

The True Method

Gottfried Wilhelm Leibniz

A Modern English Translation of La vraie méthode (probably 1677)



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Since happiness consists in contentment, and lasting contentment depends on our confidence about the future—a confidence grounded in the knowledge we ought to have of the nature of God and of the soul—it follows that knowledge is necessary for true happiness.

But knowledge depends on proof, and discovering proofs requires a certain method that is not known to everyone. Every person is capable of judging a proof, since it would not deserve to be called a proof unless everyone who considered it carefully found it convincing. Nevertheless, not everyone is capable of discovering proofs independently or of presenting them clearly once they have been found, whether for lack of time or for lack of method.

The true method, understood in its full scope, is in my opinion something that has remained entirely unknown until now. It has been practiced only in mathematics, and even there it is still very imperfect. I have had the good fortune to demonstrate this, through some surprising examples, to several people who are now regarded as among the leading mathematicians of the age. I hope to present specimens of this method that may not be unworthy of posterity.

Even though the mathematicians' method has not been sufficient to discover everything we might have wished from them, it has at least protected them from error. Although they have not said everything they ought to have said, they have also said nothing that they ought not to have said.

We would be very fortunate if those who have cultivated the other sciences had imitated the mathematicians at least in this respect. We would long ago have possessed a secure metaphysics, together with the moral philosophy that depends upon it, since metaphysics includes knowledge of God and the soul, which ought to guide our lives.

We would also possess a science of motion, which is the key to physics and therefore to medicine. I believe that we are now in a position to aspire to such a science. Some of my earliest ideas have been received with such enthusiasm by the most learned people of the present age, because of their remarkable simplicity, that I believe all that remains is to carry out certain experiments deliberately and for a definite purpose, rather than by accident and by groping around, as is commonly done. On this foundation we could construct a secure and demonstrative physics.

The reason why the art of proof has so far been found only in mathematics has not been properly understood by anyone. Had the cause of the problem been recognized, the remedy would also have been discovered long ago.

The reason is that mathematics carries its own test within itself. When someone presents me with a false theorem, I do not need to examine—or even to know—its proof. I can discover its falsity afterward

by means of an easy experiment that costs nothing but ink and paper: namely, a calculation that will reveal the error, however small it may be.

If it were equally easy in other subjects to check arguments against experience, there would not be so many conflicting opinions. The problem is that experiments in physics are difficult and expensive, while in metaphysics they are impossible—unless God were to perform a miracle for our benefit and reveal to us remote immaterial things.

This problem is not without a remedy, although at first it may appear to have none. Those who consider what I am about to say will soon change their minds.

We should observe that the checks or experiments used in mathematics to protect us against faulty reasoning—such as casting out nines, Ludolph van Ceulen's calculations concerning the size of the circle, tables of sines, and similar devices—are not performed on the things themselves. They are performed on the symbols we have substituted for those things.

Suppose, for example, that we want to check whether 1,677 multiplied by 365 equals 612,105. We would never finish if we had to make 365 piles, put 1,677 small stones in each pile, and then count all the stones to see whether they came to the stated total. Instead, we perform the operation with symbols on paper and check it by casting out nines or by some other procedure.

Similarly, when someone claims to have found an exact method for squaring the circle, we do not need to construct a physical circle, wrap a thread around it, and see whether the length of the thread—the circumference—has the proposed ratio to the diameter. That would be extremely difficult. If the error amounted to one-thousandth of the diameter, or even less, we would need an enormous circle constructed with extraordinary precision.

Nevertheless, we can refute the false solution by experiment—by seeing the result of a calculation or numerical check. But this test takes place only on paper, and therefore on the symbols representing the thing, rather than on the thing itself.

This observation is fundamental. Many highly capable people, especially in our own century, have claimed to give proofs in physics, metaphysics, morality, politics, law, and medicine. Yet either they have been mistaken, because every step is slippery and it is difficult not to fall when one has no rules to guide one, or, even when they have reached the truth, they have been unable to persuade everyone of their reasoning. Until now, there has been no way to examine such arguments by means of simple tests that anyone can perform.

It is therefore clear that if we could find symbols suited to expressing all our thoughts as clearly and precisely as arithmetic expresses numbers and geometrical analysis expresses lines, then in every subject, insofar as it is governed by reasoning, we could do everything that can be done in arithmetic and geometry.

Every investigation that depends on reasoning would be carried out by manipulating these symbols, through a kind of calculation. This would make the discovery of important results entirely straightforward. We would no longer have to rack our brains as much as we do today, while still being certain that we could accomplish everything that was possible from the information given.

Furthermore, we could bring everyone into agreement about what had been discovered or concluded, since the calculation could easily be checked, either by doing it again or by applying tests similar to casting out nines in arithmetic.

If someone doubted what I had asserted, I would say to him, "Let us calculate, sir." Then, taking up pen and ink, we would quickly settle the matter.

I always add the qualification: insofar as something can be established by reasoning from the information given. Some experiences will always be needed as the foundation for reasoning. But once those experiences have been supplied, we could derive from them everything that anyone could ever derive. We could even determine which further experiments still needed to be performed in order to clear up all remaining doubts.

This would be of extraordinary assistance even in politics and medicine, where we must reason consistently and correctly from given symptoms and circumstances. Even when there are not enough facts to form an infallible judgment, it would still be possible to determine what is most probable from the information available. That is everything reason can do.

The symbols expressing all our thoughts would make up a new language, capable of being both written and spoken. This language would be very difficult to create but very easy to learn. It would soon be accepted throughout the world because of its great usefulness and its astonishing simplicity. It would serve wonderfully for communication among different peoples, and this in turn would encourage its adoption.

Those who wrote in this language would not go wrong, provided that they avoided errors in calculation and also avoided barbarisms, solecisms, and other faults of grammar and construction.

This language would have another remarkable property: it would silence the ignorant. No one would be able to speak or write in it about something he did not understand. Or, if someone dared to do so, one of two things would happen: either the emptiness of what he was saying would be obvious to everyone, or he would learn something in the course of writing or speaking.

People who calculate do, in fact, learn as they write. And people who speak sometimes arrive at ideas they had not previously considered, with language running ahead of thought. This would happen especially often in this language because of its precision. There would be no ambiguous expressions or double meanings, and anything stated intelligibly in it would also be relevant and well founded.

I dare to say that this would be the ultimate achievement of the human mind. Once the project had been carried out, it would be up to human beings themselves to become happy, since they would possess an instrument that would enhance the power of reason no less than the telescope enhances the power of sight.

It is one of my ambitions to complete this project, if God grants me life. The idea is entirely my own. I first conceived it at the age of eighteen, as I indicated soon afterward in a published work.

Since I am certain that no other invention approaches this one in importance, I believe that nothing could do more to make its inventor's name immortal. But I have much stronger reasons for pursuing it. The religion I faithfully follow assures me that the love of God consists in an ardent desire to promote the common good. And reason teaches me that nothing contributes more to the common good of all humanity than that which perfects reason itself.