

Leibniz. G.W.  
New Essays on Human  
Understanding  
Cambridge U.P. 1996

## PREFACE

### NOTICE

This material may be  
protected by copyright  
law (Title 17 U.S. Code.)

The *Essay on the Understanding*, produced by an illustrious Englishman, is one of the finest and most admired works of the age. Since I have thought at length about the same subject and about most of the topics which are dealt with in it, I have decided to comment upon it. I thought that this would be a good opportunity to publish something entitled *New Essays on the Understanding* and to gain a more favourable reception for my thoughts by putting them in such good company. I thought too that I might benefit from someone else's labour, not only to lessen mine (since it is easier to follow the thread of a good author than to do everything by one's own efforts), but also to add something to what he has produced for us, which is always easier than to start from the beginning. It is true that my opinions frequently differ from his, but far from denying the merit of this famous writer I testify in his favour by showing where and why I differ from him, when I find that on certain significant points I have to prevent his authority from prevailing over reason. 44

Indeed, although the author of the *Essay* says hundreds of fine things which I applaud, our systems are very different. His is closer to Aristotle and mine to Plato, although each of us parts company at many points from the teachings of both of these ancient writers. He is more popular whereas I am sometimes forced to be a little more esoteric and abstract – which is no advantage for me, particularly when writing in a living language. However, I think that by using two speakers, one of whom presents opinions drawn from that author's *Essay* and the other adds my comments, the confrontation will be more to the reader's taste than a dry commentary from which he would have to be continually turning back to the author's book in order to understand mine. Nevertheless it would be well to compare our writings from time to time, and to judge of his opinions only from his own book even though I have usually retained its wording. I am afraid that the obligation to follow the thread, when commenting on someone else's treatise, has shut out any hope of my attaining to the charms of which dialogue is capable; but I hope that the matter will make up for the shortcomings of the manner. 45 46 47 48

Our disagreements concern points of some importance. There is the question whether the soul in itself is completely blank like a writing tablet on which nothing has as yet been written – a *tabula rasa* – as Aristotle and

the author of the *Essay* maintain, and whether everything which is inscribed there comes solely from the senses and experience; or whether the soul inherently contains the sources<sup>1</sup> of various notions and doctrines, which external objects merely rouse up on suitable occasions, as I believe and as do Plato and even the Schoolmen and all those who understand in this sense the passage in St Paul where he says that God's law is written 49 in our hearts (*Romans*, 2: 15). The Stoics call these sources Prolepses, that is fundamental assumptions or things taken for granted in advance. Mathematicians call them common notions or *koinai ennoiai*. Modern philosophers give them other fine names and Julius Scaliger, in particular, used to call them 'seeds of eternity' and also '*zopyra*' – meaning living fires or flashes of light hidden inside us but made visible by the stimulation of the senses, as sparks can be struck from a steel. And we have reason to believe that these flashes reveal something divine and eternal: this appears especially in the case of necessary truths. That raises another question, namely whether all truths depend on experience, that is on induction and instances, or if some of them have some other foundation. For if some events can be foreseen before any test has been made of them, it is obvious that we contribute something from our side. Although the senses are necessary for all our actual knowledge, they are not sufficient to provide it all, since they never give us anything but instances, that is particular or singular truths. But however many instances confirm a general truth, they do not suffice to establish its universal necessity; for it does not follow that what has happened will always happen in the same way. For instance, the Greeks and Romans and all the other nations on earth always found that within the passage of twenty-four hours day turns into night and night into day. But they would have been mistaken if they had believed that the same rule holds everywhere, since the contrary was observed during a stay in Novaya Zemlya. And anyone who believed that it is a necessary and eternal truth at least in our latitudes would also be mistaken, since we must recognize that neither the earth nor even the sun exist necessarily, and that 50 there may come a time when this beautiful star no longer exists, at least in its present form, nor its whole system. From this it appears that necessary truths, such as we find in pure mathematics and particularly in arithmetic and geometry, must have principles whose proof does not depend on instances nor, consequently, on the testimony of the senses, even though without the senses it would never occur to us to think of them. This distinction must be thoroughly observed, and Euclid understood that so well that he demonstrates by reason things that experience and sense-images make very evident. Logic also abounds in such truths, and so do metaphysics and ethics, together with their respective products, natural theology and natural jurisprudence; and so the \*proof of them can only come from

<sup>1</sup> '*principes*'.

inner principles, which are described as innate. It would indeed be wrong to think that we can easily read these eternal laws of reason in the soul, as the Praetor's edict can be read on his notice-board, without effort or inquiry; but it is enough that they can be discovered within us by dint of attention: the senses provide the occasion, and successful experiments also serve to corroborate reason, somewhat as checks in arithmetic help us to avoid errors of calculation in long chains of reasoning. It is in this same respect that man's knowledge differs from that of beasts: beasts are sheer empirics and are guided entirely by instances. While men are capable of demonstrative knowledge [*\*science*], beasts, so far as one can judge, never manage to form necessary propositions, since the faculty by which they make sequences is something lower than the reason which is to be found in men. The sequences of beasts are just like those of simple empirics who maintain that what has happened once will happen again in a case which is similar in the respects that they are impressed by, although that does not enable them to judge whether the same reasons are at work. That is what makes it so easy for men to ensnare beasts, and so easy for simple empirics to make mistakes. Even people made cunning by age and experience are not proof against this when they trust too much to their past experience; as has happened to various people engaged in civil or military affairs, through their not taking sufficiently to heart that the world changes and that men become cleverer and find hundreds of new tricks – whereas the deer and hares of our time are not becoming craftier than those of long 51 ago. The sequences of beasts are only a shadow of reasoning, that is, they are nothing but a connection in the imagination – a passage from one image to another; for when a new situation appears similar to its predecessor, it is expected to have the same concomitant features as before, as though things were linked [*\*liaison*] in reality just because their images are linked in the memory. It is true, moreover, that reason counsels us to expect ordinarily that what we find in the future will conform to long experience of the past; but even so, this is no necessary and infallible truth, and it can fail us when we least expect it to, if there is a change in the reasons which have been maintaining it. This is why the wisest men do not trust it so implicitly that they neglect to probe somewhat, where possible, into the reason for such regularities, in order to know when they will have to allow exceptions. For only reason is capable of establishing reliable rules, of making up the deficiencies of those which have proved unreliable by allowing exceptions to them, and lastly of finding unbreakable links in the cogency of necessary inferences. This last often provides a way of foreseeing events without having to experience sensible links between images, as beasts must. Thus what shows the existence of inner sources of necessary truths is also what distinguishes man from beast.

Perhaps our gifted author will not entirely disagree with my view. For

after devoting the whole of his first book to rejecting innate illumination, understood in a certain sense, he nevertheless admits at the start of his second book, and from there on, that ideas which do not originate in sensation come from reflection. But reflection is nothing but attention to what is within us, and the senses do not give us what we carry with us already. In view of this, can it be denied that there is a great deal that is innate in our minds, since we are innate to ourselves, so to speak, and since we include Being, Unity, Substance, Duration, Change, Action, Perception, Pleasure, and hosts of other objects of our intellectual ideas? And since these objects are immediately related to our understanding and always present to it (although our distractions and needs prevent us being  
 52 always aware of them), is it any wonder that we say that these ideas, along with what depends on them, are innate in us? I have also used the analogy of a veined block of marble, as opposed to an entirely homogeneous block of marble, or to a blank tablet – what the philosophers call a *tabula rasa*. For if the soul were like such a blank tablet then truths would be in us as the shape of \*Hercules is in a piece of marble when the marble is entirely neutral as to whether it assumes this shape or some other. However, if there were veins in the block which marked out the shape of Hercules rather than other shapes, then that block would be more determined to that shape and Hercules would be innate in it, in a way, even though labour would be required to expose the veins and to polish them into clarity, removing everything that prevents their being seen. This is how ideas and truths are innate in us – as inclinations, dispositions, tendencies, or natural potentialities, and not as actions; although these potentialities are always accompanied by certain actions, often insensible ones, which correspond to them.

Our gifted author seems to claim that there is nothing *potential* in us, in fact nothing of which we are not always actually aware. But he cannot hold strictly to this; otherwise his position would be too paradoxical, since, again, we are not always aware of our acquired dispositions [*\*habitude*] or of the contents of our memory, and they do not even come to our aid whenever we need them, though often they come readily to mind when some idle circumstance reminds us of them, as when hearing the opening words of a song is enough to bring back the rest. So on other occasions he limits his thesis to the statement that there is nothing in us of which we have not at least previously been aware. But no one can establish by reason alone how far our past and now perhaps forgotten awarenesses may have extended, especially if we accept the Platonists' doctrine of recollection which, though sheer myth, is entirely consistent with unadorned reason. And furthermore, why must we acquire everything  
 53 through awareness of outer things and not be able to unearth anything from within ourselves? Is our soul in itself so empty that unless it borrows

images from outside it is nothing? I am sure that our judicious author could not approve of such a view. Where could tablets be found which were completely uniform? Will a perfectly homogeneous and even surface ever be seen? So why could we not also provide ourselves with objects of thought from our own depths, if we take the trouble to dig there? Which leads me to believe that fundamentally his view on this question is not different from my own or rather from the common view, especially since he recognizes two sources of our knowledge, the senses and reflection.

