can be 'explained' with no trouble at all. And if God's mending is done •naturally, then rather than being *intelligentia supramundana* he is included in the nature of things—i.e. is the soul of the world.

### Clarke's second reply (10 January 1716)

**1** <page 3> When I said that the mathematical principles of philosophy are opposite to those of the materialists, I meant this contrast:

- Materialists think that the whole order of nature could have arisen from mere mechanical principles of matter and motion, acting •blindly and •inevitably.
- The mathematical principles of philosophy show that, on the contrary, the state of things (the constitution of the sun and planets) must have had a cause that was acting •thoughtfully and •freely.

As for what the principles in question should be called: to the extent that metaphysical consequences follow rigorously from mathematical ones, to that extent one could call the mathematical principles 'metaphysical', if one wanted to.

It is very true that nothing exists without there being a sufficient reason why it exists why it is *thus* rather than *so*. So where there is no cause, there can be no effect. But often this sufficient reason is simply the will of God. **[NB: Now comes the kick-off for what will be the most famous topic of this exchange.]** For an example, consider two

material things (particles or complexes) that are exactly alike and are •of course• in different places. Why are they situated as they are rather than the other way around? Why is *x* here and *y* there, rather than *y* here and *x* there? So far as bits of matter are concerned, one place is the same as another, so that if the locations of *x* and *y* had been switched *it would have been exactly the same thing* [the italicised words are exactly Clarke's]. So the only reason there *can* be for the two things to be where they are rather than *vice versa* is the mere will of God. If God couldn't choose without a predetermining cause, any more than a balance can move without an imbalance of weights, this would tend to take away all power of choosing, and to introduce fatality. [We'll find that 'fatality' is a hard word to pin down. It connects with 'fate', whose Latin root connects—as Leibniz will point out later—with 'decree'. Its broad meaning is: the thesis that whatever happens was inevitable, 'fated' to happen.]

**2** <4> Many ancient Greeks, who derived their philosophy from the Phoenicians and had it corrupted by Epicurus, did indeed believe in matter and vacuum; but they •were unlike Newton in a way that Leibniz doesn't mention, namely they•



didn't know how put mathematics to work in using those matter-and-vacuum principles to explain the phenomena of nature. As for the question of *how much* matter we should think there is: Even if there isn't much matter, that doesn't reduce God's scope for exercising his wisdom and power, because he can act wisely and powerfully on things other than matter. Re-applying Leibniz's amount-of-matter argument, we could say that there must be infinitely many men (and infinitely many dogs, horses, lions etc.), so as to give God enough scope for the full exercise of his power and wisdom.

**3** <4> The word 'sensorium', used properly, refers not to the organ of sensation but to the place of sensation. The eye, the ear etc. are organs, but not sensoria [= plural of sensorium]. Besides, Newton doesn't say that space is the sensorium of God. He merely offers a *comparison*, saying that space is *as it were* the sensorium etc.

**4** <4> It was never supposed that the presence of the soul was •sufficient for perception to occur, only that it is •necessary for it. If it weren't present to the images of the things perceived, the soul couldn't possibly perceive them: but being present isn't enough for perception, because only a living substance can have a perception. A present inanimate substance doesn't perceive anything; and a living substance can perceive things only if it is present to •the things themselves (as the omnipresent God is to the whole universe) or present to •the images of the things (as the soul of man is in its own sensorium). Nothing can act or be acted on where it isn't present, just as nothing can exist where it isn't present! The soul's being indivisible doesn't imply that it can be present only at a mere point. Space—finite or infinite—is absolutely indivisible. It isn't even *conceptually* divisible; to imagine parts of space moving away from one

another is to imagine them, as Newton has remarked, moved out of themselves! Yet space is not a mere point.

**5** <4> God perceives things, not indeed by •being merely present to them or by •acting on them, but by •being a living, thinking thing as well as an omnipresent one. Similarly with the human soul: it perceives things (vastly fewer than God perceives) by perceiving images of them; and it perceives those not by being merely present to them but by being a living substance. Without being present to them it couldn't perceive them, but (I repeat) mere presence isn't enough.

**6 and 7** <5> It's very true that the excellence of God's workmanship consists in its manifesting not only his power but also his wisdom. But what shows his wisdom is his forming at the outset the perfect and complete idea of a work that began and still carries on in conformity with that perfect idea, doing this through the continual uninterrupted exercise of God's power and government. It is *not* shown by his making nature capable of going on without him (like someone making a clock); because that's *impossible*. The powers of a clock's weights and springs don't depend on men, which is why a man can make a clock that will continue to run without him. But there are no powers of nature that are independent of God, which is why nature can't possibly continue to run without *him*.

**8** <5> The words 'correction' and 'amendment' are to be understood in the present context in terms of *our* minds, not in terms of *God's*. For example: the present set-up of the solar system, according to the present laws of motion, will in time fall into confusion; and after that it may be 'amended' or put into a new form. But this 'amendment' is relative to our conceptions—in performing it (if he does), God will be taking something that •is confusing us, and making it •easier for us to understand;

he won't be

taking something that •has gone wrong, and •fixing it. In reality, and from God's standpoint, the present set-up and the consequent disorder and the ensuing 'amendment' are *all* equally parts of the design embodied in the perfect idea that God had from the outset. •As for longevity: With the whole universe, as with any individual human body, God's wisdom consists not in making it eternal but in making it last as long as he sees fit.

**9** <5> God's wisdom and foresight don't consist in his providing from the outset remedies that will automatically cure the disorders of nature. Strictly speaking, from God's standpoint there aren't any disorders, so there aren't any remedies either; nor are there any powers of nature that can do things unaided (as weights and springs work unaided by men). God's wisdom and foresight (I repeat) consist in his forming all at once a design that his power and government is continually carrying out.

**10** <5> God is neither a mundane intelligence, nor a supra-mundane intelligence. He is an omnipresent intelligence, both inside the world and outside of it. He is in all, and through all, as well as being above all.

**11** <5> •Leibniz agrees that God continually preserves things, but what does that mean? If God's *conserving* •or *preserving*• all things means

his being actually at work preserving and continuing the beings, powers, orders, dispositions and motions

of all things,

—that is all I am arguing for. But if God's conserving things means merely

a king's creating subjects who will be able to act well enough, for ever after, without his interfering or giving them any orders,

—this does indeed make him a real creator, but a 'governor' in name only.

**12** <6> Leibniz's argument in this paragraph presupposes that everything that God does is supernatural or miraculous; so what it's aiming at is to exclude all activity by God in governing and ordering the natural world. In fact, though, the distinction between 'natural' and 'supernatural' doesn't exist from God's standpoint; all it marks is a difference between two ways that *we* have of thinking about things. Causing the sun or the earth to move regularly is something we call 'natural': stopping its motion for a day we would call 'supernatural'; but neither of these needs more power than the other, and from God's standpoint neither is more or less natural or supernatural than the other. God's being present in the world, or *to* the world, doesn't make him the soul of the world.<sup>3</sup> A soul is part of a compound, the other part being a body, and they affect each other as parts of the same whole. But God is present to the world not as a •part but as •a governor; acting on everything and not acted on by anything. He is not far from every one of us, for in him we and all things live and move and have our beings.

<sup>3</sup> 'God governs all things, not as a soul of the world but as the lord of the universe. . . "God" is a relative word, carrying in its meaning the idea of *relation to servants*. And God's divinity is his dominion [= "command"]—not like the soul's command over the body, but that of a lord over his servants. . . . In God all things exist and move in him, but without interacting with him: the movements of bodies have no effect on God, and when they move they aren't obstructed by God's omnipresence. . . . He is entirely without body or bodily shape, so he can't be seen or heard or felt; and he ought not to be worshipped through the representation of any physical thing. We have ideas of his •attributes, but we don't know what the •substance is of any thing. . . .' Newton, *Principia*, General Scholium.

