Eric Palmer
Allegheny College, Meadville PA 16335 epalmer@allegheny.edu
Prepublication copy

"Descartes' Rules and the Workings of the Mind"
in Patricia Easton, ed.
Logic and the Workings of the Mind:
The Logic of Ideas and Faculty Psychology in Early Modern Philosophy. North American Kant Society V,1997, 269-282

DESCARTES'S _RULES_ AND THE WORKINGS OF THE MIND

Introduction

The _Rules for the Direction of the Mind_ is generally taken to be an odd piece among Descartes's writings. Its difference from the later philosophical works is evident at first reading: evident, for example, in the strong focus upon imagination and the sensory system in perception; in the discussion of the "simple natures" of the mind; in the near absence of mention of God in its presentation; and in the absence of the classic Cartesian concern for metaphysics early in the treatment of a method for acquiring knowledge. One might discount the material as mere juvenalia, or plunder it for traces of a development towards Descartes's later positions; but to do so, I suggest, would be to miss or misread an interesting and singular work of early modern logic and of Descartes's early career. Descartes himself suggests that the _Rules_ are merely intended as private notes written in anticipation of decrepitude, for personal rehearsal, "so that when old age dims my memory I can readily recall [my universal mathematics]. . . by consulting this book. . ." (X,379).{1} The first-person form and apparent candidness of this pronouncement brings to mind the rhetoric of Descartes's published writing in the _Meditations_ and _Discourse_, however, and it seems unlikely that Descartes would have inserted in the middle of a work the key he thought might be advantageous to his own recollection of its purpose, when old age has dimmed his memory! It is at least as reasonable to expect that Descartes's pronouncement is a stylistic touch, and that the work was left as it was -- unfinished, in disarray, and probably untitled{2} -- not because it was at no point intended for wider circulation, but because it was superseded at the time he apparently left off its composition for the last time, late in the 1620's.

I briefly consider why Descartes stopped work on the _Rules_ towards the end of my paper. My main concern is to accurately characterize the project represented in the _Rules_, especially in its relation to early-modern logic. The _Rules_ certainly exhibits features of an art of reasoning, as the first rule and the title we affix to it suggest. It was used by the authors of the _Port Royal Logic_ to improve their work,{3} and clearly in service of such an art, Descartes writes:

> Within ourselves we are aware that, while it is the intellect alone that is capable of knowledge, it can be helped or hindered by three other faculties, _viz_. imagination, sense-perception,

> and memory. We must therefore look at these faculties in turn, to see in what respect each of them could be a hindrance, so that we may be on our guard, and in what respect an asset, so that we may make full use of their resources. (X, 398-9)

But the above rationale for including treatment of the faculties of imagination and memory -- standard fare for logic texts{4} -- masks an important difference in Descartes's discussion. Descartes goes on to develop much more sophisticated accounts of mind and of brain than one might expect in a practical art of thinking: neither is represented, for example, in the _Port-Royal Logic_, and only cursory mention of sensation and the brain are provided in Gassendi's _Institution of Logic_. Descartes's _Rules for the Direction of the Mind_, then, is far more than the ordinary guidebook for practical logic and problem solving that the title suggests.

What is the purpose of such discussion? Like Gassendi, Descartes focuses with great care upon a theory of ideas and the "necessary connections" among them;{5} but unlike Gassendi and others, Descartes includes the accounts of sensation and brain physiology to support his method for finding correct solutions to problems. I maintain that Descartes's approach exhibits a turn from one that exclusively treats of method towards one that we would say also includes epistemology, despite that neither Descartes nor his contemporaries use the latter term. In the first part of the _Rules_, Descartes supports some of his maxims for problem solving by providing an argument that connects his theory of ideas and its accompanying theory of knowledge to what we might call a cognitive science: a largely empirical theory of the mind's and of the brain's workings. In the second part of the work, these accounts inform specific practical guides for successful visual representation of mathematical and logical problems that should also be read as a further philosophical treatment of the role of the imagination in certifying some knowledge, including logic. Thus, logic is viewed as a process which involves the corporeal natures conjoined in the imagination. The product of Descartes's effort, consequently, is a problem-solving manual with a decided turn towards epistemology -- and naturalistic epistemology, at that -- which provides a theoretical foundation for his advice for improving problem-solving skills.

