

THE CAMBRIDGE
HISTORY OF
SCIENCE

VOLUME 4

Eighteenth-Century Science

Edited by

ROY PORTER

PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE
The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS
The Edinburgh Building, Cambridge CB2 2RU, UK
40 West 20th Street, New York, NY 10011-4211, USA
477 Williamstown Road, Port Melbourne, VIC 3207, Australia
Ruiz de Alarcón 13, 28014 Madrid, Spain
Dock House, The Waterfront, Cape Town 8001, South Africa
<http://www.cambridge.org>

© Cambridge University Press 2003

This book is in copyright. Subject to statutory exception
and to the provisions of relevant collective licensing agreements,
no reproduction of any part may take place without
the written permission of Cambridge University Press.

First published 2003

Printed in the United States of America

Typeface Adobe Garamond 10.75/12.5 pt. *System* QuarkXPress 4.04 [AG]

A catalog record for this book is available from the British Library.

Library of Congress Cataloging in Publication Data

(Revised for volume 4)

The Cambridge history of science

p. cm.

Includes bibliographical references and indexes.

Contents: – v. 4. Eighteenth-century science / edited by Roy Porter
v. 5. The modern physical and mathematical sciences / edited by Mary Jo Nye

ISBN 0-521-57243-6 (v. 4)

ISBN 0-521-57199-5 (v. 5)

I. Science – History. I. Lindberg, David C. II. Numbers, Ronald L.

Q125 .C32 2001

509 – dc21

2001025311

ISBN 0 521 57243 6 hardback

 THE HUMAN SCIENCES

Richard Olson

Historians have long seen the search for a viable “science of man [*sic*]” as a central feature of eighteenth-century intellectual life. David Hume’s (1711–1776) desire to be “the Newton of the moral Sciences” and his insistence in 1740 that “‘tis at least worthwhile to try if the Sciences of man will not admit of the same accuracy which several parts of natural philosophy are found susceptible of”¹ have been taken to represent the views of a huge number of intellectuals throughout the century and across all nations of Europe and North America. Moreover, the centrality of the human sciences to the Enlightenment project is acknowledged not only by those sympathetic to the goals of that project and fundamentally optimistic about its liberating consequences² but also by those who have found the goals misdirected and the consequences fundamentally destructive.³

The issue of how to portray the relationships between such twentieth-century professional disciplines as anthropology, economics, geography, history, linguistics, psychology, or sociology and various eighteenth-century attempts to establish human sciences is both extremely complex and a matter of intense debate.⁴ Eighteenth-century authors and readers often thought in

¹ David Hume, *An Abstract of A Treatise of Human Nature* (London, 1740).

² See Ernst Cassirer, *The Philosophy of the Enlightenment* (Boston: Beacon Press, 1964, from 1933 German original), and Peter Gay, *The Enlightenment: An Interpretation*, 2 vols. (New York: Vintage, 1966–9).

³ See, for example, Lester Crocker, *An Age of Crisis: Man and World in Eighteenth Century France* (Baltimore, MD: Johns Hopkins University Press, 1959), which views the undermining of traditionally grounded morality as disastrous, and Theodor W. Adorno and Max Horkheimer, *Dialectic of Enlightenment* (New York: Herder and Herder, 1972), which sees the new focus on science and reason as tyrannical in its own right. On the negative social consequences of the application of “reason” to madness, see Michel Foucault, *Madness and Civilization: A History of Insanity in the Age of Reason* (New York: Pantheon, 1965).

