

t, by an actual view of all the intermediate *ideas*, which the agreement or disagreement of those in proposition was at first perceived, but by other intermediate *ideas* that show the agreement or disagreement of the *ideas* contained in the proposition whose certainty we remember. For example, in this proposition that "the three angles of a triangle are equal to two right ones," one who has seen and clearly perceived the demonstration of this truth knows it to be true, when that demonstration is gone out of his mind, so that at present it is not actually in view and possibly cannot be recollected. But he knows it in a different way from what he did before. The agreement of the two *ideas* joined in that proposition is perceived, not by the intervention of other *ideas* than those which at first produced that perception. He remembers, i.e., he knows (for remembrance is by the revival of some past knowledge), that he was once certain of the truth of this proposition that the three angles of a triangle are equal to two right ones. The immutability of the same relations between the same immutables is now the *idea* that shows him that if the three angles of a triangle were once equal to two right ones, they will always be equal to two right ones. And since he comes to be certain that what was once true in the case is always true; that *ideas* once agreed will always agree; and consequently what he once saw to be true, he will always know to be true, as long as he can remember that he once knew it. Upon this ground it is that particular demonstrations in mathematics afford general knowledge. If then the perception that the same *ideas* will eternally have the same habitudes and relations is not a sufficient ground of knowledge, there could be no knowledge of general propositions in mathematics, for no mathematical demonstration would be any other than particular. And when a man had demonstrated any proposition concerning one triangle or circle, his knowledge would not reach beyond that particular diagram. If he would extend it further, he must renew his demonstration in another instance, before he could know it to be true in another like triangle, and so on. By these means one could never come to the knowledge of any general propositions. Nobody, I think, can deny that Mr. Newton certainly knows any proposition that now at any time reads in his book to be true,

though he does not have in actual view that admirable chain of intermediate *ideas* by which he at first discovered it to be true. Such a memory as that able to retain such a train of particulars, may be well thought beyond the reach of human faculties. When the very discovery, perception, and laying together that wonderful connection of *ideas* is found to surpass most readers' *comprehension*. But yet it is evident the author himself knows the proposition to be true, remembering he once saw the connection of those *ideas*, as certainly as he knows such a man wounded another, remembering that he saw him run him through. But because the memory is not always so clear as actual perception and does in all men more or less decay in length of time, this among other differences is one which shows that *demonstrative knowledge* is much more imperfect than *intuitive*, as we shall see in the following chapter.

Chapter II. Of the Degrees of Our Knowledge.

1. *Intuitive*. All our knowledge consisting, as I have said, in the view the mind has of its own *ideas*, which is the utmost light and greatest certainty we, with our faculties, and in our way of knowledge, are capable of, it may not be amiss to consider a little the degrees of its evidence. The different clearness of our knowledge seems to me to lie in the different way of perception the mind has of the agreement or disagreement of any of its *ideas*. For if we will reflect on our own ways of thinking, we shall find that sometimes the mind perceives the agreement or disagreement of two *ideas* immediately by themselves, without the intervention of any other. And this, I think, we may call *intuitive knowledge*. For in this the mind is at no pains of proving or examining, but perceives the truth, as the eye does light, only by being directed towards it. Thus the mind perceives that *white* is not *black*, that a *circle* is not a *triangle*, that *three* are more than *two*, and equal to *one* and *two*. Such kinds of truths the mind perceives at the first sight of the *ideas* together, by bare *intuition*, without the intervention of any other *idea*; and this kind of knowledge is the clearest and most certain that human frailty is capable

LOCKE'S
ESSAY

BOOK IV

CHAPTER II

of. This part of knowledge is irresistible, and like bright sunshine forces itself immediately to be perceived, as soon as ever the mind turns its view that way, and leaves no room for hesitation, doubt, or examination, but the mind is presently filled with the clear light of it. It is on this *intuition* that depends all the certainty and evidence of all our knowledge; this certainty everyone finds to be so great that he cannot imagine and therefore not require a greater. For a man cannot conceive himself capable of a greater certainty than to know that any *idea* in his mind is such as he perceives it to be, and that two *ideas* in which he perceives a difference are different and not precisely the same. He who demands a greater certainty than this, demands he knows not what, and shows only that he has a mind to be a skeptic, without being able to be so. Certainty depends so wholly on this intuition that in the next degree of *knowledge*, which I call *demonstrative*, this intuition is necessary in all the connections of the intermediate *ideas*, without which we cannot attain knowledge and certainty.

