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John Cottingham and Robert Stoothoff

Excerpt

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Rules for the Direction of our Native Intelligence

AT X

RULE ONE

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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. 360

The sciences as a whole are nothing other than human wisdom, which always remains one and the same, however different the subjects to which it is applied, it being no more altered by them than sunlight is by the variety of the things it shines on. Hence there is no need to impose any restrictions on our mental powers; for the knowledge of one truth does not, like skill in one art, hinder us from discovering another; on the contrary it helps us. ... It must be acknowledged that all the sciences are so closely interconnected that it is much easier to learn them all together than to separate one from the other. If, therefore, someone seriously wishes to investigate the truth of things, he ought not to select one science in particular, for they are all interconnected and interdependent. ... (361)

RULE TWO

362

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

All knowledge¹ is certain and evident cognition. Someone who has doubts about many things is no wiser than one who has never given them a thought; indeed, he appears less wise if he has formed a false opinion about any of them. Hence it is better never to study at all than to occupy ourselves with objects which are so difficult that we are unable to distinguish what is true from what is false, and are forced to take the doubtful as certain; for in such matters the risk of diminishing our knowledge is greater than our hope of increasing it. So, in accordance with this Rule, we reject all such merely probable cognition and resolve to believe only what is perfectly known and incapable of being doubted. ...

Nevertheless, if we adhere strictly to this Rule, there will be very few (363)

¹ Lat. *scientia*, Descartes' term for systematic knowledge based on indubitable foundations.

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(364) things which we can get down to studying. For there is hardly any question in the sciences about which clever men have not frequently disagreed. ... Accordingly, if my reckoning is correct, out of all the sciences so far devised, we are restricted to just arithmetic and geometry if we stick to this Rule.... So if we seriously wish to propose rules for ourselves which will help us scale the heights of human knowledge, we must include, as one of our primary rules, that we should take care not to waste our time by neglecting easy tasks and occupying ourselves only with difficult matters....

365 Of all the sciences so far discovered, arithmetic and geometry alone are, as we said above, free from any taint of falsity or uncertainty. If we are to give a careful estimate of the reason why this should be so, we should bear in mind that there are two ways of arriving at a knowledge of things – through experience and through deduction. Moreover, we must note that while our experiences of things are often deceptive, the deduction or pure inference of one thing from another can never be performed wrongly by an intellect which is in the least degree rational, though we may fail to make the inference if we do not see it. Furthermore, those chains with which dialecticians¹ suppose they regulate human reason seem to me to be of little use here, though I do not deny that they are very useful for other purposes. In fact none of the errors to which men – men, I say, not the brutes – are liable is ever due to faulty inference; they are due only to the fact that men take for granted certain poorly understood observations, or lay down rash and groundless judgements.

These considerations make it obvious why arithmetic and geometry prove to be much more certain than other disciplines: they alone are concerned with an object so pure and simple that they make no assumptions that experience might render uncertain; they consist entirely in deducing conclusions by means of rational arguments. They are therefore the easiest and clearest of all the sciences and have just the sort of object we are looking for....

(366) RULE THREE

Concerning objects proposed for study, we ought to investigate what we can clearly and evidently intuit² or deduce with certainty, and not what other people have thought or what we ourselves conjecture. For knowledge³ can be attained in no other way.

1 'Dialectic' is Descartes' term for scholastic logic.

2 Lat. *intueri*, literally 'to look at, gaze at'; used by Descartes as a technical term for immediate intellectual apprehension.

3 Lat. *scientia*; see footnote on p. 1 above.

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We would be well-advised not to mix any conjectures into the judgements (367) we make about the truth of things. It is most important to bear this point in mind. The main reason why we can find nothing in ordinary philosophy which is so evident and certain as to be beyond dispute is that students of the subject first of all are not content to acknowledge what is clear and certain, but on the basis of merely probable conjectures venture also 368 to make assertions on obscure matters about which nothing is known; they then gradually come to have complete faith in these assertions, indiscriminately mixing them up with others that are true and evident. The result is that the only conclusions they can draw are ones which apparently rest on some such obscure proposition, and which are accordingly uncertain.

But in case we in turn should slip into the same error, let us now review all the actions of the intellect by means of which we are able to arrive at a knowledge of things with no fear of being mistaken. We recognize only two: intuition and deduction.

