Rules for the Direction of the Mind

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by René Descartes

Rule I

The aim of our studies should be to direct the mind with a view to forming true and sound judgements about whatever comes before it.

Whenever men notice some similarity between two things, they are wont to ascibe to each, even in those respects in which the two differ, what they have found to be true of the other. Thus they erroneously compare the sciences, which entirely consists in the cognitive exercise of the mind, with the arts, which depend upon an exercise and disposition of the body. They see that not all the arts can be acquired by the same man, but that he who restricts himself to one, most readily becomes the best executant, since it is not so easy for the same hand to adapt itself both to agicultural operations and to harp-playing, or to the performance of several such tasks as to one alone.

Rule II

We should attend only to those objects of which our minds seem capable of having certain and indubitable cognition.

Science in its entirety is true and evident cognition. He is no more learned who has doubts on many matters than the man who has never thought of them; nay he appears to be less learned if he has formed wrong opinions on any particulars. Hence it were better not to study at all than to occupy one's self with objects of such difficulty, that, owing to our inability to distinguish true from false, we are forced to regard the doubtful as certain; for in those matters, any hope of augmenting our knowledge is exceeded by the risk of diminishing it. Thus in accordance with the above maxim we reject all such merely probable knowledge and make it a rule to trust only what is completely known and incapable of being doubted. No doubt men of education may persuade themselves that there is but little of such certain knowledge, because, forsooth, a common failing of human nature has made them deem it too easy and open to everyone, and so led them to neglect to think upon such truths; but I nevertheless announce that there are more of these than they think --truths which suffice to give a rigorous demonstration of innumerable propositions, the discussion of which they have hitherto been unable to free from the element of probability. Further, because they have believed that it was unbecoming for a man of education to confess ignorance on any point, they have so accustomed themselves to trick out their fabricated explanations, that they have ennded by gradually imposing on themselves and thus have issued them to the public as genuine.

But if we adhere closely to this rule we shall find left but few objects of legitimate study. For there is scarce any question occurring in the sciences about which talented men have not disagreed. But whenever two men come to opposite decisions about the same matter one of them at least must certainly be in the wrong, and apparently there is not even one of them who knows; for if the reasoning of the second were sound and clear he would be able so to lay it before the other to succeed in convincing his understanding also. Hence apparently we cannot attain to a perfect knowledge in any such case of probable opinion, for it would be rashness to hope for more than others have attained to. Consequently if we reckon correctly, of the sciences already discovered, Arithmetic and Geometry alone are left, to which the observance of this rule reduces us.

Yet we do not therefore condemn that method of philosophizing which others have already discovered, and those weapons of the schoolmen, probable syllogisms, which are so well suited for polemics. They indeed give practice to the wits of youth and, producing emulation among them, act as a stimulus; and it is much better for their minds to be

moulded by opinions of this sort, uncertain though they appear, as being objects of controversy amongst the learned, than to be left entirely to their own devices. For thus through lack of guidance they might stray into some abyss, but as long as they follow in their masters' footsteps, though they may diverge at times from the truth, they will yet certainly find a path which is at least in this respect safer, that it has been approved by more prudent people. We ourselves rejoice that we in earlier years experienced this scholastic training; but now, being released from that oath of allegiance which bound us to our old masters and since, as become our riper years, we are no longer subject to the ferule, if we wish in earnest to establish for ourselves those rules which shall aid us in scaling the heights of human knowledge, we must admit assuredly among the primary members of our catalogue that maxim which forbids us to abuse our leisure as many do, who neglect all easy quests and take up their time only with difficult matters; for they, though certainly making all sorts of subtle conjectures and elaborating most plausible arguments with great ingenuity, frequently find too late that after all their labours they have only increased the multitude of their doubts, without acquiring any knowledge whatsoever.

But now let us proceed to explain more carefully our reason for saying , as we did a little while ago, that of all the sciences known as yet, Arithmetic and Geometry alone are free from any taint of falsity or uncertainty. We must note then that 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. And it seems to me that the operation is profited but little by those constraining bonds by means of which the Dialecticians claim to control human reason, though I do not deny that that discipline may be serviceable for other purposes. My reason for saying so is that none of the mistakes which men can make (men, I say, not beasts) are due to faulty inference; they are caused merely by the fact that we found upon a basis of poorly comprehended experiences, or that propositions are posited which are hasty and groundless.

This furnishes us with an evident explanation of the great superiority in certitude of arithmetic and Geometry to other sciences. The former alone deal with an object so pure and uncomplicated, that they need make no assumptions at all which experience renders uncertain, but wholly consist in the rational deduction of consequences. They are on that account much the easiest and clearest of all, and possess an object such as we require, for in them it is scarce humanly possible for anyone to err except by inadvertence. And yet we should not be surprised to find that plenty of people of their own accord prefer to apply their intelligence to other studies, or to Philosophy. The reason for this is that every person permits himself the liberty of making guesses in the matter of an obscure subject with more confidence than in one which is clear, and that it is much easier to have some vague notion about any subject, no matter what, than to arrive at the real truth about a single question however simple that may be.

But one conclusion now emerges out of these considerations, viz. not, indeed, that Arithmetic and Geometry are the sole sciences to be studied, but only that in our search for the direct road towards truth we should busy ourselves with no object about which we cannot attain a certitude equal to that of the demonstrations of Arithmetic and Geometry.

