

hit upon such a system of biographical metaphysics, the reason doubtless was that they were too intelligent.

Santayana, *Realm of Truth*, XIII

56 As for the sceptics, who doubt, as least theoretically and in words, the reliability of our organs of knowledge, especially of the intellect or reason, it would obviously be waste of breath to attempt to demonstrate its reliability to them. For every demonstration rests on some previously admitted certainty, and it is their very profession to admit of none. To defend human knowledge against their attack it is sufficient (i) to show in what that knowledge consists and how it is attained; (ii) to refute the arguments they adduce; (iii) to make a *reductio ad absurdum*. When they say that they do

not know whether any proposition is true, either they know that this proposition at any rate is true, in which case they obviously contradict themselves, or they do not know whether it is true, in which case they are either saying nothing whatever, or do not know what they say. The sole philosophy open to those who doubt the possibility of truth is absolute silence—even mental. That is to say, as Aristotle points out, such men must make themselves vegetables. No doubt reason often errs, especially in the highest matters, and, as Cicero said long ago, there is no nonsense in the world which has not found some philosopher to maintain it, so difficult is it to attain truth. But it is the error of cowards to mistake a difficulty for an impossibility.

Maritain, *Introduction to Philosophy*, II, 4

## 6.7 | Reasoning, Demonstration, and Disputation

The subjects treated in this section relate to subjects treated in earlier ones: reasoning is involved in the acquisition of knowledge, in the development of hypotheses or theories, and in the criticism of opinions or beliefs; demonstration or proof is regarded, in certain fields of learning (mathematics, for example), as a condition pre-requisite to the acceptance of a conclusion as valid knowledge; disputation or controversy arises when men attempt to resolve issues generated by conflicting theories, or conflicting opinions and beliefs. The reader will also find that the subjects treated here are relevant to the discussion of philosophy, science, and mathematics in Chapter 17; and to certain aspects of the consideration of mind in Chapter 5.

Some of the passages quoted undertake to formulate the logic of reasoning in rules that determine whether the reasoning is valid or invalid, such as Aristotle's rules of the syllo-

gism; others describe reasoning in psychological rather than in logical terms, as a process by which the mind passes from one judgment to another. Different types of reasoning are distinguished, and fallacies in reasoning are noted. The difference between deduction and induction is considered in two ways: on the one hand, as a distinction between two kinds of reasoning; on the other hand, as a distinction between a ratiocinative process (deduction) and an intuitive leap (induction).

The contrast between that which the mind grasps discursively, through steps of reasoning or ratiocination, and that which it grasps intuitively, by immediate apprehension, is involved in a basic thesis concerning demonstration, advanced in certain of the passages quoted. Reasoning may be formally valid, in the sense that it does not violate any logical rules, while at the same time being materially false; i.e., reaching, from

premises that are partly or wholly false, a conclusion that is false. When the term “demonstration” is applied, as it is by certain writers, to reasoning that is not only formally valid but also materially true (the establishment of a true conclusion from true premises), a question arises. Does this always require that the truth of the premises be demonstrated in turn? Or does demonstration presuppose the existence of indemonstrable propositions—axioms that cannot be demonstrated, yet the truth of which can still be known, intuitively and not by reasoning? Those who take a strict view of

demonstration argue that it presupposes the indemonstrable.

At the opposite extreme from demonstration is the use of reasoning in what certain authors call the process of dialectic or disputation. On many issues reasonable men can take opposite sides, and when they do, they can marshal arguments for opposite conclusions. Those who draw a sharp line between the spheres of knowledge and opinion, or truth and probability, place demonstrative reasoning on one side of this line, and dialectical or disputatious reasoning on the other.

1 Come now, and let us reason together, saith the Lord.

*Isaiah 1:18*

2 *Wrong Logic.* Aye, say you so? why I have been half-burst; I do so long

To overthrow his arguments with arguments more strong.

I am the Lesser Logic? True: these Schoolmen call me so,

Simply because I was the first of all mankind to show

How old established rules and laws might contradicted be:

And this, as you may guess, is worth a thousand pounds to me,

To take the feebler cause, and yet to win the disputation.

Aristophanes, *Clouds*, 1031

3 *Socrates.* When a simple man who has no skill in dialectics believes an argument to be true which he afterwards imagines to be false, whether really false or not, and then another and another, he has no longer any faith left, and great disputers, as you know, come to think at last that they have grown to be the wisest of mankind; for they alone perceive the utter unsoundness and instability of all arguments, or indeed, of all things. . . . How melancholy, if there be such a thing as truth or certainty or possibility of knowledge—that a man should have lighted upon some argument or other which at first seemed true and then turned out to be false, and instead of blaming himself and his own want of wit, because he is annoyed, should at

last be too glad to transfer the blame from himself to arguments in general: and for ever afterwards should hate and revile them, and lose truth and the knowledge of realities.