By 'intuition' I do not mean the fluctuating testimony of the senses or the deceptive judgement of the imagination as it botches things together, but the conception of a clear and attentive mind, which is so easy and distinct that there can be no room for doubt about what we are understanding. Alternatively, and this comes to the same thing, intuition is the indubitable conception of a clear and attentive mind which proceeds solely from the light of reason. Because it is simpler, it is more certain than deduction, though deduction, as we noted above, is not something a man can perform wrongly. Thus everyone can mentally intuit that he exists, that he is thinking, that a triangle is bounded by just three lines, and a sphere by a single surface, and the like. Perceptions such as these are more numerous than most people realize, disdaining as they do to turn their minds to such simple matters....

The self-evidence and certainty of intuition is required not only for (369) apprehending single propositions, but also for any train of reasoning whatever. Take for example, the inference that 2 plus 2 equals 3 plus 1: not only must we intuitively perceive that 2 plus 2 makes 4, and that 3 plus 1 makes 4, but also that the original proposition follows necessarily from the other two.

There may be some doubt here about our reason for suggesting another mode of knowing in addition to intuition, *viz.* deduction, by which we mean the inference of something as following necessarily from some other propositions which are known with certainty. But this distinction had to be made, since very many facts which are not self-evident are known with certainty, provided they are inferred from true and known principles through a continuous and uninterrupted movement of thought in which each individual proposition is clearly intuited. This is similar to the way in which we know that the last link in

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370 a long chain is connected to the first: even if we cannot take in at one glance all the intermediate links on which the connection depends, we can have knowledge of the connection provided we survey the links one after the other, and keep in mind that each link from first to last is attached to its neighbour. Hence we are distinguishing mental intuition from certain deduction on the grounds that we are aware of a movement or a sort of sequence in the latter but not in the former, and also because immediate self-evidence is not required for deduction, as it is for intuition; deduction in a sense gets its certainty from memory. It follows that those propositions which are immediately inferred from first principles can be said to be known in one respect through intuition, and in another respect through deduction. But the first principles themselves are known only through intuition, and the remote conclusions only through deduction....

371 RULE FOUR

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

372 By 'a method' I mean reliable rules which are easy to apply, and such that if one follows them exactly, one will never take what is false to be true or fruitlessly expend one's mental efforts, but will gradually and constantly increase one's knowledge¹ till one arrives at a true understanding of everything within one's capacity.... The method cannot go so far as to teach us how to perform the actual operations of intuition and deduction, since these are the simplest of all and quite basic. If our intellect were not already able to perform them, it would not comprehend any of the rules of the method, however easy they might be....

(373) So useful is this method that without it the pursuit of learning would, I think, be more harmful than profitable. Hence I can readily believe that the great minds of the past were to some extent aware of it, guided to it even by nature alone. For the human mind has within it a sort of spark of the divine, in which the first seeds of useful ways of thinking are sown, seeds which, however neglected and stifled by studies which impede them, often bear fruit of their own accord. This is our experience in the simplest of sciences, arithmetic and geometry: we are well aware that the geometers of antiquity employed a sort of analysis which they went on to apply to the solution of every problem, though they begrudged revealing it to posterity....

374 I shall have much to say below about figures and numbers, for no other disciplines can yield illustrations as evident and certain as these. But if one attends closely to my meaning, one will readily see that ordinary mathe-

1 Lat. *scientia*; see footnote on p. 1 above.

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matics is far from my mind here, that it is quite another discipline I am expounding, and that these illustrations are more its outer garments than inner parts. This discipline should contain the primary rudiments of human reason and extend to the discovery of truths in any field whatever....

In the present age some very gifted men have tried to revive this method, for the method seems to me to be none other than the art which goes by the outlandish name of 'algebra' – or at least it would be if algebra were divested of the multiplicity of numbers and incomprehensible figures which overwhelm it and instead possessed that abundance of clarity and simplicity which I believe the true mathematics ought to have. It was these thoughts which made me turn from the particular studies of arithmetic and geometry to a general investigation of mathematics. I began my investigation by inquiring what exactly is generally meant by the term 'mathematics'¹ and why it is that, in addition to arithmetic and geometry, sciences such as astronomy, music, optics, mechanics, among others, are called branches of mathematics. To answer this it is not enough just to look at the etymology of the word, for, since the word 'mathematics' has the same meaning as 'discipline',² these subjects have as much right to be called 'mathematics' as geometry has. Yet it is evident that almost anyone with the slightest education can easily tell the difference in any context between what relates to mathematics and what to the other disciplines. When I considered the matter more closely, I came to see that the exclusive concern of mathematics is with questions of order or measure and that it is irrelevant whether the measure in question involves numbers, shapes, stars, sounds, or any other object whatever. This made me realize that there must be a general science which explains all the points that can be raised concerning order and measure irrespective of the subject-matter, and that this science should be termed *mathesis universalis*³ – a venerable term with a well-established meaning – for it covers everything that entitles these other sciences to be called branches of mathematics....