Rule III

> *Concerning objects proposed for study, we ought to investigate what we can clearly and evidently intuit or deduce with certainty, and not what other people have thought or what we ourselves conjecture. For knowledge can be attained in no other way.*
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> We must read the works of the ancients; for it is an extraordinary advantage to have available the labors of so many men, both in order to recognize what true discoveries have already long since been made and -also to become aware of what scope is still left for invention in the various disciplines. There is, however; at the same time a great danger that perhaps some contagion of error, contracted from a too attentive reading of them, may stick to us against our will, in spite of all precautions. For authors are ordinarily so disposed that whenever their heedless credulity has led them to a decision on some controverted opinion, they always try to bring us

over to the same side, with the subtlest arguments; if on the other hand they have been fortunate enough to discover something certain and evident, they never set it forth without wrapping it up in all sorts of complications. (I suppose they are afraid that a simple account may lessen the importance they gain by the discovery ; or perhaps they begrudge us the plain truth.)

But in fact, even if all writers were honest and plain; even if they never passed off matters of doubt upon us as if they were truths, but set forth everything in good faith; nevertheless, since there is hardly anything that one of them says but someone else asserts the contrary, we should be continually uncertain which side to believe. It would be no good to count heads, and then follow the opinion that has most authorities for it; for if the question that arises is a difficult one, it is more credible that the truth of the matter may have been discovered by few men than by many. But even if all agreed together, it would not be enough to have their teachings. For we shall never be mathematicians, say, even if we retain in memory all the proofs others have given, unless we ourselves have the mental aptitude of solving any given problem; we shall never be philosophers, if we have read all the arguments of Plato and Aristotle but cannot form a solid judgment on matters set before us; this sort of learning would appear historical rather than scientific. Further, this Rule counsels us against ever mixing up any conjectures with our judgments as to the truth of things. It is of no small importance to observe this; for the chief reason why in the common philosophy there is nothing to be found whose certitude is so apparent as to be beyond controversy is that those who practice it have not begun by contenting themselves with the recognition of what is clear and certain, but have ventured on the further assertion of what was obscure and unknown and was arrived at only through probable conjectures. These assertions they have later on themselves gradually come to hold with complete confidence, and have mixed them up indiscriminately with evident truths; and the final result was their inability to draw any conclusion that did not seem to depend on some such proposition, and consequently to draw any that was not uncertain.

In order to avoid our subsequently falling into the same error, the Rule enumerates all the intellectual activities by means of which we can attain to knowledge of things without any fear of deception; it allows of only two such intuition and induction. By intuition I mean, not the wavering assurance of the senses, or the deceitful judgment of a misconstructing imagination, but a conception, formed by unclouded mental attention, so easy and distinct as to leave no room for doubt in regard to the thing we are understanding. It comes to the same thing if we say: It is an indubitable conception formed by an unclouded mental mind; one that originates solely from the light of reason, and is more certain even than deduction, because it is simpler (though, as we have previously noted, deduction, too, cannot go wrong if it is a human being that performs it). Thus, anybody can see by mental intuition that he himself exists, that he thinks, that a triangle is bounded by just three lines, and a globe by a single surface, and so on; there are far more of such truths than most people observe, because they disdain to turn their mind to such easy topics.

Some people may perhaps be troubled by this new use of the word intuition, and of other words that I shall later on be obliged to shift away from their common meaning. So I give at this point the general warning that I am not in the least thinking of the usage of particular words that has prevailed in the Schools in modern times, since it would be most difficult to use the same terms while holding quite different views; I take into account only what a given word means in Latin, in order that, whenever there are no proper words for what I mean, I may transfer to that meaning the words that seem to me most suitable. The evidentness and certainty of intuition is, moreover, necessary not only in forming propositions but also for any inferences. For example, take the inference that 2 and 2 come to the same as 3 and 1; intuition must show us not only that 2 and 2 make 4, and that 3 and 1 also make 4, but furthermore that the above third proposition is a necessary conclusion from these two.

This may raise a doubt as to our reason for having added another mode of knowledge, besides intuition, in this Rule -namely, knowledge by deduction. (By this term I mean any necessary conclusion from other things known with certainty.) We had to do this because many things are known although not self-evident, so long as

they are deduced from principles known to be true by a continuous and uninterrupted movement of thought, with clear intuition of each point. It is in the same way that we know the last link of a long chain is connected with the first, even though we do not view in a single glance (Intuitu) all the intermediate links on which the connexion depends; we need only to have gone through the links in succession and to remember that from the first to the last each is joined to the next. Thus we distinguish at this point between intuition and certain deduction'; because the latter, unlike the former, is conceived as involving a movement or succession; and is again unlike intuition in not requiring something evident at the moment, but rather, so to say, borrowing its certainty from memory. From this we may gather that when propositions are direct conclusions from first principles, they may be said to be known by intuition or by deduction, according to different ways of looking at them; but first principles themselves may be said to be known only by intuition; and remote conclusions, on the other hand, only by deduction.

These are the two most certain ways to knowledge; and on the side of the mind no more must be admitted; all others must be rejected as suspect and liable to mislead. This, however, does not prevent our believing that divine revelation is more certain than any knowledge; for our faith in it, so far as it concerns obscure matters, is an act not of the mind but of the will; and any intellectual foundations that it may have can and must be sought chiefly by one or other of the two ways I have mentioned. Perhaps I shall later on show this to be so at greater length.

