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Descartes on Mind-Body Interaction and the Conservation of Motion

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1. Introduction

One central element of the standard reading of Descartes on mind-body interaction (and one of the first things many of us ever learned about Descartes) is that the *quantity of motion* in the world is conserved, that the *mind* can neither create motion nor remove any of it from the world but can change the direction of the motion of the body. Bernard Williams tells us in the *Encyclopedia of Philosophy*, "consonant with [Descartes's] views on the conservation of motion, it is only the direction, and not the speed, of movement of these [animal] spirits that is affected by the soul."[1] The *locus classicus*, so to speak, for this reading is paradoxically not in a work of Descartes himself at all, but rather is found in §80 of the *Monadology* of Leibniz. There Leibniz reports,

> Descartes recognized that souls cannot give force to bodies because the same quantity of force is always conserved in matter. He believed, however, that the soul could change the direction of the body. But this was because the law of nature was still unknown in his day, according to which matter conserves also the same total direction. If he had noticed this, he would have fallen upon my system of pre-established harmony.[2]

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[1]Bernard Williams, "Descartes," in *Encyclopedia of Philosophy* (New York: Macmillan, 1967), 2:353.

[2]G. W. Leibniz, GP 6:620–621; PPL, 651. I shall use the following conventional abbreviations: AT = Descartes, *Oeuvres*, ed. C. Adam and P. Tannery (Paris: Vrin, 1964–74); K = Descartes, *Philosophical Letters*, ed. and trans. A. Kenny (Oxford: Blackwell, 1970); CSM = Descartes, *The Philosophical Writings of Descartes*, trans. J. Cottingham, R. Stoothoff, and D. Murdoch (Cambridge: Cambridge University Press, 1985), 2 vols.; GP = Leibniz, *Die Philosophischen Schriften*, ed. Gerhardt (Berlin, 1875–90); PPL = Leibniz, *Philosophical Papers and Letters*, ed. L. Loemker (Dordrecht: Reidel, 1969).

Leibniz expressed this view, which implies that the consistency of Descartes's metaphysics depends significantly on the failings of his physics, on dozens of occasions from around 1687 onwards;[3] and it is typical of the historical literature that an extensive discussion of Descartes's position on this issue is more likely to be found in a work on Leibniz than in one on Descartes himself. This state of affairs is perhaps best illustrated by Ernst Cassirer, who at the end of the chapter on Descartes in his *Erkenntnisproblem* offers us the offhand remark that "it is well known" that Descartes held this view and refers us in a footnote to his book on Leibniz for details.[4]

Much recent literature has, however, cast doubt on this reading of Descartes. For instance, Daniel Garber has asserted that "a close examination of Descartes' writings gives us good reason to believe that he never held the positions that Leibniz attributed to him, neither the change of direction account of mind body interaction nor the universality of the laws of motion." Garber appeals further to the purported "lack of any clear and positive statement of the change-of-direction account in any of the numerous writings that survive."[5] Peter Remnant, in a similar vein though somewhat more

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[3]See, for example, GP 2:94, 3:122, 467–68, 568, 607; 4:497; 5:64, 208; 6:135–36, 540–47, 621.

[4]Ernst Cassirer, *Das Erkenntnisproblem*, vol. 1 (Darmstadt: Wissenschaftliche Buchgesellschaft, 1962), 504. In his *Leibniz' System in seinen wissenschaftlichen Grundlagen* (Darmstadt: Wissenschaftliche Buchgesellschaft, 1962), 58–67, to which he refers the reader, he presents the Leibnizian reading in some detail, but he nowhere indicates any text in which Descartes explicitly states the view attributed to him.

[5]Daniel Garber, "Mind, Body and the Laws of Nature in Descartes and Leibniz," *Midwest Studies in Philosophy* 8 (1983): 105–33 (see 111 and 115); "Understanding Interaction: What Descartes Should Have Told Elisabeth," *Southern Journal of Philosophy* 21 (suppl.) (1983): 15–32; "How God Causes Motion: Descartes, Divine Sustenance and Occasionalism," *Journal of Philosophy* 84 (1987): 567–80. See also Roger Ariew, "Mind-Body Interaction in Cartesian Philosophy: A Reply to Garber," *Southern Journal of Philosophy* 21 (suppl.) (1983): 33–37; Peter Machamer, "The Harmonies of Descartes and Leibniz," *Midwest Studies in Philosophy* 8 (1983):135–42; "Causality and Explanation in Descartes' Natural Philosophy," in *Motion and Time, Space and Matter*, ed. P. Machamer and R. Turnbull (Columbus: Ohio State University Press, 1976); Gary C. Hatfield, "Force (God) in Descartes' Physics," *Studies in History and Philosophy of Science* 10 (1979): 113–40; "Science, Certainty, and Descartes," *PSA 1988,* vol. 2, ed. A. Fine and J. Leplin (East Lansing: Philosophy of Science Association, 1989). Some of the arguments can be traced back to Norman Kemp Smith, *Studies in the Cartesian Philosophy* [1902] (New York: Russell & Russell, 1962).

cautious, characterizes Leibniz's interpretation as "creative elucidation"[6] and believes that Leibniz is rather projecting his own principles onto Descartes. Like Garber, Remnant and others go on to question Descartes's commitment to the conservation of motion or at least to its applicability to those bodies that are joined to a soul. Two arguments are offered to persuade us to entertain a radically different interpretation of Descartes:

(1) Descartes does not in fact state the change-of-direction position attributed to him by Leibniz (and most other philosophers), but he does on occasion conceive of the action of mind on bodies as *increasing* (or decreasing) the amount of motion in the body acted on—at the very least the motion of the pineal gland itself.

(2) The assertion of the conservation of the quantity of motion in the world is a statement about the constancy of God's action in the world and not about the causal interactions of bodies. Since conservation governs the motions of bodies only insofar as God moves them, there may be a loophole in the law for motions caused by human minds.

Both these arguments are mistaken. Leibniz, as we shall see, was basically right both on the historical question of what Descartes meant to say about conservation and change of direction and on the philosophical question of why he had to mean this. Furthermore, we shall see that the textual basis for his reading is somewhat better than contemporary critics make it out to be.

I shall deal with each of these arguments in a separate section of this paper. But before I turn to questions of textual interpretation and present the evidence for and against the correctness of the Leibnizian reading, I shall first present a somewhat updated and more explicit version of this interpretation and attempt to clarify what is philosophically at stake.