I doubt if it will be so easy to make him agree with us and with the \*Cartesians when he maintains that the mind does not think all the time, and in particular that it has no perceptions during dreamless sleep, arguing that since bodies can be without movement souls can just as well be without thought. But my response to this is a little different from the usual one. For I maintain that in the natural course of things no substance can lack activity, and indeed that there is never a body without movement. Experience is already on my side, and to be convinced one need only consult the distinguished Mr \*Boyle's book attacking absolute rest. But I believe that reason also supports this, and that is one of my proofs that there are no atoms. Besides, there are hundreds of indications leading us to conclude that at every moment there is in us an infinity of perceptions, unaccompanied by \*awareness or reflection; that is, of alterations in the soul itself, of which we are unaware because these impressions are either too \*minute and too numerous, or else too unvarying, so that they are not sufficiently distinctive on their own. But when they are combined with others they do nevertheless have their effect and make themselves felt, at least confusedly, within the whole. This is how we become so accustomed to the motion of a mill or a waterfall, after living beside it for a while, that we pay no heed to it. Not that this motion ceases to strike on our sense-organs, or that something corresponding to it does not still occur in the soul because of the harmony between the soul and the body; but these impressions in the soul and the body, lacking the appeal of novelty, are not forceful enough to attract our attention and our memory, which are applied only to more compelling objects. Memory is needed for attention: when we are not alerted, so to speak, to pay heed to certain of our own present perceptions, we allow them to slip by unconsidered and even unnoticed. But if someone alerts us to them straight away, and makes us take note, for instance, of some noise which we have just heard, then we remember it and are aware of just having had some sense of it. Thus, we were not straight away aware of these perceptions, and we became aware of them only because we were alerted to them after an interval, however brief. To give a clearer idea of these minute perceptions which we are unable to pick out from the crowd, I like to use the example of the roaring noise of the sea which impresses itself on us when we are standing on the

~~instance) all the time, without paying distinct attention to it; and that the conduct of a liar who contradicts himself will be upsetting to anyone, however uncivilized, if the matter is one which he takes seriously. Thus, we use these maxims without having them explicitly in mind. It is rather like the way in which one has potentially in mind the suppressed premisses in \*enthymemes, which are omitted in our thinking of the argument as well as in our outward expression of it.~~

PHIL. I am surprised by what you say about potential knowledge and about these inner suppressions. §5. For it seems 'to me near a contradiction, to say, that there are truths imprinted on the soul, which it perceives. . .<sup>1</sup> not'.

77 THEO. If you have that prejudice, I am not surprised that you reject innate knowledge. But I am surprised that it has not occurred to you that we know an infinity of things which we are not \*aware of all the time, even when we need them; it is the function of memory to store them, and of recollection to put them before us again, which it does often – but not always – when there is need for it to do so. Well might this be called *souvenir* (*subvenir*),<sup>2</sup> for recollection needs some assistance [\*mnemonics]. Something must make us revive one rather than another of the multitude of items of knowledge, since it is impossible to think distinctly, all at once, about everything we know.

PHIL. I believe you are right about that. And my too general assertion that *we are always aware of<sup>3</sup> all the truths that are in our soul* is one which I let slip without having thought enough about it. But you will not find it quite so easy to deal with the point I am about to put to you. It is that if one can maintain the innateness of any particular proposition, then one will be able to maintain by the same reasoning that all propositions which are reasonable,<sup>4</sup> and which the mind will ever be able to regard as such, are already imprinted on the soul.

THEO. I grant you the point, as applied to pure ideas, which I contrast with images of sense, and as applied to necessary truths or truths of reason, which I contrast with truths of fact. On this view, the whole of arithmetic and of geometry should be regarded as innate, and contained within us in a potential way, so that we can find them within ourselves by attending carefully and methodically to what is already in our minds, without employing any truth learned through experience or through being handed on by other people. Plato showed this, in a dialogue where he had Socrates leading a child to abstruse truths just by asking questions and without

<sup>1</sup> Locke: 'or understands'. Coste's omission.

<sup>2</sup> Here a French word meaning 'come to mind' or 'remember' is followed by a cognate Latin word meaning 'come to the assistance of'.

<sup>3</sup> '*nous nous apercevons de*'; but Locke and Philalethes have spoken only of what '*nous apercevons*', what we perceive.

<sup>4</sup> Locke: 'true'.

teaching him anything [*Meno* 82<sup>b</sup>]. So one could construct these sciences in one's study and even with one's eyes closed, without learning from sight or even from touch any of the needed truths; although it is true that if one had never seen or touched anything, one would not bring to mind the relevant ideas. For it is an admirable arrangement on the part of nature that we cannot have abstract thoughts which have no need of something sensible, even if it be merely symbols such as the shapes of letters, or sounds; though there is no necessary connection between such arbitrary \*symbols and such thoughts. If sensible traces were not required, the \*pre-established harmony between body and soul, which I shall later have an opportunity to talk to you about more fully, would not obtain. But that does not preclude the mind's obtaining necessary truths from within itself. It is sometimes evident how far it can go through a purely natural logic and arithmetic, with no help: for instance, the Swedish boy who – if I remember rightly what I was told about the case – has developed his natural arithmetic to the point where he can do complex calculations on the spot, in his head, without having learned the standard methods of calculation nor even to read and write. It is true that he cannot solve inverse problems, such as ones which require the finding of roots. But that does not preclude there being some further trick of the mind by which he could have found even those solutions within himself; so it proves only that, of the things which are in us, some are harder to become aware of than others. Some innate principles are common property, and come easily to everyone. Some theorems are also discovered straight away; these constitute natural \*sciences, which are more extensive in some people than in others. Finally, in a larger sense, which is a good one to use if one is to have notions which are more comprehensive and determinate, any truths which are derivable from primary innate knowledge may also be called innate, because the mind can draw them from its own depths, though often only with difficulty. But if someone uses the terms differently, I would not argue about words.

PHIL. I have conceded that there could be something in the soul which one did not perceive there; for one does not at any given moment remember everything one knows. But whatever is known must have been learned, and must at some earlier stage have been explicitly known. So 'if any one can be said to be in the mind, which it never yet knew, it must be only because' it has the capacity or faculty for knowing it.<sup>1</sup>

THEO. Why couldn't it be because of something different, such as that the soul can contain things without one's being aware of them? Since an item of acquired knowledge can be hidden there by the memory, as you admit that it can, why could not nature also hide there an item of unacquired

<sup>1</sup> Locke: 'it is capable of knowing it'. Coste's change.

knowledge? Must a self-knowing substance have, straight away, actual knowledge of everything which belongs to its nature? Cannot – and should not – a substance like our soul have various properties and states which could not all be thought about straight away or all at once? The Platonists thought that all our knowledge is recollection, and thus that the truths which the soul brought with it when the man was born – the ones called innate – must be the remains of an earlier explicit knowledge. But there is no foundation for this opinion; and it is obvious that if there was an earlier state, however far back, it too must have involved some innate knowledge, just as our present state does: such knowledge must then either have come from a still earlier state or else have been innate or at least created with [the soul]; or else we must go to infinity and make souls eternal, in which case these items of knowledge would indeed be innate, because they would never have begun in the soul. If anyone claimed that each previous state took something from a still earlier state which it did not pass on to its successors, the reply is that obviously some self-evident truths must have been present in all of these states. On any view of the matter, it is always manifest in every state of the soul that necessary truths are innate, and that they are proved by what lies within, and cannot be established by experience as truths of fact are. Why could one not have in the soul something which one had never used? Is having something which you do not use the same as merely having the faculty for acquiring it? If that were so, our only possessions would be the things we make use of. Whereas in fact it is known that for a faculty to be brought to bear upon an object there must often be not merely the faculty and the object, but also some disposition in the faculty or in the object, or in both.<sup>1</sup>

PHIL. On that view of the matter, one will be able to say that there are truths engraved in the soul<sup>2</sup> which it has never known, and even ones which it will never know; and that appears strange to me.

THEO. I see no absurdity in that – though one cannot say confidently that there are such truths. For things which are higher than any we can know in our present course of life may unfold in our souls some day when they are in a different state.

PHIL. But suppose that ‘truths can be imprinted on the understanding without being perceived’ by it: I do not see how they can differ, so far as their origin is concerned, from ones which the understanding is merely capable of coming to know.

