

# Descartes's Critique of the Syllogistic

## Abstract

This article presents a novel reading of Descartes's critique of the traditional syllogistic. The reading differs from those previously presented by scholars who regard Descartes's critique as a version of a well-known argument: that syllogisms are circular or non-ampliative and thus trivial. It is argued that Descartes did not see syllogisms as defective *in themselves*. For him the problem was rather that anyone considering a valid and informative syllogism must already know, by an intuition wholly independent of the syllogism, that the conclusion follows from the premises. Moreover, without such an intuition the syllogistic on its own is incapable of determining whether the consequence truly holds. Thus the syllogistic is useless unless accompanied by an intuition that renders it otiose. This reading of Descartes's view is supported and explained by examples drawn from Descartes's writing and from the Port-Royal Logic—one of the first attempts to develop a logical system on Cartesian principles.

## Key Words

Descartes, syllogistic, logic, Port-Royal Logic

## 1. Introduction

Descartes's main criticism of the syllogistic, in the *Rules for the Direction of the Mind*, is as follows:

...to make it even clearer that the [syllogistic] art of reasoning contributes nothing whatever to knowledge of the truth, we should realize that, on the basis of their method, dialecticians are unable to formulate a syllogism with a true conclusion unless they are already in possession of the substance of the conclusion, i.e. unless they have previous knowledge of the very truth deduced in the syllogism. It is obvious therefore that they themselves can learn nothing new from such forms of reasoning, and hence that ordinary dialectic is of no use whatever to those who wish to investigate the truth of things (Rule 10,

AT 10.406 / CSM 1.36-7 – “AT” and “CSM” refer to edition and translation of Descartes’s works – see reference list).

The accusation against the dialecticians is not obviously justified. It is easy, following the rules of syllogistic, to form a syllogism that has as its conclusion any given proposition consisting of subject-, predicate-, quantity-, and quality-terms. And if the proposition happens to be true then one has thereby constructed a syllogism with a true conclusion, without having *known* that the conclusion was true.

Of course, the syllogism thus formed need not be valid. Perhaps Descartes means that it is impossible to construct a *valid* syllogism without knowing ahead of time that its conclusion is true. This also seems wrong; one might choose a random middle term and thereby form a valid syllogism with the required conclusion by blind chance. Suppose we further qualify Descartes’s claim: it is impossible for dialecticians to construct a syllogism they *know* to be valid, with premises they *know* to be true, without knowing ahead of time that the conclusion is true. This claim is sufficiently plausible that various philosophers have suggested it; by the late nineteenth century John Stuart Mill could state unequivocally that “Logicians have been remarkably unanimous” in claiming something to this effect (Mill 2004, 2.3.1). I suspect that it is what Descartes means in the passage quoted. But I will argue that he does not believe it for the same reason as Mill nor the logicians to whom Mill implicitly refers.

I propose that Descartes’s implicit reasoning runs as follows: Some intuitively invalid arguments can be expressed in a form such that the syllogistic will rule them valid. And often the very same arguments can be rendered *invalid* under syllogism by being expressed in a slightly different form. The syllogistic on its own thus gives inconsistent results. Knowing whether an argument is expressed in the appropriate form for the syllogistic to be *usefully* applied to it requires one to have some intuitive

knowledge beyond the syllogistic. But this intuitive knowledge is enough to show the conclusion to be true without the need of the syllogistic.

This reading explains Descartes's complaint that truth often "slips through the fetters" of syllogisms, "while those who employ them are left entrapped in them".<sup>1</sup> Truth slips through the fetters of the syllogistic when an intuitively valid argument is expressed in such a way that the syllogistic is incapable of showing its validity: it is an instance of no valid syllogistic form. Those remain trapped in the syllogistic who cannot see by intuition that the argument is nevertheless valid. I shall explain both points using examples both from Descartes and from the *Port-Royal Logic* – a work that is, as Jill Vance Buroker has argued, "situated in the general framework of Cartesian philosophy" (Buroker 1993).<sup>2</sup> The examples will also serve to elucidate what I mean by "intuitive validity".

In reading Descartes in this way, I am disagreeing with other interpreters, who read Descartes's claim as being that the syllogistic is *inherently* incapable of delivering informative demonstrations – that its intrinsic formal qualities render it non-ampliative in every application. Descartes can admit that many syllogisms *would be*, in virtue of their formal qualities, perfectly capable of demonstrating previously unknown truths were it not for something outside of them – the intuition that accompanies them, reveals their conclusion, and thus renders them otiose. Nor could we attend to the syllogisms while ignoring this intuition, since we need it in order to be sure we have set up our arguments in the right way to apply the formal syllogistic tests. Syllogisms without intuition are blind. But if intuition is there, we have no need of the syllogistic. Descartes permits that we can acquire knowledge by using syllogisms but implies that we do so by using a sort of intuition that is quite independent of the formal rules of the syllogistic – neither adequately captured nor restricted by them.