The Process of Composition of the Rules

My first task is to briefly introduce the _Rules_, explain its complex structure, and point out the reasons why it should not be treated simply as a manual of method for the direction of the mind, as the title we affix to it suggests.

Descartes envisioned the _Rules_ as consisting of thirty-six guidelines divided evenly among three topics, with each, presumably, accompanied by a commentary. Such a plan is detailed in the twelfth rule (X, 428f.). The first twelve rules were intended to consider the most general rules of method that lead to certain knowledge. They were to present a method for inquiry, "to direct the mind with a view to forming true and sound judgments about whatever comes before it" (Rule One, X, 359). The second and third divisions were to concern applications of the material of the first section in something more representative of an ordered method for inquiry. The unfinished second division was intended to treat of problems that "can be understood perfectly, even though we do not know the solutions to them", and would focus particularly upon mathematics and geometry (X, 429). The third division, apparently never commenced, was to treat problems "not perfectly understood", especially the 'mixed' mathematics, and was to present the methods necessary for reducing those problems to perfectly understood problems. The reduction

was to be carried out by discerning the conditions required for defining the problem and, then, for determining "mutual dependence" (X, 429) between what is known and what is sought, among words and things, causes and effects, and parts and wholes, as is done in the investigations of riddles, magnetism, and plumbing systems that Descartes sketches briefly in the thirteenth rule (X, 431-7).

Such was the intended structure according to the twelfth rule, but the structure of the actual product is quite different. Descartes appears not to have finished the work: his notebooks provided drafts of only the first twenty-one rules and the first eighteen commentaries, and many of the latter survive in multiple drafts and show obvious gaps that suggest a need for revision. The second complication to the structure of the _Rules_ arises as a consequence of their incomplete condition. The _Rules_ was composed over a stretch of time perhaps as great as ten years,{6} and Descartes's conception of the project changes significantly during its composition. The order of presentation of the rules also does not correlate with their order of composition: the first rule appears not to be of the earliest date, and some of the re-drafting within particular rules appears to be a re-thinking of earlier material.

Given the unfinished and uneven character of the _Rules_, then, the level of theoretical unity I attribute to portions of the work might justly be called into doubt. Should the work be treated as a treatise, or as a scrapbook? Jean-Paul Weber's careful accounting of the history of the _Rules'_ composition might suggest the scrapbook, for the grand plan of a "universal mathematics" for solving problems in all sciences that Descartes discusses in the fragments of earliest composition (X, 374, line 16 forward) appears to have been dropped for the bulk of the work and in his later writing.{7} Other passages exhibit more staying power: in the next stage of writing, displayed in many of the earlier rules, Descartes concerns himself with maxims of a sort that punctuate his published writings. These include the methodological maxims we might expect in a set of rules for the direction of the mind, such as, "we ought to investigate what we can clearly and evidently intuit or deduce with certainty, and not what other people have thought," and "haphazard studies and obscure reflections blur the natural light and blind our intelligence" (X, 366, 371). The rules of method familiar from the _Discourse_ (VI, 18-19) also have their close ancestors here.{8}

