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A Treatise Concerning the Principles of
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Selections from

George Berkeley, *A Treatise Concerning the Principles of Human Knowledge* (1710)¹

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Preface

What I make public here has, after a long and scrupulous inquiry, seemed to me evidently true and not unuseful to be known—particularly to those who are tainted with skepticism or want a demonstration of the existence and immateriality of God or the natural immortality of the soul. Whether it is so or not, I am content the reader should impartially examine, since I do not think myself any further concerned for the success of what I have written than as it is agreeable to truth. But to the end this may not suffer, I make it my request that the reader suspend his judgment until he has, at least, once read the whole through with that degree of attention and thought which the subject matter shall seem to deserve. For as there are some passages that, taken by themselves, are very liable to gross misinterpretation (nor could it be remedied), and to be charged with most absurd consequences, which, nevertheless, upon an entire perusal will appear not to follow from them; so likewise, though the whole should be read over, yet if this is done transiently, it is very probable my sense may be mistaken, but to a thinking reader, I flatter myself, it will be throughout

1. From *The Works of George Berkeley*, ed. G. N. Wright (London, 1843), 2 vols., English, modified.

clear and obvious. As for the characters of novelty and singularity, which some of the following notions may seem to bear, it is, I hope, needless to make any apology on that account. He must surely be either very weak or very little acquainted with the sciences, who shall reject a truth that is capable of demonstration, for no other reason but because it is newly known and contrary to the prejudices of mankind. This much I thought fit to premise in order to prevent, if possible, the hasty censures of a sort of men who are too apt to condemn an opinion before they rightly comprehend it.

Introduction

1. Philosophy being nothing else but the study of wisdom and truth, it may with reason be expected that those who have spent most time and pains in it should enjoy a greater calm and serenity of mind, a greater clearness and evidence of knowledge, and be less disturbed with doubts and difficulties than other men. Yet so it is, we see the illiterate bulk of mankind who walk the high road of plain, common sense, and are governed by the dictates of nature, for the most part easy and undisturbed. To them nothing that is familiar appears unaccountable or difficult to comprehend. They do not complain of any want of evidence in their senses, and are out of all danger of

becoming skeptics. But no sooner do we depart from sense and instinct to follow the light of a superior principle, to reason, meditate, and reflect on the nature of things, but a thousand scruples spring up in our minds concerning those things which before we seemed fully to comprehend. Prejudices and errors of sense do from all parts discover themselves to our view, and, endeavoring to correct these by reason, we are insensibly drawn into uncouth paradoxes, difficulties, and inconsistencies, which multiply and grow upon us as we advance in speculation, until at length, having wandered through many intricate mazes, we find ourselves just where we were, or, which is worse, sit down in a forlorn skepticism.

2. The cause of this is thought to be the obscurity of things or the natural weakness and imperfection of our understandings. It is said the faculties we have are few and those designed by nature for the support and comfort (pleasure) of life and not to penetrate into the inward essence and constitution of things. Besides, the mind of man being finite, when it treats of things which partake of infinity, it is not to be wondered at if it runs into absurdities and contradictions, out of which it is impossible it should ever extricate itself, it being of the nature of infinite not to be comprehended by that which is finite.

3. But, perhaps, we may be too partial to ourselves in placing the fault originally in our faculties and not rather in the wrong use we make of them. It is a hard thing to suppose that right deductions from true principles should ever end in consequences which cannot be maintained or made consistent. We should believe that God has dealt more bountifully with the sons of men than to give them a strong desire for that knowledge which he had placed quite out of their reach. This would not be agreeable to the accustomed indulgent methods of Providence, which, whatever appetites it may have implanted in the creatures, does usually furnish them with such means as, if rightly made use of, will not fail to satisfy them. Upon the whole I am inclined to think that the far greater part, if not all, of those difficulties which have up to now amused philosophers and blocked up the way to knowledge are entirely owing to ourselves—that we have first raised a dust and then complain we cannot see.

4. My purpose, therefore, is to try if I can discover what those principles are which have introduced all that doubtfulness and uncertainty, those absurdities and contradictions into the several sects of philosophy, inasmuch as the wisest men have thought our ignorance incurable, conceiving it to arise from the natural dullness and limitation of our faculties. And surely it is a work well deserving our pains to make a strict inquiry concerning the first principles of *human knowledge*, to sift and examine them on all sides, especially since there may be some grounds to suspect that those obstacles and difficulties which stay and embarrass the mind in its search after truth do not spring from any darkness and intricacy in the objects or natural defect in the understanding so much as from false principles which have been insisted on and might have been avoided.

5. However difficult and discouraging this attempt may seem when I consider how many great and extraordinary men have gone before me in the same designs, yet I am not without some hopes, upon the consideration that the largest views are not always the clearest, and that he who is shortsighted will be obliged to draw the object nearer, and may, perhaps, by a close and narrow survey discern that which had escaped far better eyes.

6. In order to prepare the mind of the reader for the easier conceiving what follows it is proper to premise somewhat, by way of introduction, concerning the nature and abuse of language. But unraveling this matter leads me in some measure to anticipate my design by taking notice of what seems to have had a chief part in rendering speculation intricate and perplexed and to have occasioned innumerable errors and difficulties in almost all parts of knowledge. And that is the opinion that the mind has a power of framing *abstract ideas* or notions of things. He who is not a perfect stranger to the writings and disputes of philosophers must necessarily acknowledge that no small part of them are spent about abstract ideas. These are in a more especial manner thought to be the object of those sciences which go by the name of *logic* and *metaphysics* and of all that which passes under the notion of the most abstracted and sublime learning, in all of which one shall scarce find any question handled in such a manner as does not sup-

pose their existence in the mind and that it is well acquainted with them.

