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DESCARTES' SKEPTICAL AND ANTISKEPTICAL ARGUMENTS*

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INTRODUCTION

In the first *meditation* Descartes constructs a series of skeptical arguments which culminates in the argument from the possibility of a deceiving God. He formulates the argument in this way:

> Nevertheless I have long had fixed in my mind the belief that an all powerful God existed by whom I have been created such as I am. But how do I know that he has not brought it to pass that there is no earth, no heaven, no extended body, no magnitude, no place, and that nevertheless (I possess the perceptions of all these things and that) they seem to me to exist just exactly as I now see them? (HR I 147)[1]

One of the premises of this argument is 'I (Descartes) do not know that a deceiving God does not exist' and the argument's conclusion is 'I do not know that the earth exists that there are extended bodies, that $2 + 3 = 5$, etc.' But why does Descartes think that the failure to know that there is no deceiving God undermines all this other knowledge? In Section II of this paper I examine various answers to this question by formulating versions of the deceiving God argument in a system of epistemic logic. In Section III Descartes' antiskeptical argument is discussed and I propose an interpretation of it that apparently eludes the familiar charge of circularity. In the final Section I compare Descartes' attempted validation of clear and distinct perception with Hilbert's strikingly similar program of validating classical mathematics. The comparison both illuminates the charge of circularity and suggests that Descartes' program cannot succeed.

To understand Descartes' skeptical and antiskeptical arguments one must understand his conception of knowledge. Section I examines what he variously calls 'perfect knowledge', 'true science', and 'true and certain knowledge'.[2]

I

Descartes distinguishes what he calls 'true and certain knowledge' from unstable and changeable opinion' in the following passage:

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> Though my nature is such that while I am perceiving something very clearly and distinctly, I cannot but believe it is true, I am also of such a nature that I cannot always keep my mind fixed on the same thing so as to perceive it clearly. The memory of a judgement that I have previously made often comes back to me when I am no longer attending to the reasons on which I based the judgement, and other reasons can be brought to bear that would readily dislodge this opinion if I had no knowledge of God. I should never then have true and certain knowledge of anything, but only unstable and changeable opinions (HR I 183–4).

Descartes is saying that for the judgment that p to qualify as knowledge one's reasons for p must be sufficiently strong to insure stability of belief. They must be sufficiently conclusive to exclude reasons which would dislodge the belief that p. While that much is clear, one matter on which commentators are divided is whether or not clearly and distinctly perceiving that p provides this kind of guarantee. Is clearly and distinctly perceiving that p sufficient to know that p? According to one interpretation as long as a person clearly and distinctly perceives that p he knows that p. On this view Descartes is claiming in the cited passage that although clear and distinct perception that p is sufficient for knowledge the memory of clear and distinct perception is not. If someone merely remembers having clearly and distinctly perceived that p his belief can be dislodged by the suggestion that his memory has deceived him or that there is a deceiving God who has produced a deceptive memory in him. Commentators who interpret Descartes in this way see the proofs of the existence of a non-deceiving God as required to validate the memory of clear and distinct perceptions.[3]

Recently a number of commentators have persuasively argued that the preceding interpretation misconstrues the relationship between clear and distinct perception and knowledge.[4] An alternative reading of the passage is that a person's clearly and distinctly perceiving that p is a necessary but not sufficient condition for his knowing that p. Even if he clearly and distinctly perceives that p he does not know it if there is some reason not excluded by his knowledge which can be brought forward at a later time to dislodge the belief that p. Descartes' reference to a time at which p is clearly and distinctly perceived and a later time at which this is merely remembered is explained by his holding that "while I am perceiving something very clearly and distinctly I cannot but believe it is true". So even if there is some reason q which is incompatible with one's knowing p, that reason cannot dislodge the belief that p as long as p is clearly and distinctly perceived. On this interpretation even if a person clearly and distinctly perceives that p there may be reasons which undermine his claim to know that p but those reasons cannot

actually dislodge the belief that p until he no longer clearly and distinctly perceives it.

Strong evidence for the view that clear and distinct perception is not sufficient for knowledge is found in the *Replies*:

> That an Atheist can know clearly that the three angles of a triangle are equal to two right angles, I do not deny. I merely affirm that, on the other hand, such knowledge on his part cannot constitute true science, because no knowledge that can be rendered doubtful should be called science. Since he is, as supposed, an Atheist, he cannot be sure that he is not deceived in the things that seem most evident to him, as has been sufficiently shown; and though perchance the doubt does not occur to him, nevertheless it may come up, if he examines the matter, or if another suggests it; and he can never be safe from it unless he first recognizes the existence of God (HR II 39).

Descartes admits that an atheist can clearly know, that is clearly and distinctly perceive, the geometrical theorem. But he insists that the atheist does not have scientific knowledge of the theorem since for all he knows there may be a deceiving God and that is a reason which undermines knowledge of the theorem.