My concern is particularly with another group of passages, however: sections of the commentaries on the eighth and twelfth to sixteenth rules that appear to form a natural unit. In those passages, new and sophisticated epistemological turns lead the work away from the narrow discussion of method that the familiar title of the work suggests. The first twelve rules, though flagged as a propadeutic to method in the first, fourth, and twelfth rules, also include discussions of physiology relevant to sensation, memory, and imagination, and a theory of the contents of the mind: of the atoms, or "simple natures" of cognition. The rules of the second division, from the thirteenth forward, consider the imagination as a corporeal tablet and the simple natures in combinations upon the tablet. They also develop a theory of the role each of these items plays in establishing certain knowledge. How do these topics fit as rules for the direction of the mind? They are present in service of such rules: in later stages of composition, Descartes has made an important shift away from maxims, developing accounts of the workings of the mind, the brain, and the sense-organs to theoretically ground his maxims in aid of clear reasoning within a developing epistemology, elaborated in its fullest development in the fourteenth rule. Because I focus upon accounts of the imagination and of the simple natures of thought that Descartes himself explicitly

intertwines, then, a case can be made for the unity of these portions of the _Rules_. Weber's historical divisions also do not cut deeply here, for he suggests that the passages I consider are closely connected.{9}

The task ahead, then, is to reconstruct Descartes's implicit naturalistic epistemology, constructed as a theoretical aid to the direction of the mind, from clues present in the eighth to the sixteenth rules. Though aspects of the account will survive in Descartes's later philosophy, the roles that the imagination and simple natures play will be supplanted, replaced by Descartes's more familiar technique for the direction of the mind, the metaphysical method of doubt.

Epistemology in the first division of the Rules

Like other early modern thinkers, Descartes focuses upon a method for inquiry, rather than epistemology. However, the former flows recognizably into the latter in Descartes's writings as he asks and answers a question of a sort suitable to launch an epistemological inquiry:

> What is human knowledge and what is its scope? . . .the question ought to relate either to us, who have the capacity for knowledge, or to the actual things it is possible to know. (X, 398; c.f., X, 411)

To answer the question, Descartes considers how knowledge relates "to us" through a study of the mind and a study of the brain and sense-organs, the physical apparatus that also pertains to thinking. That area is considered below, but we consider first "the things it is possible to know," which are things "in so far as they are within the reach of the intellect;" that is, as the contents of experience. This consideration ushers in Descartes's theory of simple natures, which provides one of the grounds of his theory of knowledge.

Simple Natures

The simple natures are the sole contents of the mind: in any act of perception or comprehension, only simple natures are perceived (X, 419). But one's perception of natures and the natures' potential for providing knowledge are not always simply associated, for one can be ignorant of connections among the natures one perceives. Descartes's discussion of an example indicates his understanding of the gap between perception and knowledge:

> Indeed, it is often easier to attend at once to several mutually conjoined natures than to separate one of them from the others. For example, I can have knowledge of a triangle even though it has never occurred to me that this knowledge involves knowledge also of the angle, the line, the number three, shape, extension, _etc_. . . .Perhaps there are many additional natures contained in the triangle which escape our notice, such as the size of the angles being equal to two right angles. . . (X, 422)

In this example and others, the familiar visual metaphors of clarity, distinctness, luminosity and recognition guide Descartes's account of knowledge to an even greater extent than they do in his _Meditations_. Descartes suggests here that knowledge consists in discerning the simple natures, and in subsequently sorting out the necessary connections among them. The simples themselves are discovered by intuition, which occurs “spontaneously” to the well-prepared mind (X, 428). Such intuition can never present error, for simple natures have the quality of being "clearly and distinctly" perceived whenever they are perceived at all, and are necessarily true where truth is applicable to them: they themselves "never contain any falsity" (X, 418, 420).