7. It is agreed on all hands that the qualities or modes of things never do really exist each of them apart by itself and separated from all others, but are mixed, as it were, and blended together, several in the same object. But we are told the mind, being able to consider each quality singly or abstracted from those other qualities with which it is united, does by that means frame abstract ideas to itself. For example, there is perceived by sight an object extended, colored, and moved; this mixed or compound idea the mind resolving into its simple, constituent parts, and viewing each by itself, exclusive of the rest, does frame the abstract ideas of extension, color, and motion. Not that it is possible for color or motion to exist without extension, but only that the mind can frame to itself by *abstraction* the idea of color exclusive of extension and of motion exclusive of both color and extension.

8. Again, the mind having observed that, in the particular extensions perceived by sense, there is something common and alike in all, and some other things peculiar as this or that figure or magnitude, which distinguish them one from another, it considers apart or singles out by itself that which is common, making thereof a most abstract idea of extension, which is neither line, surface, nor solid, nor has any figure or magnitude, but is an idea entirely prescinded from all these. So likewise the mind, by leaving out of the particular colors perceived by sense that which distinguishes them one from another and retaining that only which is common to all, makes an idea of color in abstract which is neither red, nor blue, nor white, nor any other determinate color. And, in like manner, by considering motion abstractly not only from the body moved, but likewise from the figure it describes and all particular directions and velocities, the abstract idea of motion is framed—which equally corresponds to all particular motions whatsoever that may be perceived by sense.

9. And as the mind frames to itself abstract ideas of qualities or modes, so it does, by the same precision or mental separation, attain abstract ideas of the more compounded beings, which include several coexistent qualities. For example, the mind, having ob-

served that *Peter*, *James*, and *John* resemble each other in certain common agreements of shape and other qualities, leaves out of the complex or compounded idea it has of *Peter*, *James*, and any other particular man that which is peculiar to each, retaining only what is common to all, and so makes an abstract idea in which all the particulars equally partake, abstracting entirely from and cutting off all those circumstances and differences which might determine it to any particular existence. And after this manner it is said we come by the abstract idea of *man* or, if you please, humanity or human nature, in which it is true there is included color, because there is no man but has some color; but then it can be neither white, nor black, nor any particular color, because there is no one particular color in which all men partake. So likewise there is included stature, but then it is neither tall stature nor short stature, nor yet middle stature, but something abstracted from all these. And so of the rest. Moreover, there being a great variety of other creatures that partake in some parts, but not all, of the complex idea of *man*, the mind, leaving out those parts which are peculiar to men and retaining those only which are common to all the living creatures, frames the idea of *animal* which abstracts not only from all particular men, but also all birds, beasts, fishes, and insects. The constituent parts of the abstract idea of animal are body, life, sense, and spontaneous motion. By *body* is meant body without any particular shape or figure, there being no one shape or figure common to all animals without covering either of hair or feathers, or scales, etc., nor yet naked—hair, feathers, scales, and nakedness being the distinguishing properties of particular animals, and, for that reason, left out of the *abstract idea*. Upon the same account the spontaneous motion must be neither walking, nor flying, nor creeping; it is nevertheless a motion, but what that motion is, it is not easy to conceive.

10. Whether others have this wonderful faculty of *abstracting their ideas* they best can tell, for myself I find indeed I have a faculty of imagining, or representing to myself the ideas of those particular things I have perceived and of variously compounding and dividing them. I can imagine a man with two heads or the upper parts of a man joined to the body of a

horse. I can consider the hand, the eye, the nose, each by itself abstracted or separated from the rest of the body. But then whatever hand or eye I imagine, it must have some particular shape and color. Likewise the idea of man that I frame to myself must be either of a white or a black or a tawny, a straight or a crooked, a tall or a short or a middle-sized man. I cannot by any effort of thought conceive the abstract idea above described. And it is equally impossible for me to form the abstract idea of motion distinct from the body moving, and which is neither swift nor slow, curvilinear nor rectilinear; and the like may be said of all other abstract general ideas whatsoever. To be plain, I admit myself able to abstract in one sense, as when I consider some particular parts or qualities separated from others with which, though they are united in some object, yet it is possible they may really exist without them. But I deny that I can abstract one from another or conceive separately those qualities which it is impossible should exist so separated or that I can frame a general notion by abstracting from particulars in the manner aforesaid—which two last are the proper meanings of *abstraction*. And there are grounds to think most men will acknowledge themselves to be in my case. The generality of men which are simple and illiterate never pretend to *abstract notions*. It is said they are difficult and not to be attained without pains and study. We may therefore reasonably conclude that if there are such, they are confined only to the learned.

11. I proceed to examine what can be alleged in defense of the doctrine of abstraction and try if I can discover what it is that inclines the men of speculation to embrace an opinion so remote from common sense as that seems to be. There has been a late deservedly esteemed philosopher who, no doubt, has given it very much countenance by seeming to think that having abstract general ideas is what puts the widest difference in point of understanding between man and beast.² "The having of general ideas," he says, "is that which puts a perfect distinction between man and brutes, and is an excellency which the faculties of brutes do by no means attain unto. For it is evident