THEO. The mind is capable not merely of knowing them, but also of finding them within itself. If all it had was the mere capacity to receive those items of knowledge – a passive power to do so, as indeterminate as the power

<sup>1</sup> Taking ‘*et dans toutes les deux*’ to be a slip for ‘*ou dans tous les deux*’.

<sup>2</sup> Locke: ‘imprinted on the mind’. Coste’s change.

of wax to receive shapes or of a blank page to receive words – it would not be the source of necessary truths, as I have just shown that it is. For it cannot be denied that the senses are inadequate to show their necessity, and that therefore the mind has a disposition (as much active as passive) to draw them from its own depths; though the senses are necessary to give the mind the opportunity and the attention for this, and to direct it towards certain necessary truths rather than others. So you see, sir, that these people who hold a different view, able though they are, have apparently failed to think through the implications of the distinction between necessary or eternal truths and truths of experience. I said this before, and our entire debate confirms it. The fundamental proof of necessary truths comes from the understanding alone, and other truths come from experience or from observations of the senses. Our mind is capable of knowing truths of both sorts, but it is the source of the former; and however often one experienced instances of a universal truth, one could never know inductively that it would always hold unless one knew through reason that it was necessary.

PHIL. But if the words ‘to be in the understanding’ have any positive content, do they not signify *to be perceived and comprehended by the understanding*?<sup>1</sup>

THEO. They signify something quite different to us. It suffices that what is ‘in the understanding’ can be found there, and that the sources or fundamental proofs of the truths we are discussing are only ‘in the understanding’. The senses can hint at, justify and confirm these truths, but can never demonstrate their infallible and perpetual certainty.

PHIL. § II. However, all ‘those who will take the pains to reflect with a little attention on the operations of the understanding, will find, that this ready assent of the mind to some truths, depends’ on the faculty of the human mind.<sup>2</sup>

THEO. Yes indeed. But what makes the exercise of the faculty easy and natural so far as these truths are concerned is a special affinity which the human mind has with them; and that is what makes us call them innate. So it is not a bare faculty, consisting in a mere possibility of understanding those truths: it is rather a disposition, an aptitude, a preformation, which determines our soul and brings it about that they are derivable from it. Just as there is a difference between the shapes which are arbitrarily given to a stone or piece of marble, and those which its veins already indicate or are disposed to indicate if the sculptor avails himself of them.

PHIL. But truths are subsequent to the ideas from which they arise, are they not? And ideas all come from the senses.<sup>3</sup> 81

<sup>1</sup> Locke: ‘If [they] have any propriety, they signify to be understood.’ Coste’s change.

<sup>2</sup> Locke: ‘depends not, either on native inscription, or the use of reason; but on a faculty of the mind quite distinct from both of them’.

<sup>3</sup> Added by Leibniz, perhaps based on Locke’s §§ 15–16.

THEO. Intellectual ideas, from which necessary truths arise, do not come from the senses; and you acknowledge that some ideas arise from the mind's reflection when it turns in on itself. Now, it is true that explicit knowledge of truths is subsequent (in temporal or natural order) to the explicit knowledge of ideas; as the nature of truths depends upon the nature of ideas, before either are explicitly formed, and truths involving ideas which come from the senses are themselves at least partly dependent on the senses. But the ideas that come from the senses are confused; and so too, at least in part, are the truths which depend on them; whereas intellectual ideas, and the truths depending on them, are distinct, and neither [the ideas nor the truths] originate in the senses; though it is true that without the senses we would never think of them.

PHIL. But according to you, the ideas of numbers are intellectual ones; and yet the difficulties about numbers arise from the difficulty of explicitly forming the requisite ideas. § 16. For example, 'a man knows that eighteen and nineteen, are equal to thirty-seven, by the same self-evidence, that he knows one and two to be equal to three: yet, a child knows this, not so soon as the other; . . . because the ideas the words eighteen, nineteen, and thirty-seven stand for, are not so soon got, as those, which are signified by one, two, and three.'

THEO. I can grant you that the difficulty about explicitly forming truths often arises from a difficulty about explicitly forming ideas. I think that in your example, however, it is rather a matter of using ideas which have already been formed. For anyone who has learned to count to 10, and the procedure for going on from there by a certain repetition of tens, easily grasps what 18, 19 and 37 are, namely one or two or three times 10, plus 8 or 9 or 7. But to infer from this that 18 plus 19 make 37, requires more attention than is needed to know that 2 plus 1 are three, which really amounts only to a definition of *three*.

PHIL. § 18. It is not 'the prerogative of numbers alone', or of the ideas which you call intellectual, to 'afford propositions, which are sure to meet with assent, as soon as they are understood.' They are encountered also in 'natural philosophy, and all the other sciences', and even the senses provide some.<sup>1</sup> For example, the proposition 'that two bodies cannot be in the same place [at the same time],<sup>2</sup> is a truth, that no body any more sticks at, than at this maxim, That it is impossible for the same thing to be, and not to be [at the same time]; That white is not [red], That a square is not a circle, That yellowness is not sweetness'.

82

<sup>1</sup> Added by Leibniz.

<sup>2</sup> Whenever 'at the same time' occurs in parentheses, the addition is Coste's. Future occurrences will not be noted.

THEO. There is a difference between these propositions. The first of them, which claims that bodies cannot interpenetrate, needs proof. Indeed, it is rejected by all those who believe in condensation and rarefaction, strictly and properly so-called, such as the Peripatetics and the late Sir Kenelm Digby; not to mention Christians, most of whom think that the opposite – namely the \*penetration of dimensions – is possible for God. But the other propositions are *identities*, or nearly so; and identical or immediate propositions do not admit of proof. The ones pertaining to what the senses provide, such as that 'yellowness is not sweetness', merely apply the general maxim of identity to particular cases.

PHIL. 'Every proposition, wherein one different idea is denied of another,' e.g. that the square is not a circle, and that to be yellow is not to be sweet, will just as certainly be accepted as indubitable<sup>1</sup> 'at first . . . understanding the terms, as this general one, *It is impossible for the same to be, and not to be [at the same time]*'.

THEO. That is because one (namely the general maxim) is the principle, while the other (namely the negation of an idea by an opposed idea) is the application of it.

PHIL. It seems to me rather that the maxim rests on that negation, 'which is the foundation of it', and that it is even easier to grasp that '*The same is not different*' than to grasp the maxim which rejects contradictions. By your account, then, we shall have to admit as innate truths an infinite number of propositions of this kind, in which one idea is denied of another, not to mention other truths. Furthermore, 'since no proposition can be innate, unless the ideas [which make it up]<sup>2</sup> be innate, this will be, to suppose all our ideas of colours, sounds, tastes, figures, etc. innate'.

THEO. I cannot really see how the proposition *The same is not different* is the origin of the principle of contradiction, and 'easier' than it: for it appears to me that one goes further in asserting that A is not B than in saying that A is not non-A; and it is *because* B contains non-A that A is prevented from being B. Furthermore, the proposition that *The sweet is not the bitter* is not 'innate' in the sense we have given to the term 'innate truth'; for the \*sensations of sweet and bitter come from the outer senses, so that the proposition is a mixed conclusion (*hybrida conclusio*), in which the axiom is applied to a sensible truth. But as for the proposition *The square is not a circle*: it might be called innate, for in thinking it one applies the principle of contradiction to materials which the understanding itself provides, as soon as one becomes aware that these ideas – which are innate – contain incompatible notions.

83

<sup>1</sup> Locke: 'as certainly find assent'. Coste's change.

<sup>2</sup> Locke: 'ideas, about which it is'. Coste's change.

PHIL. §19. When you maintain 'that those... particular self-evident propositions, which are assented to at first hearing, as... that green is not red,... are received as the consequences of those more universal propositions, which are looked on as innate principles', you seem to overlook the fact, sir, that these particular propositions are accepted as indubitable truths by people who know nothing of those more general maxims.

THEO. I have answered that already [p. 76]. We rely on those general maxims, as we rely on the major premisses which are suppressed when we reason in enthymemes; for although we are very often not thinking distinctly about what we are doing when we reason, any more than about what we are doing when we walk or jump, it remains the case that the cogency of the inference lies partly in what is being suppressed; there is nowhere else it can come from, as one will discover in trying to defend the inference.

PHIL. §20. But 'those general and abstract ideas' seem to be 'more strangers' to our minds than are particular truths and notions; so these particular truths will be more natural to the mind than is the principle of contradiction, and yet you say that they are just applications of it.

THEO. The truths that we start by being aware of are indeed particular ones, just as we start with the coarsest and most composite ideas. But that doesn't alter the fact that in the order of nature the simplest comes first, and that the reasons for particular truths rest wholly on the more general ones of which they are mere instances. And when one wants to think about what is in us potentially, before all awareness, it is right to start with the simplest.