The passage from the *Meditations* and the *Replies* make it clear that Descartes' conception of knowledge is exceptionally stringent. He appears to have held that a person's claim to know that p could be defeated by producing a proposition q which the person does not know to be false but which if it were true would be incompatible with the knowledge claim. The atheist does not know that he is not deceived even in the things that seem most evident to him. If he were deceived then he would not know that the three angles of a triangle are equal to two right angles. It follows, according to Descartes, that he does not know that the three angles of a triangle are equal to two right angles. Another illustration of this principle is found in Descartes' dream argument. Descartes holds that the proposition that he is dreaming is incompatible with his knowing that he is dressed and seated by the fire. So unless he knows that he is not dreaming he does not know that he is dressed and seated by the fire.

This characterization of Descartes' conception of knowledge is imprecise as long as we do not specify what it means for a proposition q to be incompatible with a person A's knowing that p. There are a number of possibilities here. First, q might be incompatible with p or it might be incompatible with A's having sufficient evidence to know that p. I will argue in Section II that Descartes' view is that q is incompatible with A's knowing that p if either incompatibility obtains. Supposing this, there are two formulations of my characterization that I want to consider:

(*P*) If there is a proposition q such that A does not know that q is false and if A knows that if q is true then he does not know that p then he does not know that p.

(*P**) If there is a proposition q such that A does not know that q is false and q logically implies that A does not know p then he does not know that p.

While Descartes never explicitly characterizes his account of perfect knowledge as conforming to either (*P*) or (*P**), I will argue that good and interesting sense can be made of his skeptical and anti-skeptical arguments if we suppose that his notion of knowledge does conform to one of these principles. There is little difference between the two but for the purposes of this paper I will mainly employ (*P*).[5]

There is an important relationship between (*P*) and clear and distinct perception. Harry Frankfurt remarks that "Clear and distinct perception is a matter of recognizing that there are no reasonable grounds on which a proposition can be doubted"[6]. This is correct if he means that someone who clearly and distinctly perceives that p cannot but believe that p. But if he means that someone who clearly and distinctly perceives that p then his belief cannot be rendered doubtful then Frankfort is wrong. The atheist clearly and distinctly perceives that the sum of the angles of a traingle is equal to two right angles but there are reasonable grounds for doubting that he knows p. The apparent conflict between Descartes' example and Frankfurt's account can be dissolved by distinguishing first order from second order reasons for doubt.[7] First order reasons for doubting p are reasons for doubting the truth of p. Second order reasons for doubt are grounds for doubting that the reasons one has for believing p are sufficiently strong. They cast doubt on the presumed connections between evidence and what it is evidence for. Clearly and distinctly perceiving that p is a matter of recognizing that there are no first order grounds for doubt. But there may be second order reasons for doubting that p even though p is clearly and distinctly perceived. For example, the atheist clearly and distinctly perceives that the three angles of a triangle equal two right angles since he can prove this proposition in a system of geometry. The proof leads him to recognize that there are no first order reasons for doubting the theorem. But the atheist is in no position to reply to second order objections which may be made against the soundness of the system of geometry. For all he knows the system is inconsistent but God has demonically prevented him from recognizing this.

Descartes does hold that "What I perceive clearly and distinctly cannot fail to be true" (HR I 184). I understand this to mean that it is metaphysically necessary that if a person clearly and distinctly perceives that p then p is true. I will refer to this principle as (Q). Based on the previous discussion the import of (Q) is that if there are no first order reasons for doubting p then p is true. Since true and certain knowledge requires the ability to answer all reasons for doubting, even second order ones, it requires the ability to anwer doubts concerning (Q). It is clear that Descartes thinks that if (Q) were false then true and certain knowledge would be unattainable. But this means that if Descartes is to have true and certain knowledge of anything he must know (Q). I will return to this point in Section III when I consider Descartes' reply to his skeptical arguments.

Descartes' account of knowledge can be framed in the familiar form of necessary and sufficient conditions for knowing that p as follows: A knows that p iff (i) A believes that p, (ii) p is true, (iii) A clearly and distinctly perceives that p (or correctly remembers having clearly and distinctly perceived that p), and (iv) if q if a proposition incompatible with A's knowing that p then A knows that q is false. These conditions are interrelated in a number of ways: If (iii) holds then (i) and (ii) also hold since Descartes maintains that clear and distinct perception compels belief and guarantees truth. (iii) and (iv) are related since being able to answer first order objections to knowing that p is to clearly and distinctly perceive that p. And (ii), (iii) and (iv) are related since to know that p one must be able to answer the second order objection that it may be possible to clearly and distinctly perceive that p when p is false.

Descartes' conception of knowledge places very stringent requirements on knowing, so it should not be surprising that it is easy to construct skeptical arguments based on his conception. The deceiving God argument is supposed to show that if a person does not know that there is no deceiving deity then neither does he know any of a number of other propositions, no matter how good his reasons for believing them may be. In the next section I will examine various arguments which make explicit connections between the failure to know that there is no deceiving God and the failure to know these propositions.

II

I will represent various versions of the deceiving God argument in a system of logic which is the epistemic counterpart of the modal system *T*. The following notation is used: *K* for I know that, *B* for I believe that, *J* for I clearly and distinctly perceive that, □ for it is metaphysically necessary that, *g* for a deceiving God exists, and *p* for one of the propositions subject to doubt, e.g., that 2 + 3 = 5, that there is a sky, etc. The formal system I will use is described more fully in the appendix where I also argue that Descartes' epistemic concepts conform to the axioms and rules of the system. Note that the formalizations of principles (*P*) and (*Q*) are respectively: $(-K-q \cdot K(q \supset -Kp)) \supset -Kp$ and $\Box(Jp \supset p)$.