we observe no footsteps in them of making use of general signs for universal ideas, from which we have reason to imagine that they do not have the faculty of *abstracting* or making general ideas, since they have no use of words or any other general signs." And a little after: "Therefore, I think, we may suppose that it is in this that the species of brutes are discriminated from men, and it is that proper difference in which they are wholly separated, and which at last widens to so wide a distance. For if they have any ideas at all, and are not bare machines (as some would have them), we cannot deny them to have some reason. It seems as evident to me that they do some of them in certain instances reason as that they have sense, but it is only in particular ideas, just as they receive them from their senses. They are the best of them tied up within those narrow bounds, and have not (as I think) the faculty to enlarge them by any kind of *abstraction*." *Essay on Human Understanding* II, chap. 9, sec. 10, 11. I readily agree with this learned author that the faculties of brutes can by no means attain to *abstraction*. But then if this is made the distinguishing property of that sort of animals, I fear a great many of those that pass for men must be reckoned into their number. The reason that is here assigned why we have no grounds to think brutes have abstract general ideas is that we observe in them no use of words or any other general signs, which is built on this supposition, namely, that the making use of words implies the having general ideas. From this it follows that men who use language are able to abstract or generalize their ideas. That this is the sense and argument of the author will further appear by his answering the question he puts in another place. "Since all things that exist are only particulars, how do we come by general terms?" His answer is, "Words become general by being made the signs of general ideas." *Essay on Human Understanding* III, chap. 3, sec. 6. But to this I cannot assent, for it seems that a word becomes general by being made the sign, not of an abstract general idea, but of several particular ideas, any one of which it indifferently suggests to the mind. For example, when it is said *the change of motion is proportional to the impressed force*, or that *whatever has extension is divisible*, these propositions are to be understood of motion and extension in

2. Berkeley is referring to Locke.

general, and nevertheless it will not follow that they suggest to my thoughts an idea of motion without a body moved or any determinate direction and velocity, or that I must conceive an abstract general idea of extension, which is neither line, surface, nor solid, neither great nor small, black, white, nor red, nor of any other determinate color. It is only implied that whatever motion I consider, whether it is swift or slow, perpendicular, horizontal, or oblique, or in whatever object, the axiom concerning it holds equally true. As does the other of every particular extension, it does not matter whether line, surface, or solid, whether of this or that magnitude or figure.

12. By observing how ideas become general, we may the better judge how words are made so. And here it is to be noted that I do not deny absolutely there are general ideas, but only that there are any *abstract general ideas*, for, in the passages above quoted, in which there is mention of general ideas, it is always supposed that they are formed by abstraction, after the manner set forth in sec. 8 and 9. Now, if we will annex a meaning to our words and speak only of what we can conceive, I believe we shall acknowledge that an idea, which considered in itself is particular, becomes general by being made to represent or stand for all other particular ideas of the same sort. To make this plain by an example, suppose a geometrician is demonstrating the method of cutting a line in two equal parts. He draws, for instance, a black line of an inch in length; this, which in itself is a particular line, is nevertheless with regard to its signification general, since, as it is used there, it represents all particular lines whatsoever, so that what is demonstrated of it is demonstrated of all lines or, in other words, of a line in general. And as that particular line becomes general by being made a sign, so the name *line*, which, taken absolutely, is particular, by being a sign is made general. And as the former owes its generality not to its being the sign of an abstract or general line, but of all particular right lines that may possibly exist, so the latter must be thought to derive its generality from the same cause, namely, the various particular lines which it indifferently denotes.

13. To give the reader a yet clearer view of the nature of abstract ideas and the uses they are thought

necessary to, I shall add one more passage out of the *Essay on Human Understanding*, which is as follows. "*Abstract ideas* are not so obvious or easy to children or the yet unexercised mind as particular ones. If they seem so to grown men, it is only because by constant and familiar use they are made so. For when we nicely reflect upon them, we shall find that general ideas are fictions and contrivances of the mind that carry difficulty with them, and do not so easily offer themselves as we are apt to imagine. For example, does it not require some pains and skill to form the general idea of a triangle? (which is yet none of the most abstract, comprehensive, and difficult) for it must be neither oblique nor rectangle, neither equilateral, isosceles, nor scalene, but *all and none* of these at once. In effect, it is something imperfect that cannot exist, an idea in which some parts of several different and *inconsistent* ideas are put together. It is true the mind in this imperfect state has need of such ideas, and makes all the haste to them it can, for the convenience of communication and enlargement of knowledge, to both which it is naturally very much inclined. But yet one has reason to suspect such ideas are marks of our imperfection. At least this is enough to show that the most abstract and general ideas are not those that the mind is first and most easily acquainted with, nor such as its earliest knowledge is conversant about." IV, chap. 7, sec. 9. If any man has the faculty of framing in his mind such an idea of a triangle as is here described, it is in vain to pretend to dispute him out of it, nor would I go about it. All I desire is that the reader would fully and certainly inform himself whether he has such an idea or not. And this, I think, can be no hard task for anyone to perform. What is more easy than for anyone to look a little into his own thoughts and there try whether he has, or can attain to have, an idea that shall correspond with the description that is here given of the general idea of a triangle, which is *neither oblique, nor rectangle, equilateral, isosceles, nor scalene, but all and none of these at once?*

14. Much is here said of the difficulty that abstract ideas carry with them and the pains and skill requisite to the forming them. And it is on all hands agreed that there is need of great toil and labor of the mind to emancipate our thoughts from particular objects

and raise them to those sublime speculations that are conversant about abstract ideas, from all of which the natural consequence should seem to be that so difficult a thing as the forming abstract ideas was not necessary for *communication*, which is so easy and familiar to all sorts of men. But, we are told, if they seem obvious and easy to grown men, it is *only because by constant and familiar use they are made so*. Now I would gladly know at what time it is men are employed in surmounting that difficulty and furnishing themselves with those necessary helps for discourse. It cannot be when they are grown up, for then it seems they are not conscious of any such pains-taking; it remains, therefore, to be the business of their childhood. And surely the great and multiplied labor of framing abstract notions will be found a hard task for that tender age. Is it not a hard thing to imagine that a couple of children cannot chatter together about their sugarplums, and rattles, and the rest of their little trinkets, until they have first tacked together countless inconsistencies and so framed in their minds *abstract general ideas* and annexed them to every common name they make use of?