84 For general principles enter into our thoughts, serving as their inner core and as their mortar. Even if we give no thought to them, they are necessary for thought, as muscles and tendons are for walking. The mind relies on these principles constantly; but it does not find it so easy to sort them out and to command a distinct view of each of them separately, for that requires great attention to what it is doing, and the unreflective majority are hardly capable of that. Do not the Chinese have articulate sounds, just as we do? And yet, since they have adopted a different system of writing, it has not yet occurred to them to make an alphabet of these sounds. It is in that way that many things are possessed without the possessor's knowing it.

PHIL. §21. If the mind agrees so readily to certain truths, might that not be because the very 'consideration of the nature of... things' will not let it judge otherwise, rather than because these propositions are naturally engraved in the mind?

THEO. Both are true: the nature of things and the nature of the mind work together. And since you contrast the consideration of the thing with the awareness of what is engraved in the mind, this very objection shows, sir,

that those with whom you ally yourself take 'innate truths' to be merely whatever one would naturally accept, as though by instinct, even if one knows it only in a confused way. There are truths like that, and we shall have occasion to discuss them. But the *light of nature*, as it is called, involves distinct knowledge; and quite often a 'consideration of the nature of things' is nothing but the knowledge of the nature of our mind and of these innate ideas, and there is no need to look for them outside oneself. Thus I count as innate any truths which need only such 'consideration' in order to be verified. I have already replied (§5) [p. 79] to the objection (§22) which maintains that when it is said that innate notions are 'implicitly' in the mind, that should signify only that the mind has a faculty for knowing them; for I have pointed out that it has in addition a faculty for finding them in itself, and the disposition, if it is thinking about them properly, to accept them.

PHIL. §23. You seem then to be maintaining, sir, that those who hear these general maxims for the first time learn nothing which is entirely new to them. But it is clear that they do learn – first the names, and then the truths and even the ideas on which these truths depend.

THEO. Names are not in question here. They are in a way arbitrary, whereas ideas and truths are natural. But with regard to these ideas and truths, you attribute to me, sir, a doctrine which I am far from accepting; for I quite agree that we learn innate ideas and innate truths, whether by paying heed to their source or by verifying them through experience. So I do not suppose, as you say I do, that in the case you have mentioned we learned nothing new. And I cannot accept the proposition that *whatever is learned is not innate*. The truths about numbers are in us; but still we learn them, whether by drawing them from their source, in which case one learns them through demonstrative reason (which shows that they are innate), or by testing them with examples, as common arithmeticians do. The latter, not knowing the underlying principles, learn their rules merely through their being handed on; at best, before teaching them they confirm their rules, as far as they judge appropriate, by trying them out.<sup>1</sup> Sometimes even a very able mathematician, not knowing the proof of some result obtained by someone else, has to be satisfied with examining it by that inductive method. That is what was done by a well-known writer in \*Paris while I was there: he tested my arithmetical tetragonism rather hard by comparing it with Ludolph's numbers, expecting to find something wrong in it; and he was right to go on being sceptical until he was sent the demonstration of it [\*quadrature]. Demonstration spares us from having to make these tests, which one might continue endlessly without

<sup>1</sup> 'par l'expérience'.

ever being perfectly certain. And it is just that – namely the imperfection of inductions – that *can* be verified through the trying out of particular cases.<sup>1</sup> For there are progressions which one can follow a very long way before grasping the changes, and the laws that they involve.

PHIL. But might it not be that not only the terms or words that we use, but also our ideas, come from outside us?

THEO. If they did, we too should have to be outside ourselves; for intellectual ideas, or ideas of reflection, are drawn from our mind. I would like to know how we could have the idea of *being* if we did not, as beings ourselves, find being within us.

86

PHIL. What do you say, sir, to this challenge which a friend of mine has offered? If anyone can find a proposition whose ideas are innate, let him name it to me (he says); he could not please me more.

THEO. I would name to him the propositions of arithmetic and geometry, which are all of that nature; and among necessary truths no other kind is to be found.<sup>2</sup>

PHIL. Many people would find that strange. Can we really say that the deepest and most difficult \*sciences are innate?

THEO. The actual knowledge of them is not innate. What is innate is what might be called the potential knowledge of them, as the veins of the marble outline a shape which is in the marble before they are uncovered by the sculptor.

PHIL. §25. But is it possible that children 'receive and assent to adventitious<sup>3</sup> notions, and [are] ignorant of those, which are supposed' to be innate in them and to be as it were parts of their mind, in which they are said to be 'imprinted'<sup>4</sup>... in indelible characters, to be [a] foundation ...? This would be, to make Nature take pains to no purpose; or, at least, to [engrave]<sup>5</sup> very ill; since its characters could not be read by those eyes, which saw other things very well'.

THEO. To be aware of what is within us, we must be attentive and methodical. Now, it is not only possible but appropriate that children should attend more to the notions of the senses, because attention is governed by need. However, we shall see later that nature has not 'taken pains to no purpose' in imprinting us, innately, with items of knowledge; for without these there would be no way of achieving actual knowledge of

<sup>1</sup> *'par les instances de l'expérience'*.

<sup>2</sup> *'on n'en saurait trouver d'autres'*.

<sup>3</sup> Taking '*au dehors*' to be a slip for Coste's '*de dehors*'.

<sup>4</sup> Locke: 'supposed woven into the very principles of their being, and imprinted'. Coste's change.

<sup>5</sup> Locke: 'write'. Coste's change.

necessary truths in the demonstrative sciences, or of learning the reasons for facts; and we should have nothing over the beasts.

PHIL. §26. If there are innate truths, must there not be innate thoughts?

THEO. Not at all. For thoughts are actions, whereas items of knowledge (or truths), in so far as they are within us even when we do not think of them, are tendencies or dispositions; and we know many things which we scarcely think about.

PHIL. It is very hard to conceive of 'a truth in the mind, that it has never thought on.'

87

THEO. That is like saying that it is hard to conceive how there can be veins in the marble before they have been uncovered. Also, this objection seems to come rather too close to begging the question. Everyone who admits innate truths, without founding them on Platonic recollection, admits some which have not yet been thought of. Furthermore, your argument proves too much: for if truths are thoughts, we shall lose not only truths which we have never thought of but also those which we have thought of but are no longer thinking of at this moment. And if truths are not thoughts but tendencies and aptitudes, natural or acquired, there is no obstacle to there being within us truths which have never and will never be thought about by us.

PHIL. §27. If general maxims were innate they 'should appear fairest and clearest in those persons, in whom yet we find no footsteps of them'. I allude to 'children, idiots, savages,' who are of all men those whose minds are the least spoiled and corrupted by custom or by the influence of borrowed opinions.

THEO. I believe that the argument at this point should run quite differently. Innate maxims make their appearance only through the attention one gives to them; but those people have almost no attention to give, or have it only for something quite different. They think about little except their bodily needs; and it is appropriate that pure and disinterested thoughts should be the reward for having nobler concerns. It is true that the minds of children and savages are less 'spoiled by customs', but they are also less improved by the teaching which makes one attentive. It would be very unjust if the brightest lights had to shine better in minds which are less worthy of them and are wrapped in the thickest clouds. People as learned and clever as you, Philalethes, or your excellent author, should not flatter ignorance and barbarism; for that would be to disparage the gifts of God. It may be said that the less one knows the closer one comes to sharing with blocks of marble and bits of wood the advantage of being infallible and faultless. But unfortunately that is not the respect in which one comes close to them; and in so far as one is capable of knowledge, it

88

is a sin to neglect to acquire it, and the less instruction one has had the easier it is to fail in this.



enable us to form these notions. Ultimately one can say that the idea of the *absolute* is, in the nature of things, prior to that of the *limits* which we contribute, but we come to notice the former only by starting with whatever is limited and strikes our senses.

### Chapter xv

#### 'Of duration and expansion, considered together.'

PHILALETHES. §4. An infinite duration of time is allowed more easily than an infinite expanse of place, because we 'conceive in God infinite duration,' but we attribute extension 'only to matter, which is finite,' and we term spaces 'beyond the limits of the universe, imaginary'. §2. But 'Solomon . . . seems to have other thoughts, when he says [speaking of God], *Heaven, and the heaven of heavens, cannot contain thee*: and he, I think, very much magnifies to himself the capacity of his own understanding, who persuades himself, that he can extend his thoughts farther than [the place where]<sup>1</sup> God exists'.

THEOPHILUS. If God were extended he would have parts. But duration confers parts only on his operations. However, where space is in question we must attribute immensity to God, and this also gives parts and order to his immediate operations. He is the source of possibilities and of existents alike, the one by his essence and the other by his will. So that space like time derives its reality only from him, and he can fill up the void whenever he pleases. It is in this way that he is omnipresent.

PHIL. §11. 'What spirits have to do with space, or how they [partake]<sup>2</sup> in it, we know not.' But we do know that they partake in duration.