2. The Leibnizian Reading

In dealing with the question of mind-body interaction we should first distinguish two separate problems: (1) the question of the *intelligibility* of interaction between mind and body if they are con-

[6]Peter Remnant, "Descartes: Body and Soul," *Canadian Journal of Philosophy* 9 (1979): 377–86, at 386.

ceived as radically distinct in the way Descartes conceived them, and (2) the subsequent question raised by the apparent *conflict* between mind-body interaction and conservation principles. The first question is symmetrical and must hold equally for the action of the body on the mind and for that of the mind on the body, that is, for both perception (or emotion) and volition. The second question is asymmetric insofar as it is sensibly raised only in connection with the action of the mind on the body; for Descartes introduced a conservation law only for the world of bodies, not for the mental world: no conservation of mental energy is asserted with which perception might interfere. However, the question of the compatibility of interaction and conservation can be sensibly discussed only if the connection between mind and body is assumed to be intelligible, or if compatibility is simply taken as an *additional* constraint on an intelligible relationship. In any case we should not confuse arguments for one thesis with those for the other. I shall be dealing here primarily with the second question, concerning the *compatibility* of the action of the mind on the body with conservation laws.[7]

As far as compatibility is concerned, the modern mind-body problem generally taken to have been invented by Descartes may be characterized by the following set of propositions:[8]

(1) The material (corporeal) world is causally closed.
(2) The mind is nonmaterial.
(3) The mind acts upon the body (that is, makes a difference in the material world).

The mind-body problem arises inasmuch as these three propositions seem to be incompatible. Any philosopher who attempts to "solve" the problem must deny, relativize, or in some way get around one of these propositions. Leibniz denied (3); Hobbes de-

[7]For a discussion of Descartes on the question of intelligibility itself, see Eileen O'Neill, "Mind-Body Interaction and Metaphysical Consistency: A Defense of Descartes," *Journal of the History of Philosophy* 25 (1987): 227–45; and Margaret D. Wilson, "Descartes on the Origin of Sensation," *Philosophical Topics* 19 (1991): 293–323.

[8]I take this presentation of the mind-body problem to be uncontroversial; this particular version is derived from Peter Bieri's introduction to *Analytische Philosophie des Geistes* (Meisenheim: Hain, 1981), 37.

nied (2); but hardly anyone who takes modern science seriously wants to deny (1). Descartes can be said to have *invented* the modern mind-body problem (as opposed to having simply offered a solution to it), insofar as he was not only the first to formulate (1) but also the first (and perhaps the only) philosopher ever to have subscribed to all three propositions.[9]

How did Descartes manage this without obvious contradiction? Leibniz, in the passage from the *Monadology* (§80) quoted above and in many other places, maintains that Descartes was able to do this only because he had a mistaken notion of the "force" conserved in the world and of the constraints placed on causal closure by a *second* conservation law unknown to him. This prevented him from realizing that (3) cannot be reconciled with (1), given (2). Had Descartes realized this, he would, says Leibniz, have denied (3). Leibniz is right. Whether Descartes would have gone on to propose preestablished harmony is of course another question, especially since Descartes, as opposed to Leibniz, did not consider mind-body interaction to be *prima facie* unintelligible. But let us note that Leibniz was quite able to distinguish and employ two different arguments: (1) mind-body interaction is unintelligible and thus cannot be asserted, and (2) mind-body interaction is incompatible with the conservation laws on which physics is based and thus cannot be asserted. When arguing against Cartesians, he understandably often preferred the second argument.

According to Leibniz, Descartes was able to consider the above three propositions to be consistent because he defined the causal closure of the material world by only a single conservation law, namely, the conservation of the total amount of causal power and causal action, a scalar quantity that he called "force" or "motion" and measured (wrongly) by $|mv|$.[10] This allowed him to countenance purely directional changes in the vector of motion, which

[9]Garber, Remnant, etc. in principle deny that Descartes asserts (1), and thus imply that he neither invented nor offered a solution to the modern mind-body problem. On Descartes's role in the history of the mind-body problem, see Martin Carrier and Jürgen Mittelstrass, *Mind, Brain, Behavior* (Berlin: De Gruyter, 1991), 16–27.

[10]The fact that Descartes's measure of scalar "force" was $|mv|$ (or more precisely, the product of *size* and *speed*) instead of mv^2 (as Leibniz corrected it) is important for the construction of his physics but is not relevant to the question at hand here.

were of course causally relevant, but to conceive them to be *dynamically neutral* in the sense of neither adding to nor subtracting from the aggregate force (motion) in the world. The concept Descartes introduced for the vector of motion was *determination*—in substantival, verbal, and adjectival form this is a technical term central to Cartesian physics that can (loosely) be represented by mv considered as a directed magnitude. Determination is not merely direction since it has a *quantity* and can be divided into parts, but it is also not an *independent* magnitude since its value is always fixed by the body's quantity of motion, of which it is only a mode.[11] To clarify this concept, I shall briefly sketch its place in Descartes's physics and its connection to the conservation of motion.[12]

In book 2 of the *Principles of Philosophy*, which contains the deductive core of his physics, Descartes first introduces the concept of matter (and its contrary, nothingness or the void) (§§1–22) and then one *mode* of matter, motion and its contrary, rest (§§23–35). He then turns to the causal aspects of matter in motion (§§36–64). In this last part of book 2 he begins by defining the (minimal) *identity conditions* for the system of the world as a whole in terms of the two basic concepts just introduced: $\Sigma\, m$ = constant and $\Sigma\, |mv|$ = constant (where m is the quantity of matter and v the speed). The material universe is considered to be the same over time as long as neither its size nor the amount of action or motion going on within it undergoes change.[13]

In §36 Descartes tells us that God is the primary cause of the world and of the motion in it and that by his "ordinary concourse" he preserves it in existence and motion. There are of course countless changes in the *distribution* of the motion throughout matter—some parts become swifter while others become slower; but these

[11]Thus, in spite of what one often reads, it is not the case that "a change can occur in one without any change in the other" (Hatfield, "Force," 118); on the contrary, any change in the quantity of motion entails a change in the (quantity) of determination, though the directional aspect of determination can change without any change in the quantity of motion.

[12]See Peter Damerow, Gideon Freudenthal, Peter McLaughlin, and Jürgen Renn, *Exploring the Limits of Preclassical Mechanics* (New York: Springer, 1992), chap. 2, for an extensive analysis of the role of this concept in Cartesian physics; see also 293–332 for an English translation of most of the relevant material.

[13]AT 8:61–62; CSM 1:240.

particular internal changes, so long as there is no change in the sum total, are compatible with the constancy of God's action, which preserves the *whole* as it is. Reason tells us that since God created the world with certain defining properties, it will continue to retain precisely those properties that justify us in calling it the same world, namely, the quantities of matter and motion.

Although Descartes anchors this conservation law in the reasonableness of God's constancy and immutability, the actual argument as to what it means for the material world to be the same world at two different times has to do with the nature of matter and motion, not with that of God. A formal, second-order property of God such as the constancy of his modes of action cannot specify the content of the concept of force, for instance, whether its measure is $|mv|$ or mv^2. Leibniz reads Descartes as rightly demanding a fundamental conservation law to which all laws of nature must themselves conform, but he disagrees with Descartes on the content of this law and denies that this content can really be deduced from the predicates ascribed to God. Thus, the standard view of the role of the conservation of motion in Descartes's system is that it is a metamethodological principle: that "God's nature sets constraints on what the laws of nature should be, requiring in particular that there should be a conservation law."[14]

After introducing conservation, Descartes then in the First Law of Nature (§37) defines what staying the same (remaining in the same state) means for a *single body*: it changes neither of its two fundamental modes, shape or state of motion, of its own accord. According to the Second Law of Nature (§39), a single body considered separately also retains the (second-order) mode or *determination* of its motion.[15] Finally, in the Third Law of Nature (§§40ff.), *change* in the modes of bodies through interaction with other bodies is defined and quantified: the change in motion and/or determination of a body through interaction with another body occurs according to certain (impact) rules within the constraints set by the

[14]Bernard Williams, *Descartes: The Project of Pure Inquiry* (Harmondsworth: Penguin, 1978), 269. See Leibniz, *Animadversiones in partem generalem principiorum cartesianorum,* GP 4:370–72; PPL, 393–95. See also Damerow et al., *Exploring the Limits*, 68–78.

