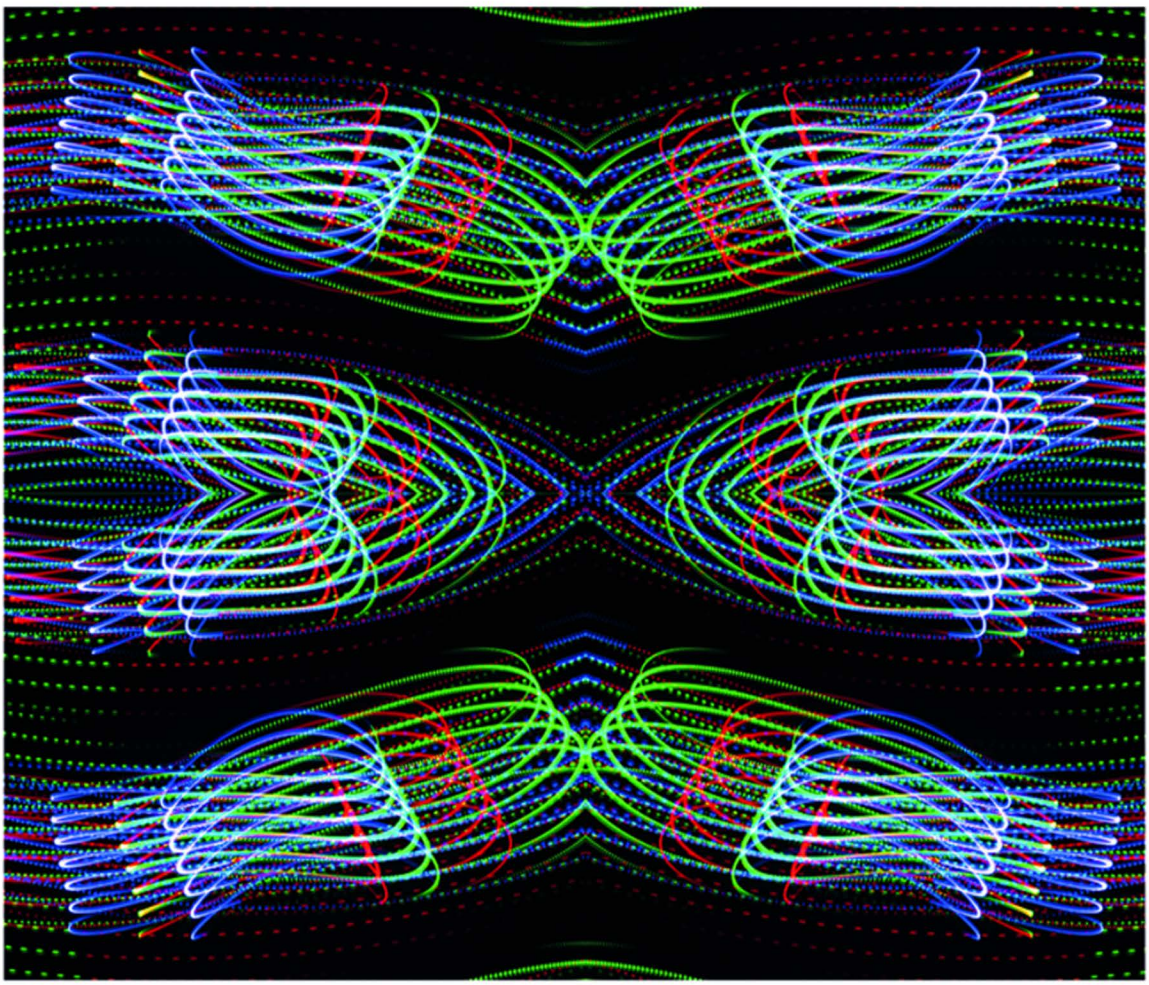
ROUTLEDGE

# The Routledge Companion to Philosophy of Psychology

Second Edition



Edited by Sarah Robins, John Symons, and Paco Calvo

# THE ROUTLEDGE COMPANION TO PHILOSOPHY OF PSYCHOLOGY

*The Routledge Companion to Philosophy of Psychology, Second Edition* is an invaluable guide and major reference source to the key topics, problems, concepts, and debates in philosophy of psychology and is the first companion of its kind. A team of renowned international contributors provide forty-eight chapters, organized into six clear parts:

- Historical background to philosophy of psychology
- Psychological explanation
- Cognition and representation
- The biological basis of psychology
- Perceptual experience
- Personhood.

*The Companion* covers key topics, such as the origins of experimental psychology; folk psychology; behaviorism and functionalism; philosophy, psychology and neuroscience; the language of thought, modularity, nativism, and representational theories of mind; consciousness and the senses; dreams, emotion, and temporality; personal identity; and the philosophy of psychopathology.

For the second edition, six new chapters have been added to address the following important topics: belief and representation in nonhuman animals; prediction error minimization; contemporary neuroscience; plant neurobiology; epistemic judgment; and group cognition.

Essential reading for all students of philosophy of mind, science, and psychology, *The Routledge Companion to Philosophy of Psychology* will also be of interest to anyone studying psychology and its related disciplines.

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*– George Graham, Georgia State University, USA*

# THE ROUTLEDGE COMPANION TO PHILOSOPHY OF PSYCHOLOGY

Second Edition

*Edited by*
*Sarah Robins, John Symons, and Paco Calvo*

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# INTRODUCTION TO THE SECOND EDITION

*Sarah Robins, John Symons, and Paco Calvo*

In this introduction, we describe some of the prominent characteristics of the second edition of *The Routledge Companion to Philosophy of Psychology* and explain how it reflects the current state of the field. The editors of the first edition observed in their introduction that philosophy of psychology had changed significantly since its origins in the late 1970s and early 1980s. Specifically, they noted that the *Routledge Companion* stood in sharp contrast with Ned Block's classic anthology *Readings in Philosophy of Psychology* of thirty years earlier. The differences between these two books signaled the changed character, as well as the dramatic expansion, of the sub-discipline. A decade has now passed between the first and second editions of this Companion. Philosophy of psychology continues to change, with perhaps the most significant development in the intervening years being the blending of work from other sub-disciplines in productive ways.

Ten years ago it was necessary to provide some justification for the shift away from solely focusing on questions of rationality, modularity, nativism, and intentionality. The editors argued that this focus was not exhaustive of topics in this area. A decade later it no longer seems necessary to justify the increased attention to the broad range of topics that fall under the purview of philosophy of psychology. In this second edition we continue to expand the range of topics under consideration and also hope to reflect the increased sophistication of contemporary research. For example, today we find an increasingly nuanced understanding of nonhuman cognitive capacities and a richer appreciation of nonhuman mental lives. Even ten years ago it would have been necessary to argue that animals had mental life, and whether that argument could extend to plants was rarely considered. Today, we see active research programs into the cognitive capacities of a range of nonhuman animals – plants, microorganisms, and even parts of the brain. Similarly, the recent work on group cognition points in directions that would have been alien to traditional philosophy of psychology. Other forms of expansion in the field are reflected in the addition of chapters on predictive processing, group cognition, and the psychology of epistemic judgment. We have also added a substantial review of recent philosophy of neuroscience.

We continue to believe that appreciation of the major positions that frame current debates is improved by attending to the historical development of the relevant

concepts and methods, as we do in Part I of this *Companion*. Ten years ago the editors received some pushback for giving such prominence to historical research. Today, it seems much more natural for philosophers of psychology to be attentive to the history of their enterprise. In this spirit, Part I remains unchanged, presenting the necessary historical background for the discussions that follow. It provides a selective tour of the relevant history of psychology and philosophy, moving from the origins of psychology in early-modern philosophy to twentieth-century debates between behaviorists and cognitivists. As the field continues to expand, we can confidently predict deeper engagement with the historical roots of the topics covered in this volume and possible interest in expanding the historical content included.

Part II explores the nature of psychological explanation and its relationship to various models of mental life. In the early 1980s, philosophers of psychology had settled into a consensus with respect to the demise of behaviorism and the centrality of cognitivist architectures. This model assumed a functionalist metaphysical framework, a computationalist approach to explanation, and a central role for representation. Part II reflects developments in the intervening years, by presenting the more critical contemporary approach to psychological explanation, folk psychology, and functionalism. Alternative explanatory frameworks to cognitivism are explained and defended in detail. Connectionism and the embodied/embedded framework not only represent novel approaches to cognitive architecture but also present fundamental challenges to the cognitivist views of psychological explanation. This plurality of explanatory frameworks is one of the hallmarks of contemporary philosophy of psychology.

Part III reviews the well-known cluster of questions related to the nature of cognition and representation. The problems addressed here relate to both the architecture within which representational states are couched and the possibility of naturalizing content. For the most part, these essays fall close to the subject matter of mainstream debates in the philosophy of mind. However, as described in Part III, philosophers of psychology have also challenged the foundational assumptions that govern these debates. One of the central concerns in the recent philosophy has been the difficulty of accounting for intentionality. Despite a variety of new metaphors and scientific developments, many of the traditional problems continue to be relevant. So, for example, whether psychological inquiry converges on a theory where minds are understood as symbol-manipulating machines, as statistically driven networks, or as embodied-embedded systems, it still faces the philosophical problem of accounting for the role of representation in psychology. Whether one denies the reality of representation along behaviorist lines or rests one's account on some variant of cognitivism or its alternatives, the difficulty of explaining (or explaining away) the role of representation remains. A central venue for debates of this kind involves reflection on the behavior and capacities of nonhuman agents. To reflect this, we have added a chapter on comparative cognition and representation, by Sarah Beth Lesson, Brandon Tinklenberg, and Kristin Andrews. We have also included a chapter on predictive processing, from Alex Kiefer and Jakob Hohwy, which reflects the increased interest in this alternative framework for characterizing cognition and representation.

Part IV reviews the principal problems that emerge from consideration of the relationship between psychology and its biological basis. The early days of computational functionalism encouraged philosophers to consider the choice of theories independently of the details of implementation. For philosophers of psychology the biological facts of cognition were more difficult to ignore. In recent decades, philosophy of psychology has moved away from a view that downplayed the significance of biological structures and constraints in the development of psychological theories. Techniques and insights from neuroscience have moved to the heart of psychological investigation. Philosophers have taken note of the import of the neurosciences. So, for example, modern theories concerning cognitive architecture and the nature of representation generally take a stand with respect to the relevance of constraints that result from the properties of the neural substrate. Our understanding of the neural substrate continues to develop along with the development of the relevant empirical sciences. William Bechtel's new chapter reflects these developments, reviewing the conceptual implications of recent neuroscience in detail. While neuroscience has loomed large in recent psychology, biology has figured in a range of other important ways in psychological inquiry. For decades, ontogenetic and evolutionary biological considerations have influenced psychological theorizing. These factors continue to shape discussions in philosophy of psychology. Thus, developmental and evolutionary considerations feature prominently in many of the chapters in this *Companion*. One important change has been the idea that psychological explanation can also influence our interpretation of biological phenomena. For example, the newly added chapter from Manuel Heras-Escribano and Paco Calvo covers the emerging field of plant neurobiology.

The scientific study of consciousness has also matured considerably over the past decade. This research has productively broken the problem of explaining conscious experience into its component parts. Part V surveys some of the ways that philosophers of psychology have pursued the divide-and-conquer approach to consciousness. Attention, introspection, and the temporal components of experience are distinguished from the emotions. These, in turn, are distinguished from perceptual experience in the sensory modalities and in dream states. By taking an incremental approach to the problem of consciousness, philosophers of psychology can attend more carefully to distinctions obscured by blanket terms like "consciousness."

The concerns that bring philosophers to the study of psychology often involve problems of personhood, moral agency, and the nature of the good life. As the field continues to mature, the connections between philosophers of psychology and broader issues in philosophy continue to expand. Over the past decade the interplay between moral philosophy, epistemology, and philosophy of psychology have deepened considerably. The contributions to Part VI demonstrate the relevance of philosophy of psychology to vital normative and epistemic questions. In this edition we have included a chapter on group cognition, from Deborah Tollefsen and Kevin Ryan, and a chapter on the psychology of epistemic judgment, from Jennifer Nagel and Jessica Wright, which exemplify some of these developments.

We are very grateful to the contributors and referees for this volume. We would also like to thank Tony Bruce for encouraging us to develop this second edition and for all his practical support during its production.

# Part I

# Historical background to the philosophy of psychology

# 1
# RATIONALIST ROOTS OF MODERN PSYCHOLOGY

*Gary Hatfield*

The philosophers René Descartes (1596–1650), Nicolas Malebranche (1638–1715), Benedict Spinoza (1632–77), and Gottfried Wilhelm Leibniz (1646–1716) are grouped together as *rationalists* because they held that human beings possess a faculty of reason that produces knowledge independently of the senses. In this regard, they contrast with *empiricist* philosophers, such as John Locke and David Hume, who believed that all knowledge arises from the senses. The rationalists contended that proper use of reason would yield the first principles of metaphysics, the most basic science of all. Metaphysics was also called "first philosophy," and it took as its subject matter nothing less than the basic properties and principles of everything. For our purposes, it is important to note that the rationalists believed that metaphysics could provide foundations for specialized disciplines, including ethics and physics, and also medicine and other applied subjects.

The rationalists and their followers developed theoretical positions of ambitious intellectual scope, ranging from metaphysical conclusions about the existence and nature of God to detailed theories of physical and physiological processes. Although they put great store in the faculty of reason for establishing overarching principles, they looked to observation and experience to provide data and evidence for their detailed theories. They took special interest in the metaphysics and physics of the human organism, and this led them to psychological topics concerning the characteristics and principles of animal behavior, the process of sense perception, the passions, emotions, and appetites, the cognitive operations of the mind (including attention and understanding), and the relation between mental phenomena and bodily processes in the brain and sense organs. The various rationalists, but especially Descartes, made original contributions to these topics. After considering the character of psychology as a discipline in the seventeenth century, we will examine these contributions in turn.

## Psychology in the seventeenth century

The term "psychology" was first used in print in the sixteenth century (Lapointe 1972). The discipline is much older. As a subject taught in school (a root meaning

of the word "discipline"), psychology was well-established in Aristotle's Lyceum. He taught the subject matter under the Greek name *Peri psyches* ("On the Soul"), which is the title of one of his major written works. Although Aristotle was Greek and taught and wrote in Greek, through an historical oddity his works are known under their Latin names, so that today we refer to this work as *De anima* ("On the Soul").

Aristotle understood the soul to be a vivifying and animating principle: it was an agent of life, sense, motion, and thought. To account for the range of living things and their capacities, Aristotelian thinkers ascribed various powers to the soul: nutritive, growth-directing, and reproductive (*vegetative* powers possessed by plants and all other living things); sensory and motor (*sensitive* powers possessed by nonhuman animals and human beings); and *rational* (possessed by human beings alone). In this scheme, the sensory capacities of animals include simple cognitive abilities to guide animal behavior, such as the ability to perceive danger or to recognize food by sight from afar; human beings share such abilities with other animals and additionally are endowed with the faculty of reason. Because Aristotle conceived of the soul as the animating force in all living things, the topics covered in Aristotelian psychology extended to subject areas that today are divided between biology, physiology, and sensory and cognitive psychology.

When the term "psychology" came into use in the sixteenth century, it named this Aristotelian discipline. Literally, the term means "rational discourse concerning the soul" (*logon peri tes psyches*). In the early seventeenth century, then, "psychology" as the science of the soul covered vivifying as well as sensory and cognitive processes. In European thought, the notion of the soul was also interpreted in a religious and theological context. The first book with the title *Psychologia*, by Goclenius (1590), focused on the theological question of whether the human soul is transferred to the fetus by the semen of the father (as in standard Aristotelian theory) or is directly infused by God (at an appropriate moment). The other standard topics concerning the sensory and cognitive powers of the soul were, however, also included. Moreover, in the wider *De anima* literature (leaving aside whether the Greek root *psyche* was used in the title), the larger part of discussion concerned the sensory and cognitive powers of the soul, with comparatively little space devoted to the nutritive, growth-directing, and reproductive powers. Discussion of these latter powers did not in fact follow a strictly Aristotelian line, but was strongly influenced by the medical tradition stemming from the second century Egyptian, Claudius Galen (whose work nonetheless showed the influence of Aristotelian physics, despite going beyond Aristotelian physiology).

Aristotle's works provided the framework for university instruction in both Protestant and Catholic lands into the seventeenth century (and into the eighteenth in Spain, Italy, France, and Austria). The curricular structure reflected an Aristotelian division of knowledge. Accordingly, the study of the soul fell under the rubric of physics (or natural philosophy). "Physics" comes from the Greek *physis*, meaning nature; "physics" or "natural philosophy" is then the "science of nature." It was not restricted to inorganic nature, but included all topics starting from the basic elements of things (earth, air, fire, and water) and working through the various kinds of natural bodies and their characteristic activities up to animals and human beings.

Sixteenth- and seventeenth-century physics books, then, contained discussions of the soul, including its sensory and cognitive functions. That these powers were classified as "physical" bore no connotation, in the Aristotelian scheme, that they were reducible to matter in a modern materialistic sense; rather, Aristotelians posited that all natural bodies possess an active principle, its "form," that serves to explain the characteristic properties and motions of every type of substance, from elemental substances to complex bodies such as plants, animals, and the human body. The human soul was the form of the human body, animating everything from growth to intellectual thought. The rational power of the soul, or the "intellect" (*nous*) as it was known in technical discussions, was granted a special status. Some questions about the rational soul, such as its immortality or whether the human intellect directly communicates with a single world-intellect, were reserved for the discipline of metaphysics, or were treated in appendixes to the usual "physical" discussion of the soul's powers. By contrast with the sensitive powers, which required material organs for their operation, the intellect was assigned no special organ. This point is somewhat tricky. Aristotelians believed that the intellect requires the assistance of a material organ (the brain, in late medieval Aristotelian anatomy) to provide it with objects of thought (as explained below); but they deemed the operations that the intellect performed in relation to such objects to be immaterial. This meant that these operations did not involve changes in a material organ.