Aware how slender my powers are, I have resolved in my search for knowledge of things to adhere unswervingly to a definite order, always starting with the simplest and easiest things and never going beyond them till there seems to be nothing further which is worth achieving where they are concerned. Up to now, therefore, I have devoted all my energies to this universal mathematics, so that I think I shall be able in due course to tackle the somewhat more advanced sciences, without my efforts being premature....

1 Lat. *mathesis*, from the Greek μάθησις, literally 'learning'.

2 Lat. *disciplina*, from *discere*, 'to learn'.

3 I.e. 'universal mathematics'.

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RULE FIVE

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.

380 This one Rule covers the most essential points in the whole of human endeavour. Anyone who sets out in quest of knowledge of things must follow this Rule as closely as he would the thread of Theseus if he were to enter the Labyrinth.... But the order that is required here is often so obscure and complicated that not everyone can make out what it is; hence it is virtually impossible to guard against going astray unless one carefully observes the message of the following Rule.

381 *RULE SIX*

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.

Although the message of this Rule may not seem very novel, it contains nevertheless the main secret of my method; and there is no more useful Rule in this whole treatise. For it instructs us that all things can be arranged serially in various groups, not in so far as they can be referred to some ontological genus (such as the categories into which philosophers divide things¹), but in so far as some things can be known on the basis of others. Thus when a difficulty arises, we can see at once whether it will be worth looking at any others first, and if so which ones and in what order.

In order to be able to do this correctly, we should note first that everything, with regard to its possible usefulness to our project, may be termed either 'absolute' or 'relative' – our project being, not to inspect the isolated natures of things, but to compare them with each other so that some may be known on the basis of others.

382 I call 'absolute' whatever has within it the pure and simple nature in question; that is, whatever is viewed as being independent, a cause, simple, universal, single, equal, similar, straight, and other qualities of that sort. I call this the simplest and the easiest thing when we can make use of it in solving problems.

1 For example, the Aristotelian categories of substance, quality, quantity, relation, etc.

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The 'relative', on the other hand, is what shares the same nature, or at least something of the same nature, in virtue of which we can relate it to the absolute and deduce it from the absolute in a definite series of steps. The concept of the 'relative' involves other terms besides, which I call 'relations': these include whatever is said to be dependent, an effect, composite, particular, many, unequal, dissimilar, oblique, etc. The further removed from the absolute such relative attributes are, the more mutually dependent relations of this sort they contain. This Rule points out that all these relations should be distinguished, and the interconnections between them, and their natural order, should be noted, so that given the last term we should be able to reach the one that is absolute in the highest degree, by passing through all the intermediate ones....

We should note, secondly, that there are very few pure and simple (383) natures which we can intuit straight off and *per se* (independently of any others) either in our sensory experience or by means of a light innate within us. We should, as I said, attend carefully to the simple natures which can be intuited in this way, for these are the ones which in each series we term simple in the highest degree. As for all the other natures, we can apprehend them only by deducing them from those which are simple in the highest degree, either immediately and directly, or by means of two or three or more separate inferences....

The third and last point to note is that we should not begin our studies (384) by investigating difficult matters. Before tackling any specific problems we ought first to make a random selection of truths which happen to be at hand, and ought then to see whether we can deduce some other truths from them step by step, and from these still others, and so on in logical sequence. This done, we should reflect attentively on the truths we have discovered and carefully consider why it was we were able to discover some of these truths sooner and more easily than others, and what these truths are....

RULE SEVEN

(387)

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.

It is necessary to observe the points proposed in this Rule if we are to admit as certain those truths which, we said above, are not deduced immediately from first and self-evident principles. For this deduction sometimes requires such a long chain of inferences that when we arrive at such a truth it is not easy to recall the entire route which led us to it. That is why we say that a continuous movement of thought is needed to make good any weakness of memory....

(388) In addition, this movement must nowhere be interrupted. Frequently those who attempt to deduce something too swiftly and from remote initial premisses do not go over the entire chain of intermediate conclusions very carefully, but pass over many of the steps without due consideration. But, whenever even the smallest link is overlooked, the chain is immediately broken, and the certainty of the conclusion entirely collapses.

We maintain furthermore that enumeration is required for the completion of our knowledge.¹ The other Rules do indeed help us resolve most questions, but it is only with the aid of enumeration that we are able to make a true and certain judgement about whatever we apply our minds to. By means of enumeration nothing will wholly escape us and we shall be seen to have some knowledge on every question.