[15]Most translations—by ellipsis or lack of precision—leave the content of this law completely unclear. See AT 8:62–65.

conservation of motion.[16] Thus, since the conservation of determination is stipulated only for single bodies and not for the system as a whole, there is no algorithm directly governing what actually happens to a body's determination in impact, nor is there any necessity that change in the determination of one body be correlated to an equal and opposite change in some other body.

In the *Dioptrics*, "determination" is used to analyze the trajectory of a tennis ball colliding with the court surface. The determination of the ball's motion is resolved into component determinations (vertical and horizontal) according to the parallelogram rule (vector addition). In deriving the inverse sign law of refraction, determinations are added vectorially and motions arithmetically. The resulting problems constitute the main subject matter of much of Descartes's correspondence with Fermat, Hobbes, and Bourdin. *Determination is also the concept used to analyze the action of the mind on the body.* The salient aspect of the concept of determination in this context is that the determination of a motion or a change in its determination (so long as no change in scalar speed is involved) *requires no force.* As Descartes wrote to Mersenne,

> It should be noted that motion is different from the determination that bodies have to move in one direction rather than another, as I wrote in my *Dioptrics*; and that, properly, force is only needed to move bodies and not to determine the direction in which they are to move.[17]

In the example discussed in the *Dioptrics*, it is the *power* of the muscles in the arm that produces the *motion* of a tennis ball hit by a racket; it is the *position* of the racket and then of the court surface that *determines* this motion in one direction or another. Or as Descartes once answered Hobbes,

> For example, I throw a ball against a wall; the wall determines the ball to return towards me, but it is not the cause of its motion.[18]

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[16]There are also implicit symmetry assumptions and an extremal principle elaborated only in a later letter to Clerselier (Feb. 17, 1645; AT 4:183–88).

[17]June 11, 1640; AT 3:75.

[18]Descartes to Mersenne, April 21, 1641; AT 3:355.

The Cartesian mind acts on the body in a forceless manner analogous to that of a surface on a colliding body. It neither adds nor subtracts motion; it merely determines it in another direction. This analogy between mind and surface may in fact have led to the transfer of the concept of determination from the discussion of free will to physics.[19] As early as *Le Monde* (1632), before he had introduced the concept of determination into his physics, Descartes was explicitly looking for an analogy between the ability of the disposition of bodies in space to cause the *motions* of other bodies to deviate from the rectilinear and the ability of the disposition of our will to cause our *actions* to deviate from the good.[20] And even in his mature physics Descartes leaves open the possibility of directional changes by dispositions of the mind.[21] In physiological contexts Descartes speaks of the animal spirits as "determining" the muscles to this or that motion, that is, infinitesimally triggering the force stored in them: just as the "least conceivable force" can "determine" a weight balanced on a curved surface to fall along various paths, so too can a muscle be determined to contract or expand.[22] While it may indeed be unclear *how* the nonextended soul is supposed to act in a manner analogous to a brick wall or an infinitesimal nudge by the animal spirits, it is certainly no less intelligible to assert that the mind *determines* motion than that it *causes* motion. Furthermore, once one has embarked on this route, there is no reason for stopping or turning back: the motion of the body is determined, not caused, by that of the animal spirits; the motion of the animal spirits is determined, not caused, by that of the pineal gland; and the motion of the pineal gland is determined, not caused, by the actions of the soul. Nothing would be gained in

[19]The concept of determination was used in discussions of free will in the sense that the will determines *itself* to action. See Francisco Suarez, *Opera omnia* (Paris, 1856), vol. 10, 459ff.; and Descartes, letter to [?], March 1638; AT 2:36; and *Passions* §170; AT 11:459.

[20]AT 11:46–47. In this comment on the original third law, which was to become the Second Law of Nature in the *Principles* (conservation of determination), God is taken to be the *ultimate* author both of the *motions* of bodies (insofar as they are rectilinear) and of the *actions* of humans (insofar as they are good).

[21]*Principles* 2, §40; AT 8:65.

[22]AT 11:518–19; also 131–32, 176–77, 179, 194.

terms of intelligibility by assuming that the mind actually moves the pineal gland, and everything would be lost in terms of consistency.

In the *Principles* Descartes does not assert the conservation of determination for the system as a whole; only scalar motion is conserved throughout all interactions. Leibniz—and classical mechanics—added a second system conservation law for the vector quantity now called *momentum*, so that the causal closure of the world came to be determined by two laws: the first asserted the conservation in the system of matter of the scalar quantity, *vis viva* (energy), the second demanded the conservation in the system of matter of the vector of motion.[23] This puts additional constraints on causal closure and prohibits Descartes's solution: there could no longer be a causally relevant but dynamically neutral change in the direction of motion. If the (nonmaterial) soul is to change the direction of motion, the material world is not causally closed.

This is all well and good and may certainly reflect the opinion of Leibniz or Cassirer; but where does Descartes actually say anything of the sort? And where does he replace the wall and the tennis ball with the soul and bodily movements? Where is the concept of *determination*, which is used to describe the forceless action of the wall on the ball, also used in a technical sense to describe the action of the soul on the body?

3. Does the Mind Cause or Merely Determine Motions?

For those unfamiliar with the debates on this subject in the literature or with the widely scattered passages cited from Descartes's works, it may be helpful to review them briefly. And it may help to bring things down to earth if I point out that we are in principle dealing with about *fifteen* pages of Cartesian text,[24] each of which contains only a few sentences that may plausibly be asserted to be both unambiguous and relevant to the question at hand. Thus, not only can anyone who wants to do it check all the material, but I can (and will) quote most of it in the course of the next few pages. I

[23]See, for example, GP 2:94 and 3:568.

[24]To be precise AT 3:665; AT 5:222–23, 276, 347, 403–4; AT 7:229; and AT 11:180 and 185, 225–26, 355, 360, 361, 365, 518–19, and 631. Some other passages (AT 11:131–32, 176–77, 179, 194) are important for the physiological mechanisms of emotion and perception.

shall deal first with the purported lack of evidence for the Leibnizian reading, and then turn to the textual evidence for the mind's originating motion.