Within the Aristotelian scheme, the rational power of the soul was studied in more than one disciplinary locus. It was studied as a natural power within physics. It was also studied as a knowing power within logic, which catalogued the proper operations of intellect and reason in obtaining and organizing knowledge. In the seventeenth century, this division between studying the sensory and cognitive powers as natural powers, in physics and physiology, and as knowing powers, in logic or methodology, was maintained and developed by rationalist writers (even as empiricists such as Thomas Hobbes chipped away at it, seeking to fully naturalize logic and reason). Modern philosophers showed disdain for the old Aristotelian logic, so they tended to discuss the scope and limits of knowledge under the title of "method." The modern philosophical field of epistemology arose from the study of the mind's powers as instruments for knowing. By contrast with study of the natural circumstances of the operations of the mind (in physics and physiology), methodology or epistemology examined the conditions for arriving at truth.

In this context, a word is needed about the notion of the intellect or reason as a faculty of knowing. Later psychologists, especially in the latter eighteenth and nineteenth centuries, reacted unfavorably to the "faculty psychology" of the seventeenth and eighteenth centuries. Their criticisms were summarized in allusions to a play by the French playwright Molière, in which a doctor explains the ability of opiates to make a person sleepy, by saying that opium has a *virtus dormitiva*, or "dormitive power." Clearly, the designation of such a power does not explain the operation of that power: it redescribes the phenomena with more abstraction and generality, by adding the notion of a "power" or "ability" that operates with regularity (opiates make this person sleepy because *they generally are able* to make people sleepy). In the Aristotelian and

early-modern contexts, the assignment of "faculties" or "powers" to the mind, such as the sensitive and intellectual powers, was not an attempt to *explain* the ability to sense or to understand; it was part of an effort to *catalogue* and *describe* the general cognitive capacities of nonhuman animals and human beings. More specific factors were then introduced in explanatory contexts, including detailed analyses of the sensory processes that underlie the perception of distance, or the attribution of innate ideas to explain some cognitive abilities. Thus, the mere mention of "faculties" or "powers" is not inherently vacuous, but may be part of a taxonomic effort that catalogues and describes the variety of psychological abilities to be examined within psychology.

Over the course of the seventeenth century, the content and boundaries of Aristotelian psychology were challenged in various ways. Starting in the sixteenth century and continuing into the seventeenth, a debate raged about whether nonhuman animals possess sufficient cognitive ability to be deemed "rational" and to be described as possessing "knowledge," characteristics that would place them in the same category as human beings. These debates raised questions about the empirically determined behavioral capacities of animals and about the theoretical resources needed to explain such capacities. Larger philosophical changes also had implications for psychological topics. The seventeenth century saw the pronouncement of a "new science" of nature, in which Aristotelian forms (as active principles) were banished from nature and matter was reconceived as passive, spatially extended stuff. If nonhuman animals are constituted of this matter and possess no souls, then even supposing that their cognitive capacities are quite simple, those capacities nonetheless must be explained through purely material mechanisms of the sort permitted by this new science.

The rationalists favored this new science of matter, but they were also committed to finding a place for human mentality within the new science. Starting with Descartes, they reconceived mind and matter as mutually distinct entities, or at least as mutually distinct conceptual and explanatory domains. This new way of thinking generated a revised problem of mind-body interaction and relation. These changes entailed a further question concerning whether all the psychological capacities of human beings and nonhuman animals must be assigned to the mental domain, or whether some psychological capacities can instead be explained through material processes alone. If psychology is the science of the soul, then the answer is clear: the psychological belongs with the mental, period. But if psychology is identified by the domain of phenomena covered in Aristotelian psychology – or perhaps by a subset of that domain, the sensory, motor, and cognitive phenomena – then the equation of the psychological with the mental is not so clear. Thus, one of our tasks is to consider the various conceptual loci of the discipline of psychology in the seventeenth and into the eighteenth centuries.

## Descartes and psychology

Descartes started his intellectual career in 1618–19, working on problems in mathematics and in "mathematical physics" (hydrostatics and falling bodies, 1974–6: Vol. 11, 67–78). His early results included the mathematical techniques that later made analytic geometry possible, and that underlay the introduction of Cartesian coordinates

in the nineteenth century. During the 1620s, he sought to create a general method – for solving all types of problems, including philosophical ones – based on the kind of thinking found in mathematics. In the late 1620s he abandoned this project and the book he was writing, the *Rules for the Direction of the Mind*, to begin an ambitious project for a comprehensive new physics. This new physics involved the fundamental reconception of matter as nothing but bare geometrical extension, devoid of the active principles and "real qualities" of Aristotelian physics. Descartes' aim (1991: 7, 40) was to explain all of the phenomena of material nature by appeal to matter and motion alone. His new physics was to cover the topics found in Aristotelian physics and more, including the formation of the solar system and the Earth, the properties of minerals and other inorganic natural kinds, the origin and properties of plants and animals, and the human body, the human soul, and their relation (1985: 131–41). Descartes did not publish this treatise in his lifetime, and when he died only two portions were extant: the *Treatise on Light*, his general physics of inorganic nature, and the *Treatise on Man*, his treatise on human and animal physiology and behavior. The original French manuscripts were first published in 1664.

At about the same time as he started work on his new physics, Descartes also reported some metaphysical insights concerning God and the soul (1991: 22). We may therefore believe that in 1629–30 he elaborated revolutionary new conceptions of both matter and mind. These radical new conceptions – which he adumbrated in the *Discourse on the Method* of 1637, revealed in the *Meditations on First Philosophy* of 1641, and used to develop his new physics in the *Principles of Philosophy* of 1644 and the *Passions of the Soul* of 1649 – had implications not only for physics conceived as the science of nature in general, but also for the subfields of physiology and psychology, as well as for the metaphysics of mind and the theory of knowledge. Let us consider these new conceptions of matter and mind in turn.

The new conception of matter as bare extension was the more radical of the two, for it denied activity or agency to material bodies. This idea had some precedent in the work of the ancient atomists Democritus, Epicurus, and Lucretius; however, at least the latter two allowed weight as a natural property that would propel bodies downward (whereas Descartes felt obliged to explain weight as arising from interactions between particles in motion). Nonetheless, Descartes' new conception of matter went contrary to nearly every previous physics, whether Aristotelian, Platonic, or Stoic; for, in denying activity to matter, it allowed only motion conceived as change of place (and governed by laws of motion established by God). Descartes extended the new conception to living matter, which meant that he had to explain physiological processes without invoking the vital and sentient powers that pervaded the dominant Galenic physiological tradition of his day. He set himself the task of explaining all features of nonhuman animals by appeal to purely material mechanisms, that is, to organized matter in motion.

Descartes' conception of soul or mind also departed from accepted theory. In Aristotelian theory, the soul, as the form of the human body, cannot exist on its own, any more than the human body could be a unified "human body" without the informing presence of the soul (according to the Aristotelianism of Thomas Aquinas). Further, the various powers of the soul are immediately involved in directing the

characteristic activities of all bodily organs: the vital organs; the senses, including the direct presence of the sensory power in the sense organs and nerves; and the brain, which was the locus of the common sense and the cognitive powers (in late medieval Aristotelian physiology). Descartes envisioned mind and body as distinct substances, which meant that each was a substance capable of existing on its own, without the other. He granted only two basic powers to the mind: intellect and will. He explained the bodily operation of the sense organs in a purely mechanical manner. In sense perception, the brain affects the mind (or the intellectual power) in a way that produces a conscious experience. (Descartes preferred the term "mind" over "soul" in philosophical contexts, 1984: 114, 246.)

Descartes also broke with the Aristotelian theory of cognition, according to which the intellect depends for its content (its objects of thought) on materials provided by the senses. Accordingly, for an Aristotelian there is no thought without an image (immaterial things, such as God or angels, are dimly understood by analogy with material things that can be imaged). By contrast, Descartes (1984: 50–1) held that the highest acts of intellect, the "clear and distinct" perception of the essences of things, occur through an intellectual act that does not require or involve images. In place of the empirical basis for fundamental knowledge envisioned by the Aristotelians, Descartes posited that the human intellect comes provisioned with a stock of innate ideas that have been attuned (by God) to the real essences of the basic kinds of stuff in the world. We have innate ideas of mind (as immaterial), of matter (as extended), and of God (as infinite being). In this way, his theory of intellectual cognition bears similarity with the Platonic tradition, but with some differences. Platonists held that the mind grasps extramental Forms when it knows the essences of things, whereas Descartes held that the fundamental contents of intellectual cognition are innate to the individual mind. Platonists also despised sensory knowledge, whereas Descartes supposed that the senses could provide important data for scientific knowledge, if the content of such data were properly interpreted using metaphysical knowledge gained by use of the intellect alone.

Descartes' new conceptions of mind and matter required that he redistribute the functions of the Aristotelian soul across the mind-body divide. Restricting ourselves to the sensory and cognitive functions, Descartes was required to explain the capacities of nonhuman animals – including simple cognitive abilities such as when a sheep detects danger in the presence of a wolf – by brain mechanisms alone, without appealing to the mind or any properly mental operations. Indeed, Descartes welcomed this challenge, and he extended it to human beings, claiming that he could explain many human behaviors without invoking the mind (1984: 161). In this way, he developed a mindless mechanistic psychology to replace portions of the Aristotelian psychology. At the same time, he reserved to the mind some psychologically important functions, including consciousness, will, general reasoning, and meaningful language use. He believed that these functions could not be explained through matter in motion.

In the ensuing sections we will examine these and other themes from Descartes' psychology, with attention to their reception and development by his followers and also the other major rationalists.

## Animal machines

Nonhuman animals exhibit a variety of behaviors. Their sense organs and motor apparatus allow them to seek nutrients, navigate the local terrain, and avoid bodily harms. These phenomena were acknowledged in the Aristotelian and Galenic traditions, and had to be accommodated in any new account of animal behavior. Debates about what was needed to explain the abilities of nonhuman animals were a stimulus to psychological theorizing in the seventeenth century and beyond.

During the seventeenth century, scholars debated whether animals possess only the lower cognitive powers as described in the Aristotelian tradition, such as the ability to perceive harms and goods, or should in fact be granted a limited form of reason. Marin Cureau de La Chambre (La Chambre 1989) contended that animals have a limited form of reasoning, restricted to particulars and not rising to truly universal notions. He allowed, as usual, that an animal such as a dog can perceive by sight that honey is white, can perceive its sweet taste, and is drawn by natural appetite to eat it. But he contended that when a dog subsequently sees honey from a distance, without being able to smell or taste it, the animal exhibits reasoning in recognizing it as a good. According to La Chambre, the dog combines previous sensory images to achieve the equivalent of a syllogism: the white thing is sweet, sweet is good to eat, the white thing is good to eat. The animal generalizes to the extent that it responds to similarities among separate instances of the white quality, the sweetness, and its own appetitive response; but, according to La Chambre, it does not thereby achieve true cognitive grasp of a universal, which would involve understanding the essence of honey (an achievement he restricted to human reason). In other cases, La Chambre ascribed means-ends reasoning to animals, as when a dog realizes that it must run after the hare if it is to catch and eat it.

In opposition to La Chambre, Pierre Chanet (1646) maintained that any behavioral capacities of animals going beyond the direct perception of good and bad through sensory qualities and giving the appearance of reasoning must be explained either through habit and memory or through instinct. In the case of the sweet honey, the animal might simply remember that the white appearance and good taste go together, and the memory of the taste would arouse its appetite. As for the dog running after its prey, Chanet disallowed means-end reasoning. He ascribed such behavior to instinct, which induces an animal to behave in ways that yield benefits or avoid harms, without the animal foreseeing those outcomes.

Descartes was greatly interested in developing physiological hypotheses to account for animal and human behavior. During the 1630s, he dissected animal parts obtained from butchers, and may even have performed vivisections (1991: 40, 81–2, 134). Throughout the 1630s and 1640s he revised his *Treatise on Man* and worked on a separate work, the *Description of the Human Body*. During his lifetime, he published portions of his physiological theories in the *Dioptrics* of 1637 and in the *Passions of the Soul*. He considered his theories of human physiology to apply also to nonhuman animals, or to the "animal in general" (1991: 134–5; 1985: 134). In these works he developed mechanistic accounts of the operation of the nerves, muscles, sense organs,

and brain, in order to be able to explain the basic phenomena of animal behavior, including avoidance of things harmful to the body and approach to things beneficial (1998: 163). The *Treatise* offers the fullest description of animal physiology, by describing a human body and its behavioral capacities in the absence of a soul or mind (a counterfactual thought experiment, since Descartes considered human beings to be essentially composed of both mind and body).

Descartes developed detailed mechanistic accounts of psychological functions that occur in nonhuman and human animals. These included the reception of sensory stimulation, the conveyance of stimulus patterns to the brain, the effects of such patterns on the motor nerves, and resultant behavior. In these descriptions, he considered both instinctual responses and responses mediated by "memory" – here interpreted as a purely corporeal (brain) function. As an example of instinct, he described the mechanisms by which a mindless human body would withdraw its hand from a fire (1998: 163). As an example of the effects of memory, he observed (1991: 20) that "if you whipped a dog five or six times to the sound of a violin, it would begin to howl and run away as soon as it heard that music again" (where "hearing" the sound, for a dog, amounts to the effects of sound waves on the nerves and brain, without consciousness or feeling). As he explained them, the mechanisms of a purely corporeal memory effect associative connections between brain structures, so that if an image is frequently repeated, say, an image of a face, then, if part of the pattern occurs later, say, eyes and a nose, the brain mechanisms fill out the rest of the pattern, supplying the forehead and mouth (1998: 151–2).

Because Descartes believed that immaterial minds essentially have intellectual capacity and that animals lack such capacity, he denied minds, and therefore sentience and feeling, to animals. (Recall that sentient feeling is a form of intellection for Descartes.) This animal-machine hypothesis was adopted by his major followers, including Malebranche (1997: 324), Pierre Regis (1970: Vol. 2, 506), who accepted it on theological grounds, and Antoine Le Grand (2003: Vol. 1, 230, Vol. 2, 228–9). Spinoza (1985: 494–7) and Leibniz (1969: 578, 650–1) affirmed that all animal behavior can be explained mechanistically and extended this thesis to all human behavior. Because their respective metaphysical views on the mind-body relation (discussed below) differed from those of Descartes and his followers, Spinoza and Leibniz were able to allow a mental aspect to animal life without granting reason to animals, and to allow a mechanical counterpart to human mental life without diminishing the status of the mental. Other adherents to the new science found it implausible to deny sentient feeling to animals, even though they denied them immaterial souls; the English physician Thomas Willis (1971) solved this problem by supposing that animal nerves and brains contain a fine, subtle matter that is capable of sentience (echoing a Galenic position).

## Sense perception

The study of visual perception is the first area in which mathematical models were applied to psychological phenomena. The second-century Egyptian, Claudius Ptolemy,

developed models of the perception of size and shape, and the eleventh-century Arab, Ibn al-Haytham, produced a comprehensive treatise on vision that including perception of size, distance, shape, color, and other visible properties. This literature went under the title of "optics," considered as the science of vision in general (and so covering physical, physiological, and psychological aspects). In the Aristotelian catalogue of disciplines, optics was a "mixed mathematical" science, which meant that it applied mathematics to a physical subject matter (in the broad sense of "physical," as pertaining to nature in general, and so including biology and psychology). This optical literature provided the background to Johannes Kepler's discovery of the retinal image. Natural philosophers also studied the other senses, including especially hearing, but they focused mainly on vision.

The rationalist philosophers, as was typical of those promulgating the new science of nature, were deeply interested in the theory of the senses and the status of sensory qualities. The theory of sensory qualities such as color, sound, or odor was bound up with the new mechanistic vision of matter as constituted of bare extension.

In the previously dominant Aristotelian philosophy, the basic properties of material things were qualitative: the elements of earth, air, fire, and water were formed by adjoining pairs of the qualities hot, cold, wet, and dry to an underlying substrate. The visible quality of color existed in the object as a "real quality"; the perception of color involved the transmission of the form of color through the air to the eye and into the brain, where this sample of color provided the content for a conscious experience. The metaphysics of the transmission process was subtle, for it had to account for the fact that the air is not rendered colored by the transmitted form (Simmons 1994). Because the new mechanistic science banished real qualities along with the substance-making forms of the Aristotelians, it had to provide a replacement account of the physics and physiology of color vision (as well as the other sensory qualities).

Descartes offered this replacement conception of color in his *Dioptrics* and in his description of the rainbow in the *Meteorology* of 1637, and then again in the *Principles*. According to this theory, color as it exists in objects is a surface property that affects the way light is reflected from objects. Light is made up of corpuscles, which take on various amounts of spin depending on the surface color of the object: red things cause the particles to rotate more quickly, blue things less quickly (1998: 88–91). The rotating corpuscles of light then affect the nerves in the retina, causing them to respond in characteristic ways (more vigorously for red, less for blue). This nervous response is transmitted mechanically into the brain, where it affects the pineal gland (the seat of mind-body interaction) and consequently causes a sensation of red or blue (1984: 295, 1985: 165–8, 1998: 148–9). In this account, color in bodies is what Locke would later call a "secondary quality": it is a dispositional property of the surfaces of things to cause sensations of color in the mind of a perceiver. Descartes' followers, as also Spinoza (1985: 170) and Leibniz (1969: 547), accepted this account of the status of color in bodies. This acceptance did not mean that these philosophers held the experience of color to be illusory or uninformative: we can tell objects apart by their color, even if we are ignorant of the physical properties of color in bodies. Nonetheless, they cautioned that we should not be fooled by the experience of color into accepting

the Aristotelian theory that there is something in objects that is "similar to" or "resembles" our experiences of colors (Descartes 1985: 167, 216). Rather, we should accept the account of the new, mechanistic physics concerning what colors are in bodies.

