

RENÉ DESCARTES (1596–1650): MIND-BODY INTERACTIONISM

The great French philosopher René Descartes (1596–1650) was a true Renaissance man—in addition to his importance to the history of philosophy, as a strong advocate for a rationalist position (a belief in the use of reason to arrive at truth), he made important contributions to mathematics, astronomy, meteorology, and, as you will learn here, to the physiology of the nervous system and to psychology. He was trained by Jesuits, but spent the majority of his life in the independent pursuit of knowledge, and he was often scornful of authority. He is perhaps best known for his *Discourse on Method* (Descartes, 1637/1960), which begins with an autobiographical chapter and includes a detailed description of his rationalist method of inquiry. In the year before his death, Descartes published *The Passions of the Soul* (1649/1969), which addressed issues that would eventually become important to physiologists and psychologists. A portion of that book is excerpted here.

Primarily a treatise on human emotions (and their rational control), *Passions* included an attempt to explain what we now call the *reflex*, and it included the description of a physiological model for Descartes' dualist position on the mind-body question. Descartes opened the book with an attack on the traditional, authority-based approach to the study of the emotions, arguing in his opening sentence that “[t]here is nothing in which the defective nature of the sciences which we have received from the ancients appears more clearly than in what they have written on the passions” (Descartes, 1649/1969, p. 331). He then began a discussion of the “bodily machine” which included (a) a direct reference to a contemporary, William Harvey, who had proposed, in 1628, a mechanical model of the heart-as-pump; (b) a description of the antagonistic action of the muscles; and (c) an opening discussion of the functioning of the nervous system.

In order to render this more intelligible, I shall here explain in a few words the whole method in which the bodily machine is composed. There is no

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one who does not already know that there are in us a heart, a brain, a stomach, muscles, nerves, arteries, veins, and such things. . . . Those who have acquired even the minimum of medical knowledge further know how the heart is composed. . . . Likewise all those whom the authority of the ancients has not entirely blinded, and who have chosen to open their eyes for the purpose of investigating the opinion of Harvey regarding the circulation of blood, do not doubt that all the veins and arteries of the body are like streams by which the blood ceaselessly flows with great swiftness. . . . We further know that all the movements of the members [e.g., arms and legs] depend on the muscles, and that these muscles are so mutually related one to another that when the one is contracted it draws toward itself the part of the body to which it is attached, which causes the opposite muscle to become elongated. . . . We know finally that all these movements of the muscles, as also all the senses, depend on the nerves, which resemble . . . little tubes, which all proceed from the brain, and thus contain like it a certain very subtle air or wind which is called the animal spirits. (pp. 333–334)

The *animal spirits* referred to by Descartes, a notion that traces to the ancient Greeks, were said to be derived from the “heat” of the blood and were the driving forces behind all movement. Descartes believed these spirits were tiny particles in constant motion and were found in the brain, the nerves, and the muscles.

[F]or what I here name spirits are nothing but material bodies and their one peculiarity is that they are bodies of extreme minuteness and that they move very quickly like the particles of the flame which issues from a torch. Thus it is that they never remain at rest in any spot, and just as some of them enter into the cavities of the brain, others issue forth by the pores which are in [the brain], which pores conduct them into the nerves, and from there into the muscles, by means of which they move the body in all the different ways in which it can be moved. . . .

For the sole cause of all the movements of the members is that certain muscles contract, and that those opposite to them elongate . . . and the sole cause of one muscle contracting rather than that set against it, is that there comes from the brain some additional amount of animal spirits, however little it may be, to it rather than to the other. Not that the spirits which proceed immediately from the brain suffice in themselves to move the muscles, but they determine the other spirits which are already in these two muscles, all to issue very quickly from the one of them and to pass into the other. (p. 336)

Muscle movement results from the action of animal spirits, but what determines which muscles will move? Two things, according to Descartes. First, the mind can initiate the movement of animal spirits in the brain by activating the nerves controlling certain muscles rather than others. That is, the mind can influence the body (more on this shortly). Second, certain muscles can move automatically in response to the results of specific sensory stimulation. That is, *reflexes* occur.

Descartes explained the relationship between sensation and the automatic motor (reflex) response by proposing the existence of thin, wire-like “filaments” that existed within the nerves and extended to the brain.