Rule IV

We need a method if we are to investigate the truth of things.

Rule V

The whole method consists entirely in the ordering and arranging of the objects on which we must concentrate our mind's eye if we are to discover some truth. We shall be following this method exactly if we first reduce complicated and obscure propositions step by step to simpler ones, and then, starting with the intuition of the simplest ones of all, try to ascend through the same steps to a knowledge of all the rest.

Rule VI

In order to distinguish the simplest things from those that are complicated and to set them out in an orderly manner, we should attend to what is most simple in each series of things in which we have directly deduced some truths from others, and should observe how all the rest are more, or less, or equally removed from the simplest.

Rule VII

In order to make our knowledge complete, every single thing relating to our undertaking must be surveyed in a continuous and wholly uninterrupted sweep of thought, and be included in a sufficient and well-ordered enumeration.

The observance of these precepts is necessary in order that we may admit to the class of certitudes those truths which, I previously said, are not immediate deductions from the first self-evident principles. For sometimes the succession of inferences is so long that when we arrive at our results we do not readily remember the whole road that has led us so far; and therefore I say that we must aid the weakness of our memory by a continuous movement of thought.

For instance, suppose that by excessive mental acts I have learnt first the relation between the magnitudes A and B, then that between B and C then that between C and D, and finally that between D and E; I do not on this account see the relation between A and E; and I cannot form a precise conception of it from the relations I know already, unless I remember them all. So I will run through these several times over in a continuous movement of the imagination, in which intuition of each relation is simultaneous with transition to the next, until I have learnt to pass from the first to the last so quickly that I leave hardly any parts to the care of memory and seem to have a simultaneous intuition of the whole. In this way memory is aided, and a remedy

found for the slowness of the understanding, whose scope is in a way enlarged.

I add that the movement must be uninterrupted because it often happens that people who try to make some deduction in too great haste and from remote principles do not run over the whole chain of intermediate conclusions with sufficient care to avoid making many unconsidered jumps. But assuredly the least oversight immediately breaks the chain and destroys all the certainty of the conclusion. Further, I say that enumeration is required in order to complete our knowledge. For other precepts are helpful in resolving very many questions, but it is only enumeration that enables us to form a true and certain judgment about anything whatever that we apply our mind to, and, by preventing anything from simply escaping our notice, seems to give us some knowledge of everything.

This enumeration, or induction, ranging over everything relevant to some question we have set before us, consists in an inquiry so careful and accurate that it is a certain and evident conclusion that no mistaken omission has been made. When, therefore, we perform this, if the thing we are looking for still eludes us, we are at any rate so much the wiser, that we can see with certainty the impossibility of our finding it by any way known to us; and if we have managed to run over all the ways of attaining it that are humanly practicable (as will often be the case) then we may boldly affirm that knowledge of it has been put quite out of reach of the human mind.

It must further be observed that by adequate enumeration or induction I mean exclusively the sort that makes the truth of conclusions more certain than any other type of proof, apart from simple intuition, makes it. Whenever a piece of knowledge cannot be reduced to simple intuition (if we throw off the fetters of syllogism), this method is the only one left to us that we must entirely rely on. For whenever we have deduced one thing from others, if the inference was an evident one, the case is already reduced to genuine intuition. If on the other hand, we make a single inference from many separate data, our understanding is often not capacious enough to grasp them all in one act of intuition, and in that case we must content ourselves with the certitude of this further operation. In the same way, we cannot visually distinguish all the links of a longish chain in one glance (intuitu); but nevertheless, if we have seen the connexion of each with the next, this will justify us in saying that we have actually seen how the first is connected to the last.

I said this operation must be adequate, because it may often be defective, and consequently liable to error. For sometimes our enumeration includes a number of very obvious points; nevertheless, the least omission breaks the chain and destroys all the certainty of the conclusion. Again, sometimes our enumeration covers everything but the items are not all distinguished, so that we have only a confused knowledge of the whole.

Sometimes, then, this enumeration must be complete, and sometimes it must be distinct; but sometimes neither condition is necessary., This is why I say merely that the enumeration must be adequate. For example, if I want to establish by enumeration how many kinds of things are corporeal, or are in some way the objects of sensation, I shall not assert that there are just so many without first assuring myself that my enumeration comprises all the kinds and distinguishes each from the others. But if I want to show in the same way that the rational soul is not corporeal, a complete enumeration will not be needed; it will be enough to comprise all bodies in a certain number of classes and show that the rational soul cannot be referred to any of these. Again, if I want to show by enumeration that the area of a circle is greater than the areas of all other figures of equal periphery, I need not give a list of all figures; it is enough to prove this in some particular cases, and then we may inductively extend the conclusion to all other figures.

I added further that the enumeration must be orderly for the defects already enumerated cannot be remedied more directly than they are by an orderly scrutiny of all items. Again, it is often the case that nobody could live long enough to go through each several item that concerns the matter in hand; either because there are too many such items, or because we should keep going back to the same items. But if we arrange these items in the ideal order, then as a rule they will be reduced to certain classes; and it may be enough to have an exact view of one class, or of some member of each class, or of some classes rather than others; at any rate, we shall

not ever go futilely over and over the same point. This is a great help; a proper arrangement often enables us to deal rapidly and easily with an apparently unmanageable multitude of details.