We are able, by sight, to perceive the size, shape, and distance of objects. Theorists since al-Haytham had conceived this process as beginning with a two-dimensional projection of the field of vision into the eye, which Kepler correctly understood to be a projection onto the surface of the retina (Lindberg 1976: Ch. 9). Descartes (1998: 146–55) described the transmission of this two-dimensional image into the brain by means of the optic nerves, which he believed consisted of threads ensleeved by tubules. According to this conception, the pattern of light activity on the retina causes the sensory nerve threads to tug open the mouths of the tubules, which are topographically ordered in the brain so that the image structure from the retina is preserved in the pattern of open tubules. In his physiology, "animal spirits" (a subtle, ethereal fluid) then flow out from the pineal gland into the open tubules, in a manner that corresponds to the image structure, as in Figure 1.1. The pineal gland is the seat of mind-body interaction, and the two-dimensional pattern of out-flowing spirits causes a sensation in the mind exhibiting the same pattern, which then enters into further processes that lead to the perception of size, shape, and distance. As Descartes explains, the image size together with perception of the distance yields a perception of the actual size of the object. In Figure 1.1, visual angle 1–5 (or pineal image a–c)

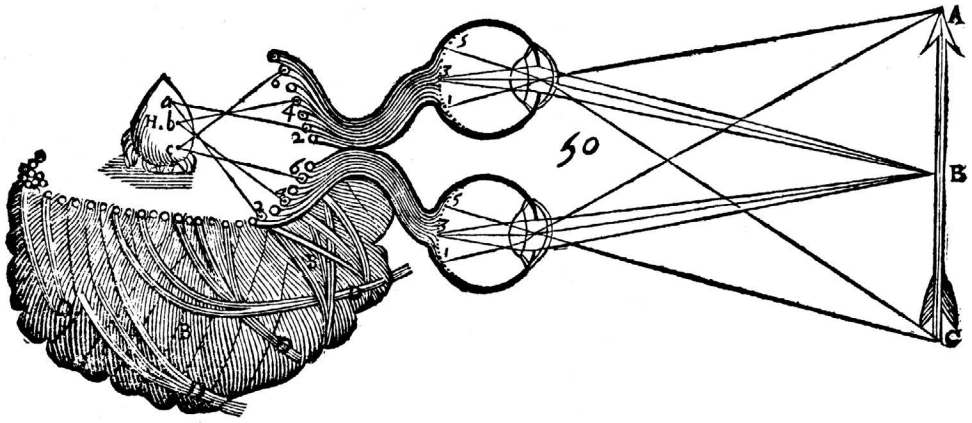


*Figure 1.1* The geometry of sight and the physiology of nervous transmission according to Descartes. Object ABC reflects light rays focused on the retina at 1-3-5, jiggling the nerve fibrils and leading to tubule openings 2-4-6, which induce spirit flows *a*2, *b*4, and *c*6, resulting in pineal image abc. Source: Reproduced from Descartes (1677). Note: The inversion of the spirit flow is not required by Descartes' text and presumably was introduced by Gerard van Gutschoven (professor of medicine at Leiden), who produced the drawing at the request of Claude Clerselier, who prepared *L'Homme* for publication after Descartes' death.

would be combined with perceived distance to yield the perception of object size A–C. Descartes in fact provided an early description of the phenomenon of size constancy; but not the first, as al-Haytham had an even earlier description (Hatfield and Epstein 1979).

Descartes (1985: 170–2) described several ways in which distance might be perceived. For objects of known size, the distance could be determined by comparing visual angle (as conveyed in the initial sensation) with known size: for an object of a given size, the smaller the visual angle, the further away it is. In this case, the distance of the object is derived by rapid and unnoticed judgments (1984: 295), based on past experience (an *empiristic* account of distance perception). In other cases, we directly perceive distance through an innate physiological mechanism (a *nativistic* account) that depends on the fact that changes in the ocular musculature directly reflect distance, at least for relatively near objects. Muscles in the eye cause the lens to accommodate, and the eyes to converge, for nearer or farther distances; the central nervous state in the brain that regulates these muscles then co-varies with the distance of objects. This nervous state causes the idea of distance in the mind (1998: 155). Finally, as to shape, if we perceive the direction and distance of all the points of an object, as object ABC in Figure 1.1, we thereby perceive its shape.

In addition to these points about the psychology of size and distance perception, Descartes is responsible for an early statement of a principle that is similar to Johannes Müller's law of specific nerve energies. Descartes held that the various sensory nerves operate according to similar mechanical principles: by the motion of nerve threads, which cause an opening of the nerve tubules, causing a flow of animal spirits, causing a sensation in the mind (Hatfield 2000). The intensity of the sensation co-varies with the intensity of the stimulus as reflected in the motion of the nerve threads and the resultant pineal outflow. The character of the sensation depends on which nerve is affected: optical, auditory, olfactory, and so on, each of which terminates in a specific region of the brain. In this way, Descartes (1985: 280–4) introduced the conceptual framework according to which the characteristics of changes in a brain state are directly correlated with characteristics of the resulting sensations (and vice versa for motor volitions, motor nerve tubules, and muscle actions). His followers embraced this point, and spoke of "laws" of mind-body interaction (Regis 1970: Vol. 1, 126–7) or of the conditional "dependency" of brain and mental states (Le Grand 2003: Vol. 1, 325). Malebranche, Spinoza, and Leibniz each recognized this conditional dependency and accounted for it metaphysically in ways that we will consider under mind-body relations.

## Passions and emotions

The passions and emotions had been an important philosophical topic from antiquity and were studied in natural philosophical, medical, moral, and theological contexts (Knuuttila 2004). In the middle ages, Thomas Aquinas articulated a detailed theory of the passions as responses of the sensitive soul to present or future goods or evils; more specifically, passions are passive responses of the sensitive appetite to the sensory

perception or the imagination of a good or evil. (Aquinas also recognized active intellectual emotions unique to humans, such as intellectual love, as did Descartes and other theorists.)

Interest in the passions grew throughout the sixteenth and into the seventeenth centuries (James 1997). Descartes' *Passions* presented the passions as perceptions of the general characteristics of a current or future situation, as regards what is good, bad, or simply "important" for the body. The passions arise as passive responses of the mind to a brain state. The brain states are produced through neural mechanisms that yield distinctive states depending on whether the current situation is of a type that is usually good or bad for the body, or that is novel and deserving of sensory attention. Descartes contended that bodily mechanisms mediate the initial behavioral response to such situations, "without any contribution from the soul" (1985: 343). Thus, in the presence of a "strange and terrifying" animal, neural mechanisms cause the legs to run. These mechanisms produce brain states that affect the body (especially the heart), and these same brain states cause a passion in the mind, which is fear in the case of a terrifying animal. The feeling of this passion serves the function of making the mind want to do what the body is already doing: the passion induces the mind to want to keep running, by presenting the present situation as evil or dangerous. Descartes thus proposed a cognitive theory of the passions: they are perceptions of the situation that have motivational import. Like sensory perceptions, they cannot be willed away. The mind can countermand the impulse to run, but it cannot simply will the fear to go away. Malebranche (1997: 338) and the other Cartesians (Le Grand 2003: Vol. 1, 338) adopted a similar view of the passions, while Leibniz's (1981: 188–95) few remarks on the passions indicate that he viewed them as motivating us toward good and away from evil.

Spinoza developed an intricate theory of the passions and the active emotions in his *Ethics* (1985). According to Spinoza, every being strives toward its own preservation. This *conatus*, or striving, is the basis for his psychology of the passions. Spinoza identified three basic passions: desire, joy, and sadness. Desire is the appetite toward self preservation. It drives us toward things that increase our strength and vitality, and away from things that decrease it. Joy is the passion (or passive response) that we feel when our body's vitality is increased, while sadness is what we feel when that vitality decreases. Spinoza believed that such passions, when uncontrolled, lead to unhappiness. He therefore proposed that each of us, insofar as we are able, should seek to replace these passions with active emotions. This can occur by our understanding the causes of our desire, sadness, or happiness, and seeking to replace the passion with this understanding. The ultimate aim is to achieve a contented mind that is rationally at peace with its place in world. The active process of understanding our place in the world produces an active emotion of love or contentment.

## Attention, the intellect, and apperception

If one compares the major divisions of seventeenth-century *De anima* textbooks, or the corresponding sections of Cartesian textbooks, with textbooks of the "new"

psychology of the latter nineteenth century, most of the categories line up. There is coverage of the external senses, of neural structures and processes, of memory and imagination, and of higher cognition, including judgment and reasoning, the guidance of bodily motion, and appetite and will (motivation). However, the later textbooks contain two new categories: attention, and the laws of association. The psychology of association, although noted by Aristotle and implicitly mentioned by Descartes (in the memory example above), belongs to the history of empiricist contributions to psychology. The phenomena of attention, by contrast, were brought into prominence by the rationalists.

Many of the phenomena of attention had been noted in the ancient world, by Aristotle, Lucretius, and Augustine. These included the narrowing aspect, or attentional bottleneck; the active directing of attention, whether in preparation for a coming event or to select among current objects; involuntary shifts by which attention is drawn to a novel or otherwise salient object; clarity of representation through heightened attention; and the drawing of attention to preferred objects (Hatfield 1998). Malebranche covered all these phenomena in his extensive discussion of attention (1997: 79–81, 411–39).

The rationalists were especially interested in using attention to focus on cognitively important thought content that might otherwise be masked by the salience of sensory content. Descartes wrote his *Meditations* as a cognitive exercise to train thinkers to attend to their own innate intellectual ideas of the essences of things, including the essence of matter as bare extension, by contrast with categories of description suggested by uncritical reliance on sensory experience (such as Aristotelian "real qualities"). Descartes (1985: 355) added a new entry to the catalogue of attentional phenomena: the voluntary or involuntary fixation of attention on sensory objects or other mental contents over time. Malebranche (1997) recognized the importance of attentiveness in intellectual thought, and he sought psychologically effective aids to attention, enlisting the passions and the imagination in this cause, including the use of diagrams to help fix attention when considering mathematical subject matter.

Spinoza (1985: 28) and Leibniz (1969: 388) also highlighted the importance of being able to focus the attention in intellectual matters. The rationalist focus on attention continued in the eighteenth-century psychology textbooks of Christian Wolff, who was heir to the rationalist tradition through his connection with Leibniz. Wolff (1738) described the main phenomena of attention in systematic order. He also speculated that quantitative (proportional) relations obtain within those phenomena, postulating an inverse relation between the extensity of attention and its intensity (1740: §360).

The intellect took pride of place in rationalist theories of cognition, as the faculty that most effectively represents truth. Seventeenth-century Aristotelian logic divided the acts of intellect and reason into three: conceptualization or categorization of objects and properties; the representation of subject-predicate content and its affirmation or denial in judgments; and discursive reasoning, deriving one judgment to another. Descartes was skeptical of logical analysis, but these three logical acts were represented in Cartesian textbooks (Le Grand 2003: Vol. 1, 1–2). Descartes was

more interested in the fourth act included in some textbooks, the act of "ordering," which was treated under "method." He offered some rules for reasoning in the *Discourse* (1985: 120, 150), which counted as his replacement for traditional logic. Theoretically, he analyzed judgments into two factors: the content to be judged, as represented by the intellect, and the affirmation or denial of that content by the will (1984: 39). The rational control of judgment lay at the core of his epistemology. Among the rationalists, Leibniz was greatly interested in logic, and in his unpublished writings developed the beginnings of predicate logic (1969: 240–6).

Leibniz was responsible for a further rationalist contribution to the phenomenology of cognition. He distinguished *petites perceptions* ("small perceptions") that fall below a threshold of open consciousness from *apperception*, or reflective awareness (1969: 557, 644). Thus, in hearing the roar of the waves at the seashore, many individual sounds that do not enter singly into our awareness constitute *petites perceptions* that, when conjoined, produce the overwhelming sound of the surf. These *petites perceptions* have the qualities of conscious perceptions and are in fact perceptions, even though we do not notice them. Descartes, the Cartesians, Malebranche, and Spinoza had all posited unnoticed and unremembered sensations – and even unnoticed complex psychological processes such as judgments underlying size and distance perception (Hatfield 2005) – but Leibniz's contribution is better known because he developed terminology for this distinction between bare consciousness and reflective awareness.

## Mind-body relations

As metaphysicians, the rationalists sought to discern the *ontology*, or the basic categories of being, of all existing things. Descartes proposed a theory according to which there is an infinite being (God) who creates two kinds of stuff: mind and matter. His *mind-body dualism* marked a conceptual divide between mind and matter, since he contended that mind, which has the essence *thought*, shares no properties (save existence and temporal duration) with matter, which has the essence *extension*. In regarding mind and matter as separate substances, he was proposing that each can exist without the other (1984: 54).

Because Descartes held that mind and matter share no properties, subsequent philosophers wondered how, or whether, such really distinct substances would be able to interact, as apparently happens in sense perception (external objects cause neural activity that causes mental sensation) and voluntary motion (the mind decides to walk, and the body's limbs move). In the face of this problem, the other rationalists each proposed their own mind-body ontologies. Malebranche (1997) accepted Descartes' substance dualism, but proposed *occasionalism* as the solution to mind-body causation: God causes appropriate sensations in the mind when a specific brain state occurs, and he causes the body's motor nerves to become active when the mind wills a bodily motion. Mind and body do not themselves interact.

Spinoza rejected substance dualism. He held that only one substance exists – an infinite substance that he called "God or nature" – and that this substance has distinct attributes of thought and extension (1985: 451). His position is called *dual-aspect*

*monism*, because he proposed one substance with two aspects (although in fact he allowed that there might be additional attributes besides thought and extension, without naming or describing them). Accordingly, for each material state in the world there is a corresponding mental state (panpsychism). In the case of human beings, the mental and bodily domains form closed causal systems that are in one-to-one correspondence but that do not interact (parallelism). For every mental state or process, there is a corresponding bodily process; all human behavior has a purely mechanical explanation, and all human thoughts follow one another by mental causation. There is no mind-body causation.

Leibniz adopted a third system. He maintained that God creates an infinity of individual substances ("monads"), all of which are mind-like. All monads have perception and appetite (1969: 644). Their perceptions unfold deterministically according to appetite. Each monad perceptually represents a distinct point of view in the universe. Some monads have the point of view of rocks or wood; their perceptions are obscure, and they lack apperceptive awareness. Other monads have the point of view of human bodily organs; their sequence of perceptions is closely related to those of the soul-monad for that person. Monads do not causally interact, but the states of all the monads in the world are put in correspondence through a *pre-established harmony*, set up by God at the beginning but unfolding now through intramonadic perception and appetite. Within the perceptions of the monads, the events of the world, from microphysical events to human perception and volition, unfold just as if there were mechanical laws governing bodies and just as if mind and body interacted (although in reality they do not).

Regarding the disciplinary locus of mind-body relations, among the Cartesians Regis (1970: Vol. 1, 120–1) examined the substantial nature of mind within metaphysics, and Le Grand (2003: Vol. 1, 77) spoke of *pneumatica* or the science of spirits in general (which also covered God and angels), of which "psychology" (the "doctrine of the soul" which considers "the mind of man") was a subdivision. Most Cartesians, even if they placed study of the mind qua spirit into metaphysics, put mind-body interaction into physics or natural philosophy. The Cartesian conception of regular natural laws governing mind-brain relations is the deep background to Gustav Fechner's "inner psychophysics" of the nineteenth century (Scheerer 1987).

## Rationalist legacy

The most fundamental legacy of rationalism is the division of mental and material into separate domains. Despite their separate views on the ontology of the mental and the material, the major rationalists agreed that matter should be thought of as extension. As regards the mental, they agreed that sense perception, imagination, remembrances, the passions and emotions, appetites and volitions, and acts of intellection belong to a single domain. The property that unified these mental states is less clear. Some scholars have proposed that Descartes made consciousness the unifying element. Others argue that representation was the key feature, a proposal that would also encompass the conceptions of the mental in Spinoza and Leibniz.

The identification of the mental and the material as distinct domains provided the framework for the notion that psychophysical or psychophysiological laws obtain between these domains. The search for such regularities was undertaken within the empirical psychology of the eighteenth century and in the psychophysics of the nineteenth century. The proper relation of the mental to the physical (where "physical" is used in its narrow sense, as referring to matter) remains an open question today. There has been no reduction of mental to physical. Nonetheless, using new methods of physiological recording and brain imaging, there have been further investigations of the correlations or regularities holding between psychological processes and brain processes.

A second rationalist contribution arose from Descartes' animal machine hypothesis, as adopted and extended by Spinoza and Leibniz. Descartes inspired later work with his view that situationally appropriate behavior can be explained by mechanistically conceived brain and nerve processes. His thesis of animal automatism was extended to human beings in the materialism of Julien Offray de La Mettrie, and was hailed as a model by the nineteenth-century Darwinist Thomas H. Huxley (1884) and so formed part of the intellectual context for John B. Watson's early behaviorist theories. The dual-aspect monism of Spinoza and the pre-established harmony of Leibniz allowed them to maintain that all human thoughts and actions have a mechanical explanation, without endorsing materialism or reducing the importance of the mental.

The employment of mechanistic explanations for psychological phenomena meant that the psychological did not neatly fall on the mental side of the divide between mind and body. When Descartes used his mechanistic physiology to explain the phenomena of the Aristotelian sensitive soul (or at least some of them, leaving conscious sensation aside), he introduced into modern thought the possibility of two different definitions of a science of psychology: the definition of Wilhelm Wundt and others of psychology as the science of mental life, and the definition of Watson and others of psychology as the science of adaptive behavior.

The term "psychology" was used with low frequency during the seventeenth century. It meant the "science of the soul," and as such it did not conform to the later definitions. Either it applied to the full range of *De anima* topics, including the biological topics of reproduction and growth, or it applied exclusively to souls and so left out Cartesian mechanistic psychology. It was left to Wolff (1738, 1740) in the eighteenth century to firmly entrench the meaning of psychology as the science of sensory, motor, and cognitive phenomena (excluding purely biological topics). His follower Michael Hanov (1766) clarified this division by introducing the term "biology" (Latin *biologia*) for the science of life, reserving the term *anima*, and by implication the connate term "psychology," for the science of the mental.