Before discussing various formal representations of the deceiving God argument there is one feature of epistemic logics that must be discussed since it may seem to threaten my enterprise at the very beginning. The feature is that in epistemic *T* the principle

(*K*) If *Kp* and *p* logically implies *q* then *Kq*

is true. To many the fact that (*K*) holds in epistemic logics has seemed reason enough to dismiss these logics as unrealistic. After all no one literally knows all the logical consequences of what he knows and so it seems that if (*K*) is required then no one knows anything. There are a number of responses that proponents of epistemic logic have made to this criticism.[8] One is to claim that epistemic logic treats of ideal knowers who do know all the logical consequences of what they know. The trouble with this response is that none of us are 'ideal knowers' and so it is not clear how this logic is to be applied to ordinary reasoning concerning knowledge. Another response is to try to develop an epistemic logic in which (*K*) fails. However, although it is certainly too much to require that for someone to know *p* he need know *all* the logical consequences of *p* it is not at all clear what should replace this requirement. If no requirements of this sort are made then there is little left for epistemic logic to do. But most accounts of what logical consequences of *p* a person who knows *p* knows have seemed arbitrary.

Fortunately I need not settle this issue to apply epistemic logic to Descartes' argument. There are two reasons for this. First, it turns out that in the reasoning I attribute to Descartes (*K*) plays no role. I do however argue that Descartes holds that anyone is in a position to know the principles of logic and certain conceptual truths merely by reflecting on the principles and

concepts involved. A second reason is that if I am right in attributing (P) to Descartes then it turns out that he is also committed to (K).[9] While this in no way makes (K) plausible it does justify my applying epistemic logic to Descartes' arguments.

The first argument I want to consider is based on the 'idea' that if there were a deceiving God he would make 'obvious truths' false.

(1) $-K-g$
$g \supset -p$
$\therefore -Kp$

It is obvious that (1) is not valid in epistemic T (if $-g$ and Kp are true then the premises are true and the conclusion false). However, if the second premise is strengthened to $K(g \supset -p)$ then the resulting argument, (1*), is T-valid.

A disturbing feature of (1*) is that its second premise is an assertion of knowledge. How can an argument for skepticism properly make an assumption of knowledge in one of its premises? One promising answer is that there are some propositions which Descartes never doubts and which he assumes he knows throughout the *Meditations*. In the *Principles* he remarks

> And when I stated that this proposition *I think, therefore I am* is the first and most certain which presents itself to those who philosophize in orderly fashion, I did not for all that deny that we must first of all know what is *knowledge*, what is *existence*, and what is *certainty*, and that *in order to think we must be*, and such like: but because these are notions of the simplest kind, which of themselves give us no knowledge of anything that exists, I did not think them worthy of being put on record. (HR I 222)

The knowledge Descartes enumerates is knowledge of logical and conceptual truths. Since any argument, even a skeptical one, presupposes an understanding of the concepts it employs, it seems unobjectionable to presuppose a knowledge of conceptual truths in skeptical arguments. If $g \supset -p$ were a conceptual truth then perhaps the second premise of (1*) would be true. However, $g \supset -p$ does not even seem to be true, let alone analytically true. It is not part of the nature of the deceiving God that if he exists then $2 + 3 \neq 5$, and there is no sky, etc. It may be part of his nature that if he exists then he can bring it about that these propositions are true, but that is quite a different matter. My conclusion is that although (1*) is valid it fails to be a persuasive skeptical argument since its second premise is false. Since Descartes would recognize that the second premise is false (1*) cannot represent this reasoning.

Given Descartes' conception of knowledge a second way of undermining a knowledge claim is to show that the reasons which support the claim are not sufficiently conclusive to preclude contrary reasons from arising. For example, if the principle (Q) were false then clearly and distinctly perceiving that p would not guarantee that contrary reasons will not be forthcoming. A deceiving God has the power to produce a clear and distinct perception that p even if p is false so if a deceiving God exists (Q) is false. This line of reasoning suggests the following argument:

$$\begin{array}{ll} & -K-g \\ (2) & g \supset -Kp \\ & \therefore -Kp \end{array}$$

Is argument (2) valid? It is not difficult to see that it is not valid in epistemic T. However, if its second premise is strengthened to $K(g \supset -Kp)$ then the resulting argument, (2*), while still not valid in T, is valid in epistemic S4. S4 is characterized by the validity of $Kp \supset KKp$. This is the famous KK-thesis. Whether or not the concept of knowledge conforms to it has been much discussed in the literature. Hintikka has observed that a number of philosophers in the Cartesian tradition have employed a strong conception of knowledge which satisfies the KK-thesis.[10] But does Descartes hold it? He does not explicitly affirm it but it is not difficult to prove that in T the formula which expresses (P), $(-K-q \cdot K(q \supset -Kp)) \supset -Kp$, and $Kp \supset KKp$ are logically equivalent.[9] And (2*) is simply an inferential form of (P). So, if as I argued in Section I, (P) characterizes Descartes' conception of knowledge then he is committed to the validity of (2*) and to the KK-thesis.