15. Nor do I think them a whit more needful for the enlargement of knowledge than for *communication*. It is, I know, a point much insisted on, that all knowledge and demonstration are about universal notions, to which I fully agree, but then it does not appear to me that those notions are formed by *abstraction* in the manner premised; *universality*, so far as I can comprehend, not consisting in the absolute, positive nature or conception of anything, but in the relation it bears to the particulars signified or represented by it, by virtue of which it is the case that things, names, or notions, being in their own nature *particular*, are rendered *universal*. Thus, when I demonstrate any proposition concerning triangles, it is to be supposed that I have in view the universal idea of a triangle, which ought not be understood as if I could frame an idea of a triangle which was neither equilateral, nor scalene, nor isosceles, but only that the particular triangle I consider—whether of this or that sort it does not matter—does equally stand for and represent all rectilinear triangles whatsoever, and is in that sense *universal*. All this seems very plain and not to include any difficulty in it.

16. But here it will be demanded how we can know any proposition to be true of all particular triangles, except we have first seen it demonstrated of the abstract idea of a triangle which equally agrees to all? For, because a property may be demonstrated to agree to some one particular triangle, it will not then follow that it equally belongs to any other triangle which in all respects is not the same with it. For example, having demonstrated that the three angles of an isosceles rectangular triangle are equal to two right ones, I cannot therefore conclude this affection agrees to all other triangles, which have neither a right angle nor two equal sides. It seems therefore that to be certain this proposition is universally true we must either make a particular demonstration for every particular triangle, which is impossible, or once and for all demonstrate it of the *abstract idea of a triangle*, in which all the particulars do indifferently partake and by which they are all equally represented. To which I answer that, though the idea I have in view while I make the demonstration is, for instance, that of an isosceles rectangular triangle whose sides are of a determinate length, I may nevertheless be certain it extends to all other rectilinear triangles of whatever sort or bigness—and that because neither the right angle, nor the equality, nor determinate length of the sides are at all concerned in the demonstration. It is true the diagram I have in view includes all these particulars, but then there is not the least mention made of them in the proof of the proposition. It is not said the three angles are equal to two right ones because one of them is a right angle or because the sides comprehending it are of the same length. This sufficiently shows that the right angle might have been oblique and the sides unequal, and for all that the demonstration has held good. And for this reason it is that I conclude that to be true of any obliquangular or scalene, which I had demonstrated of a particular right-angled, isosceles triangle, and not because I demonstrated the proposition of the abstract idea of a triangle. And here it must be acknowledged that a man may consider a figure merely as triangular, without attending to the particular qualities of the angles or relations of the sides. So far he may abstract, but this will never prove that he can frame an abstract general inconsistent idea of a triangle. In like manner

we may consider *Peter* insofar as he is a man or insofar as he is an animal without framing the aforementioned abstract idea either of man or of animal inasmuch as all that is perceived is not considered.

17. It would be an endless as well as a useless thing, to trace the *schoolmen*, those great masters of abstraction, through all the manifold, inextricable labyrinths of error and dispute which their doctrine of abstract natures and notions seems to have led them into. What bickerings and controversies, and what a learned dust has been raised about those matters, and what mighty advantage has been derived to mankind from this, are things at this day too clearly known to need being insisted on. And it had been well if the ill effects of that doctrine were confined to those only who make the most avowed profession of it. When men consider the great pains, industry, and parts that have, for so many ages, been laid out on the cultivation and advancement of the sciences, and that notwithstanding all this the far greater part of them remain full of darkness and uncertainty, and disputes that are likely never to have an end, and even those that are thought to be supported by the most clear and cogent demonstrations, contain in them paradoxes which are perfectly irreconcilable to the understandings of men, and that, taking all together, a small portion of them does supply any real benefit to mankind, otherwise than by being an innocent diversion and amusement—I say, the consideration of all this is apt to throw them into a despondency and perfect contempt of all study. But this may perhaps cease, upon a view of the false principles that have obtained in the world, among all of which there is none, I think, has a more wide influence over the thoughts of speculative men than this of abstract general ideas.

18. I come now to consider the *source* of this prevailing notion, and that seems to me to be language. And surely nothing of less extent than reason itself could have been the source of an opinion so universally received. The truth of this appears as from other reasons so also from the plain confession of the ablest patrons of abstract ideas, who acknowledge that they are made in order to naming—from which it is a clear consequence that if there had been no such thing as speech or universal signs, there never had

been any thought of abstraction. See book III, chap. 6, sec. 39, and elsewhere, of the *Essay on Human Understanding*. Let us therefore examine the manner in which words have contributed to the origin of that mistake. First, then, it is thought that every name has, or ought to have, only one precise and settled signification, which inclines men to think there are certain *abstract, determinate ideas*, which constitute the true and only immediate signification of each general name. And that it is by the mediation of these abstract ideas that a general name comes to signify any particular thing. Whereas, in truth, there is no such thing as one precise and definite signification annexed to any general name, they all signifying indifferently a great number of particular ideas—all of which does evidently follow from what has been already said and will clearly appear to anyone by a little reflection. To this it will be objected that every name that has a definition is thereby restrained to one certain signification. For example, a *triangle* is defined to be a *plain surface comprehended by three right lines*, by which that name is limited to denote one certain idea and no other. To this I answer that in the definition it is not said whether the surface is great or small, black or white, nor whether the sides are long or short, equal or unequal, nor with what angles they are inclined to each other, in all of which there may be great variety, and consequently there is no one settled idea which limits the signification of the word *triangle*. It is one thing to keep a name constantly to the same definition and another to make it stand everywhere for the same idea—the one is necessary, the other useless and impracticable.