Ignorance, then, is the result of an ignorance regarding connection among simples. Such a view is evident in subsequent advice that Descartes gives for the direction of the mind, like the following:

> whenever we deduce something unknown from something already known, it does not follow that we are discovering some new kind of entity, but merely that we are extending our entire knowledge of the topic in question to the point where we perceive that the thing we are looking for participates in this way or that way in the nature of the things given in the statement of the problem. (X, 438)

Descartes appears to suggest here and in the previous passage that in many, and perhaps all cases of error, the mind has an obscured view of its own contents. This presents a shortcoming in the theory of simple natures as epistemology: Descartes relies primarily on visual metaphors to explicate ignorance and understanding, and he does not employ the theory of simple natures to improve upon that account. Connections among simples are discovered through "deductions," and are grounded upon the intuition of "common notions" that are themselves also simples (X, 424, 419). Other processes, such as inspiration through the light of divine grace and conjecture, are not the topic of method, which is restricted to preparing the mind for intuitions, and for discerning the combination of simples through deduction of necessary connections among them (X, 424-5).{10}

Physiology and the practical role of the imagination

Descartes's discussion is augmented by a theory of the physiology of perception, principally grounded in the assumption that our senses detect only geometric and numerical properties of objects outside of the body (X, 412-13). Beyond that notable revision to the account of intelligible species, Descartes presents a roughly Aristotelian account of sensation and recollection.{11} He suggests that “sense perception occurs in the same way in which wax takes on an impression from a seal,” with all the ideas from the five senses meeting in the brain, in the “phantasy. . . a genuine part of the body. . . large enough to allow different parts of it to take on many different figures and, generally, to retain them for some time; in which case it is to be identified with what we call ‘memory’” (X, 414).

Descartes continues with a discussion of the relation of the faculties to the body, with particular regard for the processes of recall of memory and of invention in the imagination. The transition to a discussion of faculties serves to connect Descartes's treatment of physiology with his comments on method, the central concern of the _Rules_. Descartes's efforts are cashed out in a recommendation concerning the direction of the mind: “If. . .the intellect proposes to examine something which can be referred to the body, the idea of that thing must be formed as distinctly as possible in the imagination.” Descartes suggests that an "abbreviated representation" of the thing is to be formed in the imagination, so as to facilitate memory; and in later rules he instructs the reader on the art of forming such representations (X, 416-7; 450-69). In these passages, Descartes connects an account of the workings of the mind to his discussion of method.

To this point, I have drawn a rough sketch of the epistemology that can be gleaned from the _Rules_, in Descartes's treatment of perception and the contents of the mind in their relation to method. Before further examining Descartes's account of the relation of method to the workings of the mind, I should pause to note the fundamental

divergence between this approach to method and that which is presented in Descartes's later work. In the _Rules_, the method for inquiry is not begun from radical doubt, leading on to knowledge of one's own existence, then of an understanding of the character of certainty, and then of a proof of God's existence, as is familiar in Descartes's later work. Important anticipations of the more familiar method and its familiar conclusions may be found if sought; for example, in the following:

> If someone sets himself the problem of investigating every truth for the knowledge of which human reason is adequate -- and this, I think, is something everyone who earnestly strives after good sense should do once in his life -- he will indeed discover by means of the Rules we have proposed that nothing can be known prior to the intellect, since knowledge of everything else depends on the intellect, and not _vice versa_.

The passage does not anticipate Descartes's method of doubt, but it does point to the priority of knowledge of oneself. However, Descartes continues his thought in a direction quite uncharacteristic of his later philosophy:

> Once he has surveyed everything that follows immediately upon knowledge of the pure intellect, among what remains he will enumerate whatever instruments of knowledge we possess in addition to the intellect; and there are only two of these, namely imagination and sense-perception. (X, 395)

This passage, like the question that began this section, "What is knowledge and what is its scope?" instead leads Descartes toward a very different sort of inquiry than that represented in the method of doubt and subsequent metaphysical inquiry. The study of the "pure intellect" leads Descartes to a theory of simple natures, rather than the _Cogito_; and then on to the "instruments of knowledge," the faculties, rather than a proof of God's existence. The method of the _Rules_ clearly represents an approach founded in a theoretical account of cognition -- a cognitive science -- rather than the more familiar Cartesian metaphysical method of doubt.