While Descartes' conception of knowledge commits him to the validity of (2*) is he also committed to the truth of its premises? Recall that the argument is directed at someone who has not yet participated in the Meditations. Such a person would most likely not have entertained the possibility of a deceiving God before encountering Descartes' argument and would admit that he does not know that there is no deceiving God. The second premise of (2*) is a knowledge claim. But unlike the second premise of (1*) it is plausible that Descartes considered $g \supset -Kp$ to be one of those 'principles of natural light' the knowledge of which is presupposed throughout the Meditations. In fact, its truth seems to follow from his characterization of a deceiving God and his conception of knowledge. He says of God that "I

am constrained to confess that it is easy to Him, if He wishes it, to cause me to err, even in matters which I believe myself to have the best evidence" (HR I 158). So if God is a deceiver then it is possible, even though Descartes clearly and distinctly perceives that p, for p to be false. But if (Q) is false then no reasons for believing p, not even clear and distinct perception, can guarantee that reasons to the contrary will not arise. It follows that in a world governed by a deceiving God true and certain knowledge of p is unattainable. Since the preceding argument for $g \supset -Kp$ is based entirely on Descartes' own characterizations of knowledge and the deceiving God it follows that the second premise of (2*) is a conceptual principle and should be acceptable to anyone who reflects on the concepts involved.

I conclude that if Descartes' conception of knowledge is presupposed then (2*) is a sound argument, assuming that I do not yet know that a deceiving God does not exist. I think it plausible that insofar as Descartes' reasoning can be captured in a system of formal logic (2*) succeeds in doing so.

There is a third way of interpreting the argument, although this interpretation is perhaps more appropriate to the version which employs the evil genius.

> I shall suppose, that not God who is supremely good and the fountain of truth, but some evil genius not less powerful than deceitful, has employed his whole energies in deceiving me; I shall consider that the heavens, the earth, colours, figures, sound, and all other external things are nought but illusions and dreams of which this genius has availed himself in order to lay traps for my credulity (HR I p. 148).

This suggests that the evil demon is like an opponent in a game. If p is true then the evil demon will cause Descartes to believe $-p$. If Descartes believes that p then the evil demon will bring it about that $-p$. In either case, if there is an evil demon and if Descartes believes p, then p is false. The following argument emerges from these considerations:

(3) $-K-d$
$K(d \supset (Bp \supset -p))$ (In (3) 'd' stands for 'An evil domon exists')
$-Kp$

Given the KK-thesis (but not without it) and the principle that Kp implies Bp, this argument is valid.[11] But argument (3) has some features which make it interesting in its own right.

Descartes thinks that even though the possibility of the evil demon prevents him from arriving at knowledge

I may at least do what is in my power (i.e. suspend my judgement), and with firm purpose avoid giving credence to any false thing, or being imposed upon by this arch deceiver, however powerful and deceptive he may be (HR I p. 148).

By suspending judgement, Descartes can at least partially thwart the evil demon. But if it is permissable to substitute d for p in the second premise of (3) then there may *seem* to be a more effective way to combat the demon. Descartes resolves to believe that d. Notice that $Bd \cdot (d \supset (Bd \supset -d)) \supset -d$ is valid. (Of course by believing d he guarantees that at least one of his beliefs is false.) So by believing that the demon exists Descartes can insure its non-existence. But can Descartes believe that the demon exists? Curiously, although the characterization of the demon is consistent, it is inconsistent that someone believes both that the demon exists and that characterization. That is $Bd \cdot B(d \supset (Bd \supset -d))$ is inconsistent in doxastic S4.[12] These observations diminish the attractiveness of (3) as a skeptical argument since one cannot both possess d as a reason (i.e., believe that d) and also believe the characterization of the demon.

This argument is also a little less persuasive than (2*) since its second premise is stronger. The deceiving God undermines knowledge by making it impossible to ever have conclusive reasons since the deity has the power to subvert the connection between clear and distinct perception and truth. The demon is less subtle, actually falsifying each of Descartes' beliefs. But whether the reason is the existence of a threatening God or an interventionist demon it is reason enough to undermine the claim to have true and certain knowledge that p.

III

In this section I will examine Descartes' response to the deceiving God argument. I will assume that (2*) correctly formalizes the argument but my discussion is relevant to (3) as well. The issues raised by Descartes' arguments contra skepticism are complicated and subtle. The most notorious of them is the question of whether his rebuttal of the skeptical argument is viciously circular. I will try to show that if (2*) does succeed in expressing the deceiving God argument then there is one way of interpreting Descartes' rejoinder so that it is not circular, at least not in the sense that circularity is usually charged. However, there is another difficulty with Descartes' attempted validation of clear and distinct perception which is akin to circularity. The

nature of this difficulty is explained in Section IV by comparing Descartes' anti-skeptical program with Hilbert's program for securing the foundations of mathematics.