19. Secondly, but to give a further account how words came to produce the doctrine of abstract ideas, it must be observed that it is a received opinion that language has no other end but the communicating of our ideas and that every significant name stands for an idea. This being so, and it being in addition certain that names which yet are not thought altogether insignificant do not always mark out particular conceivable ideas, it is straightway concluded that they stand for abstract notions. That there are many names in use among speculative men which do not always suggest to others determinate particular ideas is what nobody will deny. And a little attention will

discover that it is not necessary (even in the strictest reasonings) that significant names which stand for ideas should, every time they are used, excite in the understanding the ideas they are made to stand for—in reading and discoursing, names being for the most part used as letters are in *algebra*, in which, though a particular quantity is marked by each letter, yet to proceed right it is not requisite that in every step each letter suggest to your thoughts that particular quantity it was appointed to stand for.

20. Besides, the communicating of ideas marked by words is not the chief and only end of language, as is commonly supposed. There are other ends such as the raising of some passion, the exciting to or deterring from an action, the putting the mind in some particular disposition—to which the former is in many cases barely subservient, and sometimes entirely omitted, when these can be obtained without it, as I think does not infrequently happen in the familiar use of language. I entreat the reader to reflect with himself and see if it does not often happen either in hearing or reading a discourse that the passions of fear, love, hatred, admiration, disdain, and the like, arise immediately in his mind upon the perception of certain words without any ideas coming between. At first, indeed, the words might have occasioned ideas that were fit to produce those emotions; but, if I am not mistaken, it will be found that when language is once grown familiar, the hearing of the sounds or sight of the characters is often immediately attended with those passions which at first were accustomed to be produced by the intervention of ideas that are now quite omitted. May we not, for example, be affected with the promise of a *good thing*, though we do not have an idea of what it is? Or is not being threatened with danger sufficient to excite a dread, though we do not think of any particular evil likely to befall us, nor yet frame to ourselves an idea of danger in abstract? If anyone shall join ever so little reflection of his own to what has been said, I believe it will evidently appear to him that general names are often used in the propriety of language without the speaker's designing them for marks of ideas in his own which he would have them raise in the mind of the hearer. Even proper names themselves do not seem always spoken with a design to bring into our

view the ideas of those individuals that are supposed to be marked by them. For example, when a schoolman tells me "Aristotle has said it," all I conceive he means by it is to dispose me to embrace his opinion with the deference and submission which custom has annexed to that name. And this effect may be so instantly produced in the minds of those who are accustomed to resign their judgment to the authority of that philosopher, as it is impossible any idea either of his person, writings, or reputation should go before. Innumerable examples of this kind may be given, but why should I insist on those things which everyone's experience will, I do not doubt, plentifully suggest unto him?

21. We have, I think, shown the impossibility of *abstract ideas*. We have considered what has been said for them by their ablest patrons, and endeavored to show they are of no use for those ends to which they are thought necessary. And lastly, we have traced them to the source from which they flow, which appears to be language. It cannot be denied that words are of excellent use in that by their means all that stock of knowledge which has been purchased by the joint labors of inquisitive men in all ages and nations may be drawn into the view and made the possession of one single person. But at the same time it must be admitted that most parts of knowledge have been strangely perplexed and darkened by the abuse of words and general ways of speech in which they are delivered. Since, therefore, words are so apt to impose on the understanding whatever ideas I consider, I shall endeavor to take them bare and naked into my view, keeping out of my thoughts, so far as I am able, those names which long and constant use has so strictly united with them—from which I may expect to derive the following advantages:

22. First, I shall be sure to get clear of all controversies purely verbal—the springing up of which weeds in almost all the sciences has been a main hindrance to the growth of true and sound knowledge. Secondly, this seems to be a sure way to extricate myself out of that fine and subtle net of *abstract ideas* which has so miserably perplexed and entangled the minds of men; and that with this peculiar circumstance, that by how much the finer and more curious was the wit of any man, by so much the deeper was he like to

a man may think of somewhat which does not think, so a body may be moved to or from another body, which is not therefore itself in motion.¹³

114. As the place happens to be variously defined, the motion which is related to it varies. A man in a ship may be said to be quiescent with relation to the sides of the vessel and yet move with relation to the land. Or he may move eastward in respect of the one and westward in respect of the other. In the common affairs of life, men never go beyond the earth to define the place of any body: and what is quiescent in respect of that is accounted *absolutely* to be so. But philosophers, who have a greater extent of thought and more just notions of the system of things, discover even the earth itself to be moved. In order therefore to fix their notions, they seem to conceive the corporeal world as finite and the utmost unmoved walls or shell thereof to be the place whereby they estimate true motions. If we sound our own conceptions, I believe we may find all the absolute motion we can frame an idea of to be at bottom no other than relative motion thus defined. For as has been already observed, absolute motion exclusive of all external relation is incomprehensible; and to this kind of relative motion all the above-mentioned properties, causes, and effects ascribed to absolute motion, will, if I am not mistaken, be found to agree. As to what is said of the centrifugal force, namely, that it does not at all belong to circular relative motion, I do not see how this follows from the experiment which is brought to prove it. See *Philosophiæ Naturalis Principia Mathematica*, in Schol. Def. 8. For the water in the vessel, at that time wherein it is said to have the greatest relative circular motion, has, I think, no motion at all; as is plain from the foregoing section.