## Leibniz's third paper (25 February 1716)

**To Clarke's 1** <page 6>

**1** In the usual sense of the phrase, 'mathematical principles' concern only pure mathematics—i.e. numbers and figures, arithmetic and geometry. Whereas 'metaphysical' principles concern more general notions, such as cause and effect.

**2** Clarke grants me this important principle, that nothing happens without a sufficient reason why it should be so rather than otherwise. But he grants it only in words and in reality denies it. This shows that he hasn't properly understood the strength of it. That leads him to use as an example something that exactly fits one of my demonstrations against •real absolute space, •the idol of some modern Englishmen •including Newton and Clarke. (I'm not using 'idol' in a theological way, but in a philosophical sense, following Bacon's thesis that there are idols of the tribe and idols of the cave, •and so on.) [Let's get this clear: Leibniz knows that Clarke follows Newton in •accepting 'real absolute space', says that Clarke's 'Why-are-they- this-way-round?' argument is really part of Leibniz's case •against real absolute space, and offers this as evidence that Clarke doesn't have a proper grasp of the issues.—As for the unexplained phrase 'real absolute space': you'll do best to hold it in mind and let its meaning grow out of the debate surrounding it.]

**3** So there we are: these gentlemen maintain that space is a real absolute being, which leads them into great difficulties. •Here is just one. It seems that if there is such a being as real absolute space, it must be eternal and infinite. That's why some people have believed that space is God himself, or one of his attributes—namely the attribute of *immensity*. But space doesn't fit with God, because space has parts.

**4** For my part, I have said several times that I hold space to

be something merely relative, as time is, taking space to be an order of coexistences, as time is an order of successions. For space indicates. . . an order of things existing at the same time, considered just as *existing together*, without bringing in any details about what they are like. When we see a number of things together, one becomes aware of this order among them. [Leibniz says that space indicates *en termes de possibilité*—'in terms of possibility'—an order of things etc. Meaning?]

**5** As for those who *imagine* that space is a substance, or at least that it is something absolute, I have many demonstrations to show them to be wrong. But just now I'll use only one of these—the one that Clarke has opened the door to •in the section of his paper that I am discussing. The demonstration argues that if space were an absolute being, something would be the case for which there couldn't possibly be a sufficient reason—which conflicts with my axiom, •and thus implies that space is not an absolute being. Here's how the argument goes:

(1) Space is something absolutely uniform; one point of space doesn't differ in any way from any other point of space.

(I mean that it doesn't differ *absolutely*, i.e. apart from differences in what bodies there are at the two places.) Add to that the thesis that I am arguing against:

(2) Space is something in itself, besides the order of bodies among themselves; •i.e. space is absolutely real.

From (1) and (2) it follows that

(3) God could not possibly have had a reason for putting the material universe in space in *this* way •rather than in some other way that retained the same

spatial relations of bodies to one another —e.g. •rather than rotating the world so as to switch west to east. •That would conflict with the principle of sufficient reason; so it can't happen; so premise (2) is false—Q.e.d. • But if we replace (2) by

(2\*) Space is nothing but an order or set of relations among bodies, so that in the absence of bodies space is nothing at all except the possibility of placing them, then we don't get the conclusion (3), because the supposed *two* states—•the universe where it is and •the universe rotated through 180 degrees—are not two states, but one; they are *la même chose*, the same thing. We have the illusion of difference, coming from the fanciful supposition that space is a real independent entity; but in reality the •supposed• two states are indistinguishable, so they are really *one*; so the question 'Why did God choose this one rather than that?' doesn't arise.

**6** The same thing holds for *time*. Suppose someone •asks 'Why didn't God did create everything a year sooner than he did?', •sees that this has no answer, and •infers that God has made a choice where there couldn't possibly be a reason for his choosing that way rather than some other. I say that his inference would be right **if** time was some *thing* distinct from things existing in time •or events occurring in time•; for in that case it would indeed be impossible for there to be any reason why events shouldn't have occurred in exactly the order they did but at some different time. But what that argument really proves is that times, considered without the things •or events•, are nothing at all, and that they consist only in the successive order of things •and events•. On that view of what time is, the supposed 'two states of affairs'—•the world exactly as it is, and •the world as it is except for having started a year sooner —don't differ *at all*, are indiscernible, are really just *one*.

**7** It can be seen from all this that Clarke hasn't properly understood my axiom, which he rejects even while seeming to accept it. It's true, he says, that for any state of affairs there is a sufficient reason why it is so rather than otherwise, but he adds that this 'sufficient reason' is often simply the mere will of God. And he gives the example of the world's being located in space as it is rather than as it would be if it were rotated through 180 degrees. But this clearly involves saying that something does happen without any sufficient reason for it, namely *God's making that choice*; which conflicts with the axiom or *general* rule about *everything* that is the case. This involves sliding back into the loose indifference—the tolerance for the idea of choice in the absence of any reason for choosing one way rather than another—•a view that I have abundantly refuted, showing it to be utterly fictional even as applied to creatures, and to be contrary to the wisdom of God because it implies that he could act without acting by reason.

**8** Clarke objects against me that if we don't admit this simple and mere will, we deprive God of the power of choosing and bring in a fatality [see note on page 6]. But the exact opposite is true! I maintain that God has the power of choosing, a power that is based on his having, in his wisdom, *reasons* for his choices. This 'fatality' is nothing but the way the universe has been ordered by providence, •by God•, the wisest being; what has to be avoided is not *that*, but a blind fatality, a necessity that has no wisdom or choice in it.

**To Clarke's 2** <6>

**9** I had remarked that a lessening of the amount of matter would lessen the quantity of objects that God could exercise his goodness on. Clarke answers that in the space where there's no matter there are other things on which God exercises his goodness. I don't agree, because I hold that

every created substance is accompanied by matter; but let that pass, because even if Clarke were right about that, it wouldn't answer the point I had been making. If there were space that was empty of matter but full of those 'other things', more matter could *also* have been present in that space; and so its *not* being there means a lessening in the number of objects God has to work with. The quip about my implying that there ought to be a greater number of men or animals misses its target, because more men or animals would fill places that could be occupied by other things.

**To Clarke's 3** <7>

**10** It will be hard to convince me that 'sensorium' in its usual meaning doesn't signify an organ of sensation. See what Goclenius says about the word in his philosophical dictionary. He calls it 'a barbarism used by some scholastics aping the Greeks', and equates it with 'organ of sensation' [Leibniz quotes the passage in Latin].

**To Clarke's 4** <7>

**11** The mere presence of a substance, even an animated one, is not sufficient for perception. A blind man, and even someone whose thoughts are wandering, doesn't *see*. Clarke should explain how the soul is aware of things outside itself.

**To Clarke's 5** <7>

**12** God is present to things not by situation but by essence; his presence shows in his immediate operation. [This sentence seems to rest on the idea that God's essence is his power. So the thought is that

•God is present to everything not because *he* is everywhere but because *his essence = power* is everywhere;

which goes with the thought that

•God is present in a place not because he *is* there but because he *acts* there.

We'll see in Clarke's **12** <14> that that's how he understands the passage.] The presence of the soul is something else again. If we

say 'It is spread all through the body', we make it extended and divisible. If we say 'It—the whole of it—is in every part of the body', we divide it from itself. All this talk about 'fixing the soul to a point', 'spreading the soul across many points'—it's just gabble, idols of the tribe!