Plato, *Phaedo*, 90A

4 *Socrates.* First principles, even if they appear certain, should be carefully considered; and when they are satisfactorily ascertained, then, with a sort of hesitating confidence in human reason, you may, I think, follow the course of the argument.

Plato, *Phaedo*, 107A

5 Verily, Glaucon, I [Socrates] said, glorious is the power of the art of contradiction!

Why do you say so?

Because I think that many a man falls into the practice against his will. When he thinks that he is reasoning he is really disputing, just because he cannot define and divide, and so know that of which he is speaking; and he will pursue a merely verbal opposition in the spirit of contention and not of fair discussion.

Plato, *Republic*, V, 454A

6 *Socrates.* That your feelings may not be moved to pity about our citizens who are now thirty years of age, every care must be taken in introducing them to dialectic.

*Glaucon.* Certainly.

There is a danger lest they should taste the dear delight too early; for youngsters, as you may have observed, when they first get the taste in their mouths, argue for amusement, and are always

contradicting and refuting others in imitation of those who refute them; like puppydogs, they rejoice in pulling and tearing at all who come near them.

Yes, he said, there is nothing which they like better.

And when they have made many conquests and received defeats at the hands of many, they violently and speedily get into a way of not believing anything which they believed before, and hence, not only they, but philosophy and all that relates to it is apt to have a bad name with the rest of the world.

Too true, he said.

But when a man begins to get older, he will no longer be guilty of such insanity; he will imitate the dialectician who is seeking for truth, and not the eristic, who is contradicting for the sake of amusement; and the greater moderation of his character will increase instead of diminishing the honour of the pursuit.

Plato, *Republic*, VII, 539A

- 7 What I now assert is that at all events we do know by demonstration. By demonstration I mean a syllogism productive of scientific knowledge, a syllogism, that is, the grasp of which is *eo ipso* such knowledge. Assuming then that my thesis as to the nature of scientific knowing is correct, the premisses of demonstrated knowledge must be true, primary, immediate, better known than and prior to the conclusion, which is further related to them as effect to cause. Unless these conditions are satisfied, the basic truths will not be 'appropriate' to the conclusion. Syllogism there may indeed be without these conditions, but such syllogism, not being productive of scientific knowledge, will not be demonstration. The premisses must be true: for that which is non-existent cannot be known—we cannot know, e.g. that the diagonal of a square is commensurate with its side. The premisses must be primary and indemonstrable; otherwise they will require demonstration in order to be known, since to have knowledge, if it be not accidental knowledge, of things which are demonstrable, means precisely to have a demonstration of them. The premisses must be the causes of the conclusion, better known than it, and prior to it; its causes, since we possess scientific knowledge of a thing only when we know its cause; prior, in order to be causes; antecedently known, this antecedent knowledge being not our mere understanding of the meaning, but knowledge of the fact as well. . . . In saying that the premisses of demonstrated knowledge must be primary, I mean that they must be the 'appropriate' basic truths, for I identify primary premiss and basic truth. A 'basic truth' in a demonstration is an immediate proposition. An immediate proposition is one which has no other proposition prior to it. . . . I call an immediate basic truth of syllogism a 'thesis' when,

though it is not susceptible of proof by the teacher, yet ignorance of it does not constitute a total bar to progress on the part of the pupil: one which the pupil must know if he is to learn anything whatever is an axiom. I call it an axiom because there are such truths and we give them the name of axioms *par excellence*. If a thesis assumes one part or the other of an enunciation, i.e. asserts either the existence or the non-existence of a subject, it is a hypothesis; if it does not so assert, it is a definition. Definition is a 'thesis' or a 'laying something down', since the arithmetician lays it down that to be a unit is to be quantitatively indivisible; but it is not a hypothesis, for to define what a unit is is not the same as to affirm its existence.

Now since the required ground of our knowledge—i.e. of our conviction—of a fact is the possession of such a syllogism as we call demonstration, and the ground of the syllogism is the facts constituting its premisses, we must not only know the primary premisses—some if not all of them—beforehand, but know them better than the conclusion.

Aristotle, *Posterior Analytics*, 71<sup>b</sup>16

- 8 Reasoning is an argument in which, certain things being laid down, something other than these necessarily comes about through them. (a) It is a 'demonstration', when the premisses from which the reasoning starts are true and primary, or are such that our knowledge of them has originally come through premisses which are primary and true: (b) reasoning, on the other hand, is 'dialectical', if it reasons from opinions that are generally accepted. Things are 'true' and 'primary' which are believed on the strength not of anything else but of themselves: for in regard to the first principles of science it is improper to ask any further for the why and wherefore of them; each of the first principles should command belief in and by itself. On the other hand, those opinions are 'generally accepted' which are accepted by every one or by the majority or by the philosophers—i.e. by all, or by the majority, or by the most notable and illustrious of them. Again (c), reasoning is 'contentious' if it starts from opinions that seem to be generally accepted, but are not really such, or again if it merely seems to reason from opinions that are or seem to be generally accepted. For not every opinion that seems to be generally accepted actually is generally accepted. For in none of the opinions which we call generally accepted is the illusion entirely on the surface, as happens in the case of the principles of contentious arguments; for the nature of the fallacy in these is obvious immediately, and as a rule even to persons with little power of comprehension. So then, of the contentious reasonings mentioned, the former really deserves to be called 'reasoning' as well, but the other should be called 'contentious reasoning', but not 'reasoning', since it appears to