## 2. Other readings of Descartes's critique

As an example of a reading that contrasts with mine, John Passmore associates Descartes's critique with that of Mill in the *System of Logic* (Passmore 1953, 548). Mill argues that the syllogism is a *petitio principii*: the very form of the syllogism ensures that the premises cannot be asserted unless the conclusion is already assumed. Thus in the syllogism "Socrates is a man; all men are mortal; therefore Socrates is mortal" the conclusion is assumed in the assertion of the major premise:

we cannot be assured of the mortality of all men, unless we are already certain of the mortality of every individual man: that if it be still doubtful whether Socrates, or any other individual we choose to name, be mortal or not, the same degree of uncertainty must hang over the assertion, All men are mortal (Mill 2004, 2.3.2).

In claiming to know that all men are mortal, in other words, one claims to know that Socrates is mortal. The syllogistic demonstration adds no knowledge in the conclusion to what is contained in the premises.<sup>3</sup>

But why should it be impossible to know that all men are mortal without knowing that Socrates is mortal? For Mill, knowledge of a general proposition such as "all men are mortal" is always arrived at by induction from particular propositions such as "John is mortal"; "Thomas is mortal"; etc. (Mill 2004, 2.3.3). In a sense we can move from knowledge of a general proposition to knowledge of another particular one, besides the particulars from which the general was inductively inferred. But this is really no different from inferring the latter particular from the former ones; the general proposition is redundant (Mill 2004, 2.3.3).

Descartes, however, has no reason to accept this analysis. As Calvin Normore notes, "Descartes does not establish the truth of universal premises by induction from singulars" (Normore 1993, 439). He does insist that particular propositions are prior to general ones in the order of discovery (AT 7.206 / CSM 2.271). But he does not claim

that general propositions are *inductively inferred* from particular ones. He is in fact not very clear on the process by which we move from particular to general notions. But some hints are given in his discussion of his *cogito* argument.<sup>4</sup> In the *Principles* we find the following:

...when I said that the proposition *I am thinking, therefore I exist* is the first and most certain of all to occur to anyone who philosophizes in an orderly way, I did not in saying that deny that one must first know what thought existence and certainty are, and that it is impossible that that which thinks should not exist... (AT 8A.8 / CSM 1.196).

There is an apparent contradiction in his saying that “I am thinking therefore I exist” is the *first* thing to occur to us and also that we must first know other things, including the general proposition “it is impossible that what thinks should not exist”. As Margaret Wilson suggests, it is possible that Descartes simply could not make up his mind about this (Wilson 1982, 50).<sup>5</sup>

A less controversial example is found in Descartes’s construal of his ontological argument in the Fifth Replies:

That which we clearly and distinctly understand to belong to the true and immutable nature, or essence, or form of something, can be truly asserted of that thing. But once we have made a sufficiently careful investigation of what God is, we clearly and distinctly understand that existence belongs to his true and immutable nature. Here we can now truly assert of God that he does exist (AT 7.115-6 / CSM 2.83).<sup>6</sup>

Here the order of Descartes’s reasoning seems to run quite clearly from a general proposition – what is clearly and distinctly perceived to belong to the essence of anything can be truly asserted of that thing – to a particular one – existence can be truly asserted of God.

Although this textual evidence is not decisive, there is enough here to suggest that Descartes allows for the possibility of deducing new particular propositions from general ones. At best he suggests only that a general proposition cannot be explicitly known until *some* particular proposition instancing it is explicitly known – and even this

is ambiguous.<sup>7</sup> Nothing Descartes says implies that *every* particular instance of a general proposition must be known before the general proposition itself is known. Consider his way of proceeding in the Third Meditation: from the particular case of the *cogito* he reasons to the general principle, that whatever I perceive clearly and distinctly is true, and then goes on to deduce what seem to be hitherto unknown – or at least hitherto uncertain – *new* particular propositions, for instance the existence of God, from it.<sup>8</sup> There is no good textual case for projecting onto Descartes the Millian view that to know a general proposition is already to know *all* of its particular instances. It is unlikely to be the basis of his critique of the syllogistic.

For another contrast with my proposed reading, Stephen Gaukroger has proposed two interpretations of Descartes's critique of the syllogism.