THEO. Every finite spirit is always joined to an organic body, and represents other bodies to itself by their relation to its own body. Thus it is obviously related to space as bodies are. Finally, before leaving this topic, I will add a comparison of my own to those that you have given between time and space. If there were a vacuum in space (for instance, if a sphere were empty inside), one could establish its size. But if there were a vacuum in time, i.e. a duration without change, it would be impossible to establish its length. It follows from this that we can refute someone who says that if there is a vacuum between two bodies then they touch, since two opposite poles within an empty sphere cannot touch – geometry forbids it. But we could not refute anyone who said that two successive worlds are contiguous in time so that one necessarily begins as soon as the other ceases, with no possible interval between them. We could not refute him, I say, because that interval is indeterminable. If space were

<sup>1</sup> Added by Coste.

<sup>2</sup> Locke: 'communicate'. Coste: '*participent*'. Locke uses 'partake in' earlier in §11.

only a line, and if bodies were immobile, it would also be impossible to establish the length of the vacuum between two bodies.

### Chapter xvi 'Of number.'

PHILALETHES. §4. 'The ideas of numbers are more precise, and distinguishable than in extension; where every equality and excess are not so easy to be observed, or measured; because our thoughts cannot in space arrive at [a certain] determined smallness beyond which it cannot go,' comparable to a unit of number.

THEOPHILUS. That applies to *whole* numbers. For *number in the broad sense* – comprising fractions, irrationals, \*transcendental numbers and everything which can be found between two whole numbers – is analogous<sup>1</sup> to a line, and does not admit of a minimum any more than the continuum does. So this definition of 'number' as a multitude of units is appropriate only for whole numbers. Precise distinctions amongst ideas of extension do not depend upon size: for we cannot distinctly recognize sizes without having recourse to whole numbers, or to numbers which are known through whole ones; and so, where distinct knowledge of size is sought, we must leave continuous quantity and have recourse to discrete quantity. So if one does not use numbers, one can distinguish amongst the modifications of extension only through *shape* – taking that word broadly enough to cover everything which prevents two extended things from being [geometrically] similar to one another.

PHIL. §5. 'By the repeating . . . of the idea of an unit, and joining it to another unit, we make thereof one collective idea, marked by the name *two*. And whosoever can do this, and proceed on, still adding one more to the last collective idea, . . . and give a name to it, may count . . . as far as he hath a series of names . . . and a memory to retain that series'.

THEO. One could not get far by that method alone. For the memory would become overloaded if it had to retain a completely new name for each addition of a new unit. For that reason there has to be a certain orderliness in these names – a certain repetitiveness, with each new start conforming to a certain progression.

PHIL. 'The several . . .<sup>2</sup> modes of numbers [are not] capable of any other difference, but more or less'. That is why they are simple modes, like those of extension.<sup>3</sup>

<sup>1</sup> '*proportional*' – meaning 'ordinally similar' in the contemporary sense.

<sup>2</sup> Locke: 'simple'. Coste's omission.

<sup>3</sup> Sentence based on Locke's xiii.1, 4.

THEO. That may be said of time, and of a straight line, but not at all of shapes and still less of numbers; for these are subject not only to differences of size but also to dissimilarities. An even number can be divided into two equal parts, but an odd one cannot; three and six are triangular numbers, four and nine are squares, eight is a cube, etc. This obtains with numbers even more than with shapes, for two non-congruent shapes can be perfectly similar, which two numbers can never be. But I am not surprised that people so often go wrong about this, because most people have no distinct idea of 'similar' and 'dissimilar'. So you see, sir, that your idea of 'simple' and of 'mixed' modifications, or your way of applying it, stands in great need of amendment.

157

PHIL. §6. You are right in your comment that numbers should be given names which are apt to be remembered. So it would be a good idea, I believe, if in counting we abbreviated 'million of millions' to 'billion', and abbreviated 'million of millions of millions' or 'million of billions' to 'trillion', and so on up to 'nonillions'; for one is hardly likely to have a use for anything higher.

THEO. These names are acceptable. Let  $x$  be equal to 10; then a million will be  $x^6$ , a billion  $x^{12}$ , a trillion  $x^{18}$ , etc. and a nonillion  $x^{54}$ .

### Chapter xvii 'Of infinity.'

PHILALETHES. §1. One extremely important notion is that of finite and infinite, which are 'looked upon . . . as the modes of quantity'.

THEOPHILUS. It is perfectly correct to say that there is an infinity of things, i.e. that there are always more of them than one can specify. But it is easy to demonstrate that there is no infinite number, nor any infinite line or other infinite quantity, if these are taken to be genuine wholes. The Scholastics were taking that view, or should have been doing so, when they allowed a 'syncategorematic' infinite, as they called it, but not a 'categorematic' one. The true infinite, strictly speaking, is only in the *absolute*, which precedes all composition and is not formed by the addition of parts.

PHIL. 'When we apply to [the] first . . . being our idea of infinite, . . . we do it primarily in respect of his duration and ubiquity; and . . . more figuratively to his power, wisdom, and goodness, and other attributes'.

THEO. Not more figuratively, but less immediately, because the magnitude of the other attributes is known only by reference to the ones which do involve the thought of parts.

PHIL. §2. I have been taking it as established that the mind looks on finite and infinite 'as modifications of expansion and duration'.

158

THEO. I do not consider that to have been established. The thought of finite and infinite is appropriate wherever there is magnitude or multiplicity. And the genuine infinite is not a 'modification': it is the absolute; and indeed it is precisely by modifying it that one limits oneself and forms a finite.

PHIL. §3. It has been our belief that the mind gets its idea of infinite space from the fact that no change occurs in its power to go on enlarging its idea of space by further additions.

THEO. It is worth adding that it is because the same principle can be seen to apply at every stage. Let us take a straight line, and extend it to double its original length. It is clear that the second line, being perfectly similar to the first, can be doubled in its turn to yield a third line which is also similar to the preceding ones; and since the same principle is always applicable, it is impossible that we should ever be brought to a halt; and so the line can be lengthened to infinity. Accordingly, the thought of the infinite comes from the thought of likeness, or of the same principle, and it has the same origin as do universal necessary truths. That shows how our ability to carry through the conception of this idea comes from something within us, and could not come from sense-experience; just as necessary truths could not be proved by induction or through the senses. The idea of the absolute is internal to us, as is that of being: these absolutes are nothing but the attributes of God; and they may be said to be as much the source of ideas as God himself is the principle of beings. The idea of the absolute, with reference to space, is just the idea of the immensity of God and thus of other things. But it would be a mistake to try to suppose an absolute space which is an infinite whole made up of parts. There is no such thing: it is a notion which implies a contradiction; and these infinite wholes, and their opposites the infinitesimals, have no place except in geometrical calculations, just like the use of imaginary roots in algebra.

PHIL. One can also conceive a magnitude without taking it to consist of parts lying side by side.<sup>1</sup> §6. 'To the perfectest idea I have of the whitest whiteness, if I add another of a less or equal whiteness, (and of a whiter than I have [which I take to be the most brilliant of which I have any present conception],<sup>2</sup> I cannot add the idea,) it makes no increase, and enlarges not my idea at all; and therefore the different ideas of whiteness . . . are called degrees.'

THEO. I cannot see that this reasoning is cogent, for nothing prevents one from having the perception of a whiteness more brilliant than one at present

159

<sup>1</sup> Added by Leibniz.

<sup>2</sup> Added by Coste.

conceives. The real reason why one has grounds for thinking that whiteness could not be increased to infinity is that it is not a fundamental quality: the senses provide only a confused knowledge of it; and when we do achieve a distinct knowledge of it we shall find that it depends upon structure, and that its limits are set by the structure of the visual organs. But where fundamental or distinctly knowable qualities are concerned, there are ways of going to infinity, not only in contexts involving *extent* or (if you will) *spread*<sup>1</sup> or what the Schoolmen call *partes extra partes* [parts beside parts], e.g. time and space, but also in ones involving *intensity* or *degrees*, e.g. with regard to speed.

PHIL. §7. We do not have the idea of a space which is infinite; §8. and 'nothing [is] more evident, than the absurdity of the actual idea of an infinite number.'

THEO. That is my view too. But it is not because we cannot have the idea of the infinite, but because an infinite cannot be a true whole.

PHIL. §16. By the same token, we have no positive idea of an infinite duration, i.e. of eternity, §18. nor one of immensity.<sup>2</sup>

THEO. I believe that we have a positive idea of each of these. This idea will be true provided that it is conceived not as an infinite whole but rather as an absolute, i.e. as an attribute with no limits. In the case of eternity, it lies in the necessity of God's existence: there is no dependence on parts, nor is the notion of it formed by adding times. That shows once again that, as I have already remarked, the notion of infinity comes from the same source as do necessary truths.