Let us suppose that a skeptic has advanced argument (2*). How can the argument be countered? Since Descartes' conception of knowledge commits him to the validity of the argument and to the truth of its second premise it is clear that a rejoinder must attack the argument's first premise. To accomplish this Descartes must show not merely that there is more reason to hold $K-g$ that $-K-g$. As long as there is any reason at all to doubt that he knows $-g$ he doesn't know it. This means that to counter (2*) he must establish $K-g$. But how can this be achieved? It might be suggested that a proof of $-g$ which results in clear and distinct perception that $-g$ is sufficient to establish $K-g$. But I have argued that while $J-g$ is a necessary condition for $K-g$ it is not sufficient. In addition, $-g$ must be true and one must be able to answer all objections, even merely metaphysical objections, that might be made against the claim to know $-g$. I also argued that iff it is known that whatever is clearly and distinctly perceived is true then these two conditions are met. If this is correct, then to establish $K-g$, one must clearly and distinctly perceive $-g$ and also establish $K \Box (Jp \supset p)$.

In the Third Meditation an analysis of the concept of God which Descartes finds in himself concludes in his claiming to clearly and distinctly perceive that a perfect God exists. He reasons that "From this it is manifest that He cannot be a deceiver, since the light of nature teaches us that fraud and deception necessarily proceed from some defect" (HR I 171). He continues that

> I experience in myself a certain capacity for judging which I have doubtless received from God, like all the other things which I possess; and as He could not desire to deceive me, it is clear that He has not given me a faculty that will lead me to err if I use it right (HR I 172).

The 'capacity for judging' which Descartes refers to is his faculty for clear and distinct perception. Since it is part of his nature that he cannot but believe what he clearly and distinctly perceives, it follows that he does not err if he clearly and distinctly perceives that a proposition is true. In other words, what he clearly and distinctly perceives is true. This argument persuades Descartes that he clearly and distinctly perceives that whatever he clearly and distinctly perceives is true. For the moment I will suppose that he is correct. He also thinks that if a perfect God exists then no deceiving

deity or demon exists. So he concludes that he also clearly and distinctly perceives that there are no deceiving deities or demons.

The situation at this stage of the argument is represented as $J-g$ and $J(\Box(Jp \supset p))$. Since Descartes clearly and distinctly perceives $-g$, his reasons for $-g$ are compelling and almost conclusive. Since he clearly and distinctly perceives that whatever he clearly and distinctly perceives is true he can meet second order challenges to his claim to know $-g$ and so his reasons are completely conclusive. However, $J-g$ and $J(\Box(Jp \supset p))$ do not logically imply $K-g$. Even though these are true it is still possible that $-g$ is, from an absolute point of view, false. Descartes seems to recognize this and comments

> What is it to us if someone should perhaps imagine that the very thing of whose truth we have been so firmly persuaded appears false to God or to an angel and that as a consequence it is false speaking absolutely? What do we care about this absolute falsity, since we by no means believe in it or even have the least suspicion of it? For we are supposing a persuasion so firm that it can in no way be removed – a persuasion, therefore, that is exactly the same as perfect certainty (HR II 41)

Frankfurt relies on this intriguing passage to support his view that "Descartes cares less about the correspondence of his beliefs to 'reality' than he does about their permanence and constancy".[13] But Descartes' point is not that correspondence with reality (absolute truth) is unimportant; it is that while it is logically possible for Jp and $J\Box(Jp \supset p)$ to be true and p false someone who clearly and distinctly perceives that p and that $\Box(Jp \supset p)$ has no reason at all to doubt that he knows p. Observe that Jp and $J\Box(Jp \supset p)$ logically imply JKp. So someone who clearly and distinctly perceives that p and clearly and distinctly perceives that whatever he clearly and distinctly perceives is true also clearly and distinctly perceives that he knows that p. Such a person is in a position to answer every challenge whether first or second order that can be made against his claim to know p.

It should now be clear why Descartes thought that although clearly and distinctly perceiving that p is generally not sufficient to remove all doubts, specifically not second order doubts, concerning p, clearly and distinctly perceiving that *God exists* does suffice te remove all doubts (HR I 184). The reason is that God's existence implies that (Q) holds so if I clearly and distinctly perceive that God exists I also clearly and distinctly perceive that no reasons contrary to this belief will arise. In other words, I clearly and distinctly perceive that I know that God exists.

If the preceding account is correct then Descartes defuses his skeptical argument by establishing that there is no reason to believe its first premise

and every reason to believe its denial, $K-g$. He believes that not only has he rebutted the deceiving God argument but that the demonstration of $J \Box (Jp \supset p)$ also rebuts any other skeptical argument that might be forthcoming. He remarks that once he has demonstrated that a nondeceiving God exists he has genuine knowledge of whatever he clearly and distinctly perceives. A skeptical argument would have to show that there is some reason to suppose that Descartes doesn't know q. But if he clearly and distinctly perceives that q and also that a nondeceiving God exists, then he, as we have already argued, clearly and distinctly perceives that he knows that q. So he clearly and distinctly perceives that no sound skeptical argument will be forthcoming.

From the very beginning Descartes' rebuttal of skepticism has been accused of circularity. Arnauld objected that

> The only secure reason we have for believing that what we clearly and distinctly perceive is true, is the fact that God exists. But we can be sure that God exists only because we clearly and evidently perceive it. Therefore, prior to being certain that God exists, we should be certain that whatever we clearly and distinctly perceive is true (HR II 92).

Arnauld seems to see the structure of Descartes' reasoning as follows:

(i) I clearly and distinctly perceive that God exists.
(ii) God exists.
(iii) If God exists then whatever I clearly and distinctly perceive is true.
(iv) Therefore, whatever I clearly and distinctly perceive is true.