This order of enumeration is variable, and depends on the free choice of the individual; skill in devising it requires that we bear in mind the terms of Rule V. There are, indeed, a good many ingenious, trivialities where the device wholly consists in effecting this sort of arrangement. For example, suppose you want to make the best anagram you can by transposing the letters of a certain name. Here there is no need to advance from easy to difficult cases, or to distinguish between what is underived and what is dependent; for these problems do not arise here. It will be enough to determine an order for examining transpositions of letters, so that you never go over the same arrangement twice over, and to divide the possible arrangements into certain classes in a way that makes the most likely source of a solution immediately apparent. The task will then often be no long one-child's play, in fact.

Really, though, these last three Rules are inseparable; in most cases they have all to be taken into account at once, and they all go together towards the completeness of the method. The order of setting them forth did not much matter; I have explained them here briefly because almost all the rest of this treatise will be a detailed exposition of what is here summed up in a general way.

Rule VIII

If in the series of things to be examined we come across something which our intellect is unable to intuit sufficiently well, we must stop at that point, and refrain from the superfluous task of examining the remaining items.

Rule IX

We must concentrate our mind's eye totally upon the most insignificant and easiest of matters, and dwell on them long enough to acquire the habit of intuiting the truth distinctly and clearly.

Rule X

In order to acquire discernment we should exercise our intelligence by investigating what others have already discovered, and methodically survey even the most insignificant products of human skill, especially those which display or presuppose order.

Rule XI

If, after intuiting a number of simple propositions, we deduce something else from them, it is useful to run through them in a continuous and completely uninterrupted train of thought, to reflect on their relations to one another, and to form a distinct and, as far as possible, simultaneous conception of several of them. For in this way our knowledge becomes much more certain, and our mental capacity is enormously increased.

It is in place here to give a clearer exposition of what I said before about intuition (Rules III and VII). In the one place I contrasted intuition with deduction; in the other, merely with enumeration. (I defined enumeration as an inference made from many separate data put together; the simple deduction of one thing from another is made, I said, by intuition.) This procedure was necessary because intuition must satisfy two conditions: first, our understanding of a proposition must be clear and distinct; secondly, it must be one simultaneous whole without succession. Now if we are thinking of the act of deduction, as in Rule III, it has not the appearance of being a simultaneous whole; rather, it involves a movement of the mind in which we infer one thing from another. Here, then, we were justified in distinguishing it from intuition. If on the other hand we attend to deduction as something already accomplished, as in the notes on Rule VII, then the term does not stand any longer for such a movement, but for the result of the movement. In that sense, then, I assume that a deduction is something intuitively seen, when it is simple and clear, but not when it is complex and involved; for that, I used the term ' enumeration' or 'induction '. For the latter sort of deduction cannot be grasped all at once; its certainty depends in a way on memory, which must retain judgments about the various points enumerated in order that we may put them all together and get some single conclusion.

All these distinctions had to be made in order to bring out the meaning of the present Rule. Rule IX dealt only with intuition, and Rule X only with enumeration; then comes this Rule, explaining how these two activities cooperate-operate and supplement one another-seem, in fact, to merge into a single activity, in which there is a movement of thought such that attentive intuition of each point is simultaneous with transition to the next.

I mention two advantages of this: the greater certainty in our knowledge of the conclusion we have in view, and the greater aptitude of our mind for making further discoveries. As I said, when conclusions are too complex to be held in a single act of intuition, their certainty depends on memory; and since memory is perishable and weak, it must be revived and strengthened by this continuous and repeated movement of thought. For example, suppose I have learnt, in a number of successive mental acts, the relations between magnitudes 1 and 2, magnitudes 2 and 3, magnitudes 3 and 4, and, finally, magnitudes 4 and 5; this does not make me see the relation between magnitudes 1 and 5, nor can I deduce it from the ones I already know, unless I remember them all; accordingly, I must run over them in thought again and again, until I pass from the first to the last so quickly that I have hardly any parts to the care of memory, but seem to have a simultaneous intuition of the whole.

In this way, as no-one can fail to see, the slowness of the mind is remedied, and its capacity enlarged. But it must further be noticed, as the chief advantage of this Rule, that by reflection upon the interdependence of simple propositions we acquire the practice of rapidly discerning their degrees of derivativeness and the steps of their reduction to what is underived. For example, if I run through a series of magnitudes in continued proportion, I shall reflect on all the following points: it is by concepts of the same level that I discern the ratio of term 1 to term 2, of term 2 to term 3, of term 3 to term 4, and so on, and there are no degrees of difficulty in conceiving these ratios; but it is more difficult for me to conceive the way that term 2 depends on terms 1 and 3 together, and still more difficult to conceive how the same term 2 depends on terms 1 and 4, and so on. This shows me the reason why, given merely terms 1 and 2, 1 can easily find terms 3, 4, etc.; for this is done by means of particular and distinct concepts. But given merely terms 1 and 3, I cannot so easily find their (geometric) mean; this can be done only by means of a concept involving two together of the concepts just mentioned. Given only terms 1 and 4, it is still more difficult to get an intuition of the two mean (proportionals), since this involves three simultaneous concepts. Consequently it might seem to be even more difficult to find three mean (proportionals) given terms 1 and 5; but, for a further reason, this is not the case. Although we have here four concepts joined together, they can be separated, because 4 is divisible by another number; so I can begin by trying to find term 3 from terms 1 and 5, and then go on to find term 2 from terms 1 and 3 <and then term 4 from terms 3 and 5>. He who is accustomed to reflect on such matters recognizes at once, when he examines each new problem, the source of the difficulty and the simplest method <of solution> ; and this helps very much towards knowledge of the truth.