### Chapter xviii 'Of other simple modes.'

PHILALETHES. §1. There are many other simple modes, which are formed out of simple ideas. For example §2. the modes of motion such as sliding and rolling; §3. those of sounds, which are modified by notes and tunes, §4. as colours are by shades; §5. not to mention tastes and smells. §6. There are not always measures and distinct names, any more than there are with complex modes,<sup>3</sup> §7. because we are guided by what is useful. We shall discuss this more fully when we come to consider words [pp. 300ff].

THEOPHILUS. Most modes are not so very simple, and could be classified as complex. For example, to explain what sliding or rolling is, one would have to take into account not just motion but also surface friction.

<sup>1</sup> 'diffusion', apparently not a rendering of any word used by Locke.

<sup>2</sup> Locke: 'infinite space'.

<sup>3</sup> Apart from an entry in the Index, the phrase 'complex mode' does not occur in the *Essay*.

### Chapter xix 'Of the modes of thinking.'

PHILALETHES. §1. Let us pass on from modes which come from the senses to those which reflection gives us. 'Sensation . . . is, as it were, the actual entrance of any idea into the understanding by the senses. [When] the same idea . . . again recurs [in the mind] without the operation of the like object on the external sensory, [that act of the mind is called] *remembrance*:<sup>1</sup> if it be sought after by the mind, and with pain and endeavour found, and brought again in view, 'tis [*self-communion*]:<sup>2</sup> if it be held there long under attentive consideration, 'tis *contemplation*: when ideas float in our mind, [as it were,] without any reflection or regard of the understanding, it is [what is called *reverie*]: when the ideas that offer themselves . . . are taken notice of, and, as it were, registered in the memory, it is *attention*: when the mind with great earnestness . . . fixes its view on any idea, considers it on all sides, and will not be called off by the . . . solicitation of other ideas, it is that we call [concentration of mind];<sup>3</sup> or *study*: sleep, without dreaming, is [a cessation of] all these. And *dreaming* . . . is the having of ideas, (whilst the outward senses are stopped, so that they receive not [the impression of] outward objects with their usual quickness,) in the mind, not suggested by any external objects, or known occasion; nor under any choice or conduct of the understanding at all: and whether that, which we call *ecstasy*, be not dreaming with the eyes open, I leave to be examined.'

THEOPHILUS. It is good to sort out these notions, and I shall try to help. I shall say then that it is *sensation* when one is aware of an outer object, and that *remembrance* is the recurrence of it<sup>4</sup> without the return of the object; but when one knows that one has had it<sup>5</sup> before, this is *memory*. *Self-communion* is usually understood not in your sense but rather as naming a state in which one disengages oneself from practical matters in order to engage in meditation. But since there is no word that I know which does fit your notion, sir, yours could be adapted for the purpose. We exercise *attention* on objects which we pick out in preference to others. When attention is continued in the mind, whether or not the outer object continues [to be observed], and whether or not it even continues to exist, it is *consideration*; and when the latter is directed towards knowledge without reference to action, that is *contemplation*. Attention which aims at *learning* – i.e. acquiring knowledge in order to keep it – is *study*. Do consider

<sup>1</sup> Locke: 'the same idea, when it again recurs . . . , is remembrance'. Coste's change.

<sup>2</sup> Locke: 'recollection'. Coste: '*recueillement*'.

<sup>3</sup> Locke: 'intention', now obsolete in this sense.

<sup>4</sup> That is, of the perception which is involved: an earlier draft said that sensation is the '*perception*' of an outer object etc.

<sup>5</sup> As previous note.

405 has been experienced a hundred thousand times. It is a certainty of experience and of fact, even though we do not know how fixity is linked with the other qualities that this body has. Besides, we should not contrast two things which agree and which amount to the same thing. When I think of a body which is at once yellow, fusible and resistant to \*cupellation, I am thinking of a body whose specific essence, though hidden from me within it, gives rise to these qualities and reveals itself, at least confusedly, through them. I see nothing wrong with this, nor anything deserving of such often-repeated hostile accusations.

PHIL. All I need for present purposes is that §9, our knowledge that the heaviest of bodies is fixed does not rest on the agreement or disagreement of ideas. §10. 'I imagine, amongst all the secondary qualities of [bodies],<sup>1</sup> and the powers relating to them, there cannot any two be named, whose necessary coexistence, or repugnance to coexist, can certainly be known, unless in those of the same sense, which necessarily exclude one another, enabling it to be said, for instance, that what is white is not black.

THEO. I believe, though, that some might be found. For example: every body which is tangible (i.e. can be sensed by touch) is visible; every hard body makes a sound when struck in air; a string or thread produces a note which is in subduplicate ratio to the weight causing the tension in it. The fact is that what you are asking for can be attained only in so far as we conceive distinct ideas combined with the confused sensory ones.

PHIL. §11. It should never be supposed that a body has 'all its qualities in it self, and independent of other things. . . . A piece of gold. . . , separate from the reach and influence of all other bodies, [would] immediately lose all its [yellow] colour and weight, and perhaps malleableness too', becoming friable. We know how much the vegetables and animals depend on earth, air and sun; and who knows but that even the most remote fixed stars have some influence on us?

THEO. This is a very good point. Even if we did know the structure of various bodies, we should still be unable to judge very much about what their effects would be unless we knew the inner nature of the other bodies which touch or penetrate them.

406 PHIL. §13. Yet our judgment can outreach our knowledge. For 'observing men may. . . penetrate farther, and on probabilities taken<sup>2</sup> from wary observation, and hints well laid together, often guess right at what experience has not yet discovered to them. But this is but guessing still'.

THEO. But if experience supports these conclusions in a regular way, do you not think that we can arrive in this way at propositions which are

<sup>1</sup> Locke: 'substances'.

<sup>2</sup> Taking the omission of Coste's '*déduites*' to be a slip.

certain? – as certain, at least, as those which affirm that the heaviest body we possess is fixed, and that the next heaviest is volatile. For it seems to me that, in the case of propositions which we have learned from experience alone and not by the analysis and connection of ideas, we rightly attain to *certainty* (moral or \*physical, that is) but not to *necessity* (metaphysical certainty).

### Chapter vii

#### Of the propositions which are named maxims or axioms.<sup>1</sup>

PHILALETHES. §1. 'There are a sort of propositions, which under the name of *maxims* and *axioms*, [pass] for principles of science: and because they are self-evident, [people are prepared to call them] *innate*, without that any body (that I know)<sup>2</sup> ever went about to show the reason and foundation' of their extreme clearness, which forces us, as it were, to give our consent.<sup>3</sup> It is worthwhile, however, to pursue this inquiry and to see whether this great evidence is peculiar to these propositions alone, 'and also to examine how far they [contribute to]<sup>4</sup> our other knowledge.'

THEOPHILUS. Such an inquiry is very useful and even important. But you should not imagine, sir, that it has been entirely neglected. You will find a hundred passages in which scholastic philosophers have said that such propositions are evident *ex terminis* – from the terms – as soon as they are understood. That is, they were satisfied that the 'force' of their convincingness is grounded in the understanding of the terms, i.e. in the connections of the associated ideas. But the geometers have gone further still: they have often undertaken to demonstrate such propositions. Proclus says that one of the earliest known geometers, Thales of Miletus, had sought to demonstrate propositions which \*Euclid later assumed as evident. Apollonius is reported to have demonstrated other axioms, as did Proclus. The late M. \*Roberval, when he was eighty or so, was planning to publish new *Elements of Geometry*, which I believe I have already mentioned to you [pp. 107f]. Perhaps M. \*Arnauld's *New Elements*, which were making a stir at that time, had something to do with it. He presented a sample of it in the Royal \*Academy of Sciences, and some people objected to his assuming the axiom that 'If equal magnitudes are added to equals, the wholes are equal' in order to prove this other axiom, which is judged to be similarly evident, 'If equal magnitudes are subtracted from equals, the remainders are equal'. They said that he ought to either assume them both or demonstrate them both. But this was not my opinion; I believed that to reduce the number of axioms was always something gained. And

<sup>1</sup> Locke: 'Of maxims.' Coste's change.

<sup>2</sup> This clause is emphasized by Leibniz.

<sup>3</sup> Locke: 'foundation of their clearness or cogency.' Coste's expansion.

<sup>4</sup> Locke: 'influence and govern'. Coste's change.

408 addition is unquestionably prior to and simpler than subtraction, because in addition both terms are dealt with in the same way while in subtraction they are not. M. Arnauld did just the opposite to M. Roberval: he assumed even more than Euclid. This can be helpful to beginners, who are hindered by rigour, but it is a different matter when the foundations of a science are at issue. So Arnauld and Roberval may both have been right. As for 'maxims': sometimes established propositions, whether evident or not, are taken to be such. That is what maxims are often taken to be in moral philosophy, and even by the logicians with their \*Topics: the latter contain a generous supply of 'maxims', though some of them are rather vague and obscure. Anyway, I have for a long time been urging, both publicly [e.g. 'Meditations on knowledge, truth and ideas' pp. 293f] and in private, the importance of demonstrating all the secondary axioms which we ordinarily use, by bringing them back to axioms which are primary, i.e. immediate and indemonstrable; they are the ones which, recently [p. 361] and in other places, I have been calling 'identities'.