115. For to denominate a body *moved*, it is requisite, first, that it changes its distance or situation with regard to some other body: and secondly, that the force or action occasioning that change is applied to it. If either of these is wanting, I do not think that, agreeable to the sense of mankind or the propriety of language, a body can be said to be in motion. I grant indeed that it is possible for us to think a body

13. [1710 edition: "I mean relative motion, for other I am not able to conceive."]

which we see change its distance from some other, to be moved, though it have no force applied to it, (in which sense there may be apparent motion,) but then it is because the force causing the change of distance is imagined by us to be applied or impressed on that body thought to move. Which indeed shows we are capable of mistaking a thing to be in motion which is not, and that is all.¹⁴

116. From what has been said, it follows that the philosophical consideration of motion does not imply the being of an *absolute space* distinct from that which is perceived by sense and related to bodies — which that it cannot exist without the mind is clear upon the same principles that demonstrate the like of all other objects of sense. And perhaps, if we inquire narrowly, we shall find we cannot even frame an idea of *pure space* exclusive of all body. This, I must confess, seems impossible, as being a most abstract idea. When I excite a motion in some part of my body, if it is free or without resistance, I say there is *space*; but if I find a resistance, then I say there is *body*, and, in proportion as the resistance to motion is lesser or greater, I say the space is more or less *free*. So that when I speak of pure or empty space, it is not to be supposed that the word *space* stands for an idea distinct from or conceivable without body and motion. Though indeed we are apt to think every noun substantive stands for a distinct idea that may be separated from all others, which has occasioned infinite mistakes. When therefore supposing all the world to be annihilated besides my own body, I say

14. [The edition of 1710 continues, "But does not prove that, in the common acceptation of motion, a body is moved merely because it changes distance from another; since as soon as we are undeceived and find that the moving force was not communicated to it, we no longer hold it to be moved. So on the other hand, when only one body, the parts whereof preserve a given position between themselves, is imagined to exist, there are some who think that it can be moved in all manner of ways, though without any change of distance or situation to any other bodies, which we should not deny, if they meant only that it might have an impressed force which, upon the bare creation of other bodies, would produce a motion of some certain quantity and determination. But that an actual motion (distinct from the impressed force, or power productive of change of place, in case there were bodies present whereby to define it) can exist in such a single body, I must confess I am not able to comprehend."]

there still remains *pure space*; thereby nothing else is meant, but only that I conceive it possible for the limbs of my body to be moved on all sides without the least resistance, but if that too were annihilated, then there could be no motion and consequently no space. Some perhaps may think the sense of seeing does furnish them with the idea of pure space; but it is plain from what we have elsewhere shown that the ideas of space and distance are not obtained by that sense. See the *Essay Concerning Vision*.

117. What is here laid down seems to put an end to all those disputes and difficulties which have sprung up among the learned concerning the nature of *pure space*. But the chief advantage arising from it is that we are freed from that dangerous *dilemma* to which several who have employed their thoughts on this subject imagine themselves reduced, namely, of thinking either that real space is God or else that there is something beside God which is eternal, uncreated, infinite, invisible, immovable. Both which may justly be thought pernicious and absurd notions. It is certain that not a few theologians, as well as philosophers of great note, have, from the difficulty they found in conceiving either limits or annihilation of space, concluded it must be *divine*. And some of late have set themselves particularly to show that the incommunicable attributes of God agree to it. Which doctrine, however unworthy it may seem of the divine nature, yet I do not see how we can get clear of it, so long as we adhere to the received opinions.

118. Until now [the discussion has been] of natural philosophy; we come now to make some inquiry concerning that other great branch of speculative knowledge, namely, *mathematics*. These, however celebrated they may be for their clearness and certainty of demonstration, which is hardly anywhere else to be found, cannot nevertheless be supposed altogether free from mistakes, if in their principles there lurks some secret error, which is common to the professors of those sciences with the rest of mankind. Mathematicians, though they deduce their theorems from a great height of evidence, yet their first principles are limited by the consideration of quantity; and they do not ascend into any inquiry concerning those transcendental maxims which influence all the particular sciences, each part of which, mathematics not ex-

cepted, does consequently participate of the errors involved in them. That the principles laid down by mathematicians are true and their way of deduction from those principles clear and incontestable, we do not deny. But we hold there may be certain erroneous maxims of greater extent than the object of mathematics and for that reason not expressly mentioned, though tacitly supposed throughout the whole progress of that science; and that the ill effects of those secret, unexamined errors are diffused through all the branches thereof. To be plain, we suspect the mathematicians are, as well as other men, concerned in the errors arising from the doctrine of abstract general ideas and the existence of objects without the mind.

119. *Arithmetic* has been thought to have for its object abstract ideas of *number*. Of which to understand the properties and mutual habitudes is supposed no mean part of speculative knowledge. The opinion of the pure and intellectual nature of numbers in abstract has made them in esteem with those philosophers who seem to have affected an uncommon fineness and elevation of thought. It has set a price on the most trifling numerical speculations, which in practice are of no use but serve only for amusement, and has therefore so far infected the minds of some that they have dreamt of mighty *mysteries* involved in numbers and attempted the explication of natural things by them. But if we inquire into our own thoughts and consider what has been premised, we may perhaps entertain a low opinion of those high flights and abstractions and look on all inquiries about numbers only as so many *difficiles nugæ*, so far as they are not subservient to practice and promote the benefit of life.

120. Unity in abstract we have considered before, in sec. 13, from which and what has been said in the Introduction it plainly follows there is not any such idea. But number being defined a *collection of units*, we may conclude that if there is no such thing as unity or unit in abstract, there are no ideas of number in abstract denoted by the numeral names and figures. The theories, therefore, in arithmetic, if they are abstracted from the names and figures, as likewise from all use and practice as well as from the particular things numbered, can be supposed to have nothing

at all for their object. Hence we may see how entirely the science of numbers is subordinate to practice and how jejune and trifling it becomes when considered as a matter of mere speculation.