We shall see that two or three passages state more or less exactly what Leibniz attributed to Descartes. In four others Descartes speaks of the mind's moving the body in terms that cause genuine (though not insurmountable) difficulties for the Leibnizian reading. In the rest he says nothing that on closer examination commits him either way. None of the apparent mind-moves-body passages are so central, unambiguous, and compelling that they could offer serious resistance to a hermeneutic regulative principle such as "Don't interpret Descartes as saying anything inconsistent with the conservation of motion in the world!" For Leibniz the formulation of the conservation of force was the great achievement of Cartesian natural philosophy, and this hermeneutic rule was thus more or less self-evident. Those interpreting Descartes differently are apparently guided by a different hermeneutic prescription, and it would be interesting to know what it is and why they subscribe to it.[25]

3.1 Evidence for the Leibnizian Reading

Let us begin with the evidence for the Leibnizian reading of Descartes, both textual and contextual. This reading isn't original with Leibniz. It seems to have been quite common in Parisian Cartesian circles and had every claim to orthodoxy. Clerselier and other insiders[26] had stated it explicitly in print before Leibniz formulated

[25]I know of no clear statement of the hermeneutic prescription guiding anti-Leibnizian readings; a suitable candidate might be "Interpret Descartes as a representative of pre-Hobbesian moral psychology, who has the soul subdue the passions not by means of other passions but by means of its own force."

[26]Clerselier in a letter to La Forge, Dec. 4, 1660 (in *Lettres de M. Descartes*, vol. 3 (Paris, 1667), 642) wrote, "mais que la finie [substance spirituelle], comme l'Ame de l'homme, peut seulement estre capable de determiner le movement qui est desia." Johann Clauberg in *Corporis et animae in homine conjunctio plenius descripta*, chap. 26, §4 (originally part of his *Physica*, Amsterdam, 1650) wrote, "Non utique motus in majore aut minore mundo quantitatem augendo vel mineundo, . . . sed in alias tantum partes eum convertendo" (*Opera omnia philosophica* (Amsterdam, 1691), vol. 1, 230; Olms, 1968).

his position. And Princess Elisabeth had originally opened her correspondence with Descartes in 1643 by stating precisely the view in question; in fact, the question she asked in her first letter was how she was supposed to conceive of the ability of the nonextended and thus shapeless soul to *determine* the motion of the animal spirits.[27] In Paris Leibniz moved in circles of people who had known Descartes personally. He also had access to manuscripts no longer available to us; in fact one of the passages to be discussed below is known to us only because Leibniz copied and kept it.[28] There is, however, no need to appeal to documents no longer available to us that Leibniz might have read in Paris. Elisabeth needed only a careful reading of the *Meditations* (and presumably of the *Diotropics*). There are clear passages in central writings and in the appropriate sections of the *Traité de l'homme* and the *Description du corps humain* at the places where he deals with the technical details of just exactly how the mind prevails upon the pineal gland to change the course of the animal spirits so as to bring about bodily movements.

Given the structure of Descartes's scientific system, a technically precise explanation of how the mind changes the direction of motion must be couched in terms of *determination.* We need a statement by Descartes to the effect that the mind does not *move* the body but only *determines* its motion.

In the *Meditations* (4th reply) we read,

> Thus, even in ourselves, the mind does not immediately move the external limbs but only directs the [animal] spirits flowing from the heart through the brain into the muscles and *determines* them to certain motions, for of their own accord these spirits could be applied just as easily to many different actions.[29]

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[27]Elisabeth wrote to Descartes, "en vous priant de me dire comment l'ame de l'homme peut determiner les esprits du corps, pour fair les actions volontaires" (AT 3:661).

[28]AT 11:631; this particular passage will, however, turn out not to be relevant to the question of mind-body interaction.

[29]AT 7:229; my translation and emphasis. Most translations I have seen manage to garble this sentence. The original reads, "adeo ut nequidem in nobis ipsis mens immediate moveat membra externa, sed dirigat tantum spiritus a corde per cerebrum in musculos fluentes, eosque ad certos motus determinet, cum ex se isti spiritus ad multas actiones diversas aeque facile applicentur."

That is, the mind can change the course or direction of the animal spirits as they flow through the brain directing them to particular muscles, and thus by this means it determines these muscles to certain motions. That the mind does this by means of one particular gland had already been stated in the Sixth Meditation.[30]

In the preface to the *Description du corps humain* Descartes says,

> And even the movements we call "voluntary" proceed principally from this disposition of the organs, since they cannot be excited without it, whatever will towards them we may have, though it is the soul that *determines* the movements.[31]

In each of these passages the soul is said to *determine* motions of the body, and in the first it is clear that this is done by redirecting the animal spirits. And in many passages in the *Traité de l'homme*[32] "determination" is the technical term used to describe the action of perceptions on the animal spirits and of the animal spirits on the brain.

But we still have no passage where Descartes explicitly says that the mind does not move the *pineal gland itself* but only determines its motion. Peter Remnant, in a rhetorical flourish, asks, "Are we to suppose that it [the mind] only changes its [the pineal gland's] direction, and not speed, of motion—something like a punching bag in perpetual use?"[33] The only consistent answer is, Yes!—with the reservation that the punching bag simile is somewhat off the mark, since it is clear from the Third Law of Nature that however the mind acts, it does not act by *impact.* There seems, however, to be no passage where Descartes actually *explicitly* says what is in fact a

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[30]AT 7:86, CSM 2:59–60.

[31]AT 11:225; my translation and emphasis.

[32]AT 11:131–32, 176–77, 179, 183, 194; see also 518–19.

[33]"Body and Soul," 380. Kemp Smith (*Studies*, 83n) writes, "But though Descartes frequently speaks of the motion of the 'animal spirits' as being merely directed (not originated) by the movements of the pineal gland, he never, so far as we are aware, suggests that those movements of the pineal gland, which are involved in voluntary action, can be explained in a similar manner as previously existing and merely guided by the mind." Jean Laporte, in *Le Rationalisme de Descartes* (Paris: Presses Universitaires, 1950), asks, "Is the soul limited to 'determining' an already existing motion [of the gland]? Descartes says nothing of the kind" (247).

trivial consequence of his position. The closest he comes to this is when he writes the following:

> There are *two principal causes*, not counting the force of the mind which I shall treat later, which can make it [the gland H] move in this way and which I must explain here.
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> The *first* [*cause*] is the difference occurring among the small particles of the spirits that proceed from [the gland]. For if all these spirits were of exactly the same force and if there were no other cause at all that *determined* them to tend one way or the other, they would flow equally through all the pores and keep [the gland] straight and immobile in the center of the head as represented in Fig. 40. . . . The *second cause* that can *determine* the motions of the gland H is the action of objects affecting the senses. . . .[34]

The manuscript ends some twenty pages later, before Descartes has gotten around to explaining the *third* cause that can make the gland move this way or that—the mind. But each of the two physical causes is said to *determine* the gland to tend or move this way or that. That is, the emotions (first cause), by way of differences in the flow of the animal spirits, determine the motion of the pineal gland, and external objects (second cause) by way of perceptions can also determine the motion of the gland. Even though the manuscript ends before the third (and nonphysical) cause is dealt with, the structure of explanation is clear: the two causes treated are causes not of motions but of the determination of motions; at least the expectation must be that the third cause (the mind) is also a cause of *determining* the motion of the gland. That is, passions, perceptions, and (presumably) volitions all exercise their causal influence only by determining the motion of the pineal gland.[35]

This interpretation of the *Traité de l'homme* may receive some additional historical support from the fact that Descartes's imme-

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[34]AT 11:180–85; emphasis added. It should be noted that the first ellipsis represents *eight* pages of text in the original edition.