The first part of the _Rules_, then, contains material that we would today include under the headings of epistemology and cognitive science, in addition to a discussion of rules for the direction of the mind in inquiry. This additional material is intended to support such straightforward rules by providing them a place in a system of thought, presenting systematic connections with these other fields; and this strategy again suggests the distance that Descartes maintains from his later rationalist and more strictly foundationalist approach to inquiry. Descartes makes a great deal in the second division of the _Rules_ of his suggestion that a study of the other Aristotelian faculties and their corresponding organs, the sense-organs and brain, can be useful in an approach that bears fruit for the direction of the mind.

Epistemology in the fourteenth rule: Visualization and validation

Though Descartes treats imaginative visualization as an aid to the direction of the mind whenever "the intellect proposes to examine something which can be referred to the body," there is much more underlying Descartes's claim than a practical maxim (X, 416). Visualization is not merely an aid: it provides another key feature of Descartes's implicit epistemology as well. In the development of the fourteenth rule, Descartes provides a theoretical basis for the clarity that he maintains will result in many areas of problem solving as a consequence of his approach through visualization (X, 438). That theoretical basis lies in the view that geometrical and mathematical

truth, and other truths related to mathematics by common natures, are also validated, or certified as true, by the process of visualization in the imagination, or by drawing diagrams, which is the topic of the fifteenth rule. The imagination can be used to validate such truths because the imagination harbours "the real extension of a body considered in abstraction:" the imagination, as a structure of the body, itself employs the very corporeal natures that are the province of mathematical truth (X, 441).

In preparation for the argument in support of his more ambitious thesis concerning visualization, Descartes writes:

> it will be to the reader's advantage . . . to think of all knowledge whatever -- save knowledge obtained through simple and pure intuition of a single, solitary thing -- as resulting from a comparison between two or more things. (X, 440)

The "single, solitary thing" mentioned is presently identified as a simple nature. Descartes has previously indicated that the intuition of natures for the prepared mind is beyond the scope of method, and so he concludes at this point with the suggestion that "the chief part of human endeavour is simply to reduce these proportions to the point where an equality between what we are seeking and what we already know is clearly visible." Because proportions are involved, such comparison is invariably a matter of comparison of magnitudes (X, 440, 441).

The topics of proportion and magnitude link the simple natures into Descartes's full explanation of the role of visualization, and the way is prepared for a theoretical justification of visualization. Descartes explains:

> it will be very useful if we transfer what we understand to hold for magnitudes in general to that species of magnitude which is most readily and distinctly depicted in our imagination. But it follows from what we said in Rule Twelve that this species is the real extension of a body considered in abstraction from everything else about it save its having a shape. In that Rule we conceived of the imagination, along with the ideas existing in it, as being nothing but a real body with a real extension and shape. (X, 441)

The above passage provides the guarantee that what applies to any magnitude will also hold of visualized magnitude. Since "nothing can be ascribed to magnitudes in general which cannot also be ascribed to any species of magnitude," the particularly useful species provided in the imagination may be called upon to validate conclusions concerning other species and magnitude in general (X, 440).

The next several pages of Descartes's argument contain an attempt to show that the intellect, if unaided by the imagination, may go astray in solving a wide variety of problems that pertain to material natures. A clear conception of extension invariably invokes actual corporeal things, and may require the use of the imagination:

> although someone may convince himself that it is not self-contradictory for extension per se to exist all on its own even if everything extended in the universe were annihilated, he would not be employing a corporeal idea in conceiving this, but merely an incorrect judgement of the intellect alone. He will admit this himself if he carefully reflects on the image of extension which he tries to form in his imagination. He will realize that he does not perceive it in isolation from every subject, and that his imagination of it is quite different from his judgement about it. (X, 442-3)

Since the imagination employs a species of extension in its application, the intellect should not go astray while using imagination in relation

to corporeality.{12} The importance of actually employing the imagination and material natures in attempts to demonstrate and validate mathematical and geometrical truth is the focus of detailed treatment in a number of drafts in the middle portion of the explication of the fourteenth rule (X, 442-9). In each case, as in the passage above, Descartes takes great pains to distinguish the common or the over-subtle understanding "obscured by many vague and ill-conceived principles" from a clear conception of problems relating to corporeal nature (X, 442). Descartes suggests that the misconceptions that pure understanding is prone to are the result of an incomplete "modal" grasp of the subject matter. Geometrical treatments of extension, surface, line, and point are incomplete concepts if understood apart from body: "a line, whose flowing motion [one] conceives as creating a surface, is a real body, whereas that which lacks breadth is simply a mode of body" (X, 446).