Despite their extension of mechanical modes of explanation to much or all of human behavior, the rationalists did not envision a reduction of reasoning and knowledge to purely physical or physiological categories (as in more recent "naturalisms"). They maintained a conception of the intellect as a power of perceiving truth. As such, they continued the Aristotelian distinction between the *De anima* topics in physics and the study of the proper use of *nous* or intellect in logic. This division between *psyche* and

*nous* later became the division between psychology and epistemology: between the study of the mind as a natural power and study of the mind as a noetic or epistemic power. It was left to empiricist philosophers such as Hume to attempt to reduce human belief formation to sense and imagination, that is, to those psychological capacities that human beings were thought to share with animals. Subsequent empiricist attempts to effect this reduction raise the question of whether the normative elements of human thought can be reduced or even reduced away. This is the question of whether epistemology can be reduced to or replaced by either behaviorist or cognitive psychology. It is not the question of whether psychology is *relevant* to epistemology (for it surely is), but of whether the concepts of epistemology, concepts such as *warranted belief*, or *justification*, are really psychological concepts, or are illusory concepts, or are legitimate concepts within a separate domain of epistemology. This question, to which authors in the seventeenth and eighteenth centuries had their own implicit or explicit answers, remains open today.

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# 2
# EMPIRICIST ROOTS OF MODERN PSYCHOLOGY

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From the thirteenth through the sixteenth centuries, European philosophers were preoccupied with using their newfound access to Aristotle's metaphysics and natural philosophy to develop an integrated account, hospitable to Christianity, of everything that was thought to exist, including God, pure finite spirits (angels), the immaterial souls of humans, the natural world of organic objects (plants, animals, and human bodies), and inorganic objects. This account included a theory of human mentality. In the sixteenth and early seventeenth centuries, first in astronomy and then, later, in physics, the tightly knit fabric of this comprehensive medieval worldview began to unravel.

The transition from the old to the new was gradual, but by 1687, with the publication by Isaac Newton (1642–1727) of his *Principia Mathematica*, the replacement was all but complete. Modern physical science had fully arrived, and it was secular. God and angels were still acknowledged. But they had been marginalized. Yet, there was a glaring omission. Theorists had yet to expand the reach of the new science to incorporate human mentality. This venture, which initially was called "moral philosophy" and came to be called "the science of human nature," became compelling to progressive eighteenth-century thinkers, just as British empiricism began to seriously challenge an entrenched Cartesian rationalism.

## Rationalism and empiricism

The dispute between rationalists and empiricists was primarily over concepts and knowledge. In response to such questions as, where does the mind get its stock of concepts?, how do humans justify what they take to be their knowledge?, and how far does human knowledge extend?, rationalists maintained that some concepts are innate, and hence not derived from experience, and that reason, or intuition, by itself, independently of experience, is an important source of knowledge, including of existing things. They also maintained that one could have a priori knowledge of the existence of God. Empiricists, on the other hand, denied that any concepts are innate, claiming instead that all of them are derived from experience. They also tended to

claim that all knowledge of existing things is derived from experience. And, as time went on, empiricists became increasingly skeptical, first, that one could have a priori knowledge of God and, later, that one could have knowledge of God at all.

Rene Descartes (1596–1650), who, along with Galileo Galilei (1564–1642), was one of the founders of modern physical science, was the most influential rationalist of the seventeenth century. Even though, when it came to the study of animal biology, Descartes was an avid experimentalist, in his abstract philosophy he elevated rational intuition over sense experience as a source of knowledge. He also claimed that humans have innate ideas, such as an idea of God, which do not come from experience. And he claimed that through reason alone, independently of appeal to experience, one could demonstrate the existence of God and the existence of immaterial souls – one such soul, intimately conjoined with a body, for each human person.

During the time that Descartes was making his major philosophical and scientific contributions, he had predecessors and contemporaries who were well known and highly influential empiricists. Chief among these were Francis Bacon (1561–1626), Pierre Gassendi (1592–1655), and Thomas Hobbes (1588–1679). However, Descartes' rationalism overshadowed the empiricism of his day – providing the framework for the most influential philosophy of the seventeenth century. It was not until close to the dawn of the eighteenth century, when John Locke (1632–1704) published his *Essay Concerning Human Understanding* (1975 [1690–94]) that the tide began to turn against rationalism and toward empiricism.

In 1690, Aristotelean science was still firmly entrenched in the universities. Even so, in his *Essay* Locke not only expressed contempt for it, but generally dismissed it without much argument, taking it as obvious that it was on the wrong track. His main target, against which he argued at length, was Cartesian rationalism. In Britain especially, but also in France, Locke found an eager audience. He quickly became the most influential empiricist of the modern era.

## Concepts

One of Locke's central ideas was that the human mind at birth is a *tabula rasa* (blank tablet) on which experience subsequently writes. He allowed that the mind might have innate capacities, such as the capacity to reason and to learn from experience, but he vehemently denied that it has any innate ideas (concepts). In trying to make this point, he taunted rationalists with the perhaps irrelevant observation that children, the mentally impaired, and "savages" lack many of the ideas that were said by rationalists to be innate. But his main thrust was to try to explain how humans *could have* acquired all of their concepts from experience, thereby making the appeal to innate ideas superfluous.

Throughout the eighteenth century many empiricists enthusiastically embraced Locke's tabula-rasa thesis, in whole or in part. These included George Berkeley (1685–1753), who allowed that humans have a *notion* (as opposed to an idea) of the self that is not derived from experience, and David Hume (1711–76), who defended Locke's view by refashioning a central component of the way Locke had supported

it. Some other philosophers simply ran with Locke's idea, including the French philosopher Étienne Bonnot de Condillac (1715–80), who in his *Treatise on Sensations* (of 1754) claimed that external sensations by themselves could account not only for all human concepts, but for all mental operations as well. Using the example of a statue endowed with only the sense of smell, Condillac tried to explain how from this bare beginning attention, memory, judgment, and imagination – indeed, one's entire mental life – might have developed. His views thus embodied a more extreme version of the tabula-rasa perspective than can be found even in Locke.

In contrast to Condillac, many British empiricists after Locke had doubts about Locke's explanations of the experiential origins of several of the concepts that he examined, including especially those of causation and of the self. Over time these more austere empiricists – Hume is the premier example – tended increasingly to agree that ideas as robust as the ones Locke assumed that we have could not have been derived from experience. But then, rather than rejecting Locke's tabula-rasa thesis, they concluded that our ideas are not as robust as Locke had imagined. Thus, Hume developed his "bundle theory of the self" and his "regularity theory of causation" in order to fashion concepts of these notions thin enough that they actually could have been derived from experience. A question, then, was whether these thinner concepts were nevertheless thick enough to account for the ways humans meaningfully think about the world, especially in science.

The tabula-rasa thesis played an important role in encouraging thinkers to speculate about how the mind becomes stocked with its simple ideas, how it then combines and augments these to form more complex ideas, and finally what the laws might be – the so-called *principles of association* – that govern how one idea leads to another in human thought. The tabula-rasa thesis also put great pressure on the assumption that humans understand what it might even mean to have, or be, an immaterial self, let alone to know that one has, or is, one.

Effectively doing away with the idea that to understand human nature one must understand the role of an immaterial self in human mentality was crucial to the emergence of a scientific psychology. In the eighteenth century, empiricism, and the tabula-rasa thesis in particular, was at the forefront of this important initiative. More generally, the tabula-rasa thesis encouraged an austere empiricist epistemology and metaphysics that inhibited acceptance of many common sense and even scientific assumptions about the reality of the external world and our epistemological access to it, as well as about the meaning of the concepts in terms of which we think about ourselves and the world. Not all empiricists embraced this entire program, but for those who did, which included most notably Hume, empiricism tended to lead to skepticism. This encouraged other thinkers – Immanuel Kant (1724–1804) is the premier example – to explore radically alternative ways to account for human knowledge, including new proposals about how the human mind might have come to be stocked with its concepts.

Today something like the doctrine of innate ideas, under the guise of what is called *nativism*, has become the prevailing orthodoxy among philosophers and psychologists. However, it was not until the second half of the twentieth century that nativism

gained this sort of ascendancy, at which time nativism's rise was due initially, and perhaps primarily, to widespread acceptance of the approach to language acquisition championed by Noam Chomsky.[1] Once nativism had made this inroad the way was open for others to advance a variety of nativist theses – for instance, for Jerry Fodor to argue that since there is no viable empiricist theory of concept acquisition it is *prima facie* reasonable to believe that all concepts are innate.[2]

## Knowledge

In addition to Locke's making subsequent empiricists uncomfortable by conceding too much to common sense about the content of our ideas, he also muddied his empiricist credentials by agreeing with Descartes that we have a demonstrative knowledge of God's existence and an intuitive knowledge of our own existence. Locke even claimed to believe that the self is an immaterial substance. However, he coupled these agreements with the wildly controversial observation that matter might think.[3] And, even more threatening to the idea of the self as immaterial substance, he gave an empirical account of personal identity that made no appeal to anything immaterial.

Subsequently Berkeley and Hume denied that we have a demonstrative knowledge of God's existence. Berkeley, however, claimed that we can know on empirical grounds that God exists. And he claimed that we have an intuitive knowledge of our own existence as an immaterial substance (privately he expressed doubt on the point). Hume, in the work that he published during his lifetime, eschewed any concession to the idea that God exists and even denied that we intuit our own existence, at least if it is conceived as robustly as Locke conceived it. In addition, Hume famously gave more empirically austere analyses of several of Locke's key notions. Other empiricists, as we shall see, did not become so preoccupied with Locke's tabula-rasa thesis that they allowed their commitment to an austere empiricist epistemology to interfere with their contributions to the newly emerging science of human nature. Instead, they allowed themselves realistic assumptions about the material world and our epistemological access to it. David Hartley (1705–57), Adam Smith (1723–90), and Joseph Priestley (1733–1804) were in this group.

There was, thus, a major divide within the empiricist camp, not so much over whether Locke's tabula-rasa thesis is true, since few empiricists questioned it, but over the role that it and the austere empiricist epistemology that it encouraged should play in science, particularly in an empirical investigation of the human mind. But, due to the high visibility and persuasiveness of those empiricists who were preoccupied with the more austere approach, empiricism quickly became linked with skepticism, a reputation that it retained into our own times. As late as 1945, Bertrand Russell (1872–1970), himself a latter-day empiricist, wrote that Hume "developed to its logical conclusion the empirical philosophy of Locke and Berkeley, and by making it self-consistent made it incredible." Hume, thus, represents, Russell continued, "a dead end"; in his direction "it is impossible to go further." And, although "to refute him has been, ever since he wrote, a favourite pastime among metaphysicians," Russell could "find none of their refutations convincing." Russell concluded, "I cannot but hope that something less sceptical than Hume's system may be discoverable."[4]

Such was the influence of the austere epistemology spawned by empiricism. But what Russell expressed is a philosopher's worry. Whether it has much to do with how science should be conducted, and a science of psychology in particular, is a separate question. Hume, though, thought that it had a lot to do with how a science of human nature should be conducted. In his view, austere empiricism and science are inextricably linked. Hence, in his strictures about how a science of human nature should be pursued, psychology never escapes from the clutches of epistemology. That, as it turns out, was not the way forward.

## The self

Although Locke's official view was that the self is an immaterial substance, he saw that for the purpose of developing a science of human nature, that idea was a nonstarter. However, rather than challenge the immaterial-self thesis directly, Locke turned to the topic of personal identity, where he had two main ideas, one negative and one positive. His negative idea was that the persistence of persons *cannot* be understood empirically as parasitic upon the persistence of any underlying substance, or substances, out of which humans or persons might be composed. His positive idea was that the persistence of persons *can* be understood empirically in terms of the unifying role of consciousness.

Most of the time when Locke talked about consciousness in the context of talking about personal identity he meant *remembers*. His eighteenth-century critics invariably attributed to him the view that a person at one time and one at another have the same consciousness, and hence are the same person, just in case the person at the later time *remembers*, from the inside, the person at the earlier time. Whether or not this is what Locke had in mind, his eighteenth-century critics were right in thinking that the memory interpretation of personal identity that they attributed to him is vulnerable to decisive objections.[5] However, almost all of them wanted to defeat what they took to be Locke's memory view to retain the view that personal identity depends on the persistence of an immaterial soul.

For his part, Locke pointed out correctly that one can determine empirically whether someone retains the same consciousness over time, but not whether someone retains the same immaterial soul. As a consequence, he thought, the soul view is not only a wrong account of personal identity, but the wrong *kind* of account, whereas his own view, by contrast, is at least the right kind of account. As it happened, Locke was right: the *kind* of account he offered was riding the crest of a wave of naturalization that was about to engulf his critics.

An early indication of what was about to happen occurred soon after Locke's death. Between 1706 and 1709 Samuel Clarke (1675–1729) and Anthony Collins (1676–1729) confronted each other in a six-part written debate.[6] At the time, Clarke, who was Newton's right hand man, was an enemy of empiricism and one of the most highly respected philosophers of the time, a status that he retained throughout the century. Collins, who in the last years of Locke's life had been one of his most beloved and devoted disciples, was a relative unknown.

Clarke and Collins' point of departure was the question of whether souls are naturally immortal, where by "soul," they agreed to mean "Substance with a Power

of Thinking" or "Individual Consciousness."[7] Clarke, who had a sophisticated understanding of Newtonian science and was revered throughout the century for his opposition to empiricism, defended the traditional Platonic idea that souls are immaterial. Collins countered that the soul is material.

Both men agreed that individual atoms are not conscious. Their dispute, thus, turned on the question of whether it is possible that a *system* of matter might think. Clarke argued that it is not possible, Collins that matter does think. Throughout their debate Clarke played the part of the traditional metaphysician. He argued largely on *a priori* grounds. Collins, though not always consistently, played the part of the empirical psychologist. His faltering, but often successful, attempts to reformulate traditional metaphysical issues empirically embodied the birth pangs of a new approach, one that grew steadily throughout the century. The Clarke-Collins debate is, thus, a poignant record of two thinkers' struggles to cope with a rapidly changing intellectual climate, Clarke by hanging onto the old, Collins by groping for the new.

Although Collins' approach was the progressive side of Locke's, he went beyond Locke, first, in espousing materialism, and second, in replacing Locke's metaphysically awkward same-consciousness view of personal identity with a more defensible connected-consciousness view. Throughout Collins said that he sought, and that Clarke should have been seeking, an empirical account of consciousness. Collins repeatedly criticized Clarke for trying to settle by verbal fiat what could only be settled empirically.[8]

Clarke countered by reiterating a priori dogma. For instance, he claimed that strictly speaking, consciousness is neither a capacity for thinking nor actual thinking, "but the Reflex Act by which I know that I think, and that my Thoughts and Actions are my own and not Another's." He also claimed that "it would necessarily imply a plain and direct Contradiction, for any power which is really One and not Many … to inhere in or result from a divisible Substance."[9] However, he conceded that his own "affirming Consciousness to be an individual Power" was neither "giving an Account of Consciousness" nor "intended to be so." It is enough, he concluded, that "every Man feels and knows by Experience what Consciousness is, better than any Man can explain it."[10] As it turned out, however, this was not enough.

It soon became clear to subsequent thinkers that while intuition might be a sufficient basis to resist the reduction of the mental to the material, it was impotent as a source of explanations of mental phenomena. Collins returned to this point again and again, even claiming to be able to explain how consciousness could be transferred from a material system of the brain initially composed of certain particles to one subsequently composed of other particles, without changing the individual subject of consciousness whose brain is involved.[11] By our current standards, his explanation is crude, but it was a genuine scientific explanation, and Clarke had nothing comparable to offer.

Throughout the eighteenth century the Clarke-Collins debate was well known to subsequent theorists. Yet even though Collins' orientation was directly toward the development of a science of psychology of a sort that would be familiar to psychologists in our own times, the extent of his influence is unclear. However, even among those who

sided with Clarke there was a gradual awakening to the idea that at least for scientific purposes the self had to be understood empirically. Thus, Clarke's bravado in his debate with Collins contrasts with the subsequent defensiveness of Berkeley and Joseph Butler (1692–1752), a few decades later, as well as with the reluctance of most immaterial-soul theorists after Hume even to do battle on the issue. And whereas toward the beginning of the century, it was enough simply to defend the immateriality of the soul and related *a priori* doctrines, such as the reflexivity of consciousness (the view that necessarily if one is conscious, then one knows that one is conscious), without also contributing to the emerging science of human nature, eventually soul theorists tended to bracket their commitment to the immaterial soul to conduct meaningful empirical research. Thus, while the immateriality of the soul is crucial to Berkeley's metaphysics, it is almost irrelevant to his inquiries into vision; and although Hartley, Thomas Reid (1710–96), and Abraham Tucker (1705–74) remained committed to the existence of the immaterial soul, each of them segregated that commitment from their empirical inquiries.

As a consequence, in debates among theorists about the nature of the mind, it tended to matter less and less as the century wore on what one's view was of the immaterial soul. Toward the end of the century, Hartley, the dualist, was regarded as an ally by Priestley, the materialist, while Reid, the dualist, attacked both. And while the main influences on Tucker, the dualist, were Locke, Clarke, and Hartley, it was not Locke and Hartley's dualism that most impressed Tucker, but their more scientific pursuits. It is only a slight exaggeration to suggest that Priestley could have put forth the very same views he did, even if, like Hartley, he had been a dualist; and Reid could have put forth most of his views, even if he had been a materialist.

This bracketing of commitment to the immaterial soul, which was reinforced later in a different context by the methodological strictures of Kant, arguably was one of empiricism's two greatest contribution to the eventual emergence of a science of psychology. The other was their contributions to formulating the principles of association. In both cases the basic message was that from the point of view of developing a science of human nature, the only ontological commitments that matter are those that can be tracked empirically; and the only theories that matter, those that can be confirmed or refuted empirically. Rationalists never quite got this, but it was central to the approach of empiricists. Unfortunately empiricists, for their part, tended not to get that for the purpose of doing science, it was more productive to make realistic assumptions about the world than to ground every claim in an empirically austere epistemology and metaphysics.