The circularity consists in the fact that the truth of (iv) is required to support the inference from (i) and (ii). This argument is undoubtably circular, but if my account of Descartee' rebuttal of skepticism is correct then he did not rely on this argument. I think that Arnauld's error is in construing clearly and distinctly perceiving that God exists as a reason for believing that God exists. The reasons for holding that God exists are provided in Descartes' argument for the existence of God. Clearly and distinctly perceiving that God exists is having reasons of sufficient strength to rebut first order objections to the claim to know that God exists but it is not itself a reason for believing that God exists. A comparison with a proof in a formal system will make the matter clearer. Suppose that a mathematician claims that H is true and offers a 'proof' to support his claim. His reasons for H are the steps in the proof. But the statements that his 'proof' really conforms to the axioms and rules of the system and that the axioms are sound are not themselves additional reasons for H.

What is especially significant about clearly and distinctly perceiving that God exists is that this enables Descartes to answer not only first order objections to his claim to know that God exists but second order objections as well. This follows from his clearly and distinctly perceiving that whatever is clearly and distinctly perceived is true is a consequence of God's existence. As I have argued, once Descartes clearly and distinctly perceives that whatever is clearly and distinctly perceived is true he can rebut second order as well as first order objections to whatever he clearly and distinctly perceives. In the single case of the proposition *God exists* clear and distinct perception is sufficient to rebut both first and second order objections and so provides a belief that is immune from doubt.

IV

In the preceding section I argued that Descartes' proof that establishes $J\,\Box(Jp \supset p)$ is not obviously circular and that although Jp and $J\,\Box(Jp \supset p)$ do not entail Kp they do establish that he has every reason to hold Kp and no reason to suspect $-Kp$. This is sufficient to disarm the skeptical arguments. Still, one may feel that the spectre of circularity has not been completely exorcised. After all, a die-hard skeptic might object, doesn't the soundness of the proof that God exists presuppose, even if it doesn't actually employ, the principle that whatever is clearly and distinctly perceived is true. If pulling on one's bootstraps does not make one spin in circles it doesn't get one off the ground either. The force of this objection can be clarified by a comparison between Descartes' attempted validation of clear and distinct perception and a more recent bootstrap operation. I have in mind Hilbert and his followers' attempts to construct consistency proofs for parts of classical mathematics.[14]

Suppose that \$ is a formalized mathematical theory, say first order Peano arithmetic. Ordinarily, a mathematician would take a proof of p in \$ as establishing that he knows p. But suppose that he had some reason to doubt the consistency of \$. This doubt would undermine his claim to know that p. A proof that \$ is consistent would be required to remove the doubt. In response to doubts occasioned by the discovery of paradoxes in classical mathematics Hilbert devised a program for validating parts of classical mathematics by proving consistency.

The analogy between Descartes' attempt to validate clear and distinct per-

ception and Hilbert's program is extremely suggestive. Clearly and distinctly perceiving that p corresponds to producing a proof of p in \$. The correspondence is not at all implausible. Descartes seems to think of certain propositions, those which can be directly intuited, as like axioms and that the clear and distinct perception of other propositions is obtained via proofs from these axioms. Hilbert thought that a proof of the consistency of \$ is needed to validated proofs in \$. Correspondingly Descartes thought that clearly and distinctly perceiving that whatever is clearly and distinctly perceived is true is required to validate the method of clear and distinct perception. Both Hilbert and Descartes conceived of their programs as answers to skeptical doubts.

Before employing the analogy to clarify Descartes' bootstrap operation there are a number of differences between the two programs which must be discussed. The most significant is that the concept of a proof in \$ can be explicitly defined. In fact, whether or not a sequence of formulas is a proof in \$ is an effectively decidable question. In contrast, Descartes' conception of clear and distinct perception is notoriously obscure. He does provide a criterion for clear and distinct perception – it compels belief – and he provides a method for obtaining clear and distinct perceptions, but he never explicitly formulates necessary and sufficient conditions for clear and distinct perception. He also holds that it is possible to be mistaken about whether one actually is clearly and distinctly perceiving that p (HR I 158). However, it also seems to be his view that by following the method of the *Meditations* one will be able to unerringly distinguish between those perceptions which are clear and distinct and those which are not (HR II 214). I will assume that this is Descartes' view. A second way in which Descartes' and Hilbert's programs differ is that the former carefully distinguished between the meta-theory, Meta\$, in which the proof that \$ is consistent was to be carried out and \$ itself. Hilbert hoped that a proof of the consistency of \$ could be found in a Meta\$ which employed only constructive or finitary principles of reasoning: If such a proof could be found then doubts about the consistency of \$ could be answered by appealing to reasoning which was not thought doubtful at all. Descartes, of course, did not distinguish between a system of clear and distinct perception in which 'ordinary propositions', e.g. that the sum of the angles of a triangle is equal to two right angles, are proved and a meta-system of clear and distinct perception in which the first system is proved to be sound. I will return to this point below.