PHIL. §2. 'Knowledge is *self-evident*' when 'the agreement or disagreement of ideas . . . is perceived immediately'. §3. But there are 'other truths, not allowed to be axioms,' which are no less self-evident. Let us see whether they are provided by the four sorts of agreement which we discussed a little while ago (i.3 and iii.7), namely identity, connection,<sup>1</sup> relation, and real existence. §4. As regards identity and diversity, we have as many evident propositions as we have distinct ideas. For we can deny one of the other, e.g. in saying '*A man is not a horse; Red is not blue.*' Also, it is as evident to say that '*Whatever is, is*' as to say that '*A man is a man*'.

THEO. That is true, and I have already pointed out [p. 367] that it is just as evident to say with reference to one illustrative example that *A is A*, as to say in general that *a thing is what it is*. But I have also pointed out [p. 363] that it is not always safe, with the subjects of two different ideas, to deny one of the other – like someone thinking that a trilateral (i.e. a three-sided thing) is not a triangle, on the grounds that trilateralness is not triangularity. Similarly, if someone had said that M. de Sluse's \*pearls, which I mentioned to you a little while ago [p. 348], are not lines of a cubic parabola, he would have been mistaken; yet that would have appeared obviously right to many people. The late M. \*Hardy, who was a magistrate at the Châtelet in \*Paris, an excellent geometer, an orientalist, well read in the ancient geometers, and the editor of Marinus's commentary on the *Data* of Euclid, was so convinced that the section of a cone which is called an ellipse is different from the oblique section of a cylinder that Serenus's demonstration appeared to him to be fallacious. I remonstrated with him

<sup>1</sup> Locke: 'coexistence'.

to no avail. Of course he was almost as old as M. Roberval when I encountered him, and I was a very young man, and that difference between us cannot have inclined him to take me very seriously, although in other respects I was on very good terms with him. This example illustrates, by the way, the power of prejudice even over clever men, for M. Hardy certainly was that, and is spoken of with respect in M. \*Descartes's letters. But I mentioned him only to indicate how far wrong one can go in denying one idea of another, if the case is one where the ideas need to be explored in depth and this has not been done.

PHIL. §5. As to connection or coexistence, we have very few 'propositions that are self-evident, though some there are[: it appears to be] a self-evident proposition, *that two bodies cannot be in the same place.*'

THEO. Many Christians disagree with you, as I have already pointed out [p. 82]; and you ought not to get agreement from Aristotle either, or from those who follow him in accepting real, literal condensation – the reduction of an entire body into a smaller space than it previously occupied – and who claim (as did the late M. \*Comenius in a little book he devoted to this topic) to have overturned modern science by an experiment with an air-gun. If you take a body to be an impenetrable mass then your statement will be true, since it will be an identity or very close to one; but it won't be conceded [by your opponents] that that is what a real body is. At the least they will say that God could make a body differently, so that they will accept this impenetrability only as following from the natural order which God has established among things and which experience has vouchsafed to us, although it would have to be admitted that it is also very consonant with reason.

PHIL. §6. 'As to the relations of modes, mathematicians have framed many axioms concerning that one relation of equality', for example the one which you have just discussed: '*Equals taken from equals, the remainder will be equals*'. But I find it no less evident 'that *One and one, are equal to two; [and] that If you take from the five fingers of one hand two, and from the five fingers of the other hand two, the remaining numbers will be equal.*'

THEO. That one and one make two is not strictly speaking a truth, but rather the definition of *two*; though it partakes of the true and the evident, in that it is the definition of a possible thing. As for applying Euclid's axiom to the fingers of the hand, I am ready to agree that we can grasp what you say about fingers just as easily as we can see it for As and Bs; but to avoid frequent repetitions of the same thing we indicate it generally, and then we need only make substitutions. Otherwise it would be like dispensing with general rules in favour of calculating with particular numbers, which would mean achieving less than one might. For it is better to resolve this general problem: 'Find two numbers whose sum is one given number and

410 whose difference is another given number', than merely to look for two numbers whose sum is 10 and whose difference is 6. If I use a mixture of arithmetic and algebra to solve the second problem the calculation will go like this:

$$\text{Let } a+b = 10 \text{ and let } a-b = 6;$$

then I add the two right sides and the two left sides together, which gives me:

$$a+b+a-b = 10+6,$$

and, since  $+b$  and  $-b$  cancel out, this yields:

$$2a = 16, \text{ or } a = 8.$$

Then by subtracting right side from right side and left from left, and seeing that taking away  $a-b$  is adding  $-a+b$ , I derive:

$$a+b-a+b = 10-6,$$

that is:

$$2b = 4, \text{ or } b = 2.$$

In this way I shall indeed get the numbers  $a$  and  $b$  that I am looking for, namely 8 and 2; they answer the problem, since their sum is 10 and their difference is 6. But that does not give me the general method for any other numbers which one might want or be able to put in place of 10 and 6, although this method is as easy to find as the numbers 8 and 2, simply by putting  $x$  and  $y$  in place of 10 and 6. For if we proceed just as before, we shall have:

$$a+b+a-b = x+y; \text{ that is } 2a = x+y; \text{ that is } a = \frac{1}{2}(x+y),$$

and we shall also have:

$$a+b-a+b = x-y; \text{ that is } 2b = x-y; \text{ that is } b = \frac{1}{2}(x-y).$$

This calculation yields the theorem or general rule that when seeking two numbers whose sum and difference are given, one has only to take the larger sought number to be half the *sum* of the given sum and difference, and the smaller sought number to be half the *difference* of the given sum and difference. You might notice that I could have dispensed with letters, by treating numbers like letters: instead of putting  $2a = 16$  and  $2b = 4$ , I could have written  $2a = 10+6$  and  $2b = 10-6$ ; this would have given me  $a = \frac{1}{2}(10+6)$  and  $b = \frac{1}{2}(10-6)$ . Thus the particular calculation would in itself have contained the general one, through my taking these marks 10 and 6 for general numbers like the letters  $x$  and  $y$ , so as to get a more general truth or method; and by taking these same symbols 10 and 6 also for the

411 numbers which they ordinarily signify, I shall have an example which can be grasped by the senses and which can even serve as a check. Whereas Viète substituted letters for numbers to achieve greater generality, I have wanted to reintroduce numerical symbols since they are more suitable than letters, even in algebra. I have found it very helpful to use numbers in place of letters in extended calculations, for avoiding mistakes and even for carrying out checks (e.g. by \*casting out nines) in mid-calculation without waiting for the final result; which is often possible if one selects the numbers shrewdly, so that the assumptions turn out true in the particular case. It is also useful in displaying connections and patterns which the mind would not be made to sort out so well by letters alone. I have shown this elsewhere [e.g. 'Responsio ad Dn. Nic. Fatii Duillierii imputationes'], having found that a good \*symbolism is one of the greatest aids to the human mind.

PHIL. §7. As to real existence, which I listed as the fourth kind of agreement to be found among ideas, it cannot provide us with any axioms, since we do not even have demonstrative knowledge of any being outside ourselves, with the sole exception of God.

THEO. One can always say that the proposition *I exist* is evident in the highest degree, since it cannot be proved by anyone else – indeed, that it is an 'immediate truth'. To say *I think therefore I am* is not really to prove existence from thought, since *to think* and *to be thinking* are one and the same, and to say *I am thinking*<sup>1</sup> is already to say *I am*. Still, there is some reason for your not including this proposition among the axioms: it is a proposition of fact, founded on immediate experience, and is not a necessary proposition whose necessity is seen in the immediate agreement of ideas. On the contrary, only God can see how these two terms, *I* and *existence*, are connected – that is, why I exist. But if you take axioms, in a more general manner, to be immediate or non-provable truths, then the proposition *I am* can be called an axiom. In any case we can be confident that it is a primary truth, and indeed *unum ex primis cognitis inter terminos complexos*, i.e. one of the first known statements – in the natural order of our knowledge, that is, since it may never have occurred to a man to form this proposition explicitly, even though it is innate in him.

PHIL. I had always believed that axioms do not have much influence on the other parts of our knowledge. But you have disabused me by actually showing me an important use for identities. But bear with me, sir, if I still tell you what I had in mind on this point, since your explanations may serve to set others right as well. §8. It is a famous rule in the Schools that all reasonings are from things already known and agreed to – *ex praecognitis et praeconcessis*. This rule seems to take these maxims to be truths known

<sup>1</sup> 'Je suis pensant'.