## Self-constitution

In empiricist traditions, it was not only the *immaterial* self that came under a cloud of suspicion, but even the *empirical* self. To see how this happened, one has to go back again to Locke, who in the *Essay* sometimes used the words *person* and *self* interchangeably, but more often used *self* to refer to a momentary entity and *person* to refer to a temporally extended one. Locke even defined the two terms differently.[12] His definition of *person* highlighted that persons are *thinkers* and, as such, have reason,

reflection, intelligence, and whatever else may be required for trans-temporal self-reference. His definition of *self* highlighted that selves are *sensors* and as such feel pleasure and pain, and are capable of happiness, misery, and self-concern.

We know how, in Locke's view, humans come into being. It is a biological process. How do selves (or persons) come into being? His answer was that is a psychological process that begins with an organism's experience of pleasure and pain, which gives rise, first, to the idea of a self – its own self – that is the experiencer of pleasure and pain, and then to concern with the quality of that self's experience (each of us wants more pleasure, less pain). Then the momentary self thus constituted (or perhaps the organism) thinks of itself (or its self) as extended over brief periods of time (say, the specious present); finally, through memory and the appropriation ingredient in self-consciousness, it thinks of itself as extended over longer periods of time.[13] Locke, thus, thought of the constitution of the self as at least being capable of being analyzed into an ordered, multi-step process. He may or may not have thought that the prior phases of this process temporally precede the subsequent phases.

Whatever Locke's view on this question of timing, he clearly thought that self-constitution involves appropriation – a kind of self-declaration of ownership – and that appropriation and accountability go hand in hand. A person, he said, is "justly accountable for any Action" just if it is appropriated to him by his self-consciousness.[14] He regarded the appropriation ingredient in self-consciousness as a natural relation between the organism and its present and past, which then is the basis for a non-natural relation of moral ownership.[15]

Joseph Butler, more than any other eighteenth-century critic of Locke, took Locke's observations about the role of appropriation in self-constitution seriously. It is "easy to conceive," Butler said, "how matter, which is no part of ourselves, may be appropriated to us in the manner which our present bodies are."[16] But, he continued, where there is appropriation, there must be an appropriator. Locke had an appropriator in "man," which he distinguished from "person" and allowed might be merely a material organism. Butler thought that he (Butler) had already shown that the appropriator must be something simple and indivisible, and, hence, could not possibly be a material organism. This simple, indivisible appropriator, he assumed, is who we truly are. But what this being appropriates, he went on to explain, is not thereby part of itself, but, rather, something it owns. Butler had learned from Locke that, for all we know, the thinking principle in us may be material. So, he astutely conceded that the appropriator might be a simple material entity.[17] In his view, it is our simplicity, not our immateriality, that ensures our survival. He thereby adapted the Platonic argument for immortality to the purposes of an age in which materialism was on the rise, recasting the a priori in an empirical mold.

When Butler turned to the topic of personal identity per se, he argued that on a relational view such as that of Locke or Collins, people would have no reason to be concerned for the future life of the person who they nominally regard as themselves, for if our being were just to consist in successive acts of consciousness, then it would be a mistake "to charge our present selves with anything we did, or to imagine our present selves interested in anything which befell us yesterday" or will befall us tomorrow

"since our present self is not, in reality, the same with the self of yesterday, but another like self or person coming in its room, and mistaken for it: to which another self will succeed tomorrow."[18]

In response to what Butler saw as the dangers of empirical analysis, he proposed that we take as primitive the idea of personal identity, which he said defies analysis. Like Clarke, he maintained that we can determine intuitively that we have persisted, not just in "a loose and popular sense" such as we might employ in saying of a mature oak that it is the same tree as one that stood in its spot fifty years previously, even though it and that former tree have not one atom in common, but in "the strict and philosophical sense" which requires sameness of substance.[19] On Locke's view, he claimed, we would have to consider ourselves to be selves and persons not really, but only in a fictitious sense. He thought that such a consequence refutes Locke's view. And, like Clarke, he admitted that he thought this not because he thought that he could show Locke's view to be false (he admitted that he could not), but rather because "the bare unfolding this notion [that selves are merely fictitious entities] and laying it thus naked and open, seems the best confutation of it."[20] Empiricists continued to struggle with this issue throughout the nineteenth century.

One who did so was John Stuart Mill (1806–73), who claimed that the self-knowledge that humans unquestionably have must be based on an intuitive belief in our own continued existence that comes with our ability to remember past states of mind as our own. Self and memory, Mill said, are "merely two sides of the same fact, or two different modes of viewing the same fact."[21] He explained that when a person – I – remembers something, "in addition" to the belief that I have "that the idea I now have was derived from a previous sensation" there is "the further conviction that this sensation" was "my own; that it happened to my self." He continued,

> I am aware of a long and uninterrupted succession of past feelings, going back as far as memory reaches, and terminating with the sensations I have at the present moment, all of which are connected by an inexplicable tie, that distinguishes them not only from any succession or combination in mere thought, but also from the parallel succession of feelings

which are had by others.

> This succession of feelings, which I call my memory of the past, is that by which I distinguish my Self. Myself is the person who had that series of feelings, and I know nothing of myself, by direct knowledge, except that I had them. But there is a bond of some sort among all the parts of the series, which makes me say that they were feelings of a person who was the same person throughout and a different person from those who had any of the parallel successions of feelings; and this bond, to me, constitutes my Ego.[22]

William James (1842–1910) later criticized Mill for having fallen back "upon something perilously near to the Soul," quoting as evidence Mill's remark that it is

"indubitable" that "there is something real" in the tie which is revealed in memory when one recognizes a sensation's having been felt before, and thereby "connects the present consciousness with the past one of which it reminds me." This tie, Mill said, "is the Ego, or Self." Mill continued, "I ascribe a reality to the Ego – to my own mind – different from that real existence as a Permanent Possibility, which is the only reality I acknowledge in Matter." This Ego, he concluded, "is a permanent element." James remarked that

> this "something in common" by which they [remembered feelings] are linked and which is not the passing feelings themselves, but something "permanent," of which we can "affirm nothing" save its attributes and its permanence, what is it but metaphysical Substance come again to life?[23]

James concluded that Mill here makes "the same blunder" that Hume had earlier made:

> the sensations per se, he thinks, have no "tie." The tie of resemblance and continuity which the remembering Thought finds among them is not a "real tie" but "a mere product of the laws of thought"; and the fact that the present Thought "appropriates" them is also no real tie.

But, James continued, whereas Hume was content "to say that there might after all be no 'real tie', Mill, unwilling to admit this possibility, is driven, like any scholastic, to place it in a non-phenomenal world."

In James' own approach to the self, the spirit of traditional empiricism burned brightly, but was now linked with a newfound interest both in physiology and in social interaction. From this perspective James claimed that the core of personhood is "the incessant presence of two elements, an objective person, known by a passing subjective Thought and recognized as continuing in time."[24] He resolved to use the word *me* for "the empirical person" and *I* for "the judging Thought." Since the "me" is constantly changing: "the identity found by the I in its me is only a loosely construed thing, an identity 'on the whole', just like that which any outside observer might find in the same assemblage of facts."[25] The I of any given moment is a temporal slice of "a stream of thought," each part of which, as "I," can "remember those which went before, and know the things they knew" and "emphasize and care paramountly for certain ones among them as 'me', and appropriate to these the rest." The core of what is thought to be the "me" "is always the bodily existence felt to be present at the time."[26]

Remembered-past-feelings that "resemble this present feeling are deemed to belong to the same me with it." And "whatever other things are perceived to be associated with this feeling are deemed to form part of that me's experience; and of them certain ones (which fluctuate more or less) are reckoned to be themselves constituents of the me in a larger sense," such as one's clothes, material possessions, friends, honors, and so on. But while the "me" is "an empirical aggregate of things objectively known," the "I" which "knows them cannot itself be an aggregate." Rather, "it is a Thought, at

each moment different from that of the last moment, but appropriative of the latter, together with all that the latter called its own."[27] In other words, what one calls "the I" is constantly changing. The *I* as a persisting thing is a fiction.

Closely related to the questions of how the self is constituted and whether anything so constituted could be a real thing was the question of how humans acquire a self-concept. Descartes had maintained that for anyone to be conscious one would have to know (or be conscious) that oneself is conscious. But to know that *oneself* is conscious, one would have to already be in possession of a self-concept. Thus, in such a view there is no room for conscious beings to gradually develop a self-concept; they must already have one in order to be conscious in the first place. Eighteenth-century rationalists, such as Clarke, continued to accept this view, and even Locke accepted it. It was not until the end of the eighteenth century that empiricists *explicitly* abandoned it.

The moment came in William Hazlitt's (1778–1830) first work, *An Essay on the Principles of Human Action* (1969 [1805]), which was the culmination of a kind of perspective on human mentality that had begun with Locke and been developed by Collins, Hume, and Priestley. According to Hazlitt, people are naturally concerned about whether someone is pleased or suffers as a consequence of their actions. This is because "there is something in the very idea of good, or evil, which naturally excites desire or aversion." But, he wrote, before the acquisition of self-concepts, people are indifferent about whether those who may be pleased or suffer are themselves or others: "a child first distinctly wills or pursues his own good," he said, "not because it is his but because it is good." As a consequence, he claimed, "what is personal or selfish in our affections" is due to "time and habit," the rest to "the principle of a disinterested love of good as such, or for its own sake, without any regard to personal distinctions."[28]

Hazlitt asked why, if people connect to the future through imagination, which does not respect the difference between self and other, the force of habit is almost invariably on the side of selfish feelings. His answer involved his trying to account for the growth of selfish motives in humans by appeal to their acquisition of self-concepts. In his view, when very young children behave selfishly it is not because they like themselves better, but because they know their own wants and pleasures better. In older children and adults, he thought, it is because they have come under the control of their self-concepts, which is something that happens in three stages. First, young children acquire an idea of themselves as beings capable of experiencing pleasure and pain. Second, and almost "mechanically" (since physiology insures that children remember only their own pasts) children include their own pasts in their notions of themselves. Finally, imaginatively, they include their own futures.[29]

In the first half of the eighteenth century, the possibility of a developmental account of the acquisition of self-concepts that Locke may have seen dimly was invisible to most of his readers. As commonsensical as the idea of this possibility may seem to us today, it did not begin to emerge in the views of eighteenth-century thinkers until mid-century. Hartley had formulated a developmental, associational account of the mind, but he focused on the development of the passions and did not consider the acquisition of self-concepts. Jean Jacques Rousseau (1712–78), especially in *Emile*, was sensitive to developmental concerns, but not particularly with respect to the acqui-

sition of self-concepts. Reid, late in the century, had a developmental psychology, but because of his commitment to the immateriality of the soul and the reflexive nature of consciousness, he may actually have made an exception in the case of the idea of self. Priestley, largely under the influence of Hartley, accepted the possibility of a developmental account of the acquisition of self-concepts, but did not elaborate.

Hazlitt thought that to progress through all three of the development stages that he distinguished in the acquisition of self-concepts, a child has to differentiate its own mental activities from those of others. In his view, this involves "perceiving that you are and what you are from the immediate reflection of the mind on its own operations, sensations or ideas." He then raised the question of how a child's formation of self-concepts is related to its development of empathy and sympathy. No one previously had asked this question.

In Hume's emotional contagion model of human sympathy, humans infer from external behavior, facial expressions, and the like that others are in some particular mental state. Then, the resulting idea that humans form of another's state becomes converted in their own minds into an impression, so that now they too are in the same state, though perhaps less vivaciously. In explaining how this conversion from idea to impression occurs, Hume appealed to the idea's "proximity" in one's mind to the impression one has of oneself, which he said is "so lively" that "it is not possible to imagine that any thing can in this particular go beyond it."[30] But, then, he added not a word of explanation about how people acquire their super-lively self-impressions.

Two decades later, Adam Smith gave an unusually thorough account of the role, in sympathy, of shifts from one's own to another's point of view. Yet Smith never attempted to explain how people acquire their ideas of the distinction between self and other. Aside from the applications of his ideas to ethical theory, Smith's gaze was fixed on the importance of point of view as a feature of adult minds, not on the psycho-genetics of point of view in our mental development. In explaining how sympathy is possible, it did not occur to him to explain how the conceptual apparatus that makes it possible came to be acquired in the first place.

Hazlitt speculated that young children imaginatively include only their own futures and not the futures of others in their ideas of self because the "greater liveliness and force" with which they can enter into their future feelings "in a manner identifies them" with those feelings. He added that once the notion of one's own personal identity is formed, "the mind makes use of it to strengthen its habitual propensity, by giving to personal motives a reality and absolute truth which they can never have." This happens, he thought, because "we have an indistinct idea of extended consciousness and a community of feelings as essential to the same thinking being," as a consequence of which we assume that whatever "interests [us] at one time must interest [us] or be capable of interesting [us] at other times."[31]

Hazlitt claimed that a bias in favor of ourselves in the future could never "have gained the assent of thinking men" but for "the force" with which a future-oriented idea of self "habitually clings to the mind of every man, binding it as with a spell, deadening its discriminating powers, and spreading the confused associations which belong only to past and present impressions over the whole of our imaginary existence."

However, whereas a host of previous thinkers – Descartes, Locke, Berkeley, Butler, and others – thought that people have intuitive knowledge of their own identities, Hazlitt rejected as "wild and absurd" the idea that people have any sort of identity that could be available to be intuited. We have been misled, he claimed, by language: by "a mere play of words." In his view, both children and adults fail to look beyond the common idioms of personal identity and as a consequence routinely mistake linguistic fictions for metaphysical realities. To say that someone has a "general interest" in whatever concerns his own future welfare "is no more," he insisted, "than affirming that [he] shall have an interest in that welfare, or that [he is] nominally and in certain other respects the same being who will hereafter have a real interest in it." No amount of mere telling "me that I have the same interest in my future sensations as if they were present, because I am the same individual," he claimed, can bridge the gulf between the "real" mechanical connections I have to myself in the past and present and the merely verbal and imaginary connections that I have to myself in the future.[32]

## Toward a science of human nature

When Locke published his *Essay*, he was eager to launch a science of human nature. Four decades later, when Hume published *A Treatise of Human Nature* (1888 [1739]), he assumed that a science of human nature had not only been launched, but had already taken a wrong turn. He was intent on setting things right, which he thought involved having the science of human nature assume its rightful position among the sciences. In his view, that position was at the *foundation* of a mighty edifice of human knowledge. Whereas today we tend to think of physics as the most fundamental science, Hume thought of the science of human nature as the most fundamental since only it would build an account based on experience (rather than things), which for Hume was our ultimate source both of evidence and meaning. "There is no question of importance," Hume said, "whose decision is not comprised in the science of man; and there is none, which can be decided with any certainty, before we become acquainted with that science." In explaining "the principles of human nature," he continued, "we in effect propose a complete system of the sciences, built on a foundation almost entirely new, and the only one upon which they can stand with any security."[33]

How, then, to proceed? The first step, Hume thought, was to reveal the basis on which any genuine science of human nature must be built. That, he said, is "experience and observation," by which he meant the ultimate *impressions* (what twentieth-century philosophical empiricists would call *sense-data*) on the basis of which all of a human's more complex *ideas* (concepts) would have to be wholly constructed. As it happened, however, for psychology to find its feet as a science it had to abandon such epistemological and metaphysical pretensions. Its practitioners had to realize that it was not their job, qua psychologists, to get to the absolute bottom of things. Happily, that task could be left to philosophers. Rather, it was their job, as psychologists, to explain human behavior. To do that, they had to take certain things for granted that in a more philosophical frame of mind could be seen to be deeply questionable. This was the

approach that Hartley followed and that Hume's friend and confidant Adam Smith followed in his early work on "the moral sentiments" (mainly human sympathy). It is also the approach that Hume himself often followed, in spite of his methodological manifesto.

This contrast between an austere empirical philosophical approach and a more realistic scientific approach is especially poignant in Hume's account of self and personal identity. In Book I of the *Treatise*, the heart of his account is his argument that belief in a substantial, persisting self is an illusion. More generally, he was intent on showing that belief in the persistence of anything is an illusion. This is what today we would call *philosophy*, rather than *psychology*. However, in the remainder of Book I, Hume addressed the task of explaining why people are so susceptible to the illusion of self. And in Book II he explained how certain dynamic mentalistic systems in which we represent ourselves and others actually work, such as those systems in us that generate sympathetic responses to others. In these more psychological projects, Hume often seems to have taken for granted things that in Book I he had subjected to withering skeptical criticism.

In Hume's view, since all ideas arise from impressions and there is no impression of a "simple and continu'd" self, there is no idea of such a self. This critique of traditional views led him to formulate his alternative "bundle" conception of the self and also to compare the mind to a kind of theatre in which none of the actors – the "perceptions [that] successively make their appearance" – is either "simple" at a time or, strictly speaking, identical over time. Hence, none is the traditional self. Beyond that, Hume claimed, humans do not even have minds, except as fictional constructions. Thus, in his view, a crucial respect in which minds are not analogous to real theatres is that there is no site for the mental performance, or at least none of which we have knowledge; rather, there "are the successive perceptions only, that constitute the mind; nor have we the most distant notion of the place, where these scenes are represented, or of the materials, of which it is compos'd."[34]

With these *philosophical* preliminaries out of the way, Hume turned to the *psychological* task of explaining how objects that are constantly changing, including the materials out of which we ourselves are constructed, nevertheless seem to persist. His answer, in one word, was: resemblance. When successive perceptions resemble each other, he said, it is easy to imagine that the first simply persists. In fact, "our propensity to this mistake" is so ubiquitous and strong "that we fall into it before we are aware." And even when we become aware of our error "we cannot long sustain our philosophy, or take off this biass from the imagination."[35]

Hume may have thought that a crucial difference between Locke and himself on the question of personal identity is that whereas Locke thought that there is a fact of the matter about whether a person persists, Hume thought that there is a fact of the matter only about the circumstances under which the illusion of persistence is nourished. In his capacity as a psychologist, Hume tried to explain what those circumstances were. But he did not stop there. As soon as he moved on to the largely psychological concerns that dominate Book II of the *Treatise*, he became deeply involved in what today we would call social psychology of the self. He, thus, completed a transition

from skeptical philosophy to the most general sorts of associational issues, and then to specific psychological hypotheses about how self-representations function in our mental economy, as for instance in his explanation of how sympathy works.