Having justified the role of imaginative visualization in validating inquiry into material natures, Descartes closes the discussion of the fourteenth rule by returning to practical method, and a detailed treatment of strategies for visualization. Descartes finds three considerations to be of relevance, "_viz._ dimension, unity, and shape" (447). 'Dimension' refers to any measurable parameter, and unity "is the common nature which, we said above, all the things which we are comparing must participate in equally" (447, 449). The shape of a visualized figure depends upon its subject matter: open figures (points and connected lines) represent sets; closed geometrical figures illustrate magnitudes (X, 451). Descartes's mention of the "common nature" of unity that serves to make dimensions commensurate indicates once again that the account of the contents of the mind of the first division of the _Rules_ plays a role in the later development of rules concerning the imagination.

The case of logic

Descartes has mentioned that the intellect can be aided by the imaginative faculty, and that abbreviated representations of problems under investigation may be formed in the imagination. The universal applicability of such a method might be doubted, however: for why should visualization play a role in understanding mathematics and logical reasoning, for example? To support the point that visualization is an aid to all problem solving involving corporeality, and specifically to logical reasoning, Descartes refers us back to the theory of the simple natures, and to his account of knowledge as discerning connections among them.

By 'logic', a word Descartes does not use in the _Rules_, I intend to refer to Descartes's method of intuition and deduction discussed above, as distinguished from empirical investigation and syllogistic reasoning. Descartes distinguishes his method from syllogism by claiming that there is no need for a method for the latter: "when the operation is straightforward and simple we have no need of a technique to help us intuit the truth which the comparison yields; all we need is the light of nature" (X, 440). Like syllogistic, and unlike empirical study, the goal of deduction is to find "conjunction" among apparently unconnected terms, or a "comparison" or common participation among the entities that those terms represent (X, 425, 440, 438). In his discussion of the magnet, for example, Descartes makes the distinction of method quite clear:

> if the magnet contains some kind of entity the like of which our intellect has never before perceived, it is pointless to hope that we shall ever get to know it simply by reasoning; in order to do that, we should need to be endowed with some new sense, or with a divine mind. But if we perceive very distinctly that combination

> of familiar entities or natures which produces the same effects which appear in the magnet, then we shall credit ourselves with having achieved whatever it is possible for the human mind to attain in this matter. (X, 438)

In the twelfth rule, Descartes expands on what this passage serves only to suggest: that deduction of connections among simple natures should follow upon observation or research. The investigator "carefully gathers together all the available observations concerning the stone in question, then he tries to deduce from this what sort of mixture of simple natures is necessary for producing all the effects which the magnet is found to have" (X, 427). Beginning with empirical investigation, experimental study ultimately arrives at logic.

Descartes's reference to natures in the above passage and others links his discussion concerning the contents of the mind to his thesis regarding imaginative visualization. Since unity and equality are simple natures common to both logic and measure (X, 449), visualization of logical problems in terms of measurement of items present in the phantasy should be possible; and since terms referring to corporeal natures ultimately require expression in some species of extended substance to ensure that the intellect considering them does not go astray, corporeal natures might even be necessary to allow for certainty in some logical applications. Among the diagrams presented to serve as models for appropriate visualization at the end of the discussion of the fourteenth rule is one that represents an aid to logical manipulation: a tree figure expressing the logical features of the relation of heredity (X, 450). The relation between the phantasy and deductive manipulation expressed in the diagram provides the link between logic and the workings of the mind.