[35]Descartes writes in the *Passions*, "And the activity of the soul consists *entirely* in the fact that simply by willing something it *brings it about* that the little gland to which it is closely joined moves in the manner required to produce the effect corresponding to this volition" (AT 11:360, CSM 1:343; emphasis added).

diate disciples had no difficulty in filling in the missing pieces. In his textbook version of this argument Jacques Rohault includes the missing third cause in strict parallel to the other two:

> For it is easy to conceive, that, the figure and particular *agitation of the particles* which compose these spirits, or the *action of external objects* upon the sense organs, or, in us, the *inclination* to such or such a motion *determining* [*determinant*] those spirits to enter one nerve rather than another, they will then arrive at one particular muscle rather than another; which, due to the common structure of all muscles, swelling and growing shorter, makes the tendon pull that part of the body to which it is affixed and thus causes the motion of our limbs.[36]

The passages quoted above seem to be all there is, but they do give serious support to the traditional interpretation. None of the recent literature questioning the Leibnizian reading deals with any of the three passages from Descartes adduced above,[37] and none of it has been sensitive enough to the form in which a change-of-direction statement would have to be formulated to notice that Elisabeth's original question to Descartes deals not with the *cause* of motion but with its *determination*, that is, that it *presupposes* the "Leibnizian" interpretation. Thus, I think we can justly consider the argument that the Leibnizian interpretation lacks a textual basis to be untenable. Although Descartes only very rarely makes an unequivocal statement about the technicalities of the action of the mind on the body, whenever he does, he invariably chooses "determination" to characterize this action. Not only does coherence demand that we interpret Descartes as holding a position consistent with the conservation of motion in the world, Descartes himself says enough that we don't have to invent the position ourselves.

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[36]Jacques Rohault, *Traité de Physique* (Amsterdam, 1672), 451–52 (pt. 4, chap. 17, §4), emphasis added. Rohault here is simply following the lead of the editors of Descartes's *De l'homme*, La Forge and Schuyl, both of whom emphasize the parallels between the three causes. See Schuyl's "Ad lectorum" (unpaginated, ninth page) in *De Homine* (1662) and La Forge's note to the passage about the "second cause" in *Traité de l'homme* (1664), 364.

[37]To my knowledge, in the recent literature only Alan Gabbey, "The Mechanical Philosophy and its Problems: Mechanical Explanations, Impenetrability, and Perpetual Motion," in *Change and Progress in Modern Science*, ed. J. Pitt (Dordrecht: Reidel, 1985), (*University of Western Ontario Series in Philosophy of Science*, 27), 20 and 70–71, cites part of these passages.

3.2 Evidence for the Anti-Leibnizian Reading

A number of passages have been cited in favor of the anti-Leibnizian view in which Descartes seems to assert that the mind is the cause of *motion*. These passages can for the purposes of discussion be divided into three groups: (1) a number of letters to Elisabeth, Arnauld, and More, (2) statements in the *Passions of the Soul*, and (3) a manuscript on motion from about 1635.

The first group is of particular importance—in spite of the fact that the passages cited do not really prove anything—because they, nonetheless, give rise to misgivings that remain even when we set the objections aside. These passages have often been cited both by proponents and by critics of the Leibnizian view; neither side has considered them decisive.[38] Recent critics, while citing these passages as auxiliary support, rest their cases on the second and third groups. Remnant bases his argument primarily on the *Passions*, and Garber puts his bets on the 1635 manuscript.

The often cited mind-moves-body passages from Descartes letters are the following:[39]

> I shall endeavor to explain the way I conceive the union of the mind with the body and how it has the force to move it. . . . As regards mind and body together, we have only the notion of their union, on which depends our notion of the force the mind has to move the body, and the body to act on the mind causing sensations and passions. (Letter to Elisabeth, May 21, 1643; AT 3:665; K, 138)

> Moreover, that a mind, which is incorporeal, can impel a body is shown to us every day by the most certain and most evident experience, without the need of any reasoning or comparison with anything else. . . . Many philosophers who think that the heaviness of a stone is a real quality distinct from the stone think that they understand well enough how such a quality can move the stone toward the center of the earth, since they think that they have a manifest experience of it. I, who have persuaded myself that there is no such quality in nature, nor thus any true idea of it in the human intellect, believe that they use the idea which they have of incorporeal substance to represent that

[38]Garber characterizes the remarks in the letters to Elisabeth, Arnauld, and More as "casual and . . . given in the context of nontechnical and almost off-the-cuff explanations" ("Mind, Body and the Laws of Nature," 112).

[39]The translations for the most part follow Garber (and Kenny).

> heaviness to themselves. Thus, it is no more difficult for us to understand how mind moves body than it is for them [to understand] how this heaviness bears a stone downwards. (Letter to Arnauld, July 29, 1648; AT 5:222–23; K, 235–36)
>
> Of course I do not think that any mode of action belongs univocally to both God and creatures, but I must confess that the only idea I can find in my mind to represent the way [*modus*] in which God or an angel can move matter is the one which shows me the way in which I am conscious I can move my own body by my own thought. (Letter to Henry More, April 15, 1649; AT 5:347; K, 252)
>
> The force moving [a body] can be that of God himself conserving as much translation in matter as he placed in it in the first moment of creation; or also that of a created substance, like our mind or that of some other thing to which he gave the force of moving a body. (Letter to Henry More, August 1649; AT 5:403–4; K, 257)

Had not Descartes in his published writings explictly maintained that the quantity of motion in matter is conserved, it is unlikely that these particular correspondents would have attributed such an opinion to him. Considered in isolation or in an appropriately constructed context, they do seem to attribute to the soul the power to *move* the body. But note that in none of these passages is the alternative between the production of motion and determination of motion even mentioned. In fact the question of the *compatibility* of mind-body interaction and conservation is not being discussed at all. All passages deal with the *intelligibility* of interaction as such, which Descartes is attempting to justify.[40] The introduction of the

[40]Garber quite rightly sees that in his first reply to Elisabeth "Descartes is attempting to establish that mind body interaction is *per se* intelligible" ("Understanding Interaction," 27–28). Had he noticed that this is *not* the question Elisabeth actually posed, he could have adduced a much stronger argument by pointing to the *difference* between Elisabeth's first letter and her second letter, in which she restates the question in terms of motion—how "nous devons juger comment l'ame . . . peut mouvoir le corps" (June 10/20, 1643; AT 3:684). The decisive event occurring between the apparently "Leibnizian" formulation of the first letter and the "anti-Leibnizian" formulation of the second is the receipt of a letter from Descartes himself. If we assume that Elisabeth was not just parroting Descartes's words when she originally spoke of determination, this singular fact must give rise to more misgivings than any of the anti-Leibnizian arguments put forward in the literature. Descartes seems to have missed a golden opportunity to give a concise explanation to someone who would have understood it.

distinction between the mind's changing a body's motion and changing the directional mode of its motion would not serve to make more plausible the substantial union of body and soul. While we might well wish that Descartes had not ignored his own technical distinctions, it is nonetheless clear that his intent here is to affirm generically the *action* of the mind on the body, rather than to single out a specific *kind* of action that is incompatible with his conservation law. There is no indication whatever that he is using "move" (or "force") in the strict technical sense of "impart $|mv|$," that is, "move as opposed to merely determine." Any interpretation must choose to attribute to Descartes either minor infelicities of expression or major inconsistencies of content. And, as we have already seen, in those contexts where Descartes does in fact take the distinction between motion and determination into account he attributes only determination to the soul. Genuine misgivings may and perhaps should remain, but they are only misgivings.