2. *Demonstrative*. The next degree of knowledge is where the mind perceives the agreement or disagreement of any *ideas*, but not immediately. Though wherever the mind perceives the agreement or disagreement of any of its *ideas*, there is certain knowledge; yet it does not always happen that the mind sees that agreement or disagreement which there is between them, even where it is discoverable, and in that case remains in ignorance, and at most gets no further than a probable conjecture. The reason why the mind cannot always perceive presently the agreement or disagreement of two *ideas* is because those *ideas*, concerning whose agreement or disagreement the inquiry is made, cannot by the mind be so put together as to show it. In this case then, when the mind cannot so bring its *ideas* together, as by their immediate comparison and as it were juxtaposition or application one to another, to perceive their agreement or disagreement, it is inclined, by the intervention of other *ideas* (one or more, as it happens) to discover the agreement or disagreement which it searches; and this is that which we call *reasoning*. Thus the mind, being willing to know the agreement or disagreement in bigness between the three angles of a triangle and two right ones, cannot by an immedi-

ate view and comparing them do it, because the three angles of a triangle cannot be brought at once and be compared with any other one or two angles; and so of this the mind has no immediate, no intuitive knowledge. In this case the mind is inclined to find out some other angles to which the three angles of a triangle have an equality, and, finding those equal to two right ones, comes to know their equality to two right ones.

3. *Depends on proofs*. Those intervening *ideas*, which serve to show the agreement of any two others, are called *proofs*; and where the agreement or disagreement is by this means plainly and clearly perceived, it is called *demonstration*, it being *shown* to the understanding, and the mind made to see that it is so. A quickness in the mind to find out these intermediate *ideas* (that shall discover the agreement or disagreement of any other) and to apply them right is, I suppose, that which is called *sagacity*.

4. *But not so easy*. This knowledge by intervening proofs, though it is certain, yet the evidence of it is *not* altogether so clear and bright, nor the assent so ready, as in *intuitive* knowledge. For though in *demonstration* the mind does at last perceive the agreement or disagreement of the *ideas* it considers, yet it is not without pains and attention. There must be more than one transient view to find it. A steady application and pursuit are required to this discovery. And there must be a progression by steps and degrees before the mind can in this way arrive at certainty and come to perceive the agreement or repugnance between two *ideas* that need proofs and the use of reason to show it.

5. *Not without precedent doubt*. Another difference between intuitive and demonstrative knowledge is that though in the latter all doubt is removed when, by the intervention of the intermediate *ideas*, the agreement or disagreement is perceived, yet before the demonstration there was a doubt, which in intuitive knowledge cannot happen to the mind that has its faculty of perception left to a degree capable of distinct *ideas*, no more than it can be a doubt to the eye (that can distinctly see white and black) whether this ink and this paper are all of a color. If there is sight in the eyes, it will at first glimpse, without hesitation, perceive the words printed on this paper

different from the color of the paper. And so if the mind has the faculty of distinct perception, it will perceive the agreement or disagreement of those *ideas* that produce intuitive knowledge. If the eye has lost the faculty of seeing, or the mind of perceiving, we in vain inquire after the quickness of sight in one, or clearness of perception in the other.

6. *Not so clear.* It is true the perception produced by *demonstration* is also very clear, yet it is often with a great abatement of that evident luster and full assurance that always accompany that which I call *intuitive*; like a face reflected by several mirrors one to another, where as long as it retains the similitude and agreement with the object, it produces a knowledge; but it is still, in every successive reflection, with a lessening of that perfect clearness and distinctness which is in the first; until at last, after many removes, it has a great mixture of dimness, and is not at first sight so knowable, especially to weak eyes. Thus it is with knowledge made out by a long train of proof.

7. *Each step must have intuitive evidence.* Now, in every step reason makes in demonstrative knowledge, there is an intuitive knowledge of that agreement or disagreement it seeks with the next intermediate *idea* which it uses as a proof; for if it were not so, that yet would need a proof, since without the perception of such agreement or disagreement, there is no knowledge produced. If it is perceived by itself, it is intuitive knowledge. If it cannot be perceived by itself, there is need of some intervening *idea*, as a common measure, to show their agreement or disagreement. By this it is plain that every step in reasoning that produces knowledge has intuitive certainty, which, when the mind perceives, there is no more required but to remember it, to make the agreement or disagreement of the *ideas* concerning which we inquire visible and certain. So that to make anything a *demonstration*, it is necessary to perceive the immediate agreement of the intervening *ideas*, by which the agreement or disagreement of the two *ideas* under examination (of which the one is always the first, and the other the last in the account) is found. This intuitive perception of the agreement or disagreement of the intermediate *ideas*, in each step and progression of the *demonstration*, must also be carried exactly in the mind, and a man must be sure that no part is left out—which

because in long deductions and the use of many proofs the memory does not always so readily and exactly retain; therefore it comes to pass that this is more imperfect than intuitive knowledge, and men embrace often falsehood for demonstrations. [...]