121. However since there may be some who, deluded by the specious show of discovering abstracted verities, waste their time in arithmetical theorems and problems which have not any use; it will not be amiss if we more fully consider and expose the vanity of that pretence, and this will plainly appear, by taking a view of arithmetic in its infancy and observing what it was that originally put men on the study of that science and to what scope they directed it. It is natural to think that at first men, for ease of memory and help of computation, made use of counters or, in writing, of single strokes, points, or the like, each of which was made to signify a unit that is some one thing of whatever kind they had occasion to reckon. Afterwards they found out the more compendious ways of making one character stand in place of several strokes or points. And lastly, the notation of the Arabians or Indians came into use, wherein, by the repetition of a few characters or figures and varying the signification of each figure according to the place it obtains, all numbers may be most aptly expressed, which seems to have been done in imitation of language so that an exact analogy is observed between the notation by figures and names, the nine simple figures, answering the nine first numeral names and places in the former, corresponding to denominations in the latter. And agreeably to those conditions of the simple and local value of figures were contrived methods of finding, from the given figures or marks of the parts, what figures, and how placed, are proper to denote the whole, or vice versa. And having found the sought figures, the same rule or analogy being observed throughout, it is easy to read them into words; and so the number becomes perfectly known. For then the number of any particular things is said to be known when we know the names or figures (with their due arrangement) that according to the standing analogy belong to them. For these signs being known, we can, by the operations of arithmetic, know the signs of any part of the particular sums signified by them; and thus computing in signs (because of the connection established between them

and the distinct multitudes of things, of which one is taken for a unit), we may be able rightly to sum up, divide, and proportion the things themselves that we intend to number.

122. In *arithmetic*, therefore, we regard not the *things* but the *signs*, which nevertheless are not regarded for their own sake, but because they direct us how to act with relation to things and dispose rightly of them. Now agreeably to what we have before observed of words in general (sec. 19, Introduction), it happens here likewise that abstract ideas are thought to be signified by numeral names or characters, while they do not suggest ideas of particular things to our minds. I shall not at present enter into a more particular dissertation on this subject, but only observe that it is evident from what has been said that those things which pass for abstract truths and theorems concerning numbers are, in reality, conversant about no object distinct from particular numerable things, except only names and characters, which originally came to be considered on no other account but their being *signs*, or capable to represent aptly whatever particular things men had need to compute. Whence it follows that to study them for their own sake would be just as wise and to as good purpose, as if a man, neglecting the true use or original intention and subservience of language, should spend his time in impertinent criticisms upon words or purely verbal reasonings and controversies.

123. From numbers we proceed to speak of *extension*, which, considered as relative, is the object of geometry. The *infinite* divisibility of *finite* extension, though it is not expressly laid down either as an axiom or theorem in the elements of that science, yet is throughout the same every where supposed and thought to have so inseparable and essential a connection with the principles and demonstrations in geometry that mathematicians never admit it into doubt or make the least question of it. And as this notion is the source from whence do spring all those amusing geometrical paradoxes which have such a direct repugnancy to the plain common sense of mankind and are admitted with so much reluctance into a mind not yet debauched by learning, so is it the principal occasion of all that nice and extreme subtlety which renders the study of *mathematics* so diffi-

cult and tedious. Hence, if we can make it appear that no finite extension contains innumerable parts or is infinitely divisible, it follows that we shall at once clear the science of geometry from a great number of difficulties and contradictions which have ever been esteemed a reproach to human reason and withal make the attainment thereof a business of much less time and pains than it has been previously.

124. Every particular finite extension which may possibly be the object of our thought, is an *idea* existing only in the mind, and consequently each part thereof must be perceived. If therefore I cannot perceive innumerable parts in any finite extension that I consider, it is certain that they are not contained in it, but it is evident that I cannot distinguish innumerable parts in any particular line, surface, or solid, which I either perceive by sense or figure to myself in my mind; wherefore I conclude they are not contained in it. Nothing can be plainer to me than that the extensions I have in view are no other than my own ideas and it is no less plain that I cannot resolve any one of my ideas into an infinite number of other ideas, that is, that they are not infinitely divisible. If by *finite extension* is meant something distinct from a finite idea, I declare I do not know what that is and so cannot affirm or deny anything of it. But if the terms *extension*, *parts*, and the like are taken in any sense conceivable, that is, for ideas, then to say a finite quantity or extension consists of parts infinite in number is so manifest a contradiction that everyone at first sight acknowledges it to be so. And it is impossible it should ever gain the assent of any reasonable creature who is not brought to it by gentle and slow degrees, as a converted gentile to the belief of *transubstantiation*. Ancient and rooted prejudices do often pass into principles, and those propositions which once obtain the force and credit of a *principle* are not only themselves, but likewise whatever is deducible from them, thought privileged from all examination. And there is no absurdity so gross which by this means the mind of man may not be prepared to swallow.

125. He whose understanding is prepossessed with the doctrine of abstract general ideas may be persuaded that (whatever is thought of the ideas of sense) extension in *abstract* is infinitely divisible. And one

who thinks the objects of sense exist without the mind will perhaps in virtue thereof be brought to admit that a line but an inch long may contain innumerable parts really existing, though too small to be discerned. These errors are grafted in the minds of geometers as well as of other men and have a like influence on their reasonings; and it were no difficult thing to show how the arguments from geometry, made use of to support the infinite divisibility of extension, are bottomed on them. At present we shall only observe in general whence it is that the mathematicians are all so fond and tenacious of this doctrine.

126. It has been observed in another place that the theorems and demonstrations in geometry are conversant about universal ideas: sec. 15, Introduction. Where it is explained in what sense this ought to be understood, namely, that the particular lines and figures included in the diagram are supposed to stand for innumerable others of different sizes—or in other words, the geometer considers them abstracting from their magnitude, which does not imply that he forms an abstract idea, but only that he cares not what the particular magnitude is, whether great or small, but looks on that as a thing indifferent to the demonstration—hence it follows that a line in the scheme, but an inch long, must be spoken of as though it contained ten thousand parts, since it is regarded not in itself, but as it is universal; and it is universal only in its signification, whereby it represents innumerable lines greater than itself, in which may be distinguished ten thousand parts or more, though there may not be above an inch in it. After this manner the properties of the lines signified are (by a very usual figure) transferred to the sign, and thence through mistake thought to appertain to it considered in its own nature.