reason, but does not really do so. Further (*d*), besides all the reasoning we have mentioned there are the mis-reasonings that start from the premisses peculiar to the special sciences, as happens (for example) in the case of geometry and her sister sciences. For this form of reasoning appears to differ from the reasonings mentioned above; the man who draws a false figure reasons from things that are neither true and primary, nor yet generally accepted. For he does not fall within the definition; he does not assume opinions that are received either by every one or by the majority or by philosophers—that is to say, by all, or by most, or by the most illustrious of them—but he conducts his reasoning upon assumptions which, though appropriate to the science in question, are not true; for he effects his mis-reasoning either by describing the semicircles wrongly or by drawing certain lines in a way in which they could not be drawn.

The foregoing must stand for an outline survey of the species of reasoning.

Aristotle, *Topics*, 100<sup>a</sup>25

- 9 You should display your training in inductive reasoning against a young man, in deductive against an expert. You should try, moreover, to secure from those skilled in deduction their premisses, from inductive reasoners their parallel cases; for this is the thing in which they are respectively trained. In general, too, from your exercises in argumentation you should try to carry away either a syllogism on some subject or a refutation or a proposition or an objection, or whether some one put his question properly or improperly (whether it was yourself or some one else) and the point which made it the one or the other. For this is what gives one ability, and the whole object of training is to acquire ability, especially in regard to propositions and objections. For it is the skilled propounder and objector who is, speaking generally, a dialectician. . . .

Do not argue with every one, nor practise upon the man in the street; for there are some people with whom any argument is bound to degenerate. For against any one who is ready to try all means in order to seem not to be beaten, it is indeed fair to try all means of bringing about one's conclusion: but it is not good form. Wherefore the best rule is, not lightly to engage with casual acquaintances, or bad argument is sure to result. For you see how in practising together people cannot refrain from contentious argument.

It is best also to have ready-made arguments relating to those questions in which a very small stock will furnish us with arguments serviceable on a very large number of occasions. These are those that are universal, and those in regard to which it is rather difficult to produce points for ourselves from matters of everyday experience.

Aristotle, *Topics*, 164<sup>a</sup>12

- 10 We must grasp the number of aims entertained by those who argue as competitors and rivals to the death. These are five in number, refutation, fallacy, paradox, solecism, and fifthly to reduce the opponent in the discussion to babbling—i.e. to constrain him to repeat himself a number of times; or it is to produce the appearance of each of these things without the reality. For they choose if possible plainly to refute the other party, or as the second best to show that he is committing some fallacy, or as a third best to lead him into paradox, or fourthly to reduce him to solecism, i.e. to make the answerer, in consequence of the argument, to use an ungrammatical expression; or, as a last resort, to make him repeat himself.

Aristotle, *On Sophistical Refutations*, 165<sup>b</sup>12

- 11 Precision is not to be sought for alike in all discussions, any more than in all the products of the crafts. Now fine and just actions, which political science investigates, admit of much variety and fluctuation of opinion, so that they may be thought to exist only by convention, and not by nature. And goods also give rise to a similar fluctuation because they bring harm to many people; for before now men have been undone by reason of their wealth, and others by reason of their courage. We must be content, then, in speaking of such subjects and with such premisses to indicate the truth roughly and in outline, and in speaking about things which are only for the most part true and with premisses of the same kind to reach conclusions that are no better. In the same spirit, therefore, should each type of statement be received; for it is the mark of an educated man to look for precision in each class of things just so far as the nature of the subject admits; it is evidently equally foolish to accept probable reasoning from a mathematician and to demand from a rhetorician scientific proofs.

Aristotle, *Ethics*, 1094<sup>b</sup>13

- 12 Scientific knowledge is judgement about things that are universal and necessary, and the conclusions of demonstration, and all scientific knowledge, follow from first principles (for scientific knowledge involves apprehension of a rational ground). This being so, the first principle from which what is scientifically known follows cannot be an object of scientific knowledge, of art, or of practical wisdom; for that which can be scientifically known can be demonstrated, and art and practical wisdom deal with things that are variable. Nor are these first principles the objects of philosophic wisdom, for it is a mark of the philosopher to have demonstration about some things. If, then, the states of mind by which we have truth and are never deceived about things invariable or even variable are scientific knowledge, practical wisdom, philosophic wisdom, and intuitive reason, and it cannot be any of the three (i.e. practical

wisdom, scientific knowledge, or philosophic wisdom), the remaining alternative is that it is intuitive reason that grasps the first principles.