**To Clarke's 6–7** <7>

**13** If the universe lost some of its active force by the natural laws God has established, so that later on there was a need for him to give it a shove in order to restore that force (like an artisan repairing his machine), this would involve something's going 'wrong' not only from our standpoint but also from God's. He could have prevented it by having a better plan in the first place—which is of course exactly what he did!

**To Clarke's 8 and 9** <7>

**14** When I said that God has provided remedies for such disorders in advance, I wasn't saying that God lets the disorders occur and then finds remedies for them, but that he has found a way of preventing any disorders in the first place.

**To Clarke's 10** <8>

**15** Clarke isn't getting anywhere with his criticism of my statement that God is *intelligentia supramundana*. Saying that God is •above the world isn't denying that he is •in the world.

**To Clarke's 11** <8>

**16** I never gave any occasion to question that

God's conservation is an actual preservation and continuation of the beings, powers, orders, dispositions, and motions of all things,

and I think I may have explained this better than many others have. But, says Clarke, 'that is all I am arguing for'.

Well, what a relief! But in fact there is much more than that to our dispute. The questions

- Does God act in the most regular and most perfect manner?
- Could his machine develop a fault that he would have to repair by extraordinary means?
- Can God's will act without reason?
- Is space is an absolute being?
- What are miracles?

and many others like them make a wide difference between us.

**To Clarke's 12** <8>

17 Theologians won't agree with Clarke (against me) that from God's standpoint there is no distinction between 'natural' and 'supernatural'; and most philosophers will disagree

with him even more strongly. There is an *infinite* difference between these two, but evidently Clarke hasn't thought hard about this. The supernatural exceeds all the powers of created things. Here's a good example that I have used before: If God wanted to bring this about—

a body moves freely through the ether around a certain fixed centre, without any other created thing acting on it

—I say that this couldn't be done without a miracle, because it can't be explained by the nature of bodies. What a free body moving along a curve would *naturally* do ·at any given moment· is to move away from the curve along the ·straight-line· tangent to it. That's why I contend that the *attraction* of bodies, properly so called, is a miraculous thing—i.e. because it can't be explained by the nature of bodies.

### Clarke's third reply (15 May 1716)

1 <page 9> This concerns only the meaning of words. We can accept Leibniz's definitions of 'mathematical' and 'metaphysical'; but ·the fact remains that· mathematical reasonings can be applied to physical and metaphysical subjects.

2 <9> For anything that exists, there is a sufficient reason why it exists, and why it is *thus* rather than *so*—there's no doubt about that.

**Clarke writes next:** : But in things in their own nature indifferent, mere will, without any thing external to influence it, is alone that sufficient reason.

**informally expressed:** But when there are two options *neither of which is intrinsically better than the other*, the sufficient reason for someone's choosing option x rather than option y may be just that *he chooses x*, without being caused by anything else to do so.

[The above 'informal expression' serves to explain the word 'indifferent', which here makes its first appearance in this text, and will occur many times hereafter.] An example of this is God's creating or placing a particle of matter in one place rather than in another, when all places are in themselves alike. And this example would still work even if space were not something real but only the

mere order of bodies: for even then, it would be absolutely indifferent, and there could be no reason except mere will, why three equal particles should be placed in the order a–b–c rather than in the contrary order. So this point about the indifferentness of all places doesn't generate an argument showing that no space is real; because two regions of space that are perfectly alike are still •really different or distinct one from another, •even if they are not in themselves real things.

[This paragraph is aimed at Leibniz's **5** <page 9>.] The thesis that space is not a real thing but merely the order of bodies is obviously absurd •in a way that I didn't point out earlier. According to this thesis, if the solar system had been placed **where the remotest fixed stars now are**, with all relationships of order and distance exactly what they are in fact, •this would indeed have been (as Leibniz rightly says) *la même chose*, the same thing in effect; •but it would also imply that the solar system would have been **exactly where it is now**, which is an explicit contradiction. [Leibniz's *la même chose* does indeed mean 'the same thing'. Adding 'in effect' weakens the phrase; that was Clarke's work, with no basis in Leibniz's text.]

[Clarke says that this paragraph responds to something Leibniz said in a private letter (we don't now have it).] The ancients didn't give the label 'imaginary space' to all space that is empty of bodies, but only space that is outside the •material• world. And they didn't mean that such space is not real,<sup>4</sup> but only that we know nothing of what kinds of things are in it. And if anyone did ever call space 'imaginary', meaning by this that it isn't real, that's no argument that it isn't real!

**3** <9> Space is not a *being* •or *thing*•, an eternal and infinite being •or thing•. Rather, it is a property—something that

depends on the existence of a being that is infinite and eternal. Infinite space is immensity. [The term 'immensity', which we will meet often, means 'infinite largeness'. It relates to space as eternity relates to time (if we understand eternity to be existence through an infinitely long stretch of time; not everyone does, because some think of eternity as timeless, but we can see from Clarke's **4** on page 2 that he isn't one of them).] But immensity is not God; so infinite space is not God. As for Leibniz's point about space having parts: there's no problem there, for the following reason. Infinite space is *one*, and is absolutely and essentially indivisible; it's a contradiction to think of it as being *parted*.

**what Clarke wrote:** because there must be space in the partition itself; which is to suppose it parted and yet not parted at the same time.

**what he may have meant:** because any partition *of* space<sub>1</sub> would have to take place *in* space<sub>2</sub>, meaning that space is (1) parted and yet (2) not parted at the same time.

(See my **4** on page 7) God's immensity or omnipresence doesn't imply that his substance is divisible into parts, any more than his existing through time implies that his existence is divisible into parts. The only problem here arises from misusing the word 'parts' by not giving it its literal meaning.

**4** <9> If space was nothing but the order of coexisting things, it would follow that if God moved the entire material world in a straight line, it would remain in the same place; and that however fast he moved it, and however abruptly he stopped it moving, nothing would be jolted. And if time was nothing but the order of succession of created things, it would follow that if God had created the world millions of ages sooner than he did, it wouldn't have been created sooner at all. And

<sup>4</sup> *Nothing* doesn't have any dimensions, magnitudes, quantity, properties. •Space outside the world has all those, so obviously it isn't *nothing*, which is to say that it is real.

another point: space and time are quantities, while situation and order are not.

**5, 6** <9> Leibniz argues like this:

Space is uniform, with no part differing from any other. Therefore, if the bodies that were created in place A had been created in place B instead (with the spatial relations amongst them kept the same), then they would still have been created in place A,

which is a manifest contradiction! The uniformity of space does indeed prove that God couldn't have an external reason for creating things in one place rather than in another; but does that stop *his own will* from being in itself a sufficient reason for putting things where he *did* put them, when all places are indifferent or alike, and there is good reason to put things *somewhere*? [Notice that Clarke has here started to expound an argument of Leibniz's and then switched it to one of his own ('which is a manifest contradiction'). He does then answer Leibniz's actual argument (about sufficient reasons), but without having stated it first.]

**7, 8** <10> An intelligent and perfectly wise agent will always base his choices on any real differences there are between the options confronting him. But how will such an agent act in a case—like the location-of-matter example we have been discussing—where two ways of acting are equally good? To say that

in such a case •God can't act at all; and •if he *could* act, that would be an imperfection in him, because he wouldn't have any external reason to move him to act in one way rather than the other

seems to deny that God has in himself any *originating* •energy-source or •power of beginning to act, and to maintain

that he always needs (mechanically, as it were) to be pushed into acting ·or deciding· by some external cause.

**9** <10> I presume that the exact amount of matter that the world now contains is what's best for the present frame of nature, or the present state of things; and that the state of the world would have been less satisfactory if the amount of matter had been greater (or less). So it's not true that having more matter would have provided a greater object for God to exercise his goodness on.