[T]here are three things to consider in respect of the nerves, i.e. first of all their marrow or interior substance, which extends in the form of little filaments from the brain, from which it originates, to the extremities of the other members [e.g., a hand] to which these filaments are attached; secondly the membranes which surround them, and which, being coterminus with those which envelope the brain, form little tubes in which these little filaments are enclosed; and finally the animal spirits which, being carried by these same tubes from the brain to the muscles, are the reason of these filaments remaining there perfectly free and extended, so that the least thing that moves the part of the body to which the extremity of any one of them is attached, causes by that same means the part of the brain from which it proceeds to move, just as when one draws one end of a cord the other end is made to move. (p. 337)

On the basis of his animal dissections and without the benefit of Anton van Leeuwenhoek's microscope, yet to be invented, Descartes believed the nerves to be hollow tubes (thus allowing for animal spirits to move through them) containing these thin filaments. Whenever our senses are stimulated, according to Descartes, these filaments move, causing certain "pores" in the brain to be opened. This in turn results in the flow of animal spirits that produces the reflex movement, as when we accidentally touch the stove and burn ourselves. The hand touches the burner on the stove, causing a tug on the filaments within the nerve in the hand. These filaments extend all the way to the brain where animal spirits are released into the nerve "tube." The spirits in turn are carried "partly to the muscles which pull back the [hand from the burner], partly to those which turn the eyes and the head in order to regard it, and partly to those which serve to advance the hands and to bend the whole body in order to shield itself" (Descartes, 1637, quoted in Fearing, 1930, p. 24). Descartes also stressed the idea that reflexes occur even if we deliberately (i.e., through the action of our "soul"—mind) try to avoid them. Note here the use of a "body as machine" metaphor frequently used by Descartes.

If someone quickly thrusts his hand against our eyes as if to strike us, even though we know him to be our friend, that he only does it in fun, and that he will take great care not to hurt us, we have all the same trouble in preventing ourselves from closing them; and this shows that it is not by the intervention of our soul that they close; seeing that it is against our will, which is its only, or at least its principle activity; but it is because the machine of our body is so formed that the movement of this hand toward our eyes excites another movement in our brain, which conducts the animal spirits into the muscles which cause the eyelids to close. (p. 338)

Descartes used the reflex concept to include not just motor reflexes, but all our automatic functioning (e.g., breathing, digesting). In yet another reference to the idea of the body as machine, he drew an analogy to the mechanics of a clock.

In this way all the movement which we make without our will contributing thereto (as frequently happens when we breathe, walk, eat, and in fact perform all those actions which are common to us and to the brutes), only

depend on the conformation of our members, and on the course which the spirits, excited by the heat of the heart, follow naturally in the brain, nerves, and muscles, just as the movements of a watch are produced simply by the strength of the springs and the form of the wheels. (pp. 339–340)

In addition to resulting in reflex action, sensations can also give rise to the movement of animal spirits in the brain that lead to *deliberate* decisions to act; hence, the mind *by itself* can initiate action. How to explain the nature of this interaction between mind and body was a problem, however. It is one thing to say that the mind can directly affect bodily movement, but it is quite another thing to demonstrate just how this occurs. After careful analysis, Descartes

clearly ascertained that the part of the body in which the soul exercises its functions immediately is in nowise the heart, nor the whole of the brain, but merely the most inward of all its parts, to wit, a certain very small gland which is situated in the middle of its substance and so suspended above the duct whereby the animal spirits in its anterior cavities have communication with those in the posterior, that the slightest movements which take place in it may alter very greatly the course of these spirits; and reciprocally that the smallest changes which occur in the course of the spirits may do much to change the movements of this gland. (pp. 345–346)

The structure in question is the *pineal gland*, and Descartes selected it as the locus for mind-body interaction because he believed it was strategically located in a place where the flow of the animal spirits could be controlled. The pineal gland was also a brain structure that was not duplicated on both the left and right side of the brain. Because the mind (or soul) was considered to be unitary, Descartes reasoned, it must exert its effect through a structure that was also a single unit.