9. *Demonstration not limited to quantity.* It has been generally taken for granted that mathematics alone is capable of demonstrative certainty; but to have such an agreement or disagreement as may intuitively be perceived, being, as I imagine, not the privilege of the *ideas* of number, extension, and figure alone, it may possibly be the want of due method and application, in us, and not of sufficient evidence in things, that demonstration has been thought to have so little to do in other parts of knowledge, and been scarcely so much as aimed at by any but mathematicians. For whatever *ideas* we have in which the mind can perceive the immediate agreement or disagreement that is between them, there the mind is capable of intuitive knowledge; and where it can perceive the agreement or disagreement of any two *ideas* by an intuitive perception of the agreement or disagreement they have with any intermediate *ideas*, there the mind is capable of demonstration, which is not limited to *ideas* of extension, figure, number, and their modes.

10. *Why it has been so thought.* The reason why it has been generally sought for, and supposed to be only in those, I imagine, has been not only the general usefulness of those sciences, but because, in comparing their equality or excess, the modes of numbers have every the least difference very clear and perceivable; and though in extension every the least excess is not so perceptible, yet the mind has found out ways to examine and discover demonstratively the just equality of two angles, or extensions, or figures. And both these, i.e., numbers and figures, can be set down by visible and lasting marks, in which the *ideas* under consideration are perfectly determined, which for the most part they are not, where they are marked only by names and words.

11. But in other simple *ideas*, whose modes and differences are made and counted by degrees, and not quantity, we have not so nice and accurate a distinction of their differences as to perceive, or find ways to measure, their just equality, or the least differ-

ences. For those other simple *ideas*, being appearances of sensations produced in us by the size, figure, number, and motion of minute corpuscles singly insensible, their different degrees also depend upon the variation of some or of all those causes, which, since it cannot be observed by us in particles of matter of which each is too subtle to be perceived, it is impossible for us to have any exact measures of the different degrees of these simple *ideas*. [. . .]

13. Not knowing therefore what number of particles, nor what motion of them is fit to produce any precise degree of *whiteness*, we cannot demonstrate the certain equality of any two degrees of *whiteness*; because we have no certain standard to measure them by, nor means to distinguish every the least real difference, the only help we have being from our senses, which in this point fail us. But where the difference is so great as to produce in the mind clearly distinct *ideas* whose differences can be perfectly retained, there these *ideas* or colors, as we see in different kinds, as blue and red, are as capable of demonstration as *ideas* of number and extension. What I have here said of *whiteness* and colors, I think, holds true in all secondary qualities and their modes.

14. *Sensitive knowledge of particular existence.* These two, namely, intuition and demonstration, are the degrees of our knowledge; whatever comes short of one of these, with whatever assurance embraced, is but faith or opinion, but not knowledge, at least in all general truths. There is, indeed, another *perception* of the mind, employed about the *particular existence of finite beings* without us, which going beyond bare probability, and yet not reaching perfectly to either of the foregoing degrees of certainty, passes under the name of knowledge. There can be nothing more certain than that the *idea* we receive from an external object is in our minds; this is intuitive knowledge. But whether there is anything more than barely that *idea* in our minds, whether we can certainly infer from this the existence of anything without us, which corresponds to that *idea*, is that of which some men think there may be a question made; because men may have such *ideas* in their minds when no such thing exists, no such object affects their senses. But yet here, I think, we are provided with an evidence that puts us past doubting. For I ask anyone whether

he is not invincibly conscious to himself of a different perception when he looks on the sun by day, and thinks on it by night—when he actually tastes wormwood, or smells a rose, or only thinks on that savor or odor? We as plainly find the difference there is between any *idea* revived in our minds by our own memory and actually coming into our minds by our senses, as we do between any two distinct *ideas*. If anyone says a dream may do the same thing, and all these *ideas* may be produced in us without any external objects, he may please to dream that I make him this answer: 1. That it is no great matter, whether I remove his scruple or not; where all is but dream, reasoning and arguments are of no use, truth and knowledge nothing. 2. That I believe he will allow a very manifest difference between dreaming of being in the fire and being actually in it. But yet if he is resolved to appear so skeptical, as to maintain that what I call being actually in the fire is nothing but a dream, and that we cannot thereby certainly know that any such thing as fire actually exists without us, I answer that we certainly find that pleasure or pain follows upon the application of certain objects to us, whose existence we perceive, or dream that we perceive by our senses; this certainty is as great as our happiness or misery, beyond which we have no concern to know or to be. Thus, I think, we may add to the two former sorts of *knowledge* this also, of the existence of particular external objects, by that perception and consciousness we have of the actual entrance of *ideas* from them, and allow these *three degrees of knowledge*, namely, *intuitive, demonstrative, and sensitive*, in each of which there are different degrees and ways of evidence and certainty.