**10** <11> The question is not what Goclenius means by 'sensorium', but what Newton means by it. . . . If Goclenius takes the eye or ear or any other organ of sensation to be the sensorium, he is certainly mistaken. But ·that's irrelevant to our issue·. When a writer explicitly states what he means by any technical term, what's the point of asking what other meanings other writers may have given it. Scapula in his dictionary translates it as *domicilium*, the place where the mind resides. [Actually, Scapula's entry for *sensorium* reads (in Latin): 'instrument of sensation; sometimes: place where the sense resides'.]

**11** <11> The reason why the soul of a blind man doesn't see is that some obstruction prevents images from being conveyed to the sensorium where the soul is present. We don't know *how* the soul of a sighted man sees the images that are present to it; but we are sure that it can't perceive what is not present to it, because nothing can act or be acted upon in a place where it isn't!

**12** <11> God, being omnipresent, is really present to everything both essentially and substantially. It's true that his presence at a place shows itself by what he does there, but he can't *act* there unless he *is* there.<sup>5</sup> The soul is not omnipresent to every part of the body; so it doesn't and can't

<sup>5</sup> In a footnote Clarke quotes Newton in Latin, which he then translates as: God is omnipresent, not only virtually but substantially; for a power can't exist without a substance ·that *has* it·.



itself act directly on every part of the body, but only on the brain and certain nerves and spirits. These influence the whole body, by virtue of laws and causal connections that God has appointed.

**13, 14** <11> The fact that the active forces<sup>6</sup> in the universe grow less and so need new input ·to keep up their level· is not an inconvenience, a disorder, an imperfection in the workmanship of the universe; it's simply a consequence of the nature of dependent things. And the dependency of things is not something that needs to be fixed! The case of a human workman making a machine is quite different, because the powers or forces by which the machine continues to move are entirely independent of the workman.

**15** <11> The phrase *intelligentia supramundana* is quite all right when explained in Leibniz's way. But without this explanation the phrase is very likely to lead to the wrong idea that God is not really and substantially present everywhere.

**16** <11> Here are my answers to the questions that Leibniz raises in his **16** :

**Leibniz:** Does God act in the most regular and most perfect manner?

**Clarke:** Yes.

**Leibniz:** Could his machine develop a fault that he would have to repair by extraordinary means?

**Clarke:** There are no faults in anything God makes; and when he chooses to *alter* the way things are going, this is no more 'extraordinary' than his choosing to *keep them going in an unaltered way*.

**Leibniz:** Can God's will act without reason?

**Clarke:** As between two options that are in their own nature

absolutely equal and indifferent, God's will can freely choose ·one of them·, determining *itself* and not being acted on by any external cause; and his ability to do this is a perfection in him.

**Leibniz:** Is space is an absolute being?

**Clarke:** Space doesn't depend at all on the order or situation or existence of bodies.

**Leibniz:** What are miracles?

**Clarke:** See the next section.

**17** <12> We haven't been discussing the question of what will be accepted by theologians and philosophers; our topic has been the reasons men give for their opinions! If a miracle is simply •something that *exceeds the power of all created things*, then it doesn't take a miracle for a man to walk on the water, or for the motion of the sun or the earth to be stopped; because none of these things requires *infinite* power to bring it about. As for ·Leibniz's example of· a body in a vacuum circling around a central point: ·there are two cases·. (1) If this is a •usual event (such as the planets moving around the sun), it isn't a miracle—whether God brings it about immediately or indirectly through some invisible created power. (2) If it's an •unusual event (such as a heavy body hanging in the air and moving in a circle), then it is a miracle—whether God brings it about immediately or indirectly through some invisible created power. And a final point: If we are to count as a miracle anything that doesn't arise from (and can't be explained in terms of) the natural powers of body, then every animal motion whatsoever is a miracle. This seems to show conclusively that Leibniz's notion of a miracle is erroneous.

<sup>6</sup> The phrase 'active force' in this context refers only to •motion and •the impetus or relative impulsive force of bodies that arises from their motion and is proportional to it. That's because the discussion of it that we have been having was prompted by this passage of Newton's: 'It appears that motion may be got or lost. But because of the stickiness of fluids. . . and the weakness of elasticity in solids, motion is much more apt to be lost than got, and is always decreasing. . . . Because the various kinds of motion that we find in the world are always decreasing, there is a need for them to be conserved and augmented by active sources.'

## Leibniz's fourth paper (2 June 1716)

**To Clarke's 2** <page 12>

**1** When two options are absolutely indifferent—meaning that there's nothing to choose between them—there is no choice, and consequently no election or will, since choice must be based on some reason or principle.

**2** A simple act of will without any motive ('a mere will') is a fiction. It is •contrary to God's perfection, •chimerical and contradictory, •inconsistent with the definition of *will*, and •sufficiently confuted in my *Theodicy*.

**3** Regarding the order in which to place three equal and perfectly alike particles—that's a case of indifferent options, and consequently they will never be placed in any order by God, who does nothing without wisdom—and there couldn't be any *wisdom* in arbitrarily choosing one out of a set of indifferent options. But this doesn't imply that in such cases God is stuck. He is the author of things—all things—and he doesn't ever produce such a thing as three indiscernible particles; so no such thing occurs in nature.

**4** There is no such thing as a pair of individuals that are indiscernible from each other. A lively-minded friend of mine, discussing these matters with me in the presence of the Princess Sophia in the garden of Herrenhausen, thought he could find two leaves perfectly alike. The princess challenged him to do it, and he spent ages running all over the garden look for such a pair of leaves—without finding any. Two drops of water or milk will turn out to be distinguishable from each other when viewed with a microscope. This is an argument against atoms, which are driven out—and empty space along with them—by the principles of true metaphysics.

**5** The great principles of •sufficient reason and the •identity of indiscernibles change the status of metaphysics. They make metaphysics real and demonstrative, whereas before it didn't amount to much more than empty words.

**6** 'Suppose x and y are two indiscernible things' comes down to 'Suppose x is y, and that this thing has two names'. What does this imply about the hypothesis that

the universe could right from the outset have had a different spatial and temporal location from what it actually had, with everything else about it—including the spatio-temporal inter-relations among parts of the universe—remaining actually the same?

It implies that the hypothesis is an impossible fiction.

**7** The reason why •space outside the world is imaginary is also the reason why •all empty space is an imaginary thing. The only difference between •space that has the world nested within it and •any other stretch of space is that one is bigger than the other.

**To Clarke's 3** <13>

**8** If space is a property or attribute, it must be the property of some substance. Well, what about the bounded empty space that the friends of empty space say occurs between any two bodies? Of what substance will *that* space be a property?

**9** If infinite space •is immensity, finite space will be the opposite to immensity, i.e. will be •measurability, or •limited extension. Now extension must be a property of something extended. But if the finite space we have been talking about is empty, it will be an attribute without a subject, an extension without anything extended. The upshot is that

when Clarke makes space a property, he falls in with my opinion, which makes it an order of things and not anything absolute. [Leibniz is here arguing like this: In saying that space is a •property, Clarke at least firmly rules out space's being a *thing*; but given that there is often nothing for it to be a property *of*, he is left with 'not a thing' and 'not a property', from which he should infer the Leibnizian conclusion 'therefore, a •relation'.]

**10** If space is an absolute reality—i.e. a *thing*—it will be even more thing-like (i.e. have more reality) than substances themselves! God can't destroy it, or even change it in any respect. As well as being immense taken as a whole, it will be unchangeable and eternal in every part. There will be an infinity of eternal things besides God.

**11** To say that infinite space has no parts is to say •that it isn't made up of finite spaces, and •that infinite space could continue to exist even if finite spaces were reduced to nothing. [He adds a comparison, to highlight the absurdity.]