Aristotle, *Ethics*, 1140<sup>b</sup>31

- 13 What things a man must learn in order to be able to apply the art of disputation, has been accurately shown by our philosophers; but with respect to the proper use of the things, we are entirely without practice. Only give to any of us, whom you please, an illiterate man to discuss with, and he cannot discover how to deal with the man. But when he has moved the man a little, if he answers beside the purpose, he does not know how to treat him, but he then either abuses or ridicules him, and says, "He is an illiterate man; it is not possible to do anything with him." Now a guide, when he has found a man out of the road leads him into the right way: he does not ridicule or abuse him and then leave him. Do you also show this illiterate man the truth, and you will see that he follows. But so long as you do not show him the truth, do not ridicule him, but rather feel your own incapacity.

How then did Socrates act? He used to compel his adversary in disputation to bear testimony to him, and he wanted no other witness. Therefore he could say, "I care not for other witnesses, but I am always satisfied with the evidence of my adversary, and I do not ask the opinion of others, but only the opinion of him who is disputing with me." For he used to make the conclusions drawn from natural notions so plain that every man saw the contradiction and withdrew from it.

Epictetus, *Discourses*, II, 12

- 14 When one of those who were present said, "Persuade me that logic is necessary," he replied: Do you wish me to prove this to you? The answer was, "Yes." Then I must use a demonstrative form of speech. This was granted. How then will you know if I am cheating you by argument? The man was silent. Do you see, said Epictetus, that you yourself are admitting that logic is necessary, if without it you cannot know so much as this, whether logic is necessary or not necessary?

Epictetus, *Discourses*, II, 25

- 15 There remain those branches of knowledge which pertain not to the bodily senses, but to the intellect, among which the science of reasoning and that of number are the chief. The science of reasoning is of very great service in searching into and unravelling all sorts of questions that come up in Scripture, only in the use of it we must guard against the love of wrangling and the childish vanity of entrapping an adversary. For there are many of what are called sophisms, inferences in reasoning that are false, and yet so close an imitation of the true, as to deceive not only dull people, but clever men too, when they are not on their

guard. For example, one man lays before another with whom he is talking, the proposition, "What I am, you are not." The other assents, for the proposition is in part true, the one man being cunning and the other simple. Then the first speaker adds: "I am a man"; and when the other has given his assent to this also, the first draws his conclusion: "Then you are not a man." Now of this sort of ensnaring arguments, Scripture, as I judge, expresses detestation in that place where it is said, "There is one that showeth wisdom in words, and is hated"; although, indeed, a style of speech which is not intended to entrap, but only aims at verbal ornamentation more than is consistent with seriousness of purpose, is also called sophistical.

There are also valid processes of reasoning which lead to false conclusions, by following out to its logical consequences the error of the man with whom one is arguing; and these conclusions are sometimes drawn by a good and learned man, with the object of making the person from whose error these consequences result, feel ashamed of them, and of thus leading him to give up his error, when he finds that if he wishes to retain his old opinion, he must of necessity also hold other opinions which he condemns. For example, the apostle did not draw true conclusions when he said, "Then is Christ not risen," and again, "Then is our preaching vain, and your faith is also vain"; and further on drew other inferences which are all utterly false; for Christ has risen, the preaching of those who declared this fact was not in vain, nor was their faith in vain who had believed it. But all these false inferences followed legitimately from the opinion of those who said that there is no resurrection of the dead. These inferences, then, being repudiated as false, it follows that since they would be true if the dead rise not, there will be a resurrection of the dead. As, then, valid conclusions may be drawn not only from true but from false propositions, the laws of valid reasoning may easily be learnt in the schools, outside the pale of the Church. But the truth of propositions must be inquired into in the sacred books of the Church.

Augustine, *Christian Doctrine*, II, 31

- 16 Human intellects obtain their perfection in the knowledge of truth by a kind of movement and discursive intellectual operation; that is to say, as they advance from one known thing to another. But, if from the knowledge of a known principle they were straightway to perceive as known all its consequent conclusions, then discourse would have no place in them. Such is the condition of the angels, because in those things which they first know naturally, they at once behold all things whatsoever that can be known in them.

Aquinas, *Summa Theologica*, I, 58, 3

- 17 As in the intellect, when reasoning, the conclusion

is compared with the principle, so in the intellect composing and dividing, the predicate is compared with the subject. For if our intellect were to see at once the force of the conclusion in the principle, it would never understand by discursion and reasoning. In like manner, if the intellect in apprehending the quiddity of the subject were at once to have knowledge of all that can be attributed to, or removed from, the subject, it would never understand by composing and dividing, but only by understanding the essence. Thus it is evident that for the self-same reason our intellect understands by discursion, and by composing and dividing, namely, that in the first apprehension of anything newly apprehended it does not at once grasp all that is virtually contained in it. And this comes from the weakness of the intellectual light within us.