Suppose that Hilbert had succeeded in constructing a proof of the consistency of $. What would the proof accomplish? First, it is worth noting that such a proof need not be circular, at least not any more circular than other valid arguments. For example, Tarski's proof that the theory of real closed fields is consistent (in fact decidable) does not make use of principles of reasoning or axioms which especially concern real numbers. The proof is finitary. The value of a proof of the consistency of $ depends on the assumtions and principles of reasoning used in the proof. If, as Hilbert hoped, a finitary proof of the consistency of $ could be found then, since finitary principles of reasoning are less doubtful than some of the principles of $, the proof would help secure the foundations of $. But suppose that the proof that $ is consistent employs principles as doubtful or more doubtful than the consistency of $? For example, one can prove the consistency of $ from the assumption that the axioms of $ are true in the standard model. But anyone who harbored doubts about the consistency of $ will not be persuaded by this proof since he will find the assumption more doubtful still.

In 1931 Godel proved that if $ is consistent any proof of the consistency of $ must make use of principles of reasoning that go beyond the resources of $. If it is assumed that all elementary reasoning can be expressed in $ then this means that a proof of the consistency of $ must be non-elementary. Since Godel's discovery a number of proofs of the consistency of $ have been produced but all of these make use of principles of reasoning not available in $. For example, Gentzen's proof employs an induction principle which allows induction up to the ordinal ϵ (this is the first ordinal for which one cannot prove an induction principle in $). Tarski, asked whether he felt more secure about classical mathematics from Gentzen's consistency proof, replied, "Yes, by an epsilon". It is still controversial whether the proof does anything to secure the foundations of $.

Godel's theorem has interesting consequences for modal and epistemic logic which have been investigated by Richard Montague. Montague's principle result is that if the modal operator 'N' (or the epistemic operator 'K') is interpreted as 'is provable in theory T' and T is a modal extension of $ in which $Np \supset p$, $N(p \supset q) > (Np \supset Nq)$, and necessitation hold, then T is inconsistent.[15] The result depends on the fact that if T satisfies the conditions above then it is provable in T that $Np \supset p$ for all p. But this means that it is provable in T that whatever is provable in T is true, so it is provable in T *that* T is consistent. But Godel's theorem establishes that the consistency of $ is provable in $ only if $ is inconsistent.

This result bears on Descartes' program in the following way. If it is assumed that clearly and distinctly perceiving p is proving p in a formal system and if it is assumed that the principles of arithmetic can be clearly and distinctly perceived then it follows that either it cannot be clearly and distinctly perceived that what is clearly and distinctly perceived is true or if it can be then clear and distinct perception can result in inconsistency and so the principle is false. Given the assumptions I have made, the only way to salvage Descartes' conception of knowledge would be to split clear and distinct perception into a hierarchy of levels of clear and distinct perception. It might then be possible to prove at level 2 that whatever can be clearly and distinctly perceived at level 1 is true and so on. But according to Godel's theorem the principles of proof employed at each higher level must go beyond the principles available at lower levels. This means that the higher the level of clear and distinct perception the more doubtful it is that what is clearly and distinctly perceived at that level is true.

In summary, I have discovered a formal representation of Descartes deceiving God argument which, given the Cartesian conception of knowledge, is valid and sound. I then showed how the argument can be rebutted without obvious circularity by demonstrating that whatever is clearly and distinctly perceived is true. I pointed out some intriguing and suggestive similarities between Descartes' attempted validation of clear and distinct perception and Hilbert's program. In so far as the analogy is a good one it suggests that Descartes' epistemological program cannot succeed.

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APPENDIX

I. In the paper I argued that Descartes' conception of perfect knowledge conforms either to P or P^*. In a system of epistemic logic P is expressed by the formula

$$(P) \qquad (-K-q \cdot K(q \supset -Kp)) \supset -Kp$$

and P^* is most naturally expressed by the rule of inference

$$(P^*) \qquad \text{If } q \supset -Kp \text{ then } -K-q \supset -Kp.$$

Let T be the epistemic logic which is identical to the modal system T except that K is substituted for the necessity operator. It is provable that if P^* is added

as a rule to T then P and $Kp \supset KKp$ are provable and that if either of the latter formulas is added as an axiom to T then the other formula is provable and P^* is obtainable as a derived rule. This shows that P, P^*, and the KK-thesis are equivalent with respect to T. I will prove this employing the formulation of T given by Hughes and Creswell.[16]

(1)	If P^* is added to T then $Kp \supset KKp$ is provable.	
(i)	$-Kp \supset -Kp$	tautology
(ii)	$-KKp \supset -Kp$	from (i) by P^*
(iii)	$Kp \supset KKp$	tautological equivalences from (ii)
(2)	In T $Kp \supset KKp$ implies P.	
(i)	$K(q \supset -Kp)$	assumption
(ii)	Kp	assumption
(iii)	$K(Kp \supset -q)$	tautological equivalence from (i)
(iv)	$KKp \supset K-q$	from (iii) by A6 and modus ponens
(v)	KKp	from (ii) by the KK-thesis
(vi)	$K-q$	from (v), (iv) by modus ponens
(vii)	$Kp \supset K-q$	discharging (ii)
(viii)	$K(q \supset -Kp) \supset (Kp \supset K-q)$	discharging (i)
(ix)	$(-K-q \cdot K(q \supset -Kp)) \supset -Kp$	tautological equivalence from (viii)
(3)	If P is added as an axiom to T then P^* is a derived role.	
(i)	$q \supset -Kp$	assumption
(ii)	$K(q \supset -Kp)$	necessitation from (i)
(iii)	$K(q \supset -Kp) \supset (-K-q \supset -Kp)$	from P and tautological equivalences
(iv)	$-K-q \supset -Kp$	from (iii)