**12** In another of his writings [Leibniz gives the reference] Clarke attributes parts to space; but in his second paper he says they are parts improperly so called—which may be understood in a good sense. [Clarke doesn't say this in his second paper as we have it.]

**To Clarke's 4** <14>

**13** To say that God can make the whole universe move in a straight line (or any other line!) without changing it in any other way is another fantasy. For two states indiscernible from each other are the same state, so that this 'movement of the entire world along a straight line' is a change that doesn't change anything. Besides, there is neither rhyme nor reason in it; and God does nothing without reason, and it is impossible that there should be any here. . . .

**14** These are idols of the tribe [Bacon's phrase, see page 9], mere chimeras, and superficial imaginations. The only basis for

this is the supposition that imaginary space is real.

**15** The supposition that God might move the entire world is like the fiction that he might have created the world some millions of years sooner—like it in being impossible! Anyone who buys into fictions of that sort will have to go along with those who argue for the eternity of the world. •Here is why•. God does nothing without reason; no reason can be given why he didn't create the world sooner; so if he has indeed created the world, then he created it before any assignable time—i.e. for *any* time *t*, he created it earlier than *t* because he had no reason not to—•which is to say that the world is eternal. But once it has been shown that the beginning, whenever it was, is always the same thing, that puts an end to the question 'Why didn't it occur earlier?'.

**To Clarke's 5, 6** <14>

**16** If space and time were anything absolute, i.e. if they were anything but certain orders of things, then indeed my assertion would be a contradiction. But since it is not so, the hypothesis •that space and time are something absolute• is contradictory, i.e. an impossible fiction.

**17** This pattern of argument is often used in geometry: we suppose that some figure is greater than it really is, and go on from that to prove that it is *not* greater. This is a contradiction all right, but the contradiction lies in the hypothesis—the initial premise about the size of the figure—which turns out to be false for just that reason. [Just to make sure that this is understood: Leibniz is referring here to the perfectly valid argument-pattern in which one derives not-P from P, this being a proof of not-P. He will use this same argument-form in **22** and **23** on this page, and will comment on it in **28** on page 32]

**To Clarke's 7, 8** <14>

**18** Because space is uniform, there can't be any *external* or *internal reason* [Leibniz uses the English words] by which to

•distinguish its parts from one another and •choose among them. For any external reason to distinguish them, it would have to be grounded on some internal one; otherwise (·i.e. if we gave some purely external reason for choosing x rather than y·), we would either be discerning something that is indiscernible or be choosing without discerning. A will without reason would be mere Epicurean *chance*. A God who acted by such a will would be a God only in name. Clarke got into these errors through not taking care to avoid everything that detracts from the divine perfections.

**19** When two incompatible things are equally good, with neither having any advantage over the other (whether intrinsically or through their combination with other things), God won't produce either of them.

**20** God is never determined by external things but always by what is in himself, i.e. by what he knows in advance of anything's existing outside him.

**To Clarke's 9** <14>

**21** There can't possibly be a reason why the quantity of matter ·in the universe· should be limited; so it can't *be* limited.

**22** And if we start with the supposition that the quantity of matter is somehow limited in some arbitrary way: It's always *possible* for more matter to be added to this without lessening the perfection of the things that do already exist; therefore more matter *must always be* added, according to the principle of the perfection of the divine operations; ·which means that our initial supposition of a limited amount of matter must be false·.

**23** So it can't be said that the present quantity of matter is the 'best for the present state of things'. Supposing it were: it would follow that this present state or constitution of things wasn't the absolutely best, because it would be blocking God

from using more matter. So it would have been better if he had chosen a different constitution of things, one that was capable of something more, ·namely the existence of more matter. From which it follows that our initial supposition 'There's a finite amount of matter, which is best for the world's actual constitution' must be false·.

**To Clarke's 10** <14>

**24** I'd like to see a passage from any philosopher who takes 'sensorium' in any other sense than Goclenius does. ·Clarke scolds me for bringing Goclenius into the discussion, but· I was right to cite his *Philosophical Dictionary*, to show how 'sensorium' is usually understood. That's what dictionaries are for.

**25** If Scapula says that sensorium is the place where the mind resides, he means by it the organ of internal sensation; so he doesn't differ from Goclenius.

**26** 'Sensorium' has always signified the organ of sensation. The pineal gland would be, according to Descartes, the sensorium in the sense that Clarke reports Scapula as giving it.

**27** Crediting God with having a sensorium is just about the *worst* thing one could say on this subject; it seems to imply that God is the soul of the world. As for what Newton says using this word: it will be hard to find *any* interpretation that justifies it.

**28** The question is indeed about Newton's sense for that word, not Goclenius's, Clarke shouldn't criticize me for quoting the *Philosophical Dictionary*, because the design of dictionaries is to show the use of words.

**To Clarke's 11, 12** <14>

**29** God is aware of things in himself. [This doesn't mean that God is aware of things *that are* in himself; but rather that God's awareness

of things is in some special way internal to him.] Space is the place of things and not the place of God's ideas. To put God's ideas into space, we'd have to regard space as something that unites God with things, along the lines of the union of soul and body that some people believe in; and then we would be back to making God the soul of the world.

**30** Clarke also goes wrong when he compares God's knowledge and operation with the knowledge and operation of souls. Souls know things because God has put into them

**what Leibniz wrote next:** *un principe representatif de ce qui est hors d'elles.*

**how Clarke translated that:** a principle representative of things without.

**what Leibniz was getting at:** a generator of representations of things outside them.

But God knows things because he is continually producing them. [Clarke reports difficulty with this passage in his **30** on page 25. Both *principe* and 'principle' could be used to mean 'source' or 'cause' or 'generator', and Clarke had that usage in his own repertoire: see for example 'physical cause or ' near the end of his discussion of Leibniz's **1-20** on page 50.]

**31** In my view, all there is to the soul's acting on things is the fact that the body adapts itself to the soul's desires, by virtue of the harmony that God has pre-established between them.

**32** But those who fancy that the soul can give a new force to the body, and that God gives new force to the world so as to fix the flaws in his machine, make God too much like the soul by ascribing too much to the soul and too little to God.

**33** Actually, God alone can give new force to nature, and he does it only supernaturally. If he needed to do it in the natural course of events, that would be because he had made

a very imperfect work. He would then relate to the world in the way ignorant people think the soul relates to the body.

**34** Those who try to defend the vulgar opinion about the soul's influence over the body by citing God's operating on things outside himself are—again!—making God too much like the soul of the world. Clarke's show of disapproval for my phrase *intelligentia supramundana* seems to tend that way.

**35** The images that the soul immediately *has* are *within* it, but they •correspond to the images of the body. The soul can be *present* to something only in an imperfect way, which can be explained only in terms of that •correspondence between the soul's images and the bodily images. [The body's 'images' are the items referred to in the note on **3** on page 2 as the 'material counterparts or underlays' of mental images.] But God's way of being present to something is perfect = complete, and is manifested by his operation.

**36** It was wrong of Clarke in arguing against me to help himself to the view that the soul's presence in the body is connected with its influence over the body; for he knows that I reject that influence.

**37** It's no easier to make sense of the soul's being diffused throughout the •brain than of its being diffused through the •entire body. The difference between those is only one of more and less.

**To Clarke's 13, 14** <15>

**38** Those who fancy that active forces automatically decrease in the world don't properly understand the chief laws of nature or the beauty of God's works.