In portions of the _Rules_ of early composition, the only treatments of the imagination with reference to logic are disparaging. Descartes writes that "there is nothing more futile than devoting our energies to those superficial proofs which are discovered more through chance than method and which have more to do with our eyes and imagination than our intellect; for the outcome of this is that, in a way, we get out of the habit of using our reason" (X, 375, c.f. 368). The universal mathematics of the first stage of writing is abandoned, however, and the maxims that followed it also give way to a return to a systematic treatment of a new kind, focused around an implicit epistemology and a study of the imagination. Descartes's shift is profound, as evidenced by his fourteenth rule:

> The problem should be re-expressed in terms of the real extension of bodies and should be pictured in our imagination entirely by means of bare figures. Thus it will be perceived much more distinctly by our intellect. (X, 438)

Why the plan of the Rules was dropped

The difficulty one faces in piecing together the evolving epistemology of the _Rules_ is largely a consequence of its unfinished state. To explain why the project of the _Rules_ was abandoned by Descartes, and to further illustrate the distinctions between the epistemologies of the _Rules_ and Descartes's later work, we need only note one decisive turn in his thinking.{13} Both contemporary correspondence and the autobiographical notes of the _Discourse_ suggest that an important change occurred in Descartes's thinking early in 1630, just around the time that Descartes appears to have left off the _Rules_ for the last time. Descartes reports the shift in a letter to Mersenne,

in which he suggests that God has control of the creation and maintenance of a variety of important truths:{14}

> The mathematical truths which you call eternal have been laid down by God and depend on him entirely no less than the rest of his creatures. Indeed to say that these truths are independent of God is to talk of him as if he were Jupiter or Saturn and to subject him to the Styx and the Fates. (15 Apr. 1630, I, 145)

With this new twist, the epistemology of the _Rules_ is found to be much less solid, since the certainty of most knowledge, including mathematical and logical knowledge, is now tied to God's condition. In later works, Descartes will hold that knowledge of things other than the immediate contents of perception, and so certainly all knowledge that calls memory into play, ultimately rests on a proof of God's goodness and constancy. This shift is reflected in the _Discourse_ as well, in which Descartes reports a central role for God in his epistemology only after "meditations. . . perhaps too metaphysical and uncommon for everyone's taste" that he commenced upon his return to Holland in 1629 (VI, 31ff.).

Descartes does not create himself entirely anew at this moment: important aspects of the framework of the _Rules_ certainly do survive in his later works. Clear and distinct perception, and illumination by the natural light -- what we might call 'phenomenological' aspects of Descartes's earlier account -- retain important and similar roles in Descartes's later account of cognition. The theory has been changed, however, and generally, it appears that cognitive science exits as metaphysics enters Descartes's study of the mind. Descartes's implicit naturalistic epistemology is overturned with the introduction of a new role for God, and henceforth, his discussion of the brain and sense-organs will remain largely separated from his method, and from discussions that could be construed as pertaining primarily to the direction of the mind.{15}

Notes

1. Quotations in the text refer to the volume number and pagination of Descartes, _Oeuvres de Descartes_, Charles Adam and Paul Tannery, eds. (Revised edition, Paris: Vrin/C. N. R. S., 1964-76). The translation is that of Cottingham _et. al._, in Descartes, _The Philosophical Writings of Descartes_, J. Cottingham, R. Stoothoff, D. Murdoch, and A. Kenny, translators & eds. (Cambridge, UK: Cambridge University Press, 1984-91).
2. Whatever title Descartes may have affixed to this work has not survived: the family of titles we find are extrapolations from other sources, perhaps taking their cues from the first rule. On the history of the title, which begins with Chanut's inventory of Descartes's writings, see Giovanni Crapulli in Descartes, _Regulae ad Directionem Ingenii_, G. Crapulli, ed., notes and appendices (The Hague: Martinus Nijhoff, 1965), pp. xxii-xxiii.
3. See the extract from the _Port-Royal Logic_ reproduced at (X, 471-2). For an account of the purposes of the _Port-Royal Logic_, see the "Introduction" to Arnauld _et al._ _The Art of Thinking: Port-Royal Logic_, J. Dickoff and P. James, translators (Indianapolis: Bobbs Merrill, 1964).
4. C.f. _Port-Royal Logic_ Part I, p. 32; Gassendi (1658) _Institution of Logic_, H. Jones, transl. (Assen: Van Gorcum, 1981), Preface and Part I.