The reason which persuades me that the soul cannot have any other seat in all the body than this gland wherein to exercise its functions immediately, is that I reflect that the other parts of our brain are all of them double, just as we have two eyes, two hands, two ears, and finally all the organs of our outside senses are double; and inasmuch as we have but one solitary and simple thought of one particular thing at one and the same moment, it must necessarily be the case that there must somewhere be a place where the two images which come to us by the two eyes, where the two other impressions which proceed from a single object by means of the double organs of the other senses, can unite before arriving at the soul, in order that they may not represent to it two objects instead of one. And it is easy to apprehend how these images or other impressions might unite in this gland by the intermission of the spirits which fill the cavities of the brain; but there is no other place in the body where they can be thus united unless they are so in this gland. (p. 346)

It is worth noting that Descartes was not arguing that the pineal gland had its special function because it was a part of the brain found only in humans—he was well aware, on the basis of some of his own dissections, that other animals possessed the structure (Finger, 2000). What he was arguing was that the gland

had a function in humans that would not be found in animals—the locus for mind-body interaction.

Descartes was not asserting that the mind was *in* the pineal gland, only that the gland serves as the place where mind and body influence each other. Thus, sensations produce a stretching of the small filaments that open pores in the brain, thereby moving the animal spirits. These movements are felt by the pineal gland and result in the mental event of a “sensation.” The animal spirits also continue their movement back down the nerve fibers into the muscles, producing movement (i.e., as in a reflex). But muscle movements can also be created by the direct action of the will. The decision to move *causes* the pineal gland to move, which in turn produces the movements of the spirits that eventually move the muscles. In a similar fashion, our decision to think about something, or use our imagination, cause the pineal gland to move in such a way that animal spirits are directed to specific portions of the brain.

Thus when we desire to imagine something we have never seen, this desire has the power of causing the gland to move in the manner requisite to drive the spirits towards the pores of the brain by the opening of which pores this particular thing may be represented; thus when we wish to apply our attention for some time to the consideration of one particular object, this desire holds the gland for the time being inclined to the same side. Thus, finally, when we desire to walk or to move our body in some special way, this desire causes the gland to thrust the spirits towards the muscles which serve to bring about this result. (pp. 350–351)

Furthermore, Descartes used his model to explain other mental processes such as memory, which he suggested was the result of animal spirits moving more easily along pathways that have been made more accessible by experience.

Thus when the soul desires to recollect something, this desire causes the gland, by inclining successively to different sides, to thrust the spirits towards different parts of the brain until they come across that part where the traces left there by the object which we wish to recollect are found; for these traces are none other than the fact that the pores of the brain, by which the spirits have formerly followed their course because of the presence of this object, have by that means acquired a greater facility than the others in being once more opened by the animal spirits which come towards them in the same way. Thus the spirits in coming in contact with these pores, enter into them more easily than into the others, by which means they excite a special movement in the gland which represents the same object to the soul, and causes it to know that it is this which it desired to remember. (p. 350)

Of course, despite the noble effort, Descartes was wrong about the physiology. For example, the pineal gland, which secretes the hormone melatonin and remains poorly understood today, is not a mind-body Grand Central Station. A more important problem, one pointed out almost immediately by critics in his own day, was that his proposal of the pineal gland as the point of mind-body interaction really did not explain *anything*, but merely pushed the problem back by one step. If it is unclear how the unextended mind can influence and be

influenced by an extended body in general, it is just as unclear how the unextended mind can influence, and be influenced by, the movements of a small, extended piece of the brain (Cottingham, 1986). For psychology, the significance of Descartes' work is not that he made a serious yet flawed effort to solve the mind-body problem, but that in so doing, he created the concept of reflex action, with its explicit distinction between sensory stimulus and motor response, and he tried to explain psychological concepts (e.g., memory) by using a physiological model. He was the first physiological psychologist.

Shortly after publishing *The Passions of the Soul* in 1649, Descartes was persuaded by Queen Christina of Sweden to move to Stockholm in order to tutor her. Christina had a keen mind, was fluent in five languages, and was determined to make Stockholm a center of learning in Europe. To accomplish her goal, she created a world-class library and began inviting scholars to her court, Descartes being among the first to be asked. He accepted with some misgivings and soon found himself conversing with and tutoring Christina for five hours a day, three days a week, beginning at 5 A.M., during a winter that was severe even by Swedish standards. He soon developed pneumonia and died on February 11, 1650.

CONCEPT REVIEW QUESTIONS

1. Use Descartes' model of the reflex to show how he was influenced by the mechanistic *Zeitgeist* of the day.
2. Why did Descartes pick the pineal gland as the place for the locus of mind-body interaction?
3. How did Descartes explain memory processes?

DISCUSSION QUESTION

1. Describe Descartes' solution to the mind-body problem. Does it make sense? Explain.