The second group of quotations often cited are found in the *Passions of the Soul*, where Descartes speaks in a somewhat more technical context about the interrelations of body and soul, although the primary context is not the actions of the soul but its passions. From §§34–47 in the first book we can glean the following representative remarks about the action of the soul on the body:

> (§34) . . . [the gland] can be *moved* in various ways by the soul. . . .
> (§41) . . . [by willing] the soul *brings it about* that the little gland to which it is closely joined moves in the manner required. . . .
> (§42) . . . this volition *makes* the gland lean first to one side and then to another. . . .
> (§43) . . . this volition *makes* the gland drive the spirits to the muscles. . . .
> (§47) . . . the little gland in the middle of the brain can be *pushed* to one side by the soul and to the other side by the animal spirits . . . and these two *impulses* [*impulsions*] often happen to be opposed, the stronger cancelling the effect of the weaker; . . . the force with which the soul by its volition *pushes* the gland in a contrary direction. . . .[41]

Although some expressions (such as the first above) vaguely state that the mind moves the body in the same sense as in the letters

[41]Descartes, *Passions of the Soul*, AT 11:355–66, CSM 1:341–47; emphasis added.

cited above, almost all the assertions about mind-body interaction from the *Passions* are expressed in the language of indirect causality: the soul does not *do* anything, it *has* things done.[42] The expression used is normally *faire que* (to *bring it about* that something happens, to *make* something happen) and occasionally *laisser* (to *let* something be done, or *have* it done). This is precisely the terminology that Descartes uses in the *Dioptrics* when he introduces the distinction between motion and its determination. The determination is said to make the tennis ball descend (*la fait descendre*) or advance horizontally (*la fait avancer*) according to the parallelogram rule; but Descartes is explicit that he does not mean by this that the determining cause affects the quantity of motion.[43] Thus, most of Descartes's descriptions of the action of the soul on the pineal gland in the *Passions* are completely compatible with the conservation of motion since they are formulated in the vocabulary introduced to guarantee compatibility.

Let us also take up the most vivid example, the last quotation (§47), which does *not* use the language of indirect causality: we are to picture the soul pushing the pineal gland one way while the animal spirits push it in the opposite direction.[44] This seems obviously to be a case of *forces* in equilibrium; and if the soul is to overcome the force of the animal spirits then it must also be able to apply more force than they do. But what about the action of the animal spirits on the gland? Do they really *push*? As we saw above, when Descartes gets down to the hard physiological details of *body-body interactions*, he says not that the animal spirits *move* the gland, but that they *determine* its motion. But the vividness of Descartes's example of the soul counteracting the animal spirits is based on the implicit assumption that the soul "pushes" *in the same way* as the animal spirits. If the actions of the animal spirits are seen as *deter-*

[42]For an analysis of the terminology of indirect causality in Descartes and late scholastic philosophy see Rainer Specht, *Commercium mentis et corporis: Über Kausalvorstellungen im Cartesianismus* (Stuttgart: Frommann, 1966), chap. 2.

[43]See, for example, AT 6:95 (CSM 1:157–58) and Damerow et al., *Exploring the Limits*, 103–25.

[44]Remnant "Body and Soul," (381) takes this passage to be decisive. And in Kemp Smith's (mis)translation, which he cites, it indeed contains the much stronger statement, that the soul acts on the pineal gland by *impact*; but it is obviously wrong to translate "impulsion" as *impact* here.

mining the motion of the gland, as Descartes repeatedly asserts,[45] how are we to conceive the "impulsions" of the mind? If we want to keep the vivid symmetry we must say that the action of the mind, too, consists in determining a motion. In fact, any attempt to take the *Passions* passages in a more technical sense than the letters discussed above forces us to interpret them as consistent with the well-entrenched doctrines of the *Dioptrics, Principles,* and *Meditations.* Impulsions of the mind neither harmonize nor clash with the conservation of scalar motion. If we take them to cause changes in speed, they clash; if we take them to cause changes in direction, they harmonize. Which choice comes closest to Descartes's intentions depends on what those intentions were. I take it he intended the *Passions* to be compatible with the *Dioptrics, Principles,* and *Meditations.*

The third group of passages deals with an example where Descartes, although he speaks only of motion (and doesn't mention determination), deals with a case of *acceleration.* If a soul is said to *increase* the motion of a body, Descartes cannot be interpreted as merely saying in lax terminology that the soul determines the direction of motion. The letter to Arnauld quoted above, which compares the mind to gravity, is taken by Garber[46] to imply that the mind can cause motion to increase just as heaviness is thought to do; but this is certainly untenable. First of all, it is clear from the context that the problem being discussed is the *intelligibility* of mind-body interaction, not the question of the compatibility of such interaction with conservation principles. Secondly, the comparison Garber makes doesn't work: heaviness as a "real quality" is *not* a cause of motion for Descartes; gravitational acceleration is caused by the impact of particles or by hydrodynamic processes in a medium. If we say that the mind causes the motion of the body just like heaviness causes gravitational acceleration, we are in effect *denying* that the mind causes motion. Thus this passage would suggest just the opposite of what Garber intends, if it were in fact relevant.

However, Garber himself puts much more stock in a second passage, in which he believes the implication that the mind in-

[45]AT 11:131–32, 176–77, 179, 194.
[46]AT 5:222–23; Garber, "Mind, Body and the Laws of Nature," 113–14.

creases the quantity of motion is "clearest of all." This is a manuscript dating from around 1635.