**39** How are they going to show that this loss-of- force defect is a consequence of the dependence of things? ·I now proceed to show the exact opposite!·

**40** When one of our machines is flawed and has to be fixed, the reason this has happened is that the machine *did not* sufficiently depend on the man who made it—i.e. some of the machine's functioning was not sufficiently in accordance with the maker's design. So nature's dependence on God, far from causing the flaw we have been discussing, is the reason why that flaw doesn't occur in nature. It's because nature is so dependent on—so much in accordance with the designs of—a workman who is too perfect to make a work that needed to be mended. Every particular machine *in* nature is somewhat liable to go out of order; but not the entire universe, which can't diminish in perfection.

**To Clarke's 16** <15>

**41** Clarke contends that space doesn't depend on the situation of bodies. I reply that it's true that space doesn't depend on this or that particular spatial lay-out of bodies, but it is the order that makes it possible for bodies to be situated, and by which they have a lay-out among themselves when they exist together, just as

**what Leibniz wrote:** *le temps est cet ordre par rapport à leur position successive.*

**what that means:** time is that order with respect to their successive position.

**what he may have been getting at:** time is the order that makes it possible for events to have a chronology among themselves when they occur at different times.

If there were no created things, space and time would only be in the ideas of God.

**To Clarke's 17** <15>

**42** Clarke seems to acknowledge here that his notion of a miracle isn't the one that theologians and philosophers usually have.

**what Leibniz wrote next:** *Il me suffit donc, que mes adversaires sont obligés de recourir à ce qu'on appelle miracle dans l'usage receu et qu'on tache d'éviter en philosophisant.*

**how Clarke translated it:** It is therefore sufficient for my purposes that my adversaries are obliged to have recourse to what is commonly called a miracle.

**a bit clearer and fuller:** I'm satisfied to see that my adversaries have to avail themselves of the ordinary everyday notion of *miracle*—a notion that one tries to avoid in doing science.

[You'll see the point of laying those out in that way when you look at Clarke's extremely odd comment on this in his **42** on page 26. As for 'science': in Leibniz's time 'philosophy' often referred to natural science as well as to what you and I call 'philosophy'; and this is one of the places where that is certainly the case.]

**43** By altering the 'philosophically' accepted sense of 'miracle', I'm afraid Clarke will get stuck with an awkward consequence. The nature of a miracle doesn't have anything to do with usualness/unusualness; if it did, then monsters would be miracles. [By 'monster' Leibniz here means 'human or other animal that has from birth physical features making it strikingly and disquietingly unlike most members of its species'.]

**44** There are miracles at a lower level, which an angel can perform—e.g. making a man walk on water without sinking. But there are miracles that only God can perform, because they exceed all natural powers. Creating and annihilating are miracles of this kind.

**45** It is also a supernatural thing that bodies should attract one another at a distance without any intermediate means, and that a body should circulate without shooting off along a tangent, though nothing hinders it from doing that. For these effects can't be explained by the nature of things.

**46** What's the problem about explaining the •motions of animals through natural forces? It is true that the •beginnings

of animals can't be explained in that way, any more than the beginning of the world can.

**P.S.** All those who maintain that there is empty space are influenced more by imagination than by reason. When I was a boy, I also bought into the notion of the •void [= 'empty space'] and •atoms, with which my imagination had a *lovely* time. Thinking in those terms,

we take our inquiries no further than •those two things; they (as it were) nail our thoughts to them; we think that we have found the first elements of things, the rock bottom. We don't want nature to go any further, wanting it to be finite, like our minds.

But then reason straightened me out, and showed me that this was sheer ignorance of the greatness and majesty of •God•, the author of things. In fact, the tiniest corpuscle is actually subdivided to infinity, and contains a world of further creatures that the universe would lack if that corpuscle were an atom. . . Similarly, to postulate stretches of empty space in nature is to ascribe to God a very imperfect work; it violates the great principle of the necessity for a sufficient reason •for anything that is the case•. Plenty of people have paid lip- service to that principle, but they haven't understood its true meaning; as I recently showed when I used the principle to show •something that those payers of lip-service would never have expected to arise from it, namely• that space is only an order of things, as time also is, and *not* an absolute being. Setting aside many *other* arguments that I have against the void and atoms, I'll present here the ones that I base on **(1)** God's perfection and **(2)** the necessity for a sufficient reason. **(1)** I lay it down as a principle that God has actually given to each thing every perfection that he could

give to it without detracting from its other perfections. Now suppose there is a wholly empty region of space. God could have put matter into it without taking *anything* away from anything else; so he actually *has* put matter in that region. •And that was just some region taken at random; the proof holds for *any* region•; so we have the result that no region of space is completely empty; therefore the whole of space is full. The same argument proves that •there are no atoms, i.e. that• every corpuscle is subdivided. [The argument would go: Suppose there is an atom. God could have made divisions without taking any perfection away from it or anything else; so he *has* done that; so etc.] **(2)** Here is a second argument, based on the need for a sufficient reason. There can't possibly be any principle to settle what *proportion* of space should have matter in it. You might say that the right proportion is *half*, i.e. that there should be exactly as much filled space as empty space; but matter is more perfect than empty space, so reason requires that there should be more matter than vacuum—as much more as matter merits being preferred to vacuum. (•If matter is *much* more perfect than vacuum, there should be *much* more filled space than empty space. If matter is just *a little* more perfect than vacuum, there should be just *a little* more filled space than empty•. ) By that reasoning, there should be no empty space at all, because the ratio of •perfection of matter to •perfection of vacuum is the ratio of •something to •nothing. A similar argument holds against atoms: what reason can anyone give what nature should be limited in how finely it is subdivided? •And what principle could lay down *how far down* the subdivision should go?• Atoms and the void are fictions, purely arbitrary and unworthy of true philosophy. The reasons Clarke gives for empty space are mere sophisms.

### Clarke's fourth reply (26 June 1716)

**1, 2** <page 16> This notion leads to universal necessity and fate, by supposing that motives relate to the will of an intelligent agent in the same way that weights relate to a balance (see Leibniz's **1** on page 4); so that a thinking agent can no more choose between two absolutely indifferent options than a balance can move itself when the weights on both sides are equal. The two are not on a par, because of the following difference between them. •A balance is not an agent, ·i.e. doesn't *act*·, but is merely passive and *acted on* by the weights; so that when the weights are equal there is nothing to move it. But •thinking beings *are* agents; they aren't passive things that are moved by their motives as a balance is moved by weights; rather, they have active powers through which they *move themselves*, sometimes upon the view of strong motives, sometimes upon weak ones, and sometimes where things are absolutely indifferent. [In that sentence, the phrase 'upon the view of' is Clarke's.] Where the options are indifferent, there may still be very good reason to act. Leibniz always supposes the contrary, on principle; but he doesn't prove this, either from the nature of things or from the perfections of God.

**3, 4** <16> If this argument were right, it would prove that God did not and could not possibly create any matter at all! For the perfectly solid parts of all matter, if you take them to have the same shapes and sizes (which is always possible in supposition), are exactly alike; in which case it would be perfectly indifferent if any two of them switched locations; and that, according to Leibniz's argument, makes it impossible for God to locate them in the places where he did actually locate them at the creation, because he could as easily have switched their locations. Of course no two

leaves are exactly alike, and perhaps no two drops of water are either; but that's because these are very •complex bodies. The case is very different with the parts of •simple solid matter. And even with complex bodies, it isn't *impossible* for God to make two of them—e.g. two drops of water—exactly alike. And if he *did* make them exactly alike, their likeness wouldn't turn them into a single drop of water! Their locations would be different, even though it was absolutely indifferent which drop was placed in which location. The same reasoning holds regarding the choice between *this way* and *that way* when God was giving the world of matter its initial shove.