Rule XII

Finally we must make use of all the aids which intellect, imagination, sense-perception, and memory afford in order, firstly, to intuit simple propositions distinctly; secondly, to combine correctly the matters under investigation with what we already know, so that they too may be known; and thirdly, to find out what things should be compared with each other so that we make the most thorough use of all our human powers.

This Rule sums up all that has been said already, and gives a general account of the various particulars that had to be explained: as follows.

Only two things are relevant to knowledge: ourselves, the subjects of knowledge; and the objects to be known. In ourselves there are just four faculties that can be used for knowledge: understanding, imagination, sense, and memory. Only the understanding is capable of perceiving truth, but it must be aided by imagination, sense, and memory, so that we may not leave anything undone that lies within our endeavor. On the side of the object of knowledge, it is enough to consider three points: first, what is obvious on its own account; secondly, the means of knowing one thing by another; lastly, the inferences that can be made from any given thing. This

enumeration seems to me to be complete, and not to leave out anything that can be attained by human endeavor.

Turning therefore to the first point <the subjective aspect of knowledge>, I should like to expound here the nature of the human mind and body, the way that the soul is the form of I the body, the various cognitive faculties that exist in the whole composed <of mind and body> and their several activities; but I think I have not enough space to contain all that would have to be premised before the truth on these matters could be made clear to everybody. For it is my aim always to write in such a way that, before making any assertion on the ordinary controversial points, I give the reasons that have led me to my view and might, in my opinion, convince other people as well.

Since such an exposition is now impossible, I shall content myself with explaining as briefly as possible the way of conceiving our means of knowledge that is most useful for our purpose. You need not, if you like, believe that things are really so; but what is to stop us from following out these suppositions, if it appears that they do not do away with any facts, but only make everything much clearer ? In the same way, geometry makes certain suppositions about quantity; and although in physics we may often hold a different view as to the nature of quantity, the force of geometrical demonstrations is not in any way weaker on that account.

My first supposition, then, is that the external senses qua bodily organs may indeed be actively applied to their objects, by locomotion, but their having sensation is properly something merely passive, just like the shape Wuram) that wax gets from a seal. You must not think this expression is just an analogy; the external shape of the sentient organ must be regarded as really changed by the object, in exactly the same way as the shape of the surface of the wax is changed by the seal. This supposition must be made, not only as regards tactual sensations of shape, hardness, roughness, etc., but also as regards those of heat, cold, and so on. So also for the other senses. The first opaque part of the eye receives an image (figuram) in this way from many-colored illumination; and the first membrane of the ears, nostrils, or tongue that is impervious to the object perceived similarly derives a new shape from the sound, odor, or savor.

It is of great help to regard all these facts in this way; for no object of sense is more easily got than shape, which is both felt and seen. And no error can follow from our making this supposition rather than any other, as may be proved thus: The concept of shape is so common and simple that it is involved in every sensible object. For example, on any view of color it is undeniably extended and therefore has shape. Let us then beware of uselessly assuming, and rashly imagining, a new entity; let us not deny anyone else's view of color, but let us abstract from all aspects except shape, and conceive the difference between white, red, blue, etc., as being like the difference between such shapes as these:

> What trouble can this lead us into? And so generally; for assuredly the infinite multiplicity of shapes is adequate to explain all varieties of sensible objects.

My second supposition is that when the external sense <organ> is disturbed by the object, the image (figuram) it receives is transmitted to another part of the body, called the <organ of> common sensibility; this happens instantaneously,,, and no real entity travels from one organ to the other. In just the same way (1 conceive) while I am now writing, at the very moment when the various letters are formed on the paper, it is not only the tip of the pen that moves; there could not be the least movement of this that was not at once communicated to the whole pen; and all these various movements are also described in the air by the top end of the pen; and yet I have not an idea that something real travels from one end of the pen to the other. For who could suppose that the parts of the human body have less interconnexion than those of the pen? and what simpler way of explaining the matter could be devised?

My third supposition is that the <organ of> common sensibility also plays the part of a seal, whereas the phantasy or imagination is the wax on which it impresses these images or ideas, which come from the external sense <organs> unadulterated and without <the transmission of> any body; and this phantasy is a genuine part of the body,. large enough for its various parts to assume a number of distinct shapes. These shapes may be

retained for some time; in this case phantasy is precisely what is called memory.

My fourth supposition is that the power of movement, in fact the nerves, originate in the brain, where the phantasy is seated; and that the phantasy moves them in various ways, as the external sense <organ> moves the <organ of> common sensibility, or as the whole pen is moved by its tip. This illustration also shows how it is that the phantasy can cause various movements in the nerves, although it has not images of these formed in itself, but certain other images, of which these movements are possible effects. For the pen as a whole does not move in the same way as its tip; indeed, the greater part of the pen seems to go along with an altogether different, contrary motion. This enables us to understand how the movements of all other animals are accomplished, although we suppose them to have no consciousness (rerum cognitio) but only a bodily <organ of> phantasy; and furthermore, how it is that in ourselves those operations are performed which occur without any aid of reason.