> If a body is pushed or impelled to motion by means of a uniform force of course imparted to it by mind [*mens*] (for there can be no other such force otherwise), and if it is moved in a vacuum, then it would always take three times longer to travel from the beginning of the motion to the midpoint than from the mid point to the end. However, there can be no such vacuum. . . . But suppose that the body were impelled by heaviness. Since that heaviness never acts uniformly like mind [*anima*], but [acts by] some other body which already is in motion, it can never happen that a heavy body is impelled more quickly than that which moves it. . . .[47]

Garber interprets this passage as contrasting the uniform acceleration caused by the mind with the nonuniform acceleration caused by gravity (interpreted as a particle stream) and thus concludes that "Descartes thought that the action of mind on bodies does *not* result in a mere change of direction. Rather, Descartes quite clearly thought, mind can produce a real change of *speed* of a body. . . ."[48] However, this manuscript tells us nothing about mind-body interaction; it describes an entirely counterfactual situation—uniform acceleration. The logic behind the example is the following: We want an example of continuous uniform acceleration. But (1) in a *medium*, acceleration by a given accelerating force is not uniform since it is increasingly retarded by the medium, and there is an upper limit to velocity. (2) In a *vacuum*, on the other hand, there can be no acceleration at all by material causes, because there is no matter to cause it. (3) Even assuming a vacuum only *on one side* of the body, with a real accelerating force on the other, acceleration would still not be uniform because the particle stream has a given velocity, so that there is again a maximum speed reached asymptotically. The free fall of a real body due to gravity is, according to Descartes, not uniformly accelerated at all. In his view, the only way to conceive of acceleration at all *inside* a vacuum is to consider its cause to be noncorporeal, and the only way to conceive of accel-

[47]Ibid., 114; AT 11:629–30; the translation (including ellipsis) is Garber's. See Damerow et al., *Exploring the Limits*, 35ff., for an analysis of the entire manuscript section et al.

[48]Garber, "Mind, Body and the Laws of Nature," 114–15.

eration as uniform and open-ended is also to conceive its cause to be noncorporeal, such as a mind. In this manner Descartes entertains the notion of a body accelerated uniformly within a vacuum by a mind and considers the relations of times, spaces, and velocities under these assumptions. In such a situation the mathematical relations familiar from his earlier work on falling bodies would hold exactly.[49] But, as Descartes states in the passage quoted, there is no such thing as a vacuum, and—as he indicates in the part represented by the first ellipsis—there is no such thing as uniform acceleration. Thus, there is no more reason to take Descartes to be affirming the acceleration of a body by a soul in a vacuum than there is to take him to be affirming the existence of a vacuum itself. 'If p then q' does not imply 'p'. Thus, this passage provides no evidence at all that Descartes abrogates the conservation of motion with the actions of the soul. It provides evidence only of Descartes's reasons for considering certain abstractions made in deriving the law of falling bodies to be a waste of time.[50]

To sum up the results so far: (1) Descartes possesses a technical scientific vocabulary capable of expressing the action of the mind on the body without contradicting the conservation of motion. (2) He sometimes uses this vocabulary to state explicitly that the mind merely determines the motion of the body as opposed to moving it. (3) He never uses this vocabulary to say explicitly that the mind moves the body as opposed to merely determining its motion. (4) In his physiology he generally expresses the analogous action of the animal spirits on the limbs or on the pineal gland in terms of determination. (5) He sometimes speaks of the mind's moving the body or having the "force" to move it. In this last case we must ask whether Descartes intends the term in the generic everyday sense of "act upon" or in the specific scientific sense of "act upon so as to increase scalar momentum." Only if we take him here to be using

[49]The question and the answer are essentially the same as those discussed with Beeckman seventeen years earlier—although the formulation has become more strongly counterfactual. On the development of Descartes's derivations of the law of falling bodies, see Damerow et al., *Exploring the Limits*, chap. 1.

[50]Descartes says as much in letters to Mersenne from the same period. See, for example, October 1631[?], AT 1:221–22; March 11, 1640, AT 3:36–38; June 11, 1640, AT 3:79.

"move" in a strict technical sense is he necessarily being inconsistent. "Determination," which specifies the directional mode of $|mv|$, is a precise technical term, whose use more or less automatically defines a context as technical; however "force" and "motion" have a broad range of everyday-language meanings in addition to their (various) physical meanings,[51] so that we have to rely on context and consistency to decide how strictly we are to take them. The decisive question is, thus, How important and deeply entrenched is the conservation of motion in Descartes's system? Must he always have taken it into account? The interpretation of most mind-moves-body passages is itself largely dependent on an evaluation of the importance for Descartes's system of the conservation of motion in the world. Let us see what arguments speak against conservation.

4. Conservation of Motion

The second anti-Liebnizian argument is based not so much on the collection of apparently conflicting statements by Descartes,[52] but on an analysis of the reasoning by which Descartes grounds the conservation of motion in the *Principles* (2, §36). The general validity of the conservation law is said to be ultimately inconsistent with Cartesian Metaphysics.

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[51]See R. W. Westfall, *Force in Newton's Physics: The Science of Dynamics in the Seventeenth Century* (New York: Elsevier, 1971), appendix B, "Descartes' Usage of *Force*," 529–34, for an analysis of the range of technical and nontechnical meanings of the term 'force' in Descartes's various writings.

[52]On occasion, appeal is made to a passage in the explication of the Third Law of Nature (*Principles* 2, §40; AT 8:65: "I am not here inquiring whether human or angelic minds have a force to move bodies and of what kind [it might be], since I am reserving this for a treatise *On Man.*"), which only shows that Descartes was aware of the problem of interaction when he formulated his conservation law and saw no insurmountable difficulty. Also, in what can only be called a straightforward misreading of *Principles* 2, §36, Garber goes a step further, maintaining that "Descartes clearly admits that there *can* be violations of the conservation law, circumstances in which motion is added or taken away" ("Mind, Body and the Laws of Nature," 116). But the only support for such "violations" in the passage he quotes is the interpolation that he himself (115–16) adds in brackets, when he interprets "changes" in the *distribution* of motion among bodies to refer to changes in the *quantity* of motion in the world.

On the basis of Descartes's doctrine that preservation in existence is comparable to re-creation,[53] it is argued that God must be not only the ultimate but also the proximate cause of most or all motions. Since Descartes sees no "real distinction" between God's original creative activity and his current conservative activity, preservation is equivalent to continual re-creation. Kemp Smith argues that "[i]f finite bodies have so little hold on reality that they require at each moment to be recreated they cannot be capable of causing changes in one another."[54] Thus God recreates matter with successively different constellations of bodies according to the laws he has given himself. Occasionalism is taken to be the necessary consequence of the doctrine of divine concourse (*concursus dei*). Kemp Smith sees that these implications of God's concourse are incompatible with most of Descartes's writings and therefore accuses Descartes of inconsistency.[55] But this is a serious misreading.

(1) The fact that Descartes sees no "real distinction" between God's acts of creation and preservation is completely inconsequential. As the term is defined in the *Principles* (1, §60) there is no "real" or substantial distinction between any two properties of one and the same substance; such differences are either "modal" or "conceptual."[56] Thus, there is no real distinction between God's omnipotence and his wisdom, nor between my height and my weight. However, it by no means follows that the distinction between preservation and creation, whether it be modal or conceptual, is irrelevant to the foundations of physical science.[57]

(2) Nothing directly attributed to Descartes here is foreign to mainstream scholasticism, which did not embrace occasionalism.

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[53]See especially the third Meditation (AT 7:49; CSM 2:33).