Aquinas, *Summa Theologica*, I, 58, 4

- 18 The discourse of reason always begins from an understanding and ends at an understanding, because we reason by proceeding from certain understood principles, and the discourse of reason is perfected when we come to understand what we did not know before. Hence the act of reasoning proceeds from something previously understood.

Aquinas, *Summa Theologica*, II-II, 8, 1

- 19 Axioms determined upon in argument can never assist in the discovery of new effects; for the subtlety of nature is vastly superior to that of argument.

Bacon, *Novum Organum*, I, 24

- 20 There are two ways by which we arrive at the knowledge of facts, viz. by experience and by deduction. We must further observe that while our inferences from experience are frequently fallacious, deduction, or the pure illation of one thing from another, though it may be passed over, if it is not seen through, cannot be erroneous when performed by an understanding that is in the least degree rational.

Descartes, *Rules for Direction of the Mind*, II

- 21 In reasoning we unite not names but the things signified by the names; and I marvel that the opposite can occur to anyone. For who doubts whether a Frenchman and a German are able to reason in exactly the same way about the same things, though they yet conceive the words in an entirely diverse way?

Descartes, *Objections and Replies*, III

- 22 All men by nature reason alike, and well, when they have good principles. For who is so stupid as both to mistake in geometry, and also to persist in it, when another detects his error to him?

By this it appears that reason is not, as sense and memory, born with us; nor gotten by experi-

ence only, as prudence is; but attained by industry: first in apt imposing of names; and secondly by getting a good and orderly method in proceeding from the elements, which are names, to assertions made by connexion of one of them to another; and so to syllogisms, which are the connexions of one assertion to another, till we come to a knowledge of all the consequences of names appertaining to the subject in hand.

Hobbes, *Leviathan*, I, 5

- 23 Those who are accustomed to judge by feeling do not understand the process of reasoning, for they would understand at first sight and are not used to seek for principles. And others, on the contrary, who are accustomed to reason from principles, do not at all understand matters of feeling, seeking principles and being unable to see at a glance.

Pascal, *Pensées*, I, 3

- 24 When we wish to demonstrate a general theorem, we must give the rule as applied to a particular case; but if we wish to demonstrate a particular case, we must begin with the general rule. For we always find the thing obscure which we wish to prove and that clear which we use for the proof; for, when a thing is put forward to be proved, we first fill ourselves with the imagination that it is, therefore, obscure and, on the contrary, that what is to prove it is clear, and so we understand it easily.

Pascal, *Pensées*, I, 4

- 25 We must know where to doubt, where to feel certain, where to submit. He who does not do so understands not the force of reason. There are some who offend against these three rules, either by affirming everything as demonstrative, from want of knowing what demonstration is; or by doubting everything, from want of knowing where to submit; or by submitting in everything, from want of knowing where they must judge.

Pascal, *Pensées*, IV, 268

- 26 Permit me to remind you of a universal rule which is applicable to all the particular subjects in which our concern is with establishing truth. I do not doubt your acceptance of it since it is generally admitted by all who consider things with an open mind and since it constitutes the chief part of the method of the schools in dealing with the sciences and that used by seekers after what is really solid, filling and fully satisfying the mind. The rule is never to make a decisive judgment, affirming or denying a proposition, unless what one affirms or denies satisfies one of the two following conditions: either that of itself it appear so clearly and distinctly to sense or to reason, according as it is subject to one or the other, that the mind cannot doubt its certainty, and that is what we call a principle or axiom, as, for example, if

equals are added to equals, the results are equal; or that it be deduced as an infallible and necessary consequence from such principles or axioms, upon whose certainty entirely depends that of the consequences correctly drawn from them, as this proposition, the three angles of a triangle are equal to two right angles, "which not being self-evident," is evidently demonstrated as an infallible consequence of such axioms. Everything satisfying one of these two conditions is certain and true, and everything satisfying neither is considered doubtful and uncertain. We pass decisive judgment on things of the first kind and leave the rest undecided, calling them, according to their deserts, now a vision, now a caprice, occasionally a fancy, sometimes an idea, and at the most a happy thought; and since it is rash to affirm them, we incline rather to the negative, ready however to return to the affirmative if a convincing demonstration brings their truth to light.

Pascal, *Concerning the Vacuum*

- 27 The art which I call the art of persuading, and which is simply the management of perfect scientific proofs, consists of three essential parts: defining by clear definitions the terms to be used; laying down evident principles or axioms to prove the matter in question; always mentally substituting in the demonstration, in place of the things defined, their definitions.