⁴ Michel Foucault has denied that any true science of man could exist in the eighteenth century. See Foucault, *The Order of Things: An Archeology of the Human Sciences* (London: Tavistock, 1970), p. 309. For the argument that the presumption of disciplinary continuities is largely misleading and that there is little to be gained by talking about such disciplines as psychology in the eighteenth century, see, for example, Roger Smith, “Does the History of Psychology Have a Subject?” *History of the Human Sciences*, 1 (1988), 147–77, and Graham Richards, *Mental Machinery: The Origins and Consequences of*

terms of categories that differ from those in use today. Thus, for example, the phrases “the natural history of man” and “philosophical history” were frequently used to include many topics now included in anthropology, linguistics, and sociology, along with some that now belong to political science and aesthetics. At the same time, “anthropology” was used in German-speaking regions to cover physiology as well as topics from the first three twentieth-century disciplines. In what follows we will try to keep distinct the categories of eighteenth-century actors from those of modern vintage.

NOTIONS OF “SCIENCE” IN THE HUMAN SCIENCES

When Hume wrote *A Treatise of Human Nature* (1739), he subtitled it *An Attempt to introduce the Experimental Method of Reasoning into Moral Subjects*. In doing so he typified two major features of eighteenth-century trends in the studies of humans. First is the emphasis on experiment, or more properly, on observation; as Hume was careful to point out, attempts to manipulate human subjects would almost certainly distort the operation of natural principles. As a consequence, insisted Hume:

We must glean up our experiments in this science from a cautious observation of human life, and take them as they appear in the common course of the world, by men’s behavior in company, in affairs, and in their pleasures. Where experiments of this kind are judiciously collected and compared, we may hope to establish on them a science, which will not be inferior in certainty, and will be much superior in utility to any other of Human comprehension.⁵

Most important seventeenth-century attempts to found human sciences, especially those of Thomas Hobbes (1588–1679), Benedictus Spinoza (1632–1677), and Gottfried Wilhelm Leibniz (1646–1716), had incorporated strong rationalist tendencies. Each of these thinkers purported to be able to deduce the most desirable features of civil society from definitions of human nature. In the cases of Hobbes and Spinoza in particular, the systems of morality and society grounded in these definitions were appalling to most contemporaries because they seemed to lead in peculiarly self-centered, secular, and atheistic directions. One consequence was the creation of an empiricist, antimetaphysical

Psychological Ideas, 1600–1850 (Baltimore, MD: Johns Hopkins University Press, 1992), pp. 1–11. For the counterargument – that given a reasonable amount of caution, it makes eminent sense to see modern sciences such as anthropology and psychology as the continuation (with modifications) of traditions that existed in the eighteenth century – see Loren Graham, Wolf Lepenies, and Peter Weingart (eds.), *The Functions and Uses of Disciplinary Histories* (Dordrecht: D. Reidel, 1983). This issue is also addressed in several of the essays in C. Fox, R. Porter, and R. Wokler (eds.), *Inventing Human Science: Eighteenth-Century Domains* (Berkeley: University of California Press, 1995).

⁵ David Hume, *A Treatise of Human Nature*, edited with an introduction by Ernest C. Mossner (New York: Penguin, 1969, from 1739 original), p. 46.

backlash that shaped much eighteenth-century discourse about human nature and human institutions.

Perhaps the most important example of this self-conscious backlash was *Traité des systèmes* (1749) by Etienne Bonnet Condillac (1715–1780). Defining a system as “a disposition of the different parts of an art or a science in an order in which they mutually support one another and in which the last are explained by the first,”⁶ Condillac explicitly attacked the metaphysical systems of Spinoza and Leibniz, arguing that all systems grounded in abstract principles or definitions are fundamentally misguided. On the other hand, systems grounded firmly in facts established by experience, such as Newton’s system of the world, represented the pinnacle of scientific knowledge. Between these two extremes were hypothetical systems based on provisionally held suppositions. When such systems were used for heuristic purposes – to propose new experiments or observational tests of the supposition, as both John Locke (1632–1704) and Newton had suggested,⁷ then they might be tremendously valuable; but if used uncritically as explanatory principles, hypotheses could be almost as dangerous and misleading as metaphysical principles.