Subsequently Reid, who in spite of his own empirical investigations was a virulent opponent of empiricist epistemology, criticized Hume for denying that there is anything more to mind than a "succession of related ideas and impressions, of which we have an intimate memory and consciousness." Reid asked,

> to be farther instructed, whether the impressions remember and are conscious of the ideas, or the ideas remember and are conscious of the impressions, or if both remember and are conscious of both? and whether the ideas remember those that come after them, as well as those that were before them?

His point was that since ideas and impressions are passive, they cannot do anything, whereas Hume implied that the "succession of ideas and impressions not only remembers and is conscious" but also "judges, reasons, affirms, denies," even "eats and drinks, and is sometimes merry and sometimes sad." Reid concluded, "If these things can be ascribed to a succession of ideas and impressions in a consistency of common sense, I should be very glad to know what is nonsense." In Reid's view, if in accounting for the mind substance were to have no place, then agency would have no place either.[36] Since Reid thought it would be absurd to deny agency, substance had to be retained.

But what Reid might instead have concluded from his criticism is that in order to conduct a science of human nature one has to make realistic assumptions about the mind.

## Associationism

The theory that complex ideas in the human mind are constructed out of simple components and that the succession in the mind of (mostly) complex ideas can be explained by appeal to their similarity with each other and their repeated juxtaposition had been around since classical times.[37] However, this theory not only resurfaced in the modern era, but became a preoccupation of empiricists. In the seventeenth century, Hobbes used it to explain the succession and coherence of ideas:

> The *cause* of the *coherence* or consequence of one conception to another, is their first *coherence* or consequence at that time when they are produced by sense; as for example, from St. Andrew the mind runneth to St. Peter, because their names are read together; from St. Peter to a *stone*, for the same cause; from *stone* to *foundation*, because we see them together; and for the same cause from foundation to *church*, and from church to *people* … [and thus] the mind may run almost from anything to anything.[38]

In the eighteenth century, such appeals to association acquired renewed vitality, due primarily to the influence of Locke, Hume, and Hartley, all of whom gave association

a central role in their accounts of experiential phenomena. But neither Locke nor Hume appealed to association to speculate on the physiological underpinnings of empirical phenomena. That task was left to Hartley.

Philosophically Hartley was a dualist, but methodologically he was a materialist. Differing in this respect from Collins before him and Priestley after, Hartley believed that "man consists of two parts, body and mind," where the mind "is that substance, agent, principle, &c. to which we refer the sensation, ideas, pleasures, pains, and voluntary motions." But Hartley accepted Locke's concession that it is possible, for all we know, that matter thinks. And he doubted that either problems with materialism or pre-scientific intuitions we may have about the so-called unity of consciousness could be used to prove that the soul is immaterial, confessing that "it is difficult to know [even] what is meant by the Unity of Consciousness." He claimed that there is a problem with materialism in that "Matter and Motion, however subtly divided, or reasoned upon, yield nothing more than Matter and Motion still." But it was, he said, "foreign to [his] Purpose" to pursue the issue.

In addition to being a dualist, Hartley was a theist. But he never allowed his metaphysical and theological views to interfere with his attempt to establish a deterministic associationist psychology. Inspired by Newton's suggestion in *Principia Mathematica* that vibrations of corpuscles of light might cause vibrations in the retina of the eye, which would then be transmitted to the brain where they would produce the sensation of sight, and by some intimations of associationism in John Gay's (1699–1745) *Dissertation Concerning the Fundamental Principles of Virtue or Morality* (of 1731), Hartley proposed a "physics of the soul" in which physical vibrations in the brain, spinal cord, and nerves are the basis of all sensations, ideas, and motions of men and animals.[39] In his view, the "higher" the mental function – images and ideas, for instance, are higher than sensations – the more delicate the vibrations with which it is associated. And when mental functions are similar, as in the case of images and ideas that faithfully replicate sensations, it is due to a correspondence in the vibrations.

All learning, Hartley claimed, including that involved in perception, memory, imagination, emotion, and language, is the consequence of repetitive juxtapositions of corpuscular vibrations and mental associations that produce habits in accordance with a pleasure-pain principle, a view that he illustrated especially by appeal to the study of how children learn languages. Hartley thereby produced the first truly general account of human and animal psychology, which was an association based, mechanistic, deterministic, physiological psychology.

In France, the physician Julien Offray de la Mettrie (1709–1751), in his *Natural History of the Soul* (of 1745) and his *Man a Machine* (of 1748) developed Hartley's approach by arguing that human beings are merely physiological machines. Subsequently, Condillac laid the groundwork for an association-based psychophysiological account of human nature that became influential on the continent in the nineteenth century. Meanwhile, in Britain, Priestley encouraged the acceptance of Hartley's ideas in his *Theory of the Human Mind, on the Principle of Association of Ideas* (of 1775). Priestley thought that the sentient and thinking principle in man must be "a property of the nervous system or rather of the brain," insisting that it is scientifi-

cally useless to postulate an immaterial substance to account for *any* aspect of human mentality or behavior.[40] Priestley saw the differences between humans and other animals as differences of degree, rather than kind, and held that human infants begin like other animals and only gradually learn adult human modes of thinking, including the ability to conceptualize themselves.

In British philosophy, where empiricism still held sway in the nineteenth century, interest in associationism gathered strength. Thomas Brown (1778–1820), in his three volume, *Lectures on the Philosophy of the Human Mind* (of 1820), importantly elaborated associationist theory by distinguishing primary and secondary laws of suggestion (his word for *association*). And James Mill (1773–1836), in his *Analysis of the Human Mind* (of 1829), sketched a general view of the mind in which it was little more than mere machinery for the association process, a view that many psychologists came to regard as an important advance on Hartley's approach.

John Stuart Mill, James Mill's son, became an enthusiastic follower of the Positivism of Auguste Comte (1798–1857), but criticized Comte's negative attitude toward psychology: Comte "rejects totally, as an invalid process, psychological observation properly so called, or in other words, internal consciousness, at least as regards our intellectual operations."[41] To fill this gap, Mill made detailed comments on and refinements to his father's thoughts, ultimately arguing for his own associationist system of "mental chemistry." However, J. S. Mill's own contributions to psychology, while extremely attentive to internal consciousness, were primarily epistemological. Like Hume, he thought that his own phenomenalism, which he called *the psychological theory*, was a kind of foundational psychology. In Mill's view, material objects are "permanent possibilities of sensation," and other minds are inferred to exist based on an analogy with one's own case, which he presumed one knows directly. He claimed that like objects in the external world, minds too are just actual and possible sensations. Subsequent psychologists tended to regard his psychology as too philosophical to be responsive to their own interests.

Meanwhile Alexander Bain (1818–1903) revived and greatly developed Hartley's interest in a physiological approach to the understanding of human mentality. In *The Senses and the Intellect* (of 1855) and *The Emotions and the Will* (1876 [1859]), Bain drew upon Hartley and others to work out a sensory-motor associationism that marked a turning point in the history of associationist psychology. Before his work associationists like Hume and J. S. Mill were committed to experience as the primary source of knowledge. Bain, in a more realist mode, accepted movement and social interaction as primary, which he then used to explain higher mental functions, including self-attributions. He claimed, for instance, that when attention is turned inward upon oneself as a personality "we are putting forth towards ourselves the kind of exercise that properly accompanies our contemplation of other persons."[42]

Bain's more sophisticated psychophysiology was distinctive, first, for its realism, in that he began by assuming the existence of the physical world, including as items in it other people and himself; second, by the primacy he gave to social observation, in that we first make judgments about others, and only later think of ourselves as one "other" among many; and, third, by his suggestion that this progression from others to self not

only explains the origin of the notion of self, but also our ability to feel toward the self emotions that originally we felt toward others. Ultimately J. S. Mill would praise Bain's account as the highest point yet reached by the empiricist tradition.

Concurrent with such philosophical and psychological developments there was in the nineteenth century a growing spirit of naturalized science, typified by the work of Charles Darwin (1809–82), but independently including inquiry into the development of self concepts and the physiology of the brain. In 1855, the same year in which Bain published *The Senses and the Intellect*, Herbert Spencer (1820–1903) published *The Principles of Psychology*, which grounded psychology in evolutionary biology. Subsequently William James would build on both of these contributions.

James followed Bain, who had defined belief as a rule or habit of action, and Charles Sanders Pierce (1839–1914), who had claimed that the point of theory is not to represent reality, but to enable us to act more effectively, in turning partly away from empiricism toward what came to be known as pragmatism.[43] In some ways, James was the last philosopher/psychologist and arguably the last psychologist of importance in whom a sort of empiricism that could be traced back directly to Locke and Hume still resonated strongly. Increasingly, in the twentieth century, philosophy and psychology tended to go their separate ways. Throughout the first half of the century empiricism, particularly in its incarnation in epistemology, continued to be a potent force in philosophy, but was much less so in psychology. There the influence of empiricism tended to be supplanted by a newfound preoccupation with behavior and with the social dimensions of mental development.

## Notes

1. See, for instance, Samet (1998).
2. See, for instance, Cowie (1998).
3. Locke (1694 [1690]: Bk 4, sec. 3, pp. 540–1).
4. Russell (1945: 659).
5. See Marya Schechtman's contribution to the present volume.
6. Clarke (1828 [1738]: Vol. 3, pp. 720–913).
7. *Ibid.*: Vol. 3, p. 750.
8. *Ibid.*: Vol. 3, pp. 769–73.
9. *Ibid.*: Vol. 3, pp. 784–7.
10. *Ibid.*: Vol. 3, p. 790.
11. *Ibid.*: Vol. 3, pp. 809, 870.
12. Locke (1975 [1690–4]: Bk 2, sec. 27, pp. 335, 341).
13. *Ibid.*: Bk 2, sec. 27, p. 346.
14. *Ibid.*: Bk 2, sec. 27, p. 341.
15. For a competing view, see Ayers (1991: Vol. 2, pp. 266–7).
16. Butler (1852 [1736]: 86).
17. *Ibid.*: 87–8.
18. *Ibid.*: 328, 331–2.
19. *Ibid.*: 330.
20. *Ibid.*: 322, 325.
21. Mill (1869: Vol. 2**,** p. 174).
22. *Ibid.*: Vol. 2, pp. 174–5.
23. Mill (1878 [1865]: 262–3); James (1890: Vol. 1, p. 358).

24. *Ibid*.: Vol. 1, p. 371.
25. *Ibid*.: Vol. 1, p. 373.
26. *Ibid*.: Vol. 1, p. 400.
27. *Ibid*.: Vol. 1, pp. 400–1.
28. *Ibid*.: 33–4.
29. *Ibid*.: 34–5.
30. Hume (1888 [1739]: 317).
31. Hazlitt (1969 [1805]: 10–1, 140).
32. *Ibid*.: 6, 10–1, 27–9.
33. *Ibid*.: Introduction.
34. *Ibid*: 253.
35. In and of itself, Hume suggested, our supposing that objects persist is not so bad. But "in order to justify to ourselves this absurdity," we make up a story, often one in which the principle character is the notion of substance; that is, we invent the fictions of "soul, and self, and substance to disguise the variation" in our perceptions. When, as in the case of "plants and vegetables," we cannot fool ourselves into believing that the persistence of an underlying substance accounts for the persistence of the organism, we invent an equally "unknown and mysterious" surrogate – presumably, "life" – to connect the successive and different perceptions, *ibid*.: 254–5.
36. Reid (1967 [1785]: 444).
37. See, for instance, Plato's *Phaedo* (73d) and Aristotle's *On Memory and Reminiscence* (*passim*). Throughout this section of my paper, I am indebted to the account of associationism in Sahakian (1975).
38. Hobbes (1969 [1640]: Ch. 4, "Of the Several Kinds of Discursion of the Mind").
39. Hartley's formulation of associationism states that "Any sensation *A*, *B*, *C*, etc. by being associated with one another a sufficient number of times, gets such a power over the corresponding ideas *a*, *b*, *c*, etc. that one of the sensations A, when impressed alone shall be able to excite in the mind *b*, *c*, etc. the ideas of the rest." In (1749: Vol. 1, prop. 10).
40. Priestley's rootedness in science, together with the matter of factness of his materialistic approach and his unproblematic commitment to realism, differed radically from the epistemologically oriented versions of empiricism championed by Locke, Berkeley, and Hume. Because of it Priestley did not think that his style of empiricist epistemology led to skepticism about the external world, as Reid had claimed, or indeed to skepticism about anything, and he more cleanly separated philosophy from science than Hume, in particular, had been able to do (Priestley 1976 [1777]: 163).
41. Mill (1968: 64).
42. Bain (1876: 203–4).
43. Richard (2004 [1998]).

## Acknowledgements

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## Further reading

For further reading on this topic, see Ludy T. Benjamin Jr., *A Brief History of Modern Psychology* (Oxford: Blackwell, 2007); Edwin G. Boring, *A History of Experimental Psychology,* 2nd edn (New York: Appleton-Century-Crofts, 1950); B. R. Hergenhahn, *An Introduction to the History of Psychology*, 5th edn (Belmont, CA: Wadsworth, 2004); Raymond Martin and John Barresi, *Naturalization of the Soul: Self and Personal Identity in the Eighteenth Century* (London: Routledge, 2000), and *The Rise and Fall of Soul and Self: An Intellectual History of Personal Identity* (New York: Columbia University Press, 2006); Henry K. Misiak and Virginia S. Sexton, *History of Psychology: An Overview* (New York: Grune & Stratton, 1966); David J. Murray, *A History of Western Psychology*, 2nd edn (1983; Englewood Cliffs, NJ: Prentice-Hall, 1988); William S. Sahakian, *History and Systems of Psychology* (New York: Schenkman; John Wiley & Sons, 1975), and *History of Psychology: A Source Book in Systematic Psychology* (Itasca, IL: F. E. Peacock, 1968); and Roger Smith, *The Norton History of the Human Sciences* (New York: W. W. Norton & Co., 1997).

# 3
# EARLY EXPERIMENTAL PSYCHOLOGY

*Alan Kim*

## Introduction

"The physiology of the senses is a border land in which the two great divisions of human knowledge, natural and mental science, encroach on one another's domain; in which problems arise which are important for both, and which only the combined labour of both can solve."[1] It was some forty years before Hermann von Helmholtz wrote these words that Johannes Müller and Ernst Heinrich Weber first forayed into the philosophers' realm of the mental with tactics and tools devised in the fields of natural science. For many decades thereafter, philosophers, particularly of an idealist stripe, readjusted the borderline between psychology and philosophy as they tried to preserve a "pure" domain of research, one untouchable by empirical (and this came more and more to mean "experimental") psychology.[2] The early history of experimental psychology is instructive for philosophers today because it was at this stage that the question of the very possibility of a science of mind was first addressed. Moreover, the *way* in which psychology asserted itself as a discipline holds lessons for those concerned with the form that contemporary debates regarding mind and brain have taken.

Psychology, or inquiry into the nature of mental phenomena such as sensation, perception, thought, feeling, and willing – indeed, the nature of "soul" itself – had long been the domain of philosophers whose general approach was speculative, and whose aim was, as James Sully wrote in the inaugural issue of *Mind* (1876), "to determine the substance of mind with the view of embodying this idea in an ultimate ontological theory."[3] Sully took a dim view of these thinkers. He complained that they had "little patience in the observation and classification of mental phenomena, little penetrative insight into the causal relations of these phenomena [, while] on the other hand we see abundant metaphysical ingenuity in building new hypotheses on arbitrarily selected groups of facts."[4] Yet, as we will also see, it is not the case, at least in Germany, that with the new rigor of experiment, psychology abruptly broke with philosophy and its alleged speculative excess. Maybe this happens later; but for the founding fathers, especially Fechner and Wundt, psychology was *still* a part of philosophy, indeed its

foundation. Experimental methodology merely gives this foundation a scientific rigor – a necessity insofar as (German) philosophers continued to consider philosophy the science of sciences. For them, the notion of a "philosophy *of* psychology" would have sounded very obscure.

I will limit myself in this chapter to the following questions: How can experiment aid us in observing, classifying and understanding the causal relations among mental phenomena? Conversely, how must the mental be construed so as to be susceptible to experiment? Proceeding historically, I examine four founding figures of experimental psychology – E. H. Weber, G. T. Fechner, H. von Helmholtz, and W. Wundt – to determine how and to what extent they recognized and dealt with these *philosophical* questions. What if anything remains of the mental as of "purely" philosophical interest lies beyond our scope.

## Background

In the eighteenth century, Kant raised several objections against any form of psychology other than his own "transcendental" variety.[5] He argued against the very possibility of both rational and empirical psychology, i.e., psychology based, respectively, on metaphysical first principles or on introspective observation of subjective phenomena;[6] the latter is especially germane here. Introspection, according to Kant, necessarily distorts, by participating in, the very phenomena it seeks to observe.[7] Moreover, Kant held that psychology could never be a science inasmuch as the "exactness" of mathematics necessarily eluded it.[8] What does this mean? A science is exact just when it can express its propositions mathematically. But for this to be possible, its objects must be capable of measurement; measurement in turn requires the fixing of units. Physics can operate "exactly" because it possesses various exact units of measurement, such as joules or meters. But how could psychic phenomena (the "manifold of inner observation," as Kant calls it)[9] be measured? What unit of measurement could a psychologist employ in determining (mathematically) the ebb and flow of consciousness?

These philosophical obstacles – introspection, exactness, psychic units, and psychic measurement – turn out, as we will see, to be evaded or ignored by the pioneers of experimental psychology: it does not begin as a self-conscious effort to reply to Kant. Rather, it is in the course of other scientific projects that problems of subjectivity ineluctably arise, e.g., in astronomy the discrepancy between observers' reaction times in marking the movement of stars across a meridian, expressed in the so-called personal equation;[10] and, more obviously, the phenomenology connected with the function of the nervous system. It was in fact a set of ingenious physiological experiments conducted by Weber that opened up the possibility, behind Kant's back, as it were, of developing an experimental psychology; but it was only exploited in a philosophically, that is, psychologically self-conscious way by Fechner and his successors.[11]

## Ernst Heinrich Weber (1795–1878)

It is in the work of the Leipzig physicist and physiologist, E. H. Weber, that a subjective or "psychological" element enters into the sensory physiology pioneered by his contemporary, Johannes Müller. We can see this in the way Weber phrases the issue of his classic studies of cutaneous and muscular sensation of temperature and touch. His *De Tactu* (1834) and *Tastsinn und Gemeingefühl* (1846) concern the human *experience* of warmth and cold; our power of *discerning* locations on the surface of the skin; of *judging* differences in weight[12] – all phenomena on the psychological side of the mind-body divide. For our purposes, Weber's work is important for two reasons. First, his innovative experimental approach to sensation revealed the possibility of psychological experimentation, later developed by Fechner.[13] Second, Weber's experiments led him to postulate an active subjective contribution to the formation of "sense-perceptions," a notion that would prove fundamental to Helmholtz and Wundt's work some decades later. Let us briefly consider these two contributions.