The first reads Descartes as stating a traditional criticism, made for instance in Sextus Empiricus's *Outlines of Pyrrhonism* (Gaukroger 1989, 11–15). Sextus has an argument against proofs in general, which applies to the case of a categorical syllogism in the following way. Suppose we are unsure of the truth of the statement: “the fair is good”. In that case, the syllogistic reasoning, “The just is fair; the fair is good; therefore the just is good”, will be inconclusive, since one premise is uncertain. On the other hand, suppose we are certain of the truth of “the fair is good”. In that case, with that certainty in the background, we should be able to infer “the just is good” directly from “the just is fair” on its own. This means that the syllogistic is incomplete:  $SaM \therefore SaP$  is not a valid syllogistic form. It also shows, at least on the principles of the philosophers whom Sextus is attacking, that the syllogistic is unsound.  $SaM; MaP \therefore SaP$ , which is ruled valid in the syllogistic, is shown to have a redundant premise, and on the Stoic theory Sextus is attacking an inference with a redundant premise is invalid.<sup>9</sup>

Gaukroger points out some weaknesses of Sextus's argument in the passage cited. But, independently of these, it is clear that the argument does not show what Descartes aims to show. There is some similarity between the two critiques, insofar as both Sextus and Descartes suggest that there are valid arguments that escape the syllogistic and invalid arguments ruled valid by it. But a major difference is that Descartes does believe there to be valid syllogisms. He becomes irritable when Bourdin accuses him of rejecting the syllogism, answering that he has "always been prepared to use syllogisms when the occasion required it" (AT 7.522 / CSM 2.355).<sup>10</sup> We saw one example with his reconstruction of his ontological proof. If Descartes had regarded syllogisms as *inherently* either useless or invalid, as Sextus seems to do, he would not have used them.

Sextus has another criticism of the syllogistic, however. He offers it despite having already dispensed with proofs in general, explaining that he is doing so because the Peripatetics and Stoics pride themselves so much upon their syllogisms. It is roughly the same as Mill's critique and runs as follows:

... whenever they argue "Every man is an animal, and Socrates is a man, therefore Socrates is an animal," proposing to deduce from the universal proposition "Every man is an animal" the particular proposition "Socrates therefore is an animal", which in fact goes ... to establish by way of induction the universal proposition, they fall into the error of circular reasoning (Sextus Empiricus 1933, 2.196, p.276–8.).

As we have already seen, Descartes is unlikely to have accepted the premises behind this critique.

The second of Gaukroger's interpretations of Descartes's critique concerns what Aristotle refers to as *demonstrative* syllogisms (Gaukroger 1989, 16–18). A demonstrative syllogism is one with a particular and a universal premise, aiming at explanation. Its aim is to show, as Aristotle puts it *why* (διότι) the conclusion holds

rather than merely *that* (ὅτι) it holds. An example of a non-demonstrative syllogism is as follows:

The planets do not twinkle,

That which does not twinkle is near,

Therefore the planets are near [i.e., nearer to the Earth than the stars].

This syllogism is non-demonstrative since failure to twinkle does not *explain* nearness.

That the planets do not twinkle does not explain *why* they are near. The following, by contrast, is demonstrative:

The planets are near,

That which is near does not twinkle,

The planets do not twinkle.

The nearness of the planets explains *why* they do not twinkle. Gaukroger implies that only demonstrative syllogisms are informative: “the latter produces understanding, the former does not” (Gaukroger 1989, 17). He then notes how Aristotle proposes that we can know the difference between demonstrative and non-demonstrative syllogisms “by a form of intellectual insight which he calls *voũς*”. Yet he asks: “what exactly is the difference that we are supposed to recognise?” So long as “it remains obscure what distinguishes the conclusions of demonstrative and non-demonstrative syllogisms ..., we have no protection against Sextus’ charge of circularity” (Gaukroger 1989, 17).

I cannot easily follow Gaukroger’s reasoning here. His point seems to be that if the distinction between demonstrative and non-demonstrative syllogisms cannot be explained, all syllogisms are at risk of being non-demonstrative and thus uninformative. But the fact that the difference cannot be *explained* does not entail that it cannot be *recognised*. Moreover, it is not clear why it would be a problem for the syllogistic if all syllogisms turned out to be non-demonstrative. Gaukroger’s implication is, if I read him

rightly, that a syllogism will be circular if its conclusion explains one of its premises, as in the first of the two examples above. But there is no obvious circularity in an argument whose conclusion explains its premises. An argument is circular if one cannot know *that* the premises are true without first knowing *that* the conclusion is true; it does not matter if one cannot know *why* the premises are true without knowing the conclusion or anything else.<sup>11</sup> One can easily know that something is true without knowing why; Descartes's follower Christoph Wittich gave the Mysteries of the Faith as examples of knowledge ὄτι that cannot possibly (for us) be accompanied by knowledge διότι.<sup>12</sup> Primitive axioms in a formal system might be another example.

Perhaps Gaukroger believes that Descartes's complaint is only that syllogisms are not capable of being demonstrative. This does seem to be along the lines of the complaint that, for example, Francis Bacon had about the syllogistic (Bacon 2000, § 13, § 105).<sup>13</sup> But it does not explain why Descartes expresses himself the way he does: the problem that syllogisms cannot explain why their conclusions are true seems entirely independent of the fact (if it is a fact) that they cannot be formed until their conclusions are already known.