Among those thinkers who developed the human sciences, some, such as David Hartley (1705–1557) and Jean-Jacques Rousseau (1712–1778), argued that the phenomena associated with human actions and interactions were so intricate and extensive that there was no hope of inducing principles directly from experience; thus, they viewed the use of provisional hypotheses as essential.⁸ In his *Discourse on the Origin and Foundations of Inequality among Men* (1755), Rousseau argued that one should proceed as follows:

Begin by setting all facts aside, for they do not affect the question. The researches that can be undertaken concerning this subject must not be taken for historical truths, but only for hypothetical and conditional reasoning better suited to clarify the nature of things than to show their true origin, like those our physicists make every day concerning the formation of the world.⁹

Others, such as Charles Louis Secondat, Baron de Montesquieu (1689–1755) and Adam Ferguson (1723–1816), were so disturbed by the use of untestable hypotheses by authors such as Hobbes and Rousseau that they argued against the use of hypotheses entirely.¹⁰

⁶ Etienne Bonnet de Condillac, *Oeuvres philosophiques de Condillac*, ed. Georges Le Roy, 3 vols. (Paris: Presses Universitaires de France, 1947–51), 1:121.

⁷ On the importance of the methodological suggestions of Newton and Locke as well as the multiple interpretations of their works by those developing the human sciences in the eighteenth century, see especially Sergio Moravia, “The Enlightenment and the Sciences of Man,” *History of Science*, 17 (1980), 247–68.

⁸ See David Hartley, *Observations On Man, His Frame, His Duty, and His Expectations* (London: Thomas Tegg and Son, 1834, 6th ed.; 1st ed., 1749), pp. 4–5.

⁹ Jean Jacques Rousseau, *The First and Second Discourses*, ed. Roger D. Masters (New York: St. Martin’s, 1964), p. 103.

¹⁰ See Adam Ferguson, *An Essay On The History of Civil Society*, ed. Duncan Forbes (Edinburgh: Edinburgh University Press, 1966), pp. 2–6.

A second issue related to the complexity of human phenomena – an issue that divided empiricist students of humanity – was also emphasized by Condillac. According to Condillac all legitimate knowledge must be formulated through a process, often called analysis, in which the complexity and initial chaos of sensations and thoughts is brought into order by isolating or abstracting its salient and simpler features and then recombining them into a whole that is “understood” to be the simple sum of its parts.¹¹ Among those concerned with the human sciences prior to about 1796, few disagreed; but toward the end of the eighteenth century the general presumption of analyticity came under attack by a group of Parisian thinkers, the *Idéologues*, who had either been trained in medicine at Montpellier or had studied with graduates of Montpellier, where a new anti-iatromechanical, provitalist, Hippocratic revival was underway. These scholars, led by Pierre Cabanis (1757–1808), whose *Rapports du Physique et du Moral de l’Homme* (Paris, 1796) sought to ground morality in physiological psychology, argued that the complexity of human life and interactions derives from the fact that different factors *interact* in unpredictable ways, so that human phenomena simply cannot be understood as the sum of the effects of a set of isolatable simple causes.

Condillac did suggest one critical nonempirical criterion for evaluating scientific explanatory systems. Borrowing from Jean d’Alembert’s *Treatise on Dynamics* of 1743, Condillac argued that “a system is the more perfect as the principles are fewer in number: it is even to be hoped that they could be reduced to one.”¹² He used this principle in his own psychological theorizing to reduce Locke’s account of knowledge acquisition, which depended on both sensation and reflection, to a system based on sensation alone. More important, the focus on simplicity was openly appropriated from Condillac in the discussions of many other proponents of the human sciences, including Claude Adrien Helvétius (1715–1771), Denis Diderot (1713–1784), Julien Offray La Mettrie (1709–1751), and Adam Smith (1723–1790).