**5, 6** <16> Two things don't stop being *two* by becoming exactly alike. The parts of •time are as exactly like each other as are the parts of •space; yet two points of time aren't one and the same point of time—'one thing with two names'. If God had created the world *right now*, it wouldn't have been created at the time when it actually was created. And if God did or could make the total bulk of matter finite in size, then the material universe would have to be in its nature movable; for nothing that is finite is immovable. Thus, to say that God couldn't have made a different choice of *when* and *where* matter was to exist is •to make matter necessarily infinite and eternal, and •to reduce all things to necessity and fate.

**7** <16> If the material world is finite in size, space outside the world is real, not imaginary. And empty spaces *in* the world aren't merely imaginary either. In a jar from which the air has been pumped, a tiny quantity of matter—rays of light, and perhaps other stuff—still remains, but the lack of resistance plainly shows that most of that space is devoid of matter. The lack of resistance can't be explained by the matter's being



very subtle, i.e. very finely divided: liquid mercury is as finely divided and as fluid as water, yet it creates more than ten times as much resistance as water does; so its resistance must arise from the quantity of matter that is involved, not from the largeness of the matter's parts; which confirms my explanation of why the pumped-out jar offers so little resistance.

**8** <16> Any region of empty space is the property of an incorporeal substance—a substance that isn't made of matter. Space is not 'bounded' by bodies, but exists equally within bodies and around them. Space isn't enclosed between bodies; rather, bodies exist in unbounded space and are terminated or bounded by their own dimensions. [Evidently meaning that what 'limits' the size of a material thing is just *its size*.]

**9** <16> Empty space is not 'an attribute without a subject', because by the phrase 'empty space' we never mean 'space that is empty of *everything*' but only 'space that is empty of *body*'. In all empty space God is certainly present, and possibly many other substances that aren't matter—ones that can't be felt by touch or detected by any of our other senses.

**10** <17> Space is not a substance, but a property; and if it's a property of something that is necessary it will (like any other property of anything necessary) itself exist necessarily; without *being* a substance, it will have a necessity of existence that contingent substances lack. •Space is immense,

unchangeable and eternal; and so also is •duration. But this doesn't at all imply that anything is eternal other than God. For space and duration are not other than or additional to God [Clarke twice uses the French *hors de Dieu*, echoing Leibniz's use of it in his **10** on page 8]; they are caused by his existence—are immediate and necessary consequences of his existence.<sup>7</sup> And without them he wouldn't be eternal and omnipresent.

**11, 12** <17> •Infinites are composed of finites only in the sense in which •finites are composed of infinitesimals. I have already explained, in my **3** on page 13, in what sense space has or doesn't have parts. In the body-related sense of the word, 'parts' are  
 separable,  
 compounded,  
 un-united,  
 independent of each other, and  
 movable from each other.

In contrast with that, although we can partly grasp or imaginatively conceive infinite space as composed of parts, those 'parts' (improperly so-called) are essentially

indiscernible from one another,  
 immovable from one other, and  
 not capable of being split off,

because the idea of splitting one off from the rest involves an explicit contradiction in terms (see my **4** on page 7, and my **3** on page 13). Thus, space is in itself essentially *one*, and absolutely indivisible.

<sup>7</sup> 'God is eternal and infinite, omnipotent and omniscient. That is, he lasts from eternity to eternity, and is present from infinity to infinity. He governs everything that exists, and knows everything that it is possible to know. He is not eternity or infinity, but is eternal and infinite. He isn't duration or space, but he . . . endures through all time and is present through all space; and by existing always and everywhere he establishes duration and space. [Newton writes *constituit*, which Clarke translates as "constitutes", but Newton is using that word in its now obsolete sense of "establishes" or "sets up".] Since every particle of space is *always*, and every indivisible moment of duration is *everywhere*, the maker and lord of all things cannot be never and nowhere. . . . His omnipresence isn't just a matter of his *power's* being everywhere; a power can't exist without substance •that *has it*•; so he himself is everywhere.' Newton, *Principia*, General scholium.

**13** <17> If the world is finite in size, it can be moved by the power of God; so my argument based on that movableness is conclusive. Two exactly alike places are not the same place. Nor are the universe's being in motion and its staying at rest the same state. If a ship is sailing smoothly enough, a man shut up in the cabin can't tell whether it is moving or not; but that doesn't alter the fact that its *moving* and its *not moving* are not the same state! Whether or not the locked-up man can detect it, the motion of the ship is a real state with real effects (a different state and different effects from motionlessness); and if the ship suddenly stopped, that would yield other real effects; as would a sudden stopping of an indiscernible motion of the universe. No answer to this argument has ever been given ·from Leibniz's side·. Newton emphasizes this at length in his *Mathematical Principles*, (Definition 8) where

from the consideration of the properties, causes, and effects of motion, he shows the difference between •real motion (a body's being moved from one part of space to another) and •relative motion (bodies merely undergoing a change of the order or situation they have with respect to one other).

This argument is a mathematical one. It shows from real effects that there may be real motion in the absence of relative motion, and relative motion in the absence of real motion. It isn't answered by simply *asserting* the contrary.

**14** <17> The reality of space is not a 'supposition', but is proved by the above arguments, to which no answer has been given. Nor is any answer given to my other argument—in **4** on page 14.—that space and time are *quantities*, which situation and order are not.

**15** <17> It wasn't impossible for God to have made the world sooner or later than he actually did; and it's not at all

impossible for him to destroy it sooner or later than he actually will. As for the notion of the world's eternity: those who suppose matter and space to be the same must indeed suppose that not only *is* the world infinite and eternal but it necessarily *must* be so; just as necessarily as space and duration, which depend not on the will but on the existence of God. [Leibniz, as he will say in his **62** on page 40, doesn't 'suppose matter and space to be the same'. This sentence of Clarke's seems to be a side-swipe at Descartes: someone who combines •Descartes's view that matter is the same as space with •Clarke's own view about the nature of space and the necessity of its existence will be forced to the conclusion that the material world exists necessarily.] But there is no problem here for those who believe that God created as much matter as he pleased, and where and when he pleased. For God in his wisdom may have had very good reasons for creating this world at the particular time that he chose; and he may have created other kinds of things before this material world began, and may create yet further kinds of things after this world is destroyed.

**16, 17** <17> In my **4** on page 13 and my **13** on this page, I have shown that space and time are not the mere order of things, but are real quantities (which order and situation are not). Leibniz hasn't answered those proofs. Until he does so, his assertion—which he says 'would be a contradiction' if I were right—has to be regarded as indeed being a contradiction.

**18** <18> The uniformity of all the parts of space isn't an argument against God's acting in any part in any way he likes. God may have good reasons to create finite beings, and finite beings have to be in particular places. All places are basically alike (and would be so even if place were nothing but the situation of bodies); so when God places two indistinguishable cubes of matter *this* way rather than *that*, the two options are perfectly equal; but that doesn't

mean that it is unworthy of the perfections of God that he should choose one of them. There may be very good reasons why both the cubes should exist, and they can't exist except placed *this way* or *that*. Also, Leibniz's statement that 'A will without reason would be mere Epicurean *chance*' is wrong. Epicurean chance is not a choice of will, but a blind necessity of fate.

**19** <18> This argument (as I observed in my **3–4** on page 22), if it proves anything, proves that God didn't *and can't* create any matter at all. The options of different initial locations for equal and exactly alike parts of matter would have to be indifferent; as was also the first-shove determination of their motions—*this way* or *the opposite way*.

**20** <18> I don't see what this has to do with anything we have been arguing about.

**21** <18> 'God cannot set limits to how much matter there is'—that is too weighty an assertion to be accepted without proof. If he also can't limit how long matter lasts, then the material world is both infinite and eternal necessarily and independently of God.