Since all the arguments examined above, with the exception of Sextus's first, aim at showing the syllogism to be inherently *circular*, it is worth reminding ourselves that Descartes never makes this accusation against it. Descartes complains that the truth derived in a syllogism must be known in advance of the construction of the syllogism. He does not argue that the conclusion of a syllogism must be *contained in its premise(s)*. In his harshest criticism of the syllogistic, he claims that it is nothing but a way of "explaining to others the things one already knows or even, as in the art of Lully, for speaking without judgement about matters of which one is ignorant" (Preface to the French *Principles*, AT 9B.13 / CSM 1.186). It is difficult to see how an inherently circular

argument could serve either purpose. If B is contained in A then the argument  $A \therefore B$  seems no more didactically useful than the argument  $B \therefore B$ . Likewise for “speaking without judgement about matters of which one is ignorant”, as in the art of Lully. If neither A nor B is known then it might yet be informative to say that  $A \therefore B$ . But if B is contained in A then  $A \therefore B$  is no more informative than  $B \therefore B$ .

### 3. My reading

Descartes is well aware that the knowledge that *B follows from A* is distinct from the knowledge that A and that B.<sup>14</sup> He gives the example of knowing not only that  $2+2=4$  and that  $3+1=4$  but additionally that these two together entail that  $2+2=3+1$  – not, that is, simply that  $2+2=3+1$ , but rather that this “proposition follows necessarily from the other two”.<sup>15</sup> He is therefore well placed, as perhaps Mill and Sextus are not, to recognise that even a syllogism proving a truth already known can yield some new knowledge. To one who knows that A and that B, the argument that  $A \therefore B$  can still newly reveal *that B follows from A*. Why, then, should the syllogistic only be useful for the two purposes Descartes lists? Can it not also be useful for a third purpose, namely that of logically connecting up propositions that one knows independently – of determining which of the things one knows follow from which others?

I propose that Descartes believed the syllogistic to be useless for that third purpose because: (i) intuition (and what Descartes calls “deduction”, which is intuition plus memory) is already sufficient for that purpose and (ii) syllogistic without intuition is unreliable and inconclusive.<sup>16</sup>

To appreciate both points, we need only examine the example just given. Descartes is clear that we can know by intuition that  $2+2=3+1$  follows from  $2+2=4$  and  $3+1=4$ . By knowing the latter two propositions one easily reaches the first, without

explicitly applying any formal decision method. But can we be sure that we have not applied the syllogistic implicitly? Taking “2+2”, “3+1”, and “4” as terms and assuming arithmetic statements to be of universal quantity, we can construct the following perfect *Barbara* syllogism:

(A) 2+2 is 4; 4 is 3+1  $\therefore$  2+2 is 3+1.

In reaching the conclusion from the premises, did we perhaps implicitly run through such a syllogism in our minds, without full awareness we were doing so? One reason to doubt this is that the argument seems no less compelling in the following form:

(B) 2+2 is 4; 3+1 is 4  $\therefore$  2+2 is 3+1.

But this has the form of a second-figure syllogism without a negative premise; the syllogistic would rule it invalid. Yet it is no less intuitively obvious that the conclusion follows from the premises with the terms in (B) than in (A). One might insist that in (B) we implicitly rearrange the terms to derive the valid syllogism, but how do we know this is permissible? It is not permissible in the argument:

(C) 7 is prime; 2 is prime  $\therefore$  7 is 2.

Here a medieval logician could make a number of points concerning the *supposition* of terms like “2” and “prime” in these propositions, and how this affects the conversion of the propositions. Suppose a convention to be in place such that numbers are always read with implicit universal quantity. Thus in (B), “3+1=4” would be read with universal quantity for both “3+1” and “4” – “every 3+1 is every 4” – whereas “7 is prime” in (C) would be read with universal quantity for “7” but *not* for “prime”. Then, according to the rules Terence Parsons draws from a variety of fourteenth-century sources, we would have distributed supposition for both terms in “3+1=4”, contrasted with distributed supposition for the subject term and merely confused supposition for

the predicate term in “7 is prime” (Parsons 2014, 7.4). This would then explain why the former can be converted to an A-proposition – “every 4 is (every) 3+1” – whereas the latter can only be converted to an I-proposition – “some prime is (every) 7”. Therefore converting “3+1=4” gives a valid *Barbara* form to (B), whereas converting “7 is prime” gives (C) an invalid AIA form.