Not all eighteenth-century attempts at human sciences embraced either the empirical emphasis or the focus on simplicity advocated by Condillac. A small number of French scholars in particular, who seem to have been influenced by the science of rational mechanics, persisted in believing that human institutions might be derived directly from the definition of “man” without recourse to observations. This view was particularly prevalent among the mid-century group of political economists known as physiocrats, who railed

¹¹ See, for example, Etienne de Condillac, *La Logique*, trans. W. R. Albury (New York: Abaris Books, 1980, from 1778 original), pp. 63–87.

¹² See note 6. D’Alembert’s formulation of this principle, repeated in his *Preliminary Discourse to the Encyclopedia of Diderot*, translated and with an introduction by Richard Schwab (Indianapolis: Bobbs-Merrill, 1963), p. 22, is as follows: “The more one reduces the number of principles of a science, the more one gives them scope, and since the object of a science is necessarily fixed, the principles applied to that science will be so much more fertile as they are fewer in number.”

against the tyranny of the past. According to one of their spokesmen, Mercier de la Rivière (1719–1792):

I do not cast my eye on any particular nation or sect. I seek to describe things as they must *essentially* be, without considering what they have been, or in what country they may have been. . . . By examining and reasoning we arrive at knowing the truth self-evidently, and with all the practical consequences which result from it. Examples which appear to contrast with these consequences prove nothing.¹³

Although a number of major eighteenth-century political economists, including David Hume, the Abbé Ferdinando Galiani (1728–1787), and Adam Smith, rejected this rational mechanics model for political economy in favor of a more empiricist approach, David Ricardo (1772–1823) revived the style in the early nineteenth century, and it has remained the dominant style everywhere through the late twentieth century. A similar, although slightly less virulent version of this perspective informed the writings of Anne-Marie de Condorcet (1743–1794), who insisted that because all humans were, by definition, capable of reason, they therefore deserved equal treatment, regardless of sex, race, or religion.¹⁴

Perhaps the most interesting eccentric views about the “scientific” nature of human science were those of Giambattista Vico (1688–1744), author of *Principles of a New Science Concerning the Nature of Nations* (1725), who hearkened back to the fifteenth-century views of legal humanists in insisting that humans can have scientific knowledge only of that which they have created themselves. This methodological perspective severely limited the impact of Vico’s work during most of the eighteenth century. But it seemed to be particularly compatible with Kantian and Neo-Kantian scientific perspectives; so it was revived and embraced at the very end of the century in Germany by Johann Herder (1744–1803), among others.

NOTIONS OF “HUMAN” IN THE HUMAN SCIENCES

With rare exceptions, students of “man” shared a few basic assumptions regarding what it meant to be human. First, even those who took a deterministic view of human actions argued that people act or should act as if they were capable of making choices. Thus, for practical purposes, consistent determinism was not part of the eighteenth-century human sciences. Second, no one denied that self-preservation and the search for individual happiness

¹³ From Mercier de la Rivière, *L'ordre naturel et essentiel des sociétés politiques* (1767), cited in Terence Hutchison, *Before Adam Smith: The Emergence of Political Economy* (Oxford: Basil Blackwell, 1988), p. 293.

¹⁴ Anne Marie Condorcet, “On the Admission of Women to the Rights of Citizenship,” in *Condorcet, Selected Writings*, ed. Keith Baker (Indianapolis: Bobbs-Merrill Co., 1976), p. 98.

played central roles in human behavior, although a number of important authors insisted on the existence of independent feelings of sociability, benevolence, or sympathy as well. Third, almost every student of human actions and institutions continued to use the dualistic categories of the physical and the moral. For most thinkers, these two categories were ontologically separate, the residue of Cartesian matter and spirit. Yet it seemed clear to all of them that physical circumstances had a strong bearing on moral choices, so the answers to many questions regarding human nature were formulated in terms of the relationships between *l'homme physique* and *l'homme moral*. Even materialists such as La Mettrie, Helvétius, and Cabanis, although they denied the separate existence of *l'esprit* (spirit), continued to use the linguistic dichotomy between the physical and moral; and the goals of their human sciences, like those of the dualists, were overtly moral.