127. Because there is no number of parts so great but it is possible there may be a line containing more, the inch-line is said to contain parts more than any assignable number, which is true, not of the inch taken absolutely, but only for the things signified by it. But men not retaining that distinction in their thoughts slide into a belief that the small particular line described on paper contains in itself parts innumerable. There is no such thing as the ten-thousandth part of an *inch*; but there is of a *mile* or *diameter* of

the earth, which may be signified by that inch. When therefore I delineate a triangle on paper and take one side not above an inch, for example, in length to be the *radius*, this I consider as divided into ten thousand or a hundred thousand parts or more. For though the ten-thousandth part of that line, considered in itself, is nothing at all, and consequently may be neglected without any error or inconvenience, yet these described lines being only marks standing for greater quantities, whereof it may be the ten-thousandth part is very considerable, it follows that to prevent notable errors in practice, the *radius* must be taken of ten thousand parts or more.

128. From what has been said, the reason is plain why, to the end any theorem may become universal in its use, it is necessary we speak of the lines described on paper as though they contained parts which really they do not. In doing of which, if we examine the matter thoroughly, we shall perhaps discover that we cannot conceive an inch itself as consisting of, or being divisible into a thousand parts, but only some other line which is far greater than an inch and represented by it. And that when we say a line is *infinitely divisible*, we must mean a line which is *infinitely great*. What we have here observed seems to be the chief cause why to suppose the infinite divisibility of finite extension has been thought necessary in geometry.

129. The several absurdities and contradictions which flowed from this false principle might, one would think, have been esteemed so many demonstrations against it. But by I know not what *logic*, it is held that proofs *a posteriori* are not to be admitted against propositions relating to infinity. As though it were not impossible even for an infinite mind to reconcile contradictions. Or as if anything absurd and repugnant could have a necessary connection with truth or flow from it. But whoever considers the weakness of this pretence will think it was contrived on purpose to humor the laziness of the mind which had rather acquiesce in an indolent skepticism than be at the pains to go through with a severe examination of those principles it has ever embraced for true.

130. Of late, the speculations about infinities have run so high and grown to such strange notions as have

occasioned no small scruples and disputes among the geometers of the present age. Some there are of great note who, not content with holding that finite lines may be divided into an infinite number of parts, do yet further maintain that each of those infinitesimals is itself subdivisible into an infinity of other parts, or infinitesimals of a second order, and so on *ad infinitum*. These, I say, assert there are infinitesimals of infinitesimals of infinitesimals, without ever coming to an end. So that according to them an inch does not barely contain an infinite number of parts, but an infinity of an infinity of an infinity *ad infinitum* of parts. Others there are who hold all orders of infinitesimals below the first to be nothing at all, thinking it with good reason absurd to imagine there is any positive quantity or part of extension which, though multiplied infinitely, can ever equal the smallest given extension. And yet, on the other hand, it seems no less absurd to think the square, cube, or other power of a positive real root should itself be nothing at all; which they who hold infinitesimals of the first order, denying all of the subsequent orders, are obliged to maintain.

131. Have we not therefore reason to conclude that they are *both* in the wrong and that there is in effect no such thing as parts infinitely small or an infinite number of parts contained in any finite quantity? But you will say that if this doctrine obtains, it will follow that the very foundations of geometry are destroyed and those great men who have raised that science to so astonishing a height have been all the while building a castle in the air. To this it may be replied that whatever is useful in geometry and promotes the benefit of human life does still remain firm and unshaken on our principles. That science, considered as practical, will rather receive advantage than any prejudice from what has been said. But to set this in a due light may be the subject of a distinct inquiry. For the rest, though it should follow that some of the more intricate and subtle parts of *speculative mathematics* may be pared off without any prejudice to truth, yet I do not see what damage will be thence derived to mankind. On the contrary, it were highly to be wished that men of great abilities and obstinate application would draw off their thoughts from those amusements

and employ them in the study of such things as lie nearer the concerns of life or have a more direct influence on the manners.

132. If it is said that several theorems undoubtedly true are discovered by methods in which infinitesimals are made use of, which could never have been if their existence included a contradiction in it, I answer that upon a thorough examination it will not be found that in any instance it is necessary to make use of or conceive infinitesimal parts of finite lines, or even quantities less than the *minimum sensibile*; no, it will be evident this is never done, it being impossible.¹⁵

133. By what we have premised, it is plain that very numerous and important errors have taken their rise from those false principles which were imagined in the foregoing parts of this treatise. And the opposites of those erroneous tenets at the same time appear to be most fruitful principles from whence do flow innumerable consequences highly advantageous to true philosophy as well as to religion. Particularly, *matter*, or *the absolute existence of corporeal objects*, has been shown to be that wherein the most avowed and pernicious enemies of all knowledge, whether human or divine, have ever placed their chief strength and confidence. And surely, if by distinguishing the real existence of unthinking things from their being perceived and allowing them a substance of their own out of the minds of spirits, no one thing is explained in nature; but on the contrary a great many inexplicable difficulties arise: if the supposition of matter is barely precarious as not being grounded on so much as one single reason; if its consequences cannot endure the light of examination and free inquiry, but screen themselves under the dark and general pretence of

15. [The following passage is added in the edition of 1710: "And whatever mathematicians may think of fluxions or the differential calculus and the like, a little reflection will show them that in working by those methods, they do not conceive or imagine lines or surfaces less than what are perceivable to sense. They may, indeed, call those little and almost insensible quantities infinitesimals or infinitesimals of infinitesimals, if they please; but at bottom this is all, they being in truth finite, nor does the solution of problems require supposing any other. But this will be more clearly made out hereafter."]