412 to the mind before the rest, and the other parts of our knowledge as truths which depend upon the axioms. §9. I thought I had shown (i.i.) that axioms are not the first things known, on the grounds that the child knows that the switch I show him is not the sugar he has tasted, long before knowing any axiom you please. But you have distinguished knowledge of particulars or experience of facts, on the one hand, from the principles of universal and necessary knowledge on the other – and I acknowledge that with the latter we must resort to axioms. And you have also distinguished between the accidental and natural orders.

THEO. And I added, furthermore, that in the natural order the statement that a thing is what it is, is prior to the statement that it is not something else [p. 82]; for we are not concerned here with the sequence of our discoveries, which differs from one man to another, but with the connection and natural order of truths, which is always the same. But your remark that what the child sees is only a fact, calls for yet further consideration. For, as you yourself pointed out not long ago [p. 373], sir, sense-experience does not provide absolutely certain truths, free from all risk of illusion: if I may make up a story which is metaphysically possible, the sugar could change into a switch in some undetectable manner, to punish the child when he had been naughty – just as in our country the water changes into wine on Christmas Eve to reward him if he has been well behaved. But you will say that all the same the pain inflicted by the switch will never turn into the pleasure which the sugar provides. I reply that the child will be as late in explicitly forming that proposition as he will in noticing the axiom that one cannot truthfully say that what is, at the same time is not; even though he is thoroughly aware of the difference between pleasure and pain, as well as of that between awareness and unawareness.

PHIL. §10. Yet there are a great many other truths which have as much self-evidence as these maxims. For instance, that 'One and two are equal to three' is as evident a proposition as the axiom that 'The whole is equal to all its parts taken together'.

413 THEO. You appear to have forgotten, sir, how I have called to your attention more than once [e.g. p. 409] that 'one and two is three' is the definition of the term 'three', so that saying that one and two is 'equal to three' is just saying that something is equal to itself. As for the axiom that 'The whole is equal to all its parts taken together', Euclid does not use precisely that. Furthermore, this axiom needs to be qualified, for it must be added that the parts should not themselves contain parts in common: 7 and 8 are parts of 12, but they add up to more than 12; the upper half of a man and his trunk add up to more than the man, since they have his chest in common. But Euclid does say that 'The whole is greater than its part', and this needs no qualification. The statement that the body

is greater than the trunk differs from Euclid's axiom only in that the axiom restricts itself to precisely what needs to be said; but by exemplifying it – giving it a body – we turn something which can be thought into something which can also be grasped by the senses. You see, the statement that *this* whole is greater than *that* part of it is actually the proposition that a whole is greater than its part, but with its features coloured in or augmented – just as one who says AB says A. So we shouldn't here be contrasting the axiom with the example, as though they were different truths in this respect [sc. of how evident they are], but rather regarding the axiom as embodied in the example and as making the example true. It is another matter when the example is not itself evident, and is affirmed as a deduction from the universal proposition and not merely as an instance of it; and this can happen with axioms too.

PHIL. Our capable author says at this point: 'I think, I may ask these men, who will needs have all knowledge [which is not of fact]<sup>1</sup> to depend on general, innate, and self-evident principles, what principle [they need] to prove, that . . . two and two are four'? For, according to him, the truth of such propositions is 'known without any proof'. What do you say to this, sir?

THEO. I say that I was ready and waiting for you. That *two and two are four* is not quite an immediate truth. Assume that 'four' signifies 'three and one'. Then we can demonstrate it, and here is how.

- Definitions.* (1) *Two* is one and one.  
 (2) *Three* is two and one.  
 (3) *Four* is three and one.

*Axiom.* If equals be substituted for equals, the equality remains.

*Demonstration.* 2 and 2 is 2 and 1 and 1 (def. 1)  $2 + 2$   
 2 and 1 and 1 is 3 and 1 (def. 2)  $2 + 1 + 1$   
 3 and 1 is 4 (def. 3)  $3 + 1$   
4

414

Therefore (by the Axiom)

2 and 2 is 4. Which is what was to be demonstrated.

Instead of saying that 2 and 2 is 2 and 1 and 1, I could say that 2 and 2 is equal to 2 and 1 and 1, and similarly with the others. But we can assume that this has already been done throughout, on the strength of another axiom which maintains that a thing is equal to itself, or that whatever is the same is equal.

PHIL. The demonstration of such a thoroughly known conclusion is hardly necessary, but it does show how truths depend on axioms and definitions. So I can foresee how you will deal with various objections that are brought

<sup>1</sup> Added by Leibniz.

against the use of axioms. It is objected that there will be a countless multitude of principles. But this comes from including among principles the corollaries which follow from the definitions with the help of some axiom: since there are countless definitions or ideas, there will on this view be countless principles too – even if we follow you in supposing that indemonstrable principles are axiomatic identities. Exemplification also gives rise to innumerable principles, but we can really count *A is A* and *B is B* as a single principle variously garbed.

THEO. Furthermore, in view of the differences in degrees of evidence, I disagree with your distinguished author when he holds that all these truths – which he calls principles, and regards as self-evident because they are so close to the first indemonstrable axioms – are entirely independent of each other and incapable of deriving proof or illumination one from another. For we can always bring them right back to axioms or to other truths closer than they are to the axioms, as you were shown by the truth that two and two make four. And I have just told you how M. Roberval reduced the number of Euclid's axioms by deriving some of them from others.

415 PHIL. §II. This judicious writer who has provided the occasion for our discussions agrees that maxims have their use, but he believes that it is rather to silence the obstinate than to provide foundations for the sciences. 'I would be glad to be shown', he says, 'any such science erected upon these... general axioms... that could not be shown to stand as firm without' axioms.

THEO. Geometry is certainly one such science. \*Euclid uses axioms explicitly in his demonstrations, and both he and Archimedes use the axiom that 'If two magnitudes are commensurable, and neither is larger than the other, then they are equal', as the foundation of their demonstrations concerning the magnitudes of curvilinear figures. Archimedes used axioms not needed by Euclid, for instance: 'Given two lines each of which is everywhere convex the same way, that which encloses the other is the greater'. Nor can we do without axiomatic identities in geometry, such as the principle of contradiction, i.e. the principle of arguments *ad absurdum*. As for the other axioms which can be demonstrated from these, strictly speaking we can dispense with them and derive our conclusions immediately from identities and definitions; but if we had always to start again from the beginning, our demonstrations would be so wordy and would involve us in such endless repetition that there would be horrible confusion; whereas by assuming intermediate principles which have already been demonstrated we can readily push ahead. This assumption of already-known truths is particularly useful with respect to axioms, since they come up so often that geometers are obliged to employ them constantly without

citing them. So that it would be a mistake to believe that they are not involved just because they may not always be seen cited in the margin.

PHIL. But he proposes theology as an example to the contrary. It is from revelation that we have received the knowledge of our holy religion, says our author, and if we had lacked that aid maxims could never have given us the knowledge. Light comes to us, then, either from things themselves or immediately from God's unerring veracity.

THEO. That is as if I were to say that since medicine is founded on experience, reason has nothing to contribute to it. Christian theology – the true medicine of souls – is founded on revelation, which corresponds to experience; but to make it into a completed system we have also to bring in natural theology, which is derived from the axioms of eternal Reason. You acknowledge that the certainty of revelation is founded on God's veracity; but is not the very principle that *veracity is an attribute of God* a maxim drawn from natural theology?

PHIL. Our author wants the method of acquiring knowledge to be distinguished from that of teaching it, or rather that of teaching and communicating it. 'When schools were erected, and sciences had their professors to teach what others had found out, they often made use of maxims' to imprint these sciences on the minds of their scholars, and to convince them, by means of axioms, of certain particular truths. Whereas particular truths enabled 'the first discoverers' to find out the truth, without general maxims.

THEO. I wish he had offered support for this supposed procedure by giving us some examples of particular truths. But if we look carefully into the matter, we will not find this procedure employed in the founding of the sciences. If a discoverer finds only a particular truth, he is only a half-discoverer. If Pythagoras had merely noticed that a triangle whose sides are 3, 4, 5 has the property that the square on its hypotenuse equals those on its sides (i.e. that  $9 + 16$  makes 25), would this have made him the discoverer of that great truth which holds for all right-angled triangles and has become a maxim among the geometers? It is true that an example hit on by chance will often prompt an intelligent man to look for the general truth involved; but finding it is usually a very different matter. In any case, this way of discovering things is not the best, nor is it the one most used by those who proceed in an orderly and methodical way – they make use of it only in situations where better methods fall short. Some people have believed that Archimedes found the quadrature of the parabola by weighing a piece of wood which was carved into the shape of a parabola – that he found the general truth by means of this particular experiment; but those who know that great man's acuteness of mind see clearly that he had no need for this sort of aid. And this empiric's way of