The reason for this method is apparent, since it would be useless to put forward something capable of proof and to undertake its demonstration if we had not first clearly defined all unintelligible terms; and since likewise the demonstration must be preceded by the granting of the evident principles required for the demonstration, for if we do not make sure of the foundation, we can have no assurance of the building; and since finally while demonstrating we must mentally substitute the definition in place of the things defined, for otherwise we could be led astray by the different meanings encountered in the terms. It is easy to see that if we observe this method we are sure to convince, since, with all the terms so defined that they are understood and entirely free from ambiguity and with the principles granted, if in the demonstration we always substitute in thought the definitions in place of the things defined, the invincible force of the conclusions cannot fail of its full effect.

Pascal, *Geometrical Demonstration*

- 28 How vain . . . it is to expect demonstration and certainty in things not capable of it; and refuse assent to very rational propositions, and act contrary to very plain and clear truths, because they cannot be made out so evident, as to surmount every the least (I will not say reason, but) pretence of doubting. He that, in the ordinary affairs of life, would admit of nothing but direct plain demonstration, would be sure of nothing in this

world, but of perishing quickly.

Locke, *Concerning Human Understanding*,  
Bk. IV, XI, 10

- 29 As demonstration is the showing the agreement or disagreement of two ideas by the intervention of one or more proofs, which have a constant, immutable, and visible connexion one with another; so probability is nothing but the appearance of such an agreement or disagreement by the intervention of proofs, whose connexion is not constant and immutable, or at least is not perceived to be so, but is, or appears for the most part to be so, and is enough to induce the mind to judge the proposition to be true or false, rather than the contrary.

Locke, *Concerning Human Understanding*,  
Bk. IV, XV, 1

- 30 If the use and end of right reasoning be to have right notions and a right judgment of things, to distinguish betwixt truth and falsehood, right and wrong, and to act accordingly, be sure not to let your son be bred up in the art and formality of disputing, either practicing it himself, or admiring it in others; unless instead of an able man, you desire to have him an insignificant wrangler, opiniator in discourse, and priding himself in contradicting others; or, which is worse, questioning everything, and thinking there is no such thing as truth to be sought, but only victory, in disputing. There cannot be anything so disingenuous, so misbecoming a gentleman or anyone who pretends to be a rational creature, as not to yield to plain reason and the conviction of clear arguments. Is there anything more consistent with civil conversation, and the end of all debate, than not to take an answer, though never so full and satisfactory, but still to go on with the dispute as long as equivocal sounds can furnish . . . a term to wrangle with on the one side, or a distinction on the other; whether pertinent or impertinent, sense or nonsense, agreeing with or contrary to what he had said before, it matters not. For this, in short, is the way and perfection of logical disputes, that the opponent never takes any answer, nor the respondent ever yields to any argument. This neither of them must do, whatever becomes of truth or knowledge, unless he will pass for a poor baffled wretch, and lie under the disgrace of not being able to maintain whatever he has once affirmed, which is the great aim and glory in disputing. Truth is to be found and supported by a mature and due consideration of things themselves, and not by artificial terms and ways of arguing: these lead not men so much into the discovery of truth as into a captious and fallacious use of doubtful words, which is the most useless and most offensive way of talking, and such as least suits a gentleman or a lover of truth of anything in the world.