Let us begin with a précis of Weber's experimental work. In *De Tactu* and *Tastsinn*, he describes his experiments on the sense of touch. He discovered that when the points of a compass close together on the skin, they are sensed as a single point, yet as they are moved apart, we become conscious of being touched at two points. Weber called this moment at which we become aware of feeling two contacts instead of one the two-point threshold or *limen*.[14] This threshold, he found through exhaustive tests, varies on different regions of the body's surface, a phenomenon he explained by postulating *Empfindungskreise* or "sensory regions,"[15] tiny fields of sensitivity associated with a single nerve ending;[16] the more such regions lie between the compass points, the further apart they appear to us to be, and vice versa.[17]

Weber also studied the sense of temperature, which, unlike the sense of brightness and dimness, is relative and mutable. Whereas the zero-point (*Nullpunkt*) of illumination is absolute darkness, and thus the various degrees of illumination are necessarily positive magnitudes, the zero-point of the temperature sense, Weber says, is an internal thermal source.[18] Weber hypothesized that "the experience of warmth and cold is not dependent directly on the temperature of the stimulating object, but on the *increase* and *decrease* of the temperature of the skin,"[19] since any body that upon contact with the skin raises or lowers its "zero-point" temperature will appear warm or cold, respectively.[20] Thus what is sensed is not temperature as such, but the contrast between the temperature of the skin and the stimulating object.

These examples show that Weber's chief interest lay not so much in the qualitative phenomenology of sensation as in the difference between sensations, specifically, in the moment at which one sensation ends and another begins. Difference of sensations is philosophically significant for two reasons. First, it suggests a criterion of separating mental events, namely noticeability; if, moreover, a regular relationship between two just noticeably different sensations can be established, then we might come into possession of a method by which mental events more generally could be manipulated in a controlled fashion, that is, an experimental method for psychology.

In fact, Weber discovered just such a law-like regularity between changes in stimulatory intensity, on the one hand, and differentiation of sensations, on the other, a regularity that Fechner would later codify and name Weber's law. It was Weber's work on the sensation of just noticeable differences in weight or pressure (*Drucksinn*), in lengths of lines, and in changes in tone that proved most important for establishing this functional rule relating stimulus and sensation.[21] On the basis of numerous documented trials, Weber concludes in *De Tactu* that "when noting a difference between things that have been compared, we do not perceive the difference between the things [i.e., the absolute weight difference], but the ratio of the difference to their magnitude."[22] His point is quite simple. If a weight of half an ounce is placed in our hand, we can easily perceive it; however, if "two weights of 33 and 34 half-ounces are compared by touch, we do not perceive the difference" between the two weights, even though they differ by the previously perceptible weight, namely half an ounce.[23] The reason for our not perceiving the difference in this case is that "the ratio of the difference between the two weights is only a 34th part of the heavier weight," and this ratio (rather than the difference in absolute weight) is too small to be discerned. Similarly, when comparing the length of lines, Weber found his subjects to be unable to discern differences less than one percent, regardless whether the lines were, say, 100 and 101 mm, or 50 and 50.5 mm in length, respectively: "The disparity is recognized as easily in the latter case, even though it is twice as small, because in both cases the difference between the two lines is equal to 1/100 of the longer line."[24]

Weber's law, both in its more pragmatic formulation by Weber himself and in Fechner's formalizations of it (see below), proved immensely controversial and fruitful for decades after. From a strictly philosophical point of view, it seems most interesting for the mathematical regularity it reveals in certain psychological, that is, subjective phenomena. Moreover, Weber recognized, on the one hand, that "tactile acuity depends partly on the structure of the organ, and partly on movements of the organ made *deliberately* and *consciously*,"[25] and on the other hand, that his experimental subjects may become more "practised," that is, may improve their tactile acuity. Although he did not himself draw any psychological or philosophical conclusions from these facts, they clearly indicate a regular connection between measurable stimuli and subjective activity of conscious deliberation and will – a connection more explicitly and deeply worked out by Helmholtz and Wundt.

## Gustav Theodor Fechner (1801–87)

Fechner for the first time clearly states the problem of a scientific psychology: how can the subjective realm be made the object of an exact *and* experimental science?[26] In other words, how is psychology as an exact science possible?[27] Fechner's answer is, only by becoming psychophysics. Fechner's method and practice of psychophysics, as laid out in his groundbreaking *Elemente der Psychophysik* (1860) and defended against objections in his *In Sachen der Psychophysik* (1877), cannot be treated in detail here.[28] What interest us, rather, are his philosophical conception of psychology as psychophysics, and his justification of an experimental approach to the subjective realm.[29]

Fechner was an idealist, a panpsychist, a satirical mystic who wrote a comparative anatomy of angels and argued in print that plants have souls. At the same time, he was a champion of atomism and mentor to Mach, an influence on Schlick and Carnap, and an untiring experimenter, whose visual trials even led to temporary blindness and nervous collapse. As philosophically riven as he may strike us today, Fechner saw his work as coherent: on the one hand, it describes the world as it gives itself to us, appearing from the "outside" as material and mechanistic, while, on the other, it penetrates that same world from the "inside," from the point of view of life and soul.

Fechner defines psychophysics as the "exact theory of the functionally dependent relations of body and soul, or, more generally, of the material and the mental, of the physical and the psychological worlds."[30] What metaphysical presupposition would make such a theory of "functionally dependent relations of body and soul" possible? Fechner, like Wundt after him, subscribes to psychophysical parallelism, i.e., the theory that mental and physical events run on rigorously corresponding but irreducible tracks. However, as I have argued elsewhere regarding Wundt,[31] this label is misleading insofar as it suggests the existence of two ontologically independent, if parallel, realms. Instead, I call Fechner and Wundt's view "perspectival monism":[32] there is just *one* line, one "track," not two, with the left and right "sides" of this line representing, respectively, its mental and physical *appearances*.

Now instead of "right" and "left," Fechner himself speaks of the "inner" and "outer": the natural sciences take the external standpoint towards reality, whereas the humanities take the inner, though it is one and the same reality in both cases. The two approaches can be compared to observers of a circle: to an observer inside the circle, it appears concave, and its convex appearance is hidden, whereas for the observer outside the circle, it appears convex while its concavity is concealed. "It is just as impossible, standing in the plane of a circle, to see both sides of the circle simultaneously, as it is to see both sides of man from the plane of human existence."[33] Again, the "inner" and "outer" are Fechner's criterion for determining the psychological and the material.[34] The psychological includes "all that can be grasped by introspective observation or that can be abstracted from it," while the material is "all that can be grasped by observation from the outside or abstracted from it."[35] It is just the exact sciences that combine measurement, experiment, and mathematics that deal with external phenomena, for it is only among these that units and instruments of measurement have traction; the soul's inner realm by contrast is immeasurable and intractable. If, however, Fechner is correct that these two realms are only different aspects of one reality, related to each other as the convex and concave, then it could be possible to find a functional relationship between the two, such that if the one were mathematically determinable, the other could be found as a function of it.

In his preface to the *Elements*, Fechner writes, "Since the measure of physical magnitudes is already known, the first and main task of [psychophysics] will be to establish the as yet nonexistent measure of psychic magnitudes."[36] A *science* of subjectivity is possible only if the manifest differences in subjective intensities (more or less bright, long, heavy, loud) can be associated with a metric – which is what he believes to have done. He considers Weber's discovery of a constant ratio between (external)

stimulus intensity and (internal) sensation to provide an empirical basis for such an "exact" mapping of the inner realm, a transformation code, as it were, and so, too, an indirect way of establishing units of psychic magnitude. Weber had experimentally discovered that the ratio of a given stimulus (*Reiz*, R) to another stimulus required to elicit a just noticeable difference in sensation is constant (*k*), a fact that can be expressed as follows:

$$\Delta R/R = k.$$

Fechner elaborates this simple equation to read

$$\Delta S = k\,(\Delta R/R).$$

In other words, for any difference in sensation, whether just noticeable or not, the proportion of stimulus-increase to original stimulus will remain constant.[37] This new formula, which Fechner calls the "basic formula [*Fundamentalformel*],"[38] is made possible by his assumption that the JNDs (i.e., ΔS) are constant (since they are always *equally* "just" noticeably different).[39] In this way he tries to satisfy the scientific requirement for a psychic unit of measurement.

After further elaboration,[40] Fechner finally arrives at

$$S = k \log R,$$

which he calls Weber's law.[41] This equation expresses the notion that sensation (S) stands in a constant logarithmic relationship to stimulus (R), such that as the S increases arithmetically, R increases geometrically.[42] In other words, for every addition of one sensation-unit (JND), the stimulus increases by some constant factor (which, of course, must be discovered by empirical trial). Fechner thus took Weber's law to represent the functional relation between the external stimulus and the internal sensation, interpreting Weber's original finding in a "fresh" way "as psychological measurement," rather than in its former, merely physiological sense.[43]

Fechner's claims for his Weber's law were immediately criticized, both for taking the JND as a constant unit,[44] as well as for the very notion of a "magnitude" of sensation.[45] While such criticisms exposed obscurities in psychophysics' theoretical foundations, they did not lessen the experimental fecundity of Fechner's formulae.[46] His philosophical relevance, however, lies mainly in his perspectival monism, expressive of the impulse towards ontological unification mentioned by Sully. Yet, in Fechner's defense, he makes every effort to keep distinct the empirical and cosmological senses of his psychophysical parallelism. Psychophysics as a science is based on the empirical postulate that there obtains a functional relationship between mental and physical phenomena, "without referring back in any way to the nature of the body or of the soul beyond the phenomenal in the metaphysical sense."[47]

## Hermann von Helmholtz (1821–94)

Helmholtz was a giant of nineteenth-century physics and physiology. His work in physiological optics and acoustics led him across the border, as he put it, into the realm of psychology.[48] Our interest in this section remains with the theoretical problems that arise on this frontier, especially in the area of spatial perception. Helmholtz writes that although physiology concentrates only on "material changes in material organs, and that of the special physiology of the senses [on] the nerves and their sensation, so far as these are excitations of the nerves," science cannot "avoid also considering the apprehension of external objects, which is the result of these excitations of the nerves."[49] Yet this takes us from the somatic or material domain into the mental, since "apprehension of external objects must always be an *act* of our power of realization, and must therefore be accompanied by consciousness."[50] Thus Helmholtz goes beyond Fechner's achievement, fulfilling the latter's goal of psychophysics:[51] at first, experiment can illuminate mental processes

> only so far as we are able by experiment to determine the particular sensible impressions which call up one or another conception in our consciousness. But from this first step will follow *numerous deductions* as to the nature of the mental processes which contribute to the result,

namely the apprehended perception.[52] Whereas in Fechner we see the problem of a scientific psychology framed in terms of a functional relationship between the physical and the mental, in Helmholtz, the mind-body problem is conceived differently, the question posed at a higher level: what is the *active* contribution of mind to its appearances, even when these are perceived as being of an external (physical) object?

The reason for this divergence may be found in the differing nature of Fechner and Helmholtz's physiological research, Fechner concerning himself primarily with sensual intensity, Helmholtz with perception of objects.[53] As I discuss more closely below, Helmholtz's work in optics leads him to conclude that our conscious perceptions of spatial location result not from our native sensory apparatus, but from a process of active, interpretive "experiments" by which sensations are construed as spatial and spatially located objects. He thus goes beyond Fechner, as Fechner went beyond Weber. Where Weber's ratio had simply expressed an experimental fact, Fechner gave it a psychophysical interpretation, that there obtains a lawful relation between the mental and the material, thanks to which measurement of the mental is possible. Helmholtz now asks: what is the origin of such a relation? This deeper, genetic concern arises from the fact that depth perception cannot be explained by a simple correspondence relation between what is sensed by the eye and what we are aware of seeing. Hence Helmholtz is forced to consider an active, synthetic power on the side of the mind. Fechner, by contrast, mainly occupied himself with the measurement of *intensities* of tactile pressure, temperature, and tone, all of which appear "in" the sensing body itself. He would therefore not have been as vividly concerned with phenomena of external objectivity, such as depth, location, dimension, etc.[54] Since

these intensities are passively felt or "noted" by the mind, the question of its active contribution does not arise.

Helmholtz's theory of perception is epitomized by his theory of vision. There were in his day two conflicting views of how external objects come to be perceived as extended and located in space. According to nativism, the optic apparatus suffices to represent the external world. In Helmholtz's words, Müller held that

> the retina or skin, being itself an organ which is extended in space, *receives* impressions which carry with them this quality of extension in space; that this conception of locality is innate; and that impressions derived from external objects are transmitted of themselves to corresponding local positions in the image produced in the sensitive organ.[55]

Against this view, empiricists like Helmholtz hold that visual perception[56] requires experience[57] on the basis of which we learn to construe and construct sensible objects. Both terms, "nativism" and "empiricism," can lead to misunderstanding. In our context "nativism" does not mean a commitment to ideal *a priori* structures or faculties of mind, but rather to hypothetical *neural* – i.e., material – mechanisms and their innate capacities and functions.[58] Similarly, Helmholtz's empiricism does not imply a rejection of a subjective contribution to the construction of experience; with respect to the problem of visual perception of objects in space, the empiricist holds that these percepts are not given to us *as* spatial through the receptive function of our visual apparatus (the nativist view) but that they are learned constructions or interpretations of our visual sensations.

In other words, Helmholtz rejects the notion that space and the "quality of extension" of spatial objects is given directly through sensation, with the visual apparatus simply serving to transmit this quality – he rejects, in short, the notion that sensation equals perception, that sensing equals perceiving. Instead, "none of our sensations give us anything more than 'signs' for external objects and movements, and that we can only learn how to *interpret* these signs by means of experience and practice."[59] Again, the qualities of visual sensations "can only be regarded as signs of certain different qualities, which belong sometimes to light itself, sometimes to the bodies it illuminates," "but there is not a single actual quality of the objects seen which precisely corresponds to our sensations of sight."[60]

Perhaps the most important of these signs is the so-called local sign (*Lokalzeichen*), a color sensation making it possible to "distinguish local differences in the field of vision."[61] Now both nativists and empiricists may accept the theory of local signs, but where the nativist "supposes that the local signs are nothing else than *direct* conceptions of differences in space as such, both in their nature and their magnitude," the empiricist regards them "as signs the signification of which must be learnt, and is actually learnt, in order to arrive at a knowledge of the external world;" and for this, "it is not at all necessary to suppose any kind of correspondence between these local signs and the actual differences of locality which they signify."[62] Thus Helmholtz distinguishes between sensations and perceptions, i.e., between "bare sensory patterns …

directly dependent upon the stimulus-object" and our consciousness of an (external) object itself.[63] We do not directly sense the "immediate action of the external exciting cause upon the ends of our nerves, but only the changed condition of the nervous fibres which we call the state of *excitation* or functional activity."[64] Excitation, in turn, requires interpretation, Helmholtz argues, in order to enter consciousness as "of" an object.[65] Under normal circumstances, we are of course unaware of any such interpretive activity. Helmholtz therefore speaks of "unconscious inferences": when we interpret certain local signs to indicate, "that there in front of us at a certain place there is a certain object of a certain character," these inferences are "generally not conscious activities, but unconscious ones," equivalent "in their result … to a conclusion."[66] His use of the word "sign" suggests an analogy with learned conventional signs, such as letters. Before we learned them, letters appeared to us as mere sensations or, at most, shapes, but their (functional) meaning remained obscure. After learning our letters and words, their signific function now overwhelms their qualities as mere sensa. If you are reading this, it is scarcely possible, except by an act of great concentration, *not* to see "through" their sensory shape directly to their significance; Q, or "catacomb," e.g., will forever more *appear*, that is, be perceived as a letter or word, respectively, and not as whatever we took them before we learned to read.

Helmholtz explains the phenomenon of visual illusions in a similar way. Precisely because perceptual inferences are unconscious, they are also involuntary and thus "irresistible," by which he means that their effects "cannot be overcome by a better understanding of the real relations."[67] Through experience, over time, we come to prefer using our sensory organs in ways that "we recognize as enabling us to reach the most certain and consistent judgment with regard to … the form, spatial relationships and composition" of external objects.[68] We are thus led automatically to interpret certain sensory patterns as indicating a certain external state of affairs in the world, what Helmholtz calls normal, veridical perception.[69] An illusion occurs when a sensory pattern contains certain cues that trigger the automatic inference, even though in this abnormal case the pattern in fact does not reflect the objective state of affairs (e.g., cues indicating distance distorting our perception of the size of the moon on the horizon).[70]

We now can see interesting relations between Helmholtz's empiricism and Kantianism. Where a (neo-) Kantian might find Helmholtz's theory congenial insofar as it involves an active "imposition" of categories upon intuitively given "sense-data," thereby making experience "possible," Helmholtz diverges in his *genetic* interpretation of what we may call the "categories" of interpretation. For while Helmholtz, like the Kantians, thinks that the mind "assigns meaning to our sensations," this activity crucially "depends upon experiment, and not upon mere observation of what takes place around us."[71] We constantly perform "experiments" by moving our bodies, thereby subjecting our perceptions of space to continual verification.[72] Interpretation of the local signs takes place over time by "comparing them with the result of our own movements, with the changes which we thus produce in the outer world."[73] Thus our interpretive (loosely: "categorial") framework as well as our conception of space are not *a priori* at all, but "experimental," empirical. Helmholtz's doctrine thus stands

in a peculiar relation to Kant's transcendental aesthetic and transcendental analytic in the first *Critique*. On the one hand, Helmholtz seems to reject the transcendental aesthetic's doctrine of space as a native "form" of intuition, whereas, on the other hand, his theory of unconscious inference seems in accord with the doctrine of categorial structuring of the perceptual "matter" provided by the senses.