My fifth and last supposition is that the power of cognition properly so called is purely spiritual, and is just as distinct from the body as a whole as blood is from bone or a hand from an eye; and that it is a single power. Sometimes it receives images from the common sensibility at the same time as the phantasy does; sometimes it applies itself to the images preserved in memory; sometimes it forms new images, and these so occupy the imagination that often it is not able at the same time to receive ideas from the common sensibility, or to pass them on to the locomotive power in the way that the body left to itself -would. In all these processes the cognitive power is sometimes passive, sometimes active; it plays the part now of the seal, now of the wax; here, however, these expressions must be taken as merely analogical, for there is nothing quite like this among corporeal objects. The cognitive power is always one and the same; if it applies itself, along with the imagination, to the common sensibility, it is said to see, feel, etc.; if it applies itself to the imagination alone, in so far as that is already provided with various images, it is said to remember; if it does this in order to form new images, it is said to imagine or conceive; if, finally, it acts by itself, it is said to understand. (The manner of this last operation will be explained at more length in the proper place). In accordance with these diverse functions the same power is called now pure intellect, now imagination, now memory, now sense; and it is properly called mind (ingenium) when it is either forming new ideas in the phantasy or attending to those already formed. We regard it as capable of these various operations; and the distinction between these terms will have to be observed in what follows. In terms of these conceptions, the attentive reader will easily gather how we must seek to aid each faculty, and how far human endeavor can supply what is lacking to the mind.

For the understanding may be set in movement by the imagination, or on the other hand may set it in movement. Again the (organ of> imagination may act on the senses by means of the locomotive power, by applying them to their objects; or on the other hand they may act upon it, since it is upon it that they trace images (imagines) of bodies. Further, memory (considered, that is, as a corporeal faculty like the recollections of brutes) is nothing distinct from imagination. From this it is a certain inference that if the understanding is occupied with objects that have no corporeal or quasi-corporeal aspect, it cannot be aided by these faculties; on the contrary, we must prevent it from being hindered by them; sense must be banished, and imagination stripped (so far as possible) of every distinct impression. If, on the other hand, the understanding intends to examine something that can be referred to <the concept of> body, then we must form in the imagination as distinct an idea of this thing as we can; and in order to provide this in a more advantageous way, the actual object represented by this idea must be presented to the external senses. There are no further means of aiding the distinct intuition of individual facts. The inference of one fact from several, which often has to be carried out, requires that we should discard any element in our ideas that does not need our attention at the moment, in order to make it easier to keep the remainder in our memory; and then we must similarly present to the external senses, not the actual objects of our ideas, but rather compendious diagrams of them; so long as these are adequate to guard against a lapse of memory, the less space they take up the better. And anybody who observes all these precepts will, I think, have left nothing undone as regards the first point <the subjective conditions of knowledge>.

We must now take the second point <the conditions relating to the object of knowledge>. Here we must make a careful distinction between simple and compound notions, and try to discern, as regards each class, the possible sources of error, in order to avoid it, and the possible objects of assured knowledge, in order to occupy ourselves with these alone. Here, as previously, I shall have to make some assumptions that are perhaps not generally received; but it does not matter much, even if they are no more believed in than the imaginary circles by which astronomers describe their phenomena, so long as they enable you to distinguish the sort of apprehension of any given thing that is liable to be true or false.

In the first place, we must think differently when we regard things from the point of view of our knowledge and when we are talking about them as they are in reality. For example, take a body that has shape and extension. We shall admit that objectively there is one simple fact; we cannot call it, in this sense, ' a compound of the natures body, extension, and figure ', for these ' parts ' have never existed separate from one another. But in respect of our understanding we do call it a compound of these three natures; for we had to understand each one separately before judging that the three are found in one and the same subject. Now we are here concerned with things only in so far as they are perceived by the understanding; and so we use the term ' simple' only for realities so clearly and distinctly known that we cannot divide any of them into several realities more distinctly known, for example, shape, extension, motion, etc.; and we conceive of everything else as somehow compounded out of these. This principle must be taken quite generally, without even excepting the concepts that we sometimes form by abstraction even from simple ones. For example, we may say that figure is the terminus of an extended thing, meaning by 'terminus' something more general than 'figure', since we may also say' terminus of a duration', ' terminus of a motion', etc. But although in this case the meaning of ' terminus ' is abstracted from figure, it is not therefore to be regarded as simpler than figure; on the contrary, since it is predicated also of other things, e.g. the end of a duration or motion, which are wholly different in kind from figure, it must have been abstracted from these too, and is thus something compounded out of quite diverse natures - in fact, its various applications to these are merely equivocal.