Although they focused attention on moral issues, however, the human sciences treated those issues in a nontraditional way, insisting on secular understandings of what had long been understood as the primary domain of revealed religion. Prior to the eighteenth century, the Bible had been widely accepted as the primary source of moral guidance in Judeo-Christian Europe. Some intellectuals, including d' Holbach and Helvétius, turned away from this source of morality because they viewed all religions as impositions on an ignorant and emotionally needy populace by a clerical elite whose primary goal was to accumulate power and wealth. Others continued to remain deeply committed to Christianity but argued that God acted in things human, as in nonhuman nature, through the mechanism of natural laws. Thus, Gershom Carmichael, the orthodox Presbyterian professor of moral philosophy at Glasgow, wrote in 1727 that moral philosophy is nothing but "the demonstration of the duties of man and citizen from knowledge of the nature of things and the circumstances of human life."¹⁵

Finally, even though the tendency through the century was to view the passions as increasingly important in shaping human actions, the capacity to reason continued to be seen as uniquely human. Even at the end of the century, Mary Wollstonecraft (1759–97) could write, "In what does man's pre-eminence over the brute creation consist? The answer is as clear as that a half is less than a whole; in Reason."¹⁶ Almost no author would have disputed this claim, even though many of them would have seen the extent of the powers of human reason as severely limited; and a very small number, including Vico and Herder, would have seen formal reasoning as a historical accretion rather than as a universal characteristic of humans.

¹⁵ Cited in James Moore and Michael Silverthorne, "Gershom Carmichael and the Natural Jurisprudence Tradition in Eighteenth-Century Scotland," in Istvan Hont and Michael Ignatieff (eds.), *Wealth and Virtue: The Shaping of Political Economy in the Scottish Enlightenment* (Cambridge University Press, 1983), p. 76.

¹⁶ Mary Wollstonecraft, *A Vindication of the Rights of Woman* (New York: W. W. Norton, 1975), p. 12, especially note 2.

THE RESERVOIR OF HUMAN "EXPERIMENTS":
HISTORY AND TRAVEL ACCOUNTS

Nineteenth-century social scientists looked down on the human scientists of the eighteenth century because of their failure to carry out experiments or observations under sufficiently controlled conditions and because those who theorized about human nature and institutions frequently got their data secondhand, from travel accounts and historical literature.

Even eighteenth-century scholar François Catrou recognized that even though he might have taken the greatest of care in researching and composing the four volumes of his *Histoire romaine, depuis la fondation de Rome* (twenty-one volumes from 1725 to 1737) that dealt with the Punic wars, his extremely negative view of Carthage and his admiration for Roman virtue were inevitably shaped by the fact that all the available sources were by Roman and Greco-Roman historians and that no sources from the Carthaginian side remained. Furthermore, it was well understood that subsequent interpretations of antiquity added their own filters to the information that was offered in firsthand accounts. Thus, wrote Adam Ferguson, all historical accounts

are made to bear the stamp of the times through which they have passed in the form of tradition, not of the ages to which their pretended descriptions relate. The information they bring is not like the light reflected from a mirror, which delineates the object from which it originally came; but, like rays that come broken and dispersed from an opaque or unpolished surface, only give the colors and features of the body from which they were last reflected.¹⁷

Perhaps even more important, it was also well recognized that reports of non-European cultures were shaped by the interests and assumptions of European reporters. From the mid-sixteenth-century, for example, almost all accounts of Native American and Pacific Island inhabitants tended to treat them as either noble and unspoiled or ignorant, vicious, and cruel. This dichotomy had been established during the 1550s as scholars fought over the treatment of indigenous populations by Spanish Conquistadors. The tradition of the ignoble savage was continued most extensively by ships' captains and settlement leaders who feared the consequences when sailors and community members went native, threatening the success of their projects.¹⁸ The image of the noble savage, on the other hand, was perpetuated and promoted by Dutch scholars who supported the revolt against Spanish rule. It was intensified in writings such as the 1703 *Supplément aux Voyages du Baron Lahontan ou l'on trouvé des dialogues curieux entre l'auteur et un sauvage de bon sens*

¹⁷ Adam Ferguson, *An Essay on the History of Civil Society* (London: Transaction Books, 1980 reprint of 1767 original), p. 76.