Locke, *Some Thoughts Concerning Education*, 189

- 31 Who reasons wisely is not therefore wise,  
His pride in Reasoning not in Acting lies.  
Pope, *Moral Essays*, Epistle I, 117
- 32 The gift of ratiocination and making syllogisms—  
I mean in man—for in superior classes of beings,  
such as angels and spirits—'tis all done, may it  
please your worships, as they tell me, by Intu-  
ition;—and beings inferior, as your worships all  
know—syllogize by their noses: though there is an  
island swimming in the sea (though not altogether  
at its ease) whose inhabitants, if my intelligence  
deceives me not, are so wonderfully gifted, as to  
syllogize after the same fashion, and oft-times to  
make very well out too:—but that's neither  
here nor there—  
The gift of doing it as it should be, amongst us,  
or—the great and principal act of ratiocination in  
man, as logicians tell us, is the finding out the  
agreement or disagreement of two ideas one with  
another, by the intervention of a third (called the  
*medius terminus*); just as a man, as Locke well ob-  
serves, by a yard, finds two men's ninepin-alleys  
to be of the same length, which could not be  
brought together, to measure their equality, by  
juxtaposition.  
Had the same great reasoner looked on, as my  
father illustrated his systems of noses, and ob-  
served my uncle Toby's deportment—what great  
attention he gave to every word—and as oft as he  
took his pipe from his mouth, with what wonder-  
ful seriousness he contemplated the length of it—  
surveying it transversely as he held it betwixt his  
finger and his thumb—then foreright—then this  
way, and then that, in all its possible directions  
and foreshortenings—he would have concluded  
my uncle Toby had got hold of the *medius terminus*,  
and was syllogizing and measuring with it the  
truth of each hypothesis of long noses, in order, as  
my father laid them before him. This, by the bye,  
was more than my father wanted—his aim in all  
the pains he was at in these philosophic lectures—  
was to enable my uncle Toby not to discuss—but  
comprehend—to hold the grains and scruples of  
learning—not to weigh them.—My uncle  
Toby, as you will read in the next chapter, did  
neither the one nor the other.  
Sterne, *Tristram Shandy*, III, 40
- 33 When one has had a good argument about spirit  
and matter, one always finishes by not under-  
standing each other. No philosopher has been  
able with his own strength to lift this veil stretched  
by nature over all the first principles of things.  
Men argue, nature acts.  
Voltaire, *Philosophical Dictionary*: Soul
- 34 One of the company took the other side. . . . This  
appeared to me very satisfactory. Johnson did not  
answer it; but talking for victory, and determined  
to be master of the field, he had recourse to the  
device which Goldsmith imputed to him in the  
witty words of one of Cibber's comedies: "There is  
no arguing with Johnson; for when his pistol mis-  
ses fire, he knocks you down with the butt end of  
it."  
Boswell, *Life of Johnson* (Oct. 26, 1769)
- 35 Johnson having argued for some time with a per-  
tinacious gentleman; his opponent, who had  
talked in a very puzzling manner, happened to  
say, "I don't understand you, Sir": upon which  
Johnson observed, "Sir, I have found you an argu-  
ment; but I am not obliged to find you an under-  
standing."  
Boswell, *Life of Johnson* (June 1784)
- 36 When reason employs conceptions alone, only one  
proof of its thesis is possible, if any. When, there-  
fore, the dogmatist advances with ten arguments  
in favour of a proposition, we may be sure that  
not one of them is conclusive. For if he possessed  
one which proved the proposition he brings for-  
ward to demonstration—as must always be the  
case with the propositions of pure reason—what  
need is there for any more?  
Kant, *Critique of Pure Reason*,  
Transcendental Method
- 37 Myself when young did eagerly frequent  
Doctor and Saint, and heard great argument  
About it and about; but evermore  
Came out by the same door where in I went.  
With them the seed of Wisdom did I sow,  
And with mine own hand wrought to make it  
grow;  
And this was all the Harvest that I reaped—  
"I came like Water, and like Wind I go."  
FitzGerald, *Rubáiyát*, XXVII–XXVIII
- 38 When you cannot prove that people are wrong,  
but only that they are absurd, the best course is to  
let them alone.  
T. H. Huxley, *On the Method of Zadig*
- 39 There is no greater mistake than the hasty conclu-  
sion that opinions are worthless because they are  
badly argued.  
T. H. Huxley, *Natural Rights and  
Political Rights*
- 40 There are two forms of reasoning: first, the inves-  
tigating or interrogative form used by men who do  
not know and who wish to learn; secondly, the  
demonstrating or affirmative form employed by  
men who know or think they know, and who wish  
to teach others.  
Claude Bernard, *Experimental Medicine*, I, 2



- 41 Few persons care to study logic, because everybody conceives himself to be proficient enough in the art of reasoning already. But I observe that this satisfaction is limited to one's own ratiocination, and does not extend to that of other men.

We come to the full possession of our power of drawing inferences, the last of all our faculties; for it is not so much a natural gift as a long and difficult art.

C. S. Peirce, *Fixation of Belief*

- 42 The object of reasoning is to find out, from the consideration of what we already know, something else which we do not know. Consequently, reasoning is good if it be such as to give a true conclusion from true premisses, and not otherwise. Thus, the question of validity is purely one of fact and not of thinking. A being the facts stated in the premisses and B being that concluded, the question is, whether these facts are really so related that if A were B would generally be. If so, the inference is valid; if not, not. It is not in the least the question whether, when the premisses are accepted by the mind, we feel an impulse to accept the conclusion also. It is true that we do generally reason correctly by nature. But that is an accident; the true conclusion would remain true if we had no impulse to accept it; and the false one would remain false, though we could not resist the tendency to believe in it.