But Descartes would be on solid ground replying that such rules, applied in this case, look like *ex post* rationalisations for what any mathematically competent person already knows by simply looking at the examples. It is *prima facie* plausible that we only know we can rearrange the terms to form a valid syllogism in the one case and not the other *because* we know by intuition that the argument is valid in one case and not the other. At any rate Descartes is on solid ground with this example since, as Nelson notes: “It had always been fairly obvious that practical mathematical reasoning rarely fit into the formal straightjacket of Aristotelian syllogistic logic” (Nelson 2015).<sup>17</sup>

We still need to work out what Descartes means by “intuition”.<sup>18</sup> Let us begin by examining what Descartes has to say in comparing his own favoured method – one involving intuition – with the syllogistic:

This is the sole respect in which we imitate the dialecticians: when they expound the forms of the syllogisms, they presuppose that the terms or subject-matter of the syllogisms are known; similarly, we are making it a prerequisite here that the problem under investigation is perfectly understood. But we do not distinguish, as they do, a middle term and two extreme terms. We view the whole matter in the following way. First, in every problem there must be something unknown; otherwise there would be no point posing the problem. Secondly, this unknown something must be delineated in some way, otherwise there would be nothing to point us to one line of investigation as opposed to any other. Thirdly, the unknown something can be delineated only by way of something else which is already known (*Rule 13*, AT 10.430 / CSM 1.51-2).

The sort of problem he describes appears to be one in which the value of some bound variable – an “unknown something” delineated by way of something known – is to be

determined. This explains the relevance of the distinction between middle and extreme terms in the syllogism, since one version of the sort of problem to which Descartes refers is that of finding the middle term in a syllogism.

Suppose, for instance, we face the incomplete syllogism: All whales are  $x$ ; all  $x$  are warm-blooded; therefore all whales are warm-blooded. One solution to the problem is that  $x$  is “mammals”. Such exercises were popular during the Middle Ages, and at least one tradition believed the finding of middle terms in demonstrative syllogisms to be the main business of science (Kretzmann et al. 1988). But Descartes recognises that this is a special case of a more general kind of problem. Breaking the fetters of the syllogistic, we can look for a general method for solving the general problem – that is, solving for an unknown value, delineated in terms of known values, without requiring that the unknown value be the middle of a syllogism and the known values be extremes.

Descartes gives the example of riddles. The riddle of the Sphinx, as a Cartesian problem, can be expressed as follows:  *$x$  is four-footed in the morning;  $x$  is two-footed at midday;  $x$  is three-footed in the evening;  $x = ?$*

There is not much use in trying to construe this as a syllogism with a missing middle. Nevertheless, there is a clear similarity to the problem of finding middle terms, in that finding the right value for  $x$  will result in a valid argument: if  $x$  is a human then  $x$  is four-footed to begin with, etc. The problem of the riddle is to find one value of  $x$  such that there is a valid inference from the statement that  $x$  possesses that value to the conjunction of the statements ascribing properties to  $x$ . Calling the conjunction of the given statements  $F$ , the problem is to find some  $a$  such that  $x=a \models Fx$ . There may, of course, be more than one solution. Descartes claims that his method also applies to imperfect problems as well as perfect problems. From his examples, I infer that an imperfect problem is one with multiple possible solutions. One of his examples is a

simple curve-fitting problem: we can know “the nature of sound” from knowing that the same sound (presumably the same pitch, measured on some scale) is produced by one string, by another twice as thick and tensioned with a weight twice as heavy, and by a third twice as long, not as thick, and tensioned with a weight four times as heavy.<sup>19</sup> Here the problem seems to be that of finding a function  $f(l, t, w)$ , such that the arguments  $(1,1,1)$ ,  $(1,2,2)$ , and  $(2, \frac{1}{2}, 4)$  all generate the same value.<sup>20</sup> There are, of course, indefinitely many correct solutions to this problem. But for any correct solution, for instance  $f(l, t, w) = \frac{t}{w} 2^{l^2}$ , there will be a valid inference from the solution to the givens of the problem; that is,  $f(l, t, w) = \frac{t}{w} 2^{l^2}$  entails  $f(1,1,1) = f(1,2,2) = f(2, \frac{1}{2}, 4)$ . Descartes promises to outline a method for reducing every imperfect problem to a perfect one, a promise left unfulfilled. We can suppose he had in mind a way of specifying problems to the point that each only has one solution; for instance further conditions might be imposed on the unknown  $f(l, t, w)$  such that only one function will be capable of both meeting them and generating the given results. In that case there will be a valid inference not only from the solution to the givens but also from the givens to the solution. In this way we can see how problems and inferences are related in Descartes’s thought.

That there are non-syllogistic problems for Descartes indicates that there are non-syllogistic inferences. We already know that we can solve Cartesian problems without a formal method. The problem of finding middle terms yields to no such method; what Aristotle offers in the *Topics* are tips and guidelines rather than methodical rules. Llull (Lully) promises an art for finding middle terms, but for all the mechanical interest of his whirling apparatuses the information they contain is no more than a list of middles for a fixed set of extremes (Bonner 2007, 219ff.). Burgersdijck’s

logic textbook – an example of a general type from the period – gives a set of mnemonics for working out which *sort* of middle term is needed to prove a particular proposition; for instance, to prove a universal affirmative proposition we need the middle term to be the antecedent of the predicate and the consequent of the subject (Burgersdijck 1644, 2.10.3). But knowing these required formal properties does not tell us how to find the required middle terms. That remains a matter of intuition or anyway some sort of informal process.