II. Consider the fragment of T obtained by omitting A6 $(K(p \supset q) \supset (Kp \supset Kq))$ and the Rule of Necessitation. In this system T- the logical consequence condition (that A know all the logical consequences of what he knows) does not hold. If we add to this system rule P^* then in the resulting system T^* not only is the KK-thesis provable but also the following rule holds:

(C) $\dfrac{p \supset q}{Kp \supset Kq}$

(1)	$p \supset q$	assumption
(2)	$-q \supset -p$	from (1)
(3)	$Kp \supset p$	Ax. A5
(4)	$-p \supset -Kp$	from (3)
(5)	$-q \supset -Kp$	from (2) and (4)
(6)	$Kp \supset K-q$	from (5) by (P^*)
(7)	$Kp \supset Kq$	from (6)

This shows that if Descartes's conception of knowledge does conform to P^* then Descartes is committed to the principle that a person knows all the logical consequences of what he knows. If we add P^* to the system then the resulting system is equivalent to epistemic S4. (S4 is $T + Kp \supset KKp$).

III. Proof that (3) is valid in epistemic S4 with the additional axiom $Kp \supset Bp$.

(1)	$K(g \supset (Bp \supset -p))$	assumption
(2)	$K(Bp \supset (g \supset -p))$	from (1) by substitution of equivalents
(3)	$KBp \supset K(g \supset -p)$	from (2) by Ax A6
(4)	Kp	assumption
(5)	KKp	KK-thesis from (4)
(6)	$Kp \supset Bp$	axiom
(7)	KBp	from (5), (6) by rule (C)
(8)	$K(g \supset -p)$	from (3), (7) by modus ponens
(9)	$K(p \supset -g)$	from (8) substitution of equivalents
(10)	$Kp \supset K-g$	from (9) ax. A6
(11)	$K-g$	from (10), (4) by modus ponens

This is a proof of $K-g$ from Kp and $K(g \supset (Bp \supset -p))$. It follows that (3) is valid in epistemic S4 to which the axiom $Kp \supset Bp$ has been added.

IV. $Bg \cdot B(g \supset (Bg \supset -g))$ is inconsistent in doxastic S4 (doxastic S4 is doxastic $T + Bp \supset BBp$)

(1)	Bg	assumption
(2)	$B(g \supset (Bg \supset -g))$	assumption
(3)	$Bg \supset B(Bg \supset -g)$	from (2) by ax. S6
(4)	$B(Bg \supset -g)$	from (1), (3) by MP
(5)	$BBg \supset B-g$	from (4) by ax. A6

(6)	BBg	from (1) by BB-thesis
(7)	$B-g$	from (5), (6) by modus ponens
(8)	$-Bg$	from (7)

NOTES

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[1] Page reference to Descartes' writings is the edition by Elizabeth S. Haldane and G. R. T. Ross, The Philosophical Works of Descartes (Cambridge University Press, Cambridge, 1968).

[2] For a penetrating discussion of Descartes' notion of perfect knowledge see Willis Doney, 'Descartes's conception of perfect knowledge', Journal of the History of Philosophy II 4 (1970), pp. 387–403. Whenever I speak of Descartes' conception of knowledge in this paper I am referring to his notion of perfect knowledge.

[3] This interpretation has been held by S. V. Keeling (Ernest Benn, Descartes, London, 1934) and by Willis Doney ('The Cartesian circle', Journal of the History of Ideas XVI (1955). Doney no longer subscribes to the memory interpretation.

[4] For example: H. G. Frankfurt, 'Memory and the Cartesian circle', Philosophical Review LXXI (1962).

[5] In the Appendix I, I show that the formal counterparts of P and P^* are logically equivalent in epistemic T.

[6] Harry Frankfurt, Demons, Dreamers, and Madmen (Bobbs-Merrill, Indianapolis, 1970).

[7] A distinction between first and second order reasons for doubt is made by Anthony Kenny (Descartes: A Study of His Philosophy, Random House, New York, 1968). I am not certain that my distinction coincides with his.

[8] The classic development of epistemic logic is by Jaakko Hintikka, Knowledge and Belief (Cornell University Press, Ithaca, 1962).

[9] See Appendix II for a proof.

[10] *Op. cit.*, pp. 107–110.

[11] This is proved in the Appendix III.

[12] See Appendix IV for a proof.

[13] *Op. cit.*, p. 62.

[14] For a discussion of Hilbert's program see Georg Kreisel, 'Hilbert's program', Dialectica 12 (1958). I intend the analogy between Descartes' and Hilbert's program to be suggestive. Of course there are important differences between the two.

[15] Richard Montague, 'Syntactical treatments of modality', Acta Philosophica Fennica XVI (1963).

[16] Hughes and Creswell, An Introduction to Modal Logic (Methuen and Co. Ltd., 1968), p. 31.