There is some confusion on this in the literature. Boring, e.g., writes that Helmholtz opposed a German philosophical psychology that "had stressed intuitionism – that is to say, the doctrine of innate ides, of *a priori* judgments, of native categories of the understanding."[74] No doubt Kant (and Helmholtz)[75] would have been surprised to hear that his doctrine of "native categories of the understanding" (or even of innate ideas, if by this Boring means the Ideas of reason) made him an "intuitionist,"[76] since for Kant the categories are radically opposed to intuition: they are the basic concepts by which the understanding makes sense of sensible intuition, that is, in Helmholtzian terms, interprets sensibility so as to *construct* experience.[77]

Helmholtz's empiricism has two important philosophical consequences for the next psychologist in our survey, Wilhelm Wundt, who studied and worked under him at Heidelberg from 1858 until 1871.[78] In the first place, it retains the decisive quasi-Kantian element of spontaneity, for these sense-making experiments depend on an active, voluntary factor. As Helmholtz says, we "learn by experiment that the correspondence between two processes takes place at any moment that we *choose*."[79] This point reappears in Wundt's psychological voluntarism. Secondly, Helmholtz accepts introspection as basic to psychological study. For example, the common phenomenon of double vision that ineluctably and constantly accompanies the vast majority of our visual perceptions can only be recognized when, as he says, we learn "to pay heed to our individual sensations."[80] The problem with introspection in his view is not, as Kant said, its tendency to distort or change the very things it seeks to observe, but rather that they – our *pure* sensations – so easily elude observation. For it is our natural habit, as discussed above, to interpret them unconsciously as external objects, a habit that through constant exercise is honed to a fine skill. But "we are completely unskilled in observing the sensations *per se* … [so that] the practice of associating them with things outside of us actually prevents us from being distinctly conscious of the pure sensations."[81]

## Wilhelm Wundt (1832–1920)

We end our overview of early experimental psychology with Wundt, the "father" of a discipline, which, as we have seen, also had several grandfathers. He makes a fitting (if temporary) stopping-point, since it is in his vast œuvre that we find the philosophical issues latent in Weber, Fechner, and Helmholtz brought to the surface and dealt with explicitly. In particular, Wundt synthesizes the voluntaristic and introspective elements of Helmholtz with the psychophysical parallelism of Fechner.

For Wundt, experimental psychology just meant physiological psychology. But unlike Weber, Fechner, or Helmholtz, Wundt for the first time sees psychology as an independent discipline, with physiology as its methodological basis, rather than

as a subdiscipline of the physiology of sensation. Although Fechner announced in the *Elements* that the "psychophysical experiment, which has so far found only an incidental place in either the physical or the physiological laboratory now demands its own laboratory, its own apparatus, its own methods,"[82] it was left to Wundt to take this decisive step. Much of Wundt's work, therefore, consists in testing, clarifying, and codifying of the theories of Weber, Fechner, and Helmholtz. Let us consider how he does this.[83]

Wundt finds Weber's law, the cornerstone of experimental psychology, to be theoretically unstable: what is it a law *of*? It can be taken as a physiological law of the "excitation of neural matter," or as a psychophysical (Fechnerian) law governing the relation of matter and mind.[84] Against these, Wundt favors a purely *psychological* interpretation, that is, one that takes into account the phenomenon of "apperception." Wundt argues that the estimation of sensory intensity involves not just excitation but also apperceptive concentration. We see here Helmholtz's influence: since we can *say* nothing immediate about how sensations would be sensed independently of the latter, Weber's law only ever concerns *apperceived* sensations; hence it could just as well have its origin in the (active) apperceptive comparison of sensation as in the our (passive) neural receptors.[85] But apperception is a purely psychological act of consciousness; hence Wundt takes Weber's law to apply not to "sensations in and for themselves, but to processes of apperception, without which a quantitative estimation of sensations could never take place."[86] Since Weber's law simply expresses a ratio between noticeably different mental conditions,[87] Wundt interprets it as an instance of a more general "law" of consciousness: we have "no absolute, but merely a relative measure of the intensity of its conditions," in a word, all our inner conditions are relative to each other.[88] Wundt thus adapts Fechner's view, that the psychic and physical phenomena do not conflict, but are simply separate spheres of explanation. But his reading of Weber's law goes beyond Fechner, in that Fechner sees it as expressing the relation between these spheres, whereas for Wundt it expresses the relativity within the psychic realm alone – and yet these purely psychological relationships are revealed by physiological experiment. Thus his "psychological interpretation [of Weber's law] offers the advantage of not excluding a simultaneous [parallel] physiological explanation," while the two rival readings "only permit a one-sided explanation."[89]

For Wundt, the possibility of an experimental psychology depends on the possibility of introspection, or better, self-observation (*Selbstbeobachtung*). Yet self-observation is useful only if the sequence of inner phenomena is assumed to obey an independent principle of psychic causality. For if it does not, then these phenomena would be chaotic and intractable to knowledge. However, if they were governed by physical causality, a special psychological approach such as self-observation would be superfluous. In fact, however, Wundt thinks a system of psychic causality can be determined that is at no point reducible to physical causality: "no connection of physical processes can ever teach us anything about the manner of connection between psychological elements."[90] This fact leads him to his so-called principle of psychophysical parallelism.

Commentators continue to misconstrue this principle as a metaphysical doctrine. Wundt himself clearly states that it names only an "empirical postulate" necessary

to explain the phenomenal "fact" of consciousness of which we are immediately and incontrovertibly aware.[91] Thus, he insists that the physical and psychic do not name two ontologically separate realms whose events unfold on separate yet parallel tracks.[92] Instead, the physical and psychic represent two mutually irreducible *perspectives* from which one reality may be observed: "Nothing occurs in our consciousness that does not find its sensible foundation in certain physical processes," and all psychological acts of association, apperception, willing, "are accompanied by physiological nerve-actions."[93] The psychologist must therefore assume for heuristic reasons two "parallel" and mutually irreducible causal chains by which two distinct types of phenomena may be accounted for.[94] Just as Fechner compared the convex and concave "views" of one and the same circle, Wundt draws an analogy from science: the distinct psychological and physiological explanatory schemes are like chemical and physical accounts of a single object, a crystal. Just as chemistry and physics describe or explain the same crystal from two distinct points of view, so too physiology and psychology describe the same process seen from the outside and inside, respectively. "'Inner' and 'outer' experience merely designate distinct *perspectives* that we can apply in our grasp and scientific investigation of what is, in itself, a unitary experience."[95] Like Fechner and Kant, Wundt rejects any metaphysical psychology, that is, any speculation on what the circle or crystal is "in itself." Fechner and Wundt both continually stress that they are concerned only with appearances, but that these themselves dictate distinct treatment for the mental and the material, the "internal" and the "external."

By the principle of psychophysical parallelism, then, Wundt commits himself to an ontological monism while also justifying a separate, that is, nonphysical approach to the study of psychological phenomena. I have described his theory of consciousness in detail elsewhere,[96] and want here briefly to highlight the so-called voluntarism that is its most peculiar characteristic. Wundt views consciousness as a continuous flow of representational acts. The sensations that lie at the root of all consciousness always enter awareness as compounds he calls "representations [*Vorstellungen*]," the synthetic products of the representational acts.[97] So far, Wundt's view seems firmly rooted in Helmholtz's theory of mental synthesis of a sensible manifold. But Wundt presses forward into a purely psychological dimension. Consciousness is not merely a parade of representations; it is also, crucially, *attention to* our representations.[98] He likens consciousness to the field of vision (*Blickfeld*); when we attend to something in this field, it becomes our "visual focal point [*Blickpunkt*]." When a representation enters the *Blickpunkt*, it is no longer a "perception," but an "apperception."[99] Apperception admits of degrees of intensity that vary as we pay more or less close attention to a given representation. Thus, regardless of the "strength of the external impression" upon the sensorium, the degree of apperception is to be measured "solely according to the subjective activity through which consciousness turns to a particular sense-stimulus."[100] Thus, as subjective activity, apperception is an activity of will[101] that operates according to its own laws of collection and division (*Verbindung* and *Zerlegung*), independent of any physiological or psychophysical laws.[102] While the details lie outside our scope, these laws govern apperception's tendency to "agglu-

tinate" or fuse disparate sensory representations, synthesizing them in successive stages into a single, ultimately symbolic representation.[103]

## Conclusion

Returning to the guiding question of this survey – how experiment can aid the observation, classification, and grasping of the causal relations among mental phenomena – the result is surprising. None of our four founders speak of physical *causation* of psychological appearances; indeed, they scrupulously avoid such statements as unscientific, metaphysical speculation. Further, despite being firmly grounded in physiology and physics, Weber, Helmholtz, and Wundt all avoid reductionism, recognizing an element of spontaneity that radically distinguishes the inner flow of subjective phenomena from the train of outer events. They point instead to an *association* between the physical and mental, which they consider a sufficient foundation for experimental inquiry. Fechner, Helmholtz, and Wundt thus take a broadly Kantian attitude, seeing both physical and psychological science as the determination of relations among *appearances*: the former, of outer appearances; the latter, of inner. This perspectival phenomenalism justifies, in Wundt and Fechner's view, the linkage of experimental manipulation of outer stimuli with the introspective registration of their corresponding (if not caused) inner phenomena. The Kantian objection to introspection is, ultimately, ignored as irrelevant: introspection allows us to attend and observe psychological phenomena, and one can frankly admit that it is just *these* phenomena – the ones introspected – that are the objects of experimental psychology. This is no different than saying that the chemicals studied in the lab under highly artificial conditions are the proper objects of experimental chemistry, and that if you wish to believe that they behave differently "in the wild," then you are free to do so. Indeed Helmholtz seems to consider introspection a special cathartic form of attention, very much akin to the focused, controlled, and artificial observations conducted in a physical laboratory. Finally, regarding the second question posed at the outset – how the mental must be construed so as to be susceptible to experiment – it too turns out to be answered in a nonmetaphysical way: psychic ontology is simply avoided; subjectivity is instead determined phenomenologically by its quality of "interiority" and flux. Again, as much as its flowing nature would seem to thwart its scientific examination, the early experimentalists take this in stride: psychology must simply be a hydrodynamics rather than a chemistry of the soul.

## Notes

1. Helmholtz (1868: 61).
2. Some philosophers deserving special mention in this regard are the neo-Kantian Paul Natorp; Gottlob Frege; and the founder of Phenomenology, Edmund Husserl. Natorp, in two books devoted to what he calls "psychology according to the critical method," indeed continued to argue Kant's point, albeit with newer and more extravagant arguments, that psychology could never be a true, i.e., "objective," science. See below; see also Macnamara (1986) and Kusch (1995).
3. Sully (1876: 21).

4. Sully (1876: 21).
5. On transcendental psychology, see Kitcher (1990) and Hatfield (1992). For an attempt at working out a transcendental or "critical" psychology, see Natorp (1888 and 1912).
6. For Kant's flurry of objections to the possibility of an "empirical doctrine of the soul" see Kant (2004: 7). See also, Hatfield (1992: 200–1, *et passim*).
7. Kant (2004: 7).
8. Kant (2004: 5, 7).
9. Kant (2004: 7).
10. Boring (1950: 134–53).
11. Nevertheless, it would be wrong to suggest that the early physiological psychologists deliberately turned away from philosophy as overly speculative, as Sully suggests (see above). On the contrary, both Weber and Fechner were influenced by the *Naturphilosophie* of German idealism, Fechner decisively so (see Murphy 1949: 79, 84–5; Adler 1966: xx; Ross and Murray, at Weber 1978b). Helmholtz had a personal connection to Fichte through his father, and Wundt saw his psychological work as foundational to philosophy. Historians of nineteenth-century German philosophy such as Herbert Schnädelbach perhaps have exaggerated the divorce of science and philosophy in the aftermath of German idealism's collapse.
12. Weber (1905: 46).
13. See Ross and Murray, at Weber (1978b: 8).
14. This notion of threshold goes back to Herbart (and, according to Boring, Leibniz) (see Boring 1950: 284).
15. The common translation of "sensory" or "sensation circle" is misleading, since, as Weber says, these *Kreise* have various shapes; I therefore translate the word, *Kreis*, as "region."
16. Weber (1905: 68–9, 1978b: 19–54), Murphy (1949: 81), see Ross and Murray, at Weber (1978b: 9–10), Boring (1950: 28, ch. 6).
17. Weber (1905: 70).
18. Weber (1905: 101).
19. Murphy (1949: 80).
20. Weber (1905: 101).
21. Weber distinguishes two types of pressure-sensation, namely, that arising from an object pressing down on a bodily part (the hand, e.g.) (Weber 1905: 94) and that involving the voluntary muscular action of lifting (Weber 1905: 96, 115). The latter is more sensitive to weight or pressure differences than the former (Weber 1905: 115, 1978a: 61, 120). He writes: "The smallest difference between two weights that we can distinguish by means of the sense of exerting our muscles seems, according to my trials, to obtain between weights that stand in a proportion of 39 to 40, i.e., when the one is about 1/40 heavier than the other. [On the other hand,] by sensing the pressure that the two weights exert on our skin, we can only notice a weight-difference of 1/30, so that the weights are related as 29 is to 30." These two means of weight-sensation are "almost always used together" (Weber 1978a: 120).
22. Weber (1978a: 131).
23. Weber (1978a: 131).
24. Weber (1978a: 131, see 220–3, 1905: 115–18). According to Boring, "Weber's experimental finding may be expressed: $\delta R/R$ = constant, for the jnd [just noticeable difference]" (where R stands for the magnitude of the stimulus [*Reiz*]) (Boring 1950: 287).
25. Weber (1978a: 108).
26. I specify "experimental" psychology here in order to distinguish Fechner's project from Herbart's earlier efforts to create a scientific, but purely mathematical and non-experimental psychology. See Boring (1950: 286) and Fechner (1966: xxx).
27. See Fechner (1966: xxvii).
28. For a standard overview, see Boring (1950); the most recent major study of Fechner, and especially his relation to recent philosophy of science and of psychology, is Heidelberger (2004). I refer the reader to these two sources for detailed discussions, especially of Fechner's mathematical permutations of Weber's law.
29. For the significance to the philosophy of *science* (as opposed to the philosophy of psychology) of

certain problems in Fechner's formulations, such as the *Fundamentalformel* and the *Maßformel*, as well as of his statistical methods, see esp. Boring (1950: 284–5) and Heidelberger (2004: 191–207, 309ff.).

30. Fechner (1966: 7).
31. See my 2006.
32. While I agree with Boring that "Fechner's view of the relation of *mind and body* was not that of psychophysical parallelism," Boring's claim that Fechner's view was instead "what has been called the *identity hypothesis* and also *panpsychism*" is equally misleading. The material and the mental are *not* "identical" for Fechner. Rather, they are irreducible perspectives on a metaphysical reality that must be *postulated* as self-identical, though it can never appear to us as such.
33. Fechner (1966: 2).
34. Fechner's talk of inner and outer aspects of reality should not be confused with his notion of "inner" and "outer" psychophysics. In the latter, "the [external] stimulus rather than the bodily response is compared with subjective intensities" and "was accepted only because it was more immediately practicable" (Murphy 1949: 89); "inner psychophysics," by contrast, relates the subjective intensity of sensation to the intensities of the somatic activities mediating between the external stimulation and the sensation itself (see Murphy 1949: 88; Adler 1966: xxiii).
35. Fechner (1966: 7).
36. Fechner (1966: xxvii).
37. See Boring (1950: 287–8) and Heidelberger (2004: 201ff.).
38. For Fechner's notation, see Fechner (1877: 10).
39. See Boring (1950: 287–8) and Heidelberger (2004: 201–2). For troubles with this assumption, see Boring (1950: 289ff.) and Heidelberger (2004: 204ff.).
40. Beyond our scope here; see Fechner (1877: 9–12), Boring (1950: 288–9), and Heidelberger (2004: 202–3).
41. See Boring (1950: 289).
42. See Murphy (1949: 86). See Wundt (1893, vol. 1: 359).
43. Fechner (1966: xxviii). Wundt will reject both the physiological and psychophysical interpretations of Weber's law, as I discuss below.
44. See esp. Stevens (1960).
45. See especially Heidelberger (2004: 207ff.).
46. As Boring nicely puts it, "the experimentalists went on measuring sensation while the objectors complained, or at least they went on measuring whatever Fechner's S is" (Boring 1950: 291).
47. Fechner (1966: 7). See Heidelberger (2004: 169ff.).
48. Helmholtz (1868: 61–2).
49. Helmholtz (1868: 61).
50. Helmholtz (1868: 61).
51. See Fechner's preface to Fechner (1966: xxvii).
52. Helmholtz (1868: 62).
53. It is also true that despite their both being physicists, they had fundamentally different approaches to psychology. Although Fechner denies his metaphysics any explanatory role in psychophysics, he clearly wants to harmonize the fact of physics with the truth, as he saw it, of *Naturphilosophie* à la Schelling and Oken: mind and matter are ultimately identical. Against this top-down approach, by contrast, Helmholtz confronts psychological issues in the course of his research into the physics and physiology of sensation, without any prior commitments as to their metaphysical status.
54. Even in such optical experiments on vision as Fechner does address, he confines himself to *two*-dimensional acuity, e.g., distinguishing longer and shorter lines, or, again, the magnitude of light-intensities. See Fechner (1966: 223ff.) and Helmholtz (1868: 111–14).
55. Helmholtz (1868: 110; emphasis added).
56. I.e., of objects, as opposed to mere subjective sensations. See below.
57. A view traceable to Berkeley's *An Essay Towards a New Theory of Vision* (1709: see, e.g., §41).
58. See Warren and Warren (1968: 17).
59. Helmholtz (1868: 110; emphasis added).
60. Helmholtz (1868: 106).