Why, then, cannot the same informal faculty be invoked in judging the validity of the inferences produced when the problem is solved? The inference “if something is a human then it is four-footed in the morning, two-legged at midday, and three-legged in the evening” is implicated in the solution to the riddle of the Sphinx. Whatever faculty we use to solve the riddle goes beyond the syllogistic and the techniques for finding middle terms. This faculty is what I believe Descartes refers to as “intuition”.

Descartes recognises, as Dutilh Novaes puts it, that:

[t]he syllogistic system is a clear case of undergeneration w.r.t. the intuitive notion of logical validity: all valid syllogistic patterns are indeed intuitively valid, but the group of valid arguments described by syllogistics is but a very small subset of all intuitively valid logical arguments (Dutilh Novaes 2005b, 115).

This is far from being a new recognition on Descartes’s part. Dutilh Novaes notes that early theories of *consequentiae* explicitly recognised that the syllogistic system chronically undergenerates; logicians then turned to Aristotle’s *Topics* to expand the range of consequences accepted as logically valid (Dutilh Novaes 2005b, 115). The fact that we can recognise this undergeneration shows that we must have an intuitive sense of validity going beyond the formal constraints of the syllogistic. This can explain why Descartes claims that “truth often slips through the fetters” of the syllogistic – or, more properly, validity often slips through its fetters.

But it does not explain why Descartes claims that it is impossible to construct a syllogism with a true conclusion without already knowing the *substance* of that conclusion. Elsewhere Descartes identifies the substance of a proposition with its terms.<sup>21</sup> To explain what he means by claiming that one cannot construct a valid syllogism without knowing its terms, and *thus* knowing the truth deduced in the syllogism, I find it helpful to turn to the Port-Royal Logic, a work that examines the syllogistic from a position informed by the thought of Descartes.<sup>22</sup>

#### 4. Examples from the Port-Royal Logic

The key examples are in Part Three, Chapter Nine of the Port-Royal Logic, which begins with a passage that strongly echoes Descartes's warnings about dialectic. Logic can be as harmful to some as it is useful to others, and those who are most harmed by it

attach themselves more to the external shell of the rules than to good sense, which is their soul; thus they are brought easily to reject as deficient reasoning that is perfectly good. They have not enough light to adjust the rules, which can only serve to deceive because they are understood imperfectly (Arnauld and Nicole 1992, 3.9, 190).

One example of this hypercorrection can be found in response to the following syllogism:

Divine law commands that we honour kings;

Louis XIV is a king;

∴ Divine law commands that we honour Louis XIV.

There are, says the Port-Royal Logic, “persons of little intelligence”, who assert that this syllogism is vicious, on the grounds that it is in the second figure yet has no negative premise. This analysis divides up the terms as follows:

S = “Divine law commands that we honour”

M = “king(s)”

P = "Louis XIV".

But the authors object to taking "kings" as the predicate of the major. They give two arguments. First, kings are not affirmed of the divine law in the proposition. Second, they have argued elsewhere that the predicate of a proposition is always restricted by its subject, but here "kings" is taken generally rather than being restricted (Arnauld and Nicole 1992, 2.17).

Neither argument is compelling in its own right. First, "kings" in the major is predicated not of "divine law" but of "divine law commands that we honour". We can read this as saying that it is true of (some of) *what divine law commands that we honour* that they are *kings*. The Port-Royal Logic analyses affirmative propositions as statements about the coextension of classes; in this case coextension is ascribed to the classes, *things that divine law commands that we honour* and *kings*. This seems a perfectly legitimate analysis. As for the second point, according to the Port-Royal Logic's principles of analysis, we should read the extension of "kings" as implicitly restricted by "divine law commands that we honour", since, in an affirmative proposition, we must take the extension of the predicate to be restricted by that of the subject (Arnauld and Nicole 1992, 2.17 - Axiom 4). Thus "kings" refers not to kings in general but only to those kings that divine law commands that we honour. And then if we analyse the major premise according to the principles of the Port-Royal Logic, the syllogism turns out to be formally invalid, just as the persons of little intelligence propose. Since the extension of "kings" is restricted by "divine law commands that we honour", and since nothing in the premises assures us that Louis XIV falls into that extension, the conclusion does not follow formally. This intuitively unwarranted verdict on validity results from the unprejudiced application of the Port-Royal principles of analysis, contrary to the authors' claim that their principles help us to *avoid* the unwarranted verdict.