15. *Knowledge not always clear, where the ideas are so.* But since our knowledge is founded on and employed about our *ideas* only, will it not follow from this that it is conformable to our *ideas*; and that where our *ideas* are clear and distinct, or obscure and confused, our knowledge will be so too? To which I answer, no. For our knowledge consisting in the perception of the agreement or disagreement of any two *ideas*, its clearness or obscurity consists in the clearness or obscurity of that perception, and not in the clearness or obscurity of the *ideas* themselves—e.g., a man who has as clear *ideas* of the angles of a

triangle, and of equality to two right ones, as any mathematician in the world, may yet have but a very obscure perception of their agreement, and so have but a very obscure knowledge of it. But *ideas*, which by reason of their obscurity or otherwise, are confused, cannot produce any clear or distinct knowledge, because, as far as any *ideas* are confused, so far the mind cannot perceive clearly, whether they agree or disagree. Or to express the same thing in a way less apt to be misunderstood: he who has not determined *ideas* to the words he uses cannot make propositions of them of whose truth he can be certain.

Chapter III. Of the Extent of Human Knowledge.

1. *First, no further than we have ideas.* Knowledge, as has been said, lying in the perception of the agreement or disagreement of any of our *ideas*, it follows from hence that,

First, we can have knowledge no further than we have *ideas*.

2. *Secondly, no further than we can perceive their agreement or disagreement.* Secondly that we can have no knowledge further than we can have perceptions of that agreement or disagreement, which perception being: 1. either by *intuition*, or the immediate comparing any two *ideas*; or, 2. by *reason*, examining the agreement or disagreement of two *ideas*, by the intervention of some others; or, 3. by *sensation*, perceiving the existence of particular things. Hence it also follows:

3. *Thirdly, intuitive knowledge does not extend itself to all the relations of all our ideas.* Thirdly that we cannot have an *intuitive knowledge* that shall extend itself to all our *ideas*, and all that we would know about them, because we cannot examine and perceive all the relations they have one to another by juxtaposition, or an immediate comparison one with another. Thus having the *ideas* of an obtuse and an acute angled triangle, both drawn from equal bases, and between parallels, I can, by intuitive knowledge, perceive the one not to be the other, but cannot that way know whether they are equal or not, because their agreement or disagreement is equal.

be perceived by an immediate comparing them; the difference of figure makes their parts incapable of an exact immediate application; and therefore there is need of some intervening qualities to measure them by, which is demonstration or rational knowledge.

4. *Fourthly, nor demonstrative knowledge.* Fourthly, it follows also, from what is above observed that our *rational knowledge* cannot reach to the whole extent of our *ideas*, because between two different *ideas* we would examine, we cannot always find such *mediums* as we can connect one to another with an intuitive knowledge in all the parts of the deduction; and wherever that fails, we come short of knowledge and demonstration.

5. *Fifthly, sensitive knowledge, narrower than either.* Fifthly, *sensitive knowledge* reaching no further than the existence of things actually present to our senses is yet much narrower than either of the former.

6. *Sixthly, our knowledge, therefore, narrower than our ideas.* From all which it is evident that the extent of our knowledge comes not only short of the reality of things, but even of the extent of our own *ideas*. Though our knowledge is limited to our *ideas* and cannot exceed them, either in extent or perfection, and though these are very narrow bounds, in respect of the extent of all being, and far short of what we may justly imagine to be in some even created understandings, not tied down to the dull and narrow information, is to be received from some few and not very acute ways of perception, such as are our senses, yet it would be well with us if our knowledge were but as large as our *ideas*, and there were not many doubts and inquiries concerning the *ideas* we have, of which we are not, nor I believe ever shall be in this world resolved. Nevertheless I do not question but that human knowledge, under the present circumstances of our beings and constitutions, may be carried much further than it has been up to now, if men would sincerely and with freedom of mind employ all that industry and labor of thought in improving the means of discovering truth, which they do for the coloring or support of falsehood to maintain a system, interest, or party, they are once engaged in. But yet after all, I think I may, without injury to human perfection, be confident that our knowledge would never reach