[54]*Studies*, 73. For a refutation of the notion that God's *continuous* preservation is to be interpreted as a *discontinuous* "continual" repetition of discrete events, see Richard T. W. Arthur, "Continuous Creation, Continuous Time: A Refutation of the Alleged Discontinuity of Cartesian Time," *Journal of the History of Philosophy* 26 (1988): 349–75.

[55]*Studies*, 85. If material bodies are not taken by Descartes to cause our ideas of them, it is hard to make any sense of the *Meditations*, as Kemp Smith openly admits; see *New Studies in the Philosophy of Descartes* (London: Macmillan, 1966), 213–17.

[56]AT 8:28–30; see also the sixth Meditation and the reply to the first objection (AT 7:78 and 120; CSM 2:54, 86).

[57]Leibniz (GP 4:365) objected to Descartes's definition of real distinction because he thought it would lead to such misunderstandings.

Simply from the denial of a "real distinction" between the cause of becoming (*causa secundum fieri*) and the cause of continuing to exist (*causa secundum esse*) no such conclusion can be drawn: It is possible without any inconsistency to assert (1) that God is the source of everything material, (2) that nothing would continue to exist without God's conserving it in being, and (3) that material events are true *secondary* causes of other material events. This seems to be what Aquinas believed, and it is certainly what contemporary neoscholastic philosophy asserts.[58]

(3) Moreover, even if these commentators were able to pin such consequences on mainstream Thomism, they would still be unsuccessful in pinning them on Descartes, because they have failed to understand the particular doctrine of *concursus dei* to which he is appealing. Descartes explicitly asserts that it is by his *ordinary* concourse (*concursus ordinarius*) that God conserves the quantity of motion in the world. He thus appeals to the conceptual distinction between the *ordinary* (or preserving) concourse and the *extraordinary* (or miraculous) concourse of God.[59] The fact that neither Kemp Smith nor those following him take any notice of this is perplexing to say the least. This is precisely the

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[58]See *Summa theologica* 1:104 and Walter Farrell, *A Companion to the Summa* (New York: Sheed & Ward, 1939–42), vol. 1, chap. 17.

[59]There seems to be some uncertainty about the translation of the term *concursus ordinarius*. In this context Kemp Smith (*New Studies*, 208) renders it "orderly [!] concourse"; Anscombe/Geach, "ordinary co-operation"; CSM, "regular concurrence"; Miller and Miller, "normal participation." Robert Boyle (*Works*, vol. 5, 163–64, 179) spoke in this context of God's "ordinary and preserving concourse"; and Samuel Clarke (and most scholars after him) translated Leibniz's *concours (extra)ordinaire* as "(extra)ordinary concourse." I shall follow them. See J. E. McGuire, "Force, Active Principles, and Newton's Invisible Realm," *Ambix* 15 (1968): 154–208, for examples of other English writers of the period who use the same term. The exact origins of the terminology are not entirely clear, though there is obviously some connection to the distinction between the absolute and regulated power of God (*potentia absoluta, potentia ordinata*). See Amos Funkenstein, *Theology and the Scientific Imagination from the Middle Ages to the Seventeenth Century* (Princeton: Princeton University Press, 1986), 124–52; Francis Oakley, *Omnipotence, Covenant and Order: An Excursion in the History of Ideas from Abelard to Leibniz* (Ithaca, N.Y.: Cornell University Press, 1984), 72–92. A pre-Cartesian use can be found in Francisco Suarez, *De arbitrii libertate*, chap. 5, §§20 and 28; *Opera omnia* (Paris, 1856), vol. 7, 31–33.

distinction that Leibniz later used in his debate with Newton and Samuel Clarke to keep God *out* of explanations of natural phenomena.[60]

Some commentators try to make Descartes consistent by limiting the scope of the conservation law and interpreting the rest of his philosophy as compatible with Kemp Smith's reading of the *Principles*. Hatfield, for instance, takes Descartes literally to have *derived* his physics from his metaphysics: the conservation of motion is entailed by God's immutability. But the immutability of God and his actions can then be taken really to imply the conservation of motion only if God produces all the motions himself. For, if bodies produced the motions of other bodies and God merely conserved the system of bodies as a whole, then changes might occur in the system without a change in God's act of preservation:

> for surely his act of preservation could be immutable, while the thing preserved could exhibit changing attributes (including the quantity of motion).[61]

Therefore, since Descartes believed that God's immutability entails the conservation of motion, he must have taken God as the proximate cause of every motion. However, leaving aside the question of what it means to say that God could preserve immutably a changing universe, this argument, if it were valid, would prove much too much; the same argument must, for instance, apply equally well to the number of human beings as to the quantity of motion. Since God originally put a certain number of human beings into the world (namely, two) and since he preserves the world just as he created it, then he must constantly conserve the same total number of human beings as he originally created—unless, of course, the number of humans does not belong to the identity conditions of the material universe. Only if having the same quantity of matter and motion is what makes the universe the same universe at different times must the constancy of God's operation guarantee their

[60]See Leibniz's first letter to Clarke (GP 7:345); see also his letter to Arnauld, April 30, 1687 (GP 2:92) and *Causa dei* (GP 6:440).

[61]Hatfield, "Force," 122 n. 44.

conservation. But this has to do with predicates of the universe, not of God.

5. Conclusion

Both objections to the Leibnizian interpretation of Descartes discussed above meet in the following point: If (1) human minds can originate motions, and (2) the conservation of motion is a law that God gives to himself to govern *his own* actions, not a law that he has given to matter, then the conservation law can still hold for those motions caused by God without constraining those caused by us. That is, God conserves *his* motions, not *ours*:

> Now, when God causes motion, the motion He causes must observe the conservation law. But there is no reason at all to impose similar constraints on *finite* and *imperfect* causes of motion. . . . *They* may add or subtract motion from the world, even if *God* cannot.[62]

But this just shows that with enough effort, projection, and speculation we can have Descartes's words without their content.

The "standard" interpretation sketches a Descartes who stipulates that the first proposition of a physical system must state the identity conditions of its object; the system must include definitions of what it means for a body to be in a particular state and what it means for that state to change, as well as laws governing the quantitative relations involved. When God is adduced, it is to provide (nonphysical) foundations for physics, not to undermine them. The alternative we have been offered by recent commentators is a Descartes who makes arbitrary and genuinely theological assertions about God's activity that neither constrain physical theory formation nor lead to any propositions about the material world except that it need not be causally closed. The interaction form of the modern mind-body problem is not only not solved, it is not even posed. Leibniz has offered us a Descartes who does bad physics but good metaphysics; recent commentators, while on occasion doing

[62]Garber, "Mind, Body and the Laws of Nature," 125; emphasis in original.

no little violence to the texts, offer us a Descartes whose metaphysics is worse than his physics. In spite of all the real difficulties involved in interpreting Descartes consistently, it seems preferable to take the strong philosophical position attributed to him by Leibniz, which is at least compatible with the texts. Given that Descartes's texts themselves often purchase consistency with vagueness, Leibniz offers us a way to make our interpretations precise and sensible in the context without loss of consistency or of philosophical substance. And that is really the point.

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