In this context enumeration, or induction, consists in a thorough investigation of all the points relating to the problem at hand, an investigation which is so careful and accurate that we may conclude with manifest certainty that we have not inadvertently overlooked anything.

389 So even though the object of our inquiry eludes us, provided we have made an enumeration, we shall be wiser at least to the extent that we shall perceive with certainty that it could not possibly be discovered by any method known to us....

We should note, moreover, that by 'sufficient enumeration' or 'induction' we just mean the kind of enumeration which renders the truth of our conclusions more certain than any other kind of proof (simple intuition excepted) allows...

(390) The enumeration should sometimes be complete, and sometimes distinct, though there are times when it need be neither. That is why I said only that the enumeration must be sufficient. For if I wish to determine by enumeration how many kinds of corporeal entity there are or how many are in some way perceivable by the senses, I shall not assert that there are just so many and no more, unless I have previously made sure I have included them all in my enumeration and have distinguished one from another. But if I wish to show in the same way that the rational soul is not corporeal, there is no need for the enumeration to be complete; it will be sufficient if I group all bodies together into several classes so as to demonstrate that the rational soul cannot be assigned to any of these....

1 Lat. *scientia*; see footnote on p. 1 above.

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RULE EIGHT

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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.

The most useful inquiry we can make at this stage is to ask: What is human knowledge and what is its scope? We are at present treating this as one single question, which in our view is the first question of all that should be examined by means of the Rules described above... In order to see how the above points apply to the problem before us, we shall first divide into two parts whatever is relevant to the question; for the question ought to relate either to us, who have the capacity for knowledge, or to the actual things it is possible to know. We shall discuss these two parts separately. (397)

Within ourselves we are aware that, while it is the intellect alone that is capable of knowledge,¹ it can be helped or hindered by three other faculties, *viz.* imagination, sense-perception, and memory. We must therefore look at these faculties in turn, to see in what respect each of them could be a hindrance, so that we may be on our guard, and in what respect an asset, so that we may make full use of their resources. We shall discuss this part of the question by way of a sufficient enumeration, as the following Rule will make clear. 398

We should then turn to the things themselves; and we should deal with these only in so far as they are within the reach of the intellect. In that respect we divide them into absolutely simple natures and complex or composite natures. Simple natures must all be either spiritual or corporeal, or belong to each of these categories. As for composite natures, there are some which the intellect experiences as composite before it decides to determine anything about them: but there are others which are put together by the intellect itself. All these points will be explained at greater length in Rule Twelve, where it will be demonstrated that there can be no falsity save in composite natures which are put together by the intellect. In view of this, we divide natures of the latter sort into two further classes, *viz.* those that are deduced from natures which are the most simple and self-evident (which we shall deal with throughout the next book), and those that presuppose others which experience shows us to be composite in reality.... 399

1 Lat. *scientia*; see footnote on p. 1 above.

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RULE NINE

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.

We have given an account of the two operations of our intellect, intuition and deduction, on which we must, as we said, exclusively rely in our acquisition of knowledge. In this and the following Rule we shall proceed to explain how we can make our employment of intuition and deduction more skilful and at the same time how to cultivate two special mental faculties, *viz.* perspicacity in the distinct intuition of particular things and discernment in the methodical deduction of one thing from another.

We can best learn how mental intuition is to be employed by comparing it with ordinary vision. If one tries to look at many objects at
401 one glance, one sees none of them distinctly. Likewise, if one is inclined to attend to many things at the same time in a single act of thought, one does so with a confused mind. Yet craftsmen who engage in delicate operations, and are used to fixing their eyes on a single point, acquire through practice the ability to make perfect distinctions between things, however minute and delicate. The same is true of those who never let their thinking be distracted by many different objects at the same time, but always devote their whole attention to the simplest and easiest of matters: they become perspicacious....

Everyone ought therefore to acquire the habit of encompassing in his
402 thought at one time facts which are very simple and very few in number – so much so that he never thinks he knows something unless he intuits it just as distinctly as any of the things he knows most distinctly of all.... There is, I think, one point above all others which I must stress here, which is that everyone should be firmly convinced that the sciences, however abstruse, are to be deduced only from matters which are easy and highly accessible, and not from those which are grand and obscure....

RULE TEN

(403) *In order to acquire discernment we should exercise our native 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.*

(404) Since not all minds have such a natural disposition to puzzle things out by their own exertions, the message of this Rule is that we must not take up the more difficult and arduous issues immediately, but must first tackle the simplest and least exalted arts, and especially those in which order prevails