C. S. Peirce, *Fixation of Belief*

- 43 A friend of the writer gave as proof of the almost human intelligence of his dog that he took him one day down to his boat on the shore, but found the boat full of dirt and water. He remembered that the sponge was up at the house, a third of a mile distant; but, disliking to go back himself, he made various gestures of wiping out the boat and so forth, saying to his terrier, "Sponge, sponge; go fetch the sponge." But he had little expectation of a result, since the dog had never received the slightest training with the boat or the sponge. Nevertheless, off he trotted to the house, and, to his owner's great surprise and admiration, brought the sponge in his jaws. Sagacious as this was, it required nothing but ordinary contiguous association of ideas. The terrier was only exceptional in the minuteness of his spontaneous observation. Most terriers would have taken no interest in the boat-cleaning operation, nor noticed what the sponge was for. This terrier, in having picked those details out of the crude mass of his boat-experience distinctly enough to be reminded of them, was truly enough ahead of his peers on the line which leads to human reason. But his act was not yet an act of reasoning proper. It might fairly have been called so if, unable to find the sponge at the house, he had brought back a dipper or a mop instead. Such a substitution would have shown that, embedded in the very different appearances

of these articles, he had been able to discriminate the identical partial attribute of capacity to take up water, and had reflected, "For the present purpose they are identical." This, which the dog did not do, any man but the very stupidest could not fail to do.

William James, *Psychology*, XXII

- 44 It is very desirable, in instruction, not merely to persuade the student of the accuracy of important theorems, but to persuade him in the way which itself has, of all possible ways, the most beauty. The true interest of a demonstration is not, as traditional modes of exposition suggest, concentrated wholly in the result; where this does occur, it must be viewed as a defect, to be remedied, if possible, by so generalizing the steps of the proof that each becomes important in and for itself. An argument which serves only to prove a conclusion is like a story subordinated to some moral which it is meant to teach: for aesthetic perfection no part of the whole should be merely a means.

Russell, *Study of Mathematics*

- 45 The proof of self-evident propositions may seem, to the uninitiated, a somewhat frivolous occupation. To this we might reply that it is often by no means self-evident that one obvious proposition follows from another obvious proposition; so that we are really discovering new truths when we prove what is evident by a method which is not evident. But a more interesting retort is, that since people have tried to prove obvious propositions, they have found that many of them are false. Self-evidence is often a mere will-o'-the-wisp, which is sure to lead us astray if we take it as our guide. For instance, nothing is plainer than that a whole always has more terms than a part, or that a number is increased by adding one to it. But these propositions are now known to be usually false. Most numbers are infinite, and if a number is infinite you may add ones to it as long as you like without disturbing it in the least. One of the merits of a proof is that it instils a certain doubt as to the result proved; and when what is obvious can be proved in some cases, but not in others, it becomes possible to suppose that in these other cases it is false.

Russell, *Mathematics and the Metaphysicians*

- 46 I have never been able to convince myself of the truth of the saying that "strife is the father of all things." I think the source of it was the philosophy of the Greek sophists and that it errs, as does the latter, through the overestimation of dialectics. It seems to me, on the contrary, that scientific controversy, so-called, is on the whole quite unfruitful, apart from the fact that it is almost always conducted in a highly personal manner.

Freud, *General Introduction to Psycho-Analysis*, XVI

47 Bacon's conviction of the quarrelsome, self-displaying character of the scholarship which had come down from antiquity was of course not so much due to Greek science itself as to the degenerate heritage of scholasticism in the fourteenth century, when philosophy had fallen into the hands of disputatious theologians, full of hair-splitting argumentativeness and quirks and tricks by which to win victory over somebody else.

But Bacon also brought his charge against the Aristotelian method itself. In its rigorous forms it aimed at demonstration, and in its milder forms at persuasion. But both demonstration and persuasion aim at conquest of mind rather than of nature. Moreover they both assume that some one is already in possession of a truth or a belief, and that the only problem is to convince some one else, or to teach. In contrast, his new method had an exceedingly slight opinion of the amount of truth already existent, and a lively sense of the extent and importance of truths still to be attained. It would be a logic of discovery, not a logic of argumentation, proof and persuasion. To Bacon, the old logic even at its best was a logic for teaching the already known, and teaching meant indoctrination, disciplining. It was an axiom of Aristotle that only that which was already known could be learned, that growth in knowledge consisted simply of bringing together a universal

truth of reason and a particular truth of sense which had previously been noted separately. In any case, learning meant *growth* of knowledge, and growth belongs in the region of becoming, change, and hence is inferior to *possession* of knowledge in the syllogistic self-revolving manipulation of what was already known—demonstration.

In contrast with this point of view, Bacon eloquently proclaimed the superiority of discovery of new facts and truths to demonstration of the old. Now there is only one road to discovery, and that is penetrating inquiry into the secrets of nature.

Dewey, *Reconstruction in Philosophy*, II

48 Dialectic is the conscience of discourse and has the same function as morality elsewhere, namely, to endow the soul with integrity and to perfect it into a monument to its own radical impulse. But as virtue is a wider thing than morality, because it includes natural gifts and genial sympathies, or even heroic sacrifices, so wisdom is a wider thing than logic. To coherence in thought it adds docility to facts, and humility even of intellect, so that the integrity of its system becomes a human virtue, like the perfect use of a single language, without being an insult to the nature of things or a learned madness.

Santayana, *Realm of Essence*, VII