5. Descartes, (X, 425); c.f., Gassendi Part I, Canon V.
6. Weber, _La Constitution du Texte des Regulae_. (Paris: Societe d'Edition d'Enseignement Superieur, 1964).
7. See Weber (1964) pp. 4ff. A variant of Weber's argument, particularly focusing on the earlier stages of the _Rules'_ composition and the extent to which the ideal of the _mathesis universalis_ is preserved in the later stages, is developed in Schuster, "Descartes's _Mathesis Universalis_, 1619-28," _Descartes: Philosophy, Mathematics, and Physics_, S. Gaukroger, ed. (New Jersey: Barnes & Noble, 1980). See also Shea, _The Magic of Numbers and Motion_, (Canton, Mass.: Science History Publications, 1992).
8. _E. g._: "we should never assume to be true anything which is false," (X, 372); "reduce complicated and obscure propositions step by step to simpler ones, and then, starting with the intuition of the simplest ones of all, try to ascend through the same steps to a knowledge of all the rest" (X, 379; c.f. X, 378-9). For a detailed accounting of the relation of the Rules to the four rules of the _Discourse_, see Gibson, "The Regulae of Descartes," _Mind_ 7 (1898) pp. 332-63.
9. Weber dates these passages to 1623 and later. See Weber (1964), 234ff., and Schuster (1980), pp. 55ff.
10. For further details concerning the role of the simple natures in Descartes's philosophy, see Palmer (forthcoming), "The Limits of Cartesian Doubt," _Studies in Early Modern Philosophy_. See also Marion, _Questions Cartésiennes_, (Paris: Presses Universitaires de France, 1991). One chapter of Marion's is translated into English by John Cottingham and reprinted in _The Cambridge Companion to Descartes_, J. Cottingham, ed. (Cambridge: Cambridge University Press, 1992).
11. A detailed comparison of Descartes's theory of sensation and its relation to contemporary Aristotelian accounts can be found in Wolff-Devine, _Descartes on Seeing: Epistemology and Visual Perception_, (Carbondale: Journal of the History of Philosophy Monograph series, 1993).
12. For a discussion of the role of the imagination as the validator of mathematics in the _Rules_, see Schuster (1980). Descartes completely reverses the argument presented in these passages in his later writings, as the chiliagon discussion in the Meditation Six suggests, and as he unequivocally states in the Fifth Replies: "although geometrical figures are wholly corporeal, this does not entail that the ideas by means of which we understand them should be thought of as corporeal (unless they fall under the imagination)" (VII, 385).
13. Reasons based in the development of Descartes's mathematics may be found in Gaukroger, "Descartes's Early Doctrine of Clear and Distinct Ideas," _Journal of the History of Ideas_ 53 (1992) pp. 585-602.
14. Bréhier, E. (1937). "The creation of the eternal truths in Descartes's system," _Descartes: A Collection of Critical Essays_, W. Doney, ed. and trans. (New York, Anchor, 1967).
15. Concerning the carryover from the _Rules_ to later epistemology, see Palmer (forthcoming). Warm thanks to the members of the Early Modern Logic Project and conferees for their hospitality and help, to Jim Sheridan and to the National Endowment for the Humanities, Jonathan Bennett and the members of the Syracuse N. E. H. seminar for the Summer of 1995, at which a redrafting of this paper was completed.