At any rate, the authors propose that the verdict *is* unwarranted, and to show this they go on to rewrite the syllogism in this form:

Kings should be honoured;

Louis XIV is a king;

∴ Louis XIV should be honoured.<sup>23</sup>

Now the syllogism is perfectly valid in standard *Barbara*: “kings”, being in the subject position, is now unrestricted (predications of singular terms are again taken as universal). The question is: how do we know that this is a better way to construe the syllogism? Nothing on the surface of the original argument indicates that rewriting should be needed. It is only because rewriting allows us to avoid the unwanted verdict of invalidity that we find it preferable. Thus, rather than using the formal rules of syllogistic to decide validity, we use our knowledge of validity to express the syllogism in the right natural form – the natural form that allows the syllogistic rules to generate the result we *already* know to be correct concerning validity.

Appealing to the categories of an earlier logical theory, we might say that in the syllogism expressed in the original form there is true *material* consequence but not true *formal* consequence.<sup>24</sup> The premises really do entail the conclusion, though not on account of their logical form, at least not their explicit form. The business of the logician in such a case is not to reject the material consequence because of the lacking formal consequence. It is rather to rephrase the propositions until they instance a valid form. But this requires a knowledge of material consequence that is independent of knowledge of syllogistic.

The same knowledge is required where propositions can be construed in such a way as to instance a valid form while forming a materially invalid argument. The Port-Royal Logic also contains an example of this sort:

We should believe Scripture;  
Tradition is not at all Scripture;  
∴ We should not believe tradition.

The terms could be assigned as follows: S = “We should believe”; M = “Scripture”; P = “tradition”. The mood of the syllogism is then: SiM; MeP (by conversion) ∴ SoP, which is Ferio – a valid mood. But we can see intuitively that the argument is invalid. The trick occurs at the final SoP-form proposition. A proposition in that form, with the terms as defined, makes at first the ungrammatical: “some *we should believe* is not *tradition*” – this is what Lewis Carroll calls the normal form of the proposition (Carroll 1986, 67). It is not immediately obvious how to turn this into something more grammatical. But “we should not believe tradition” does not seem a bad candidate. After all, the first proposition in the syllogism – “We should believe Scripture” – corresponds to the normal form: “Some *we should believe* is *Scripture*”. The concluding proposition is grammatically isomorphic, with the addition of a negation operator.<sup>25</sup> What warns us against this rendering in this context, however, is the fact that the conclusion thus expressed plainly does not follow from the premises given. We can see intuitively that what *does* follow is, rather, “some of what we should believe is not tradition”. And so we know that this is how we should construe the final SoP proposition if the syllogism is to be valid. Again, we know this not by the syllogistic; rather, it is the knowledge we require to avoid drawing an incorrect result concerning validity from the syllogistic.

For their part, the authors of the Port-Royal Logic suggest that we rewrite the whole argument as follows:

Scripture should be believed;  
Tradition is not Scripture;  
∴ Tradition should not be believed.

Now the assignments of terms are: S = "Tradition"; M = "Scripture"; P = "should be believed", and the mood is: MaP; SeM  $\therefore$  SeP – a vicious mood. We can see that this is a superior formal analysis, since it brings out the intuitively apparent invalidity of the argument.

In both this case and the previous one, the rules of syllogistic are no use to us unless we *already know* whether or not the conclusion follows from the premises. We know this, as Descartes proposes, because we know about the *terms* – the substance – of the syllogism. Just understanding the meanings of the propositions is enough for us to see whether or not the conclusions follow from the premises.

Stephen Read, in discussing the difference between formal and material validity, points out that every argument is an instance of an invalid form; for instance, every two-premise argument is of the (invalid) form: P, Q  $\vdash$  R (Read 1994, 248). Likewise pretty well any syllogism in natural language can be rendered an instance of an invalid form: reading "men" and "a man" as distinct terms we can make the syllogism "Socrates is a man; all men are mortal; therefore Socrates is mortal" an invalid four-term syllogism. The traditional syllogistic does not include rules for how to treat different words in natural language as forming one term, nor one word as distinct terms where the word is equivocal. Some help might be given by theories of supposition. Descartes, for his part, does not directly discuss supposition. But, again, it is *prima facie* plausible that no knowledge of such theories is necessary to see the appropriateness of rewriting certain arguments in natural language so that the syllogistic gives the correct ruling on validity. Quite the reverse, such knowledge is indispensable in working out a viable theory of supposition.

As I read him, Descartes's point is that we can always intuitively recognise the *material* validity or invalidity of an argument – the relation between the truth of its

premises and conclusion – and that it is this knowledge that inspires us to look for a way to show the same argument to be *formally* valid.<sup>26</sup> Even if we cannot find such a way, we continue to know that the argument is valid. And contrariwise, even if our formal theory overgenerates, providing forms under which a materially invalid argument appears to be valid, we do not change our view of its material invalidity. Instead we are motivated to correct our formal analysis. Whether or not this is true of modern theories of formal logic, Descartes’s claim that it is true of the syllogistic is well-supported by his examples and those of the Port-Royal Logic.