Secondly, the things that are termed simple (in relation to our understanding) are either purely intellectual, or purely material, or common<to both realms>. The purely intellectual objects are those that the understanding knows by means of an innate light, without the help of any corporeal image. For there certainly are some such objects; no corporeal idea can be framed to show us the nature of knowledge, doubt, ignorance, or the action of the will (which we may call volition), or the like; but we really do know all these things, and quite easily at that; we need only have attained to a share of reason in order to do so. Those objects of knowledge are purely corporeal which are known to occur only in <the realm of> bodies: e.g. shape, extension, motion, etc. Finally, we must term common <to both realms> what is predicated indiscriminately now of corporeal things and now of spirits; e.g. existence, unity, duration, etc. We must also refer to this class axioms that form connecting links between other simple natures, and on whose self-evident character all conclusions of reasoning depend. For example: things that are the same as a single third thing are the same as one another; things that cannot be related in the same way to a third thing are in some respect diverse, etc. The understanding may know these common properties either by its own bare act, or by an intuition of images of material things.

Further, among these simple natures I wish to count also privations or negations of them, in so far as we conceive of such; for my intuition of nothingness, an instant, or rest is not less genuine knowledge than my concept of existence, duration, or motion. This way of regarding them will be helpful, for it enables us to say by way of summary that everything else we get to know will be a compound of these simple natures; for example, if I judge that some figure is not moving, I shall say that my thought is in a way a compound of ' figure ' and 'rest'; and so in other cases.

Thirdly, the knowledge of each of these simple natures is underived, and never contains any error. This is easily shown if we distinguish the intellectual faculty of intuitive knowledge from that of affirmative or negative judgment. For it is possible for us to think we do not know what in fact we do know; namely, we may

be of opinion that besides the actual object of intuition, or what is grasped in our experience (cogitando), some further element hidden from us is involved, and this opinion (cogitatio) of ours may be false. Hence it is evident that we go wrong if we ever judge that one of these simple natures is not known to us in its entirety. For if our mind grasps the least thing to do with such a nature-as is necessary ex hypothesi if we are forming some judgment about it-this of itself entails that we know it in its entirety; otherwise it could not be termed simple, but would be compounded of the element perceived by us and the supposed unknown element.

Fourthly, the conjunction of these simple natures with one another is either necessary or contingent. It is necessary when one is implicitly contained in the concept of the other, so that we cannot distinctly conceive of either if we judge that they are separated; it is in this way that figure is conjoined with extension, motion with duration or time, etc., since an extensionless figure or a durationless motion is inconceivable. Again, if I say 'four and three are seven ' this is a necessary conjunction; for we have no distinct concept of the number seven that does not implicitly include the numbers three and four. Similarly, any demonstrated property of figures or numbers is necessarily connected with that of which it is asserted. It is not only in the sensible world that we find this sort of necessity, but we have also cases like this: from Socrates' assertion that he doubts everything there is a necessary consequence ' therefore he understands at least what he doubts ', or again ' therefore he knows that there is something that can be true or false ', or the like; for these are necessarily bound up with the nature of the doubt. A combination of natures is contingent when they are not conjoined by any inseparable relation; as when we say that a body is animated, that a man is clothed, etc. Many necessary conjunctions, moreover, are generally counted as contingent, because their real relation is generally unobserved, e.g. the proposition ' I am, therefore God is', or again, ' I understand, therefore I have a mind distinct from the body', and the like. Finally, it is to be observed that very many necessary propositions have contingent converses; e.g. although God's existence is a certain conclusion from mine, my existence cannot be asserted on account of God's existence.

Fifthly, we can never have any understanding of anything apart from these single natures and their blending or composition. It is often easier to attend to a conjunction of several than to separate out one from the others; for I may, e.g. know a triangle without ever having thought that this involves knowledge of angle, line, the number three, figure, extension, etc. But this in no way goes against our saying that the nature of a triangle is composed of all these natures, and that they are prior to ' triangle ' in the order of knowledge, since they are the very natures that are understood to occur in a triangle. Moreover, there may well be many other natures implicit in 'triangle' that escape our notice; e.g. the size of the angles (their being equal to two right angles), and an infinity of relations between the sides and the angles, the sides and the area, etc.

Sixthly, the natures called 'compound' are known to us either because we have experience (experimur) of them or because we ourselves compound them. By our experience I mean sense-perception, hearsay, and in general everything that is either brought to our understanding from outside or arises from its own self-contemplation. It must here be remarked that no experience can deceive the understanding if it confines itself to intuition of what is presented to it-of what it itself contains, or what is given by means of a brain-image-and does not go on to judge that imagination faithfully reproduces the objects of the senses, or that the senses give us true pictures (figures) of things, in short, that external things are always what they seem. On all such matters we are liable to go wrong; e.g. if somebody tells us a tale and we believe the thing happened; if a man suffering from jaundice thinks everything is yellow because his eye is suffused with yellow; if again, there is a lesion in the organ of imagination, as in melancholia, and we judge that the disordered images it produces represent real things. But the understanding a sage (sapientis)l will not be misled by such things; as regards any datum of the imagination, he will indeed judge that there really is such a picture in that faculty, but he will never assert that this picture has been transmitted in its entirety and unchanged from the external object to the senses and from the senses to the phantasy, unless he has antecedently had some other means of knowing this fact. I say that an object of understanding is 'compounded by ourselves ' whenever we believe that something is involved in it that has not been directly perceived by the mind in experience. For example, the jaundiced man's conviction

that what he sees is yellow is a mental state (cogitatio) compounded of the representation in his phantasy and an assumption that he makes on his own account, viz. that the yellow color appears not through a defect in the eye but because what he sees really is yellow. From this we conclude that we can be deceived only so long as the object of our belief is, in a way, of our own compounding.