**22, 23** <18> If this argument were sound, it would prove that anything that God *can* do is something that he *must* do—can't help doing; so that he can't help making everything infinite and everything eternal. That would mean that he isn't a governor at all, but a mere necessary agent, i.e. not really an agent at all but mere fate and nature and necessity.

**24–28** <18–18> Concerning the use of the word *sensorium* [this time Clarke uses the English 'sensory'], I have already said enough in my **10** on page 11, my **3** on page 7, and my **3** on page 1 (but bear in mind that Newton says only '*... as it were* the sensorium. . .').

**29** <18> Space is the place of all things and of all ideas; just as duration is the duration of all things and of all ideas. This

has no tendency to make God the soul of the world—see my **12** on page 8 [Clarke might also have referred to his **12** on page 15.] There is no union between God and the world. It would be more proper to call the mind of man 'the soul of the images of things that it perceives' than to call God 'the soul of the world'—the world to which he is present throughout, acting on it as he pleases without being acted on by it. I gave this answer in my **12** on page 14, but Leibniz repeats the same objection again and again, without taking any notice of my answer.

**30** <25> I don't know what is meant by 'representative principle' [see note in **30** on page 19]. The soul discerns things by •having the images of them conveyed to it through the sense-organs; God discerns things by •being present to and in the substances of the things. *Not* by •producing them continually (for he is now resting from his work of creation), but by •being continually omnipresent to everything that he created at the beginning.

**31** <19> Leibniz holds that

- the soul doesn't act on the body;
- the body moves purely in accord with the laws of impact-mechanics; and yet
- the body's movements conform to the will of the soul in all the infinite variety of spontaneous animal motion.

That is a perpetual miracle! 'Pre-established harmony' is just a phrase, an invented technical term. It doesn't help in the slightest to explain this miraculous effect.

**32** <19> To suppose that in spontaneous animal motion the soul has no *effect* on matter, and that all spontaneous animal motion is performed through impact-mechanics, is to reduce everything to mere fate and necessity. God acts on everything in the world, in any way he likes, without any 'union' and

without being acted on by anything—all that shows plainly the difference between an omnipresent governor and an imaginary soul of the world.

**33** <19> In the nature of things, every action is the giving of a new force to the thing that is acted on. Otherwise it's not really •action but mere •passiveness; which is the case in all mechanical and inanimate passings-on of motion. [The thought here is that when any inanimate thing x makes something else y move, all x does is to pass on to y some motion which *came to it from something else*. In inanimate systems motion is never *originated*.] If the giving of a new force is supernatural, then every one of God's actions is supernatural, and he has no role in the workings of the natural world. And it follows also that either •every human action is supernatural (•because it creates new force•) or •man is as much a mere machine as a clock is (•because he never creates new force•).

**34, 35** <19> I have already shown the difference between •the true notion of God and •the notion of a soul of the world. See my **12** on page 11 and my **29** and **32** just above.

**36** <19> This has been answered in my **31** above.

**37** <19> The soul is not 'diffused throughout the brain'. It is present in one particular place, the sensorium.

**38** <19> This is a bare assertion, without proof. When two perfectly inelastic bodies meet in a head-on collision in which their forces are equal, they both lose their motion. And Newton has given a mathematical example in which the amount of motion is continually falling and rising, without any of it being passed on to other bodies (*Optics*, near end of Query 31).

**39** <19> This loss of force is not a 'defect', as Leibniz here supposes. It is the just and proper nature of inert matter.

**40** <20> If this argument is sound, it proves that •the material world must be infinite, •that it must have existed from

eternity and must continue to eternity, and •that God must always have created as many men, and as many things of every other kind, as it was possible for him to create, and to have gone on doing this for as long a time as it was possible for him to do it. [This item seems irrelevant to Leibniz's **40** on page 20; it is closer to fitting his **23** on page 18. See Leibniz's puzzled comment on it in his **103** on page 45.]

**41** <20> I don't understand the words *the order* (or situation) *that makes it possible for bodies to be situated*. It seems to amount to saying that *situation is the cause of situation*. [Leibniz had written only of 'the order which ' etc.; the insertion of '(or situation)' was Clarke's.] As I point out in my **13** and **14** two pages back, it has been *shown* that space is not merely the order of bodies, and Leibniz has not *answered* this. Also, it is obvious that time is not merely the order of things succeeding each other, because the •quantity of time may be greater or less while the •order of events remains the same. . . . If there were no created things, space and duration would be exactly the same as they are in actuality—God's ubiquity [= 'everywhereness'] and the continuance of his existence would see to that.

**42** <20> This is appealing from reason to vulgar opinion, which philosophers should not do, because it is not the rule of truth. [Leibniz in his **107** on page 46 thinks Clarke is referring to the 'vulgar opinion' that the ordinary concept of miracle shouldn't be used in science. He, of course, couldn't know that Clarke in translating what he had written would *omit* the mention of how science should be done.]

**43** <20> The concept of *miracle* does include *unusualness*. Think of things we count as 'natural' although they are absolutely wonderful and manifest enormous amounts of power—things like the movements of the heavenly bodies, and the generation and formation of plants and animals etc. Astounding as these are, they aren't miracles, simply

because they are common, usual. But it doesn't follow that everything *unusual* is a miracle. It might instead be only an irregular and rarer effect of *usual* causes—for example, eclipses, monstrous births [see note to **43** on page 20], madness in men, and countless other things that the vulgar call prodigies.

**44** <20> This concedes what I claimed; though it's contrary to the common theological opinion to suppose that an angel can perform a miracle.

**45** <20> That one body should attract another ·from a distance· without any intermediate means—indeed this isn't a •miracle because it's •a contradiction! That's because it supposes something to *act* where it *is* not. But the means by which two bodies attract each other may be invisible and intangible, quite different from *mechanism*, and yet be something that acts so regularly and constantly that we can call it 'natural'—it's much less wonderful than animal motion, though that is never called a miracle. [In these remarks of Clarke's and in Leibniz's response to them in his **118** on page 48, *moyen* = 'means' is apparently being used in two senses at once. •There is no *how* concerning the attraction they are talking about, no *means* by which it is brought about; it just happens. But the absence of a *moyen* is also •the absence of any *intervening link* between the mutually attracting bodies.]

**46** <20> If this is about forces that are 'natural' in the sense of being 'mechanical', then Leibniz is implying that all animals, all men even, are mere machines—as much so as a clock. But if 'natural' doesn't mean 'mechanical', then gravitation may be brought about by forces that are regular and natural

without being mechanical. [Here and throughout, 'mechanical' and its cognates refer to the physics of *collisions*—impact-mechanics.]

**N.B.** <21> The arguments offered in the postscript to Leibniz's fourth paper have been already answered in my replies above. All I need add here is that his view about the impossibility of atoms (*physical* atoms, that is; we aren't arguing about mathematical atoms) is an obvious absurdity. Either •there are perfectly solid particles of matter or •there are not. •If there are, then there's nothing conceptually wrong with supposing that they have parts that are all of the same size and shape; and those parts would be physical atoms that were perfectly alike. But •if there aren't any such perfectly solid particles, then there's no matter at all in the universe. Here is why:

When you divide and subdivide the parts of a body, trying to get down to the level where there are perfectly solid parts with no pores in them, the longer it takes you to reach that level the greater is the proportion of pores to solid matter in that body. ·That's because at each level you will have a mixture of pores and matter, and at each stage the matter you've reached is *itself* a mixture of pores and matter, which. . . etc.· So if your division-and-subdivision goes on to infinity without your *ever* arriving at parts that are perfectly solid, i.e. contain no pores, it will follow that all bodies consist of pores only, without any matter at all; which is plainly absurd.

And the same pattern of argument applies with regard to the matter of which the bodies of any particular species are composed.