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## Notes

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<sup>1</sup> Rule 10, AT 10.406 / CSM 1.36.

<sup>2</sup> Alan Nelson also calls the Port-Royal Logic "a virtual compendium of Cartesianism" (Nelson 2015, 252)

<sup>3</sup> Mill identifies the syllogistic as an instance of the more general "paradox of deduction". On this paradox in relation to Descartes see Rogers and Nelson (2015).

<sup>4</sup> I do not mean to undertake a full analysis of the *cogito* argument, nor to address the contested questions of whether it is in fact an inference and, if so, what sort of inference. An unrepresentative sample of the literature on these and related questions: Hintikka (1962); Kenny (1968, ch.3); Williams (1990, ch.3); Wilson (1982, 45–62); Alanen (1981); Markie (1998).

<sup>5</sup> See also Frans Burman's report of his conversation with Descartes on this point (AT 5.147 / CSM 3.333).

<sup>6</sup> I thank an anonymous reviewer for pointing out the salience of this example to me.

<sup>7</sup> See the passage quoted in note 5.

<sup>8</sup> AT 7.35 / CSM 7.24.

<sup>9</sup> Gaukroger points this out, linking to an article by Jonathan Barnes: Gaukroger (1989, 20); Barnes (1969)

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<sup>10</sup> See also AT 7.544 / CSM 2.371. It might be replied that Descartes could have changed his mind about syllogisms between writing the *Rules* and writing the *Replies*. But elsewhere in the *Replies* Descartes offers a warning about becoming too trapped in the method of “the Dialecticians”, which somewhat echoes the criticism in the *Rules* – AT 7.206 / CSM 2.271.

<sup>11</sup> We might need to add “certainly” to each instance of “known” here, if we follow Normore’s thesis that the validity of arguments, for Descartes, concerns the transmission of certainty (Normore 1993).

<sup>12</sup> Wittichius (1653, 1.2.3,8) See Douglas (2015, 98)

<sup>13</sup> See Charrak (2005)

<sup>14</sup> It is not my purpose here to specify what Descartes means in saying that one proposition *follows from* another. On this vexed question, see (Gaukroger 1989; Normore 1993; Rogers and Nelson 2015; Owen 2002, 13–29; David B. Wong 1982)

<sup>15</sup> AT 10.369 / CSM 1.15.

<sup>16</sup> I do not mean to imply that “deduction is intuition plus memory” is all there is to be said about Descartes’s theory of deduction. For more discussion, see, in addition to the sources cited in note 14 above, Clarke (1977); Recker (2008)

<sup>17</sup> Nelson refers to: Mancosu (1999)

<sup>18</sup> A detailed discussion of the nature of intuition, and the objects towards which it is directed, can be found in Nelson (2015)

<sup>19</sup> AT 10.431 / CSM 1.52.

<sup>20</sup> *l* is length of string, *t* is thickness, and *w* is tension weight. I substitute “half as thick” for Descartes’s vague “not as thick”.

<sup>21</sup> Rule 10: AT X.408 / CSM 1.37.

<sup>22</sup> See note 2 above. Note also that one of the main authors of the Port-Royal Logic, Antoine Arnauld, was a close friend and follower of Descartes and a loyal defender of his system against rivals. Among other relevant works, see: Ndiaye (1991); Kremer (1996); Nadler (1989); Schmaltz (2002); Moreau (1999).

<sup>23</sup> The clause “divine law commands” is excluded from the logical form as a mere “incidental proposition”, akin to “who was son of Philip” in the proposition “Alexander, who was son of Philip, defeated the Persians” (see Arnauld and Nicole 1992, 2.7, 117)). But we need not quibble about this; somebody who wanted to treat it as essential could simply replace “honoured” with “honoured according to divine law”, with the same result respecting the validity of the syllogism.

<sup>24</sup> “Consequences are divided thus: some are material, others are formal. A formal consequence is one which holds in all terms, given similar mutual arrangement (*dispositio*) and form of the terms. A material consequence is one which does not hold in all terms given similar mutual arrangement and form so that the only variation is in the terms themselves.” – Pseudo-Scotus, quoted in Bocheński (1961, § 30.12).

<sup>25</sup> An alternative would be to analyze the first proposition as being of the form SaP. But then by parity the final proposition, which is grammatically identical with the addition of a negation operator, should be of the form SeP. And then, again, we have a valid mood – Celarent – with the false conclusion.

<sup>26</sup> Modern philosophers of logic might be inclined to ask what it means to say that the conclusion follows from the premises in this case. It cannot mean that the conclusion can be formally inferred from the premises. Sources discussing this problem in relation to Descartes are given above, but some modern discussions are found in Kapitan (1982); Read (1994); Etchemendy (1999); Dutilh Novaes (2005b).

For pre-Cartesian historical background, see Dutilh Novaes (2007, Part 2, 2005a); Klima (2016).