Seventhly, this 'compounding' may take place in three ways; on impulse, or from conjecture, or by deduction. People compound their judgments about things 'on impulse' when their own mind' leads them to believe something without their being convinced by any reasoning; they are determined to do so either by a higher power, or by their own spontaneity, or by the disposition of the phantasy; the first never misleads, the second rarely, the third almost always. But the first does not concern us here, since it is not something attainable by our technique. The following is an example of conjecture: Water, which is further from the center than earth, is also rarer; air, which comes above water, is still more rare; we conjecture that above air there is only a very pure aether, far thinner even than air. Views 'compounded' in this way are not misleading, so long as we regard them only as probable and never assert them as truth; they actually add to our stock of information.

There remains deduction-the only way of 'compounding' things so that we may be certain that the result is true. But even here all sorts of faults are possible. For example, from the fact that this region (which is full of air) contains nothing that we perceive by sight or touch or any other sense, we may conclude that it is empty, and thus wrongly conjoin the natures ' this region ' and 'vacuum'. This error occurs whenever we judge that a general and necessary conclusion can be got from a particular or contingent fact. But it lies within our powers to avoid it; we can do so by never conjoining things unless we see intuitively that their conjunction is absolutely necessary, as we do when we infer that nothing can have shape without extension because shape has a necessary connexion with extension.

From all this the first conclusion to be drawn is that we have now set forth in a distinct way, and with what seems to me to be an adequate enumeration, the truth that we were previously able to establish only confusedly and roughly; viz. that there are no ways of attaining truth open to man except self-evident intuition and necessary inference; and it is moreover clear what 'simple natures' are. . . . It is obvious, furthermore, that the scope of intuition covers all these, and knowledge of their necessary connexions; and, in sum, covers everything that is comprised precisely in the experience (experitur) of the understanding, as a content either of its own or of the phantasy. About deduction. we shall say more in the sequel. . . .

For the rest, in case anybody should miss the interconnexion of my rules, I divide all that can be known into simple propositions and problems (quaestiones). As regards simple propositions, the only rules I give are those that prepare the mind for more distinct intuition and more sagacious examination of any given objects; for such propositions must come to one spontaneously-they cannot be sought for. This was the content of my first twelve Rules, and I think that in these I have set forth all that can facilitate the use of reason. As regards problems, they consist, first, of those that are perfectly understood, even if the solution is unknown; we shall deal exclusively with these in the next twelve Rules: 1 and, secondly, of those that are not perfectly understood; these we reserve for the last twelve. We have made this division on purpose, both in order to avoid having to speak of anything that presupposes an acquaintance with what follows, and also to teach those matters first which, in our view, should be studied first in developing our mental powers. Among ' problems perfectly understood', be it observed, I count only those as regards which we see three things distinctly: first, the criteria for recognizing what we are looking for, when we come upon it; secondly, the precise premise from which to infer it; thirdly, the way to establish their interdependence-the impossibility of modifying one without the other. We must, then, be in possession of all the premises; nothing must remain to be shown except the way of finding the conclusion. This will not be a question of a single inference from a single simple premise (which, as I have said, can be performed without rules), but of a technique for deriving a single conclusion from many premises taken together without needing a greater mental capacity than for the simplest inference. These problems are for the most part abstract ones, and are almost confined to arithmetic and

geometry; so novices may regard them as comparatively useless. But I urge the need of long use and practice in acquiring this technique for those who wish to attain a perfect mastery of the latter part of the Method, in which we shall treat of all these other matters.

Rule XIII

If we perfectly understand a problem we must abstract it from every superfluous conception, reduce it to its simplest terms and, by means of an enumeration, divide it up into the smallest possible parts.

Rule XIV

The problem should be re-expressed in terms of the real extension of bodies and should be pictured in our imagination entirely by means of bare figures. Thus it will be perceived much more distinctly by our intellect.

Rule XV

It is generally helpful if we draw these figures and display them before our external senses. In this way it will be easier for us to keep our mind alert.

Rule XVI

As for things which do not require the immediate attention of the mind, however necessary they may be for the conclusion, it is better to represent them by very concise symbols rather than by complete figures. It will thus be impossible for our memory to go wrong, and our mind will not be distracted by having to retain these while it is taken up with deducing other matters.

Rule XVII

We should make a direct survey of the problem to be solved, disregarding the fact that some of its terms are known and others unknown, and intuiting, through a train of sound reasoning, the dependence of one term on another.

Rule XVIII

For this purpose only four operations are required: addition, subtraction, multiplication and division. The latter two operations should seldom be employed here, for they may lead to needless complication, and they can be carried out more easily later.

Rule XIX

Using this method of reasoning, we must try to find as many magnitudes, expressed in two different ways, as there are unknown terms, which we treat as known in order to work out the problem in the direct way. That will give us as many comparisons between two equal terms.

Rule XX

Once we have found the equations, we must carry out the operations which we have left aside, never using multiplication when division is in order.

Rule XXI

If there are many equations of this sort, they should all be reduced to a single one, viz. to the equation whose terms occupy fewer places in the series of magnitudes which are in continued proportion, i.e. the series in which the order of the terms is to be arranged.

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