¹⁸ See especially B. W. Sheehan, *Savagism and Civility: Indians and Englishmen in Colonial Virginia* (Cambridge University Press, 1980), chap. 1.

qui à voyagé written by Louis Armond de Lom d'Arce, baron de La Hontan (1666–1715). This work expressed the admiration held by a French soldier who had lived and fought among the Canadian Indians for twenty years for their values and ways of life in comparison with what he viewed as the corrupt lifestyles and institutions of the French. It was appropriated by Jean-Jacques Rousseau in formulating his eccentric but influential *A Discourse on the Origin and Foundations of Inequality Among Men* (1755). And it was reintroduced as a self-conscious device from Rousseau into the travel literature genre by Georg Forster, whose account of Captain James Cook's second voyage, *A Voyage Around the World* (1777), is counted among the best pieces of eighteenth-century ethnographic reporting.¹⁹

In spite of all their limitations and the tendency of European observers to impose their own “presentist” categories of analysis on their interpretations of distant others, by the eighteenth century, both the historical narratives and the travel accounts – which had been accumulating since the simultaneous initiation of European voyages of exploration and the humanistic revival of interest in antiquity – contained huge masses of information that had not previously been available. Amid the credulous and the accidentally or intentionally distorted accounts for which readers showed a voracious appetite, there were many serious, self-aware, and respectful, although not worshipful, descriptions and discussions of other cultures from which discerning philosophical historians drew much of their “experimental” knowledge.²⁰

If European categories were sometimes imposed upon others, immersion in non-European cultures also initiated a reevaluation of traditional European categories and assumptions about human institutions. In his *Origin of the Distinction of Ranks: Or an Enquiry into the Circumstances which give rise to Influence and Authority in the Different Members of Society* (1779, third edition of the 1771 original), John Millar (1735–1801), for example, drew heavily from the ethnographic accounts of the Iroquois Nations in the *Histoire et Description Générale de la Nouvelle France* (1744) by Pierre-François Xavier de Charlevoix (1682–1761) and the *Moeurs des sauvages américains comparées aux mœurs des premiers temps* (1724) by Joseph-François Lafitau (1681–1746) in challenging both the notion that monogamous marriage is a “natural” and ubiquitous institution and the notion that all “governing” structures are inevitably

¹⁹ Among the best of the many accounts of the noble savage tradition is that in Urs Bitterli, *Die “Wilden” und die “Zivilisierten”: Grundzüge einer Geistes- und Kulturgeschichte der europäisch überseeischen Begegnung* (Munich, 1976). Unusual in its complexity, it emphasizes the late eighteenth-century return of literary images of the noble savage into travel journals such as that of Forster. See also Bitterli's *Cultures in Conflict* (Stanford, CA: Stanford University Press, 1986), especially chaps. 3 and 7.

²⁰ P. J. Marshall and Glyndwr Williams, *The Great Map of Mankind: Perceptions of New Worlds in the Age of Enlightenment* (Cambridge, MA: Harvard University Press, 1982), offers an excellent evaluation of travel literature available during the eighteenth century in England. Michelle Duchet, *Anthropologie et Histoire au siècle des lumières: Buffon, Voltaire, Helvétius, Diderot* (Paris: François Maspero, 1971), contains an extensive annotated list of French sources.

patriarchal.²¹ Similarly, between 1550 and 1750 the European concept of “Liberty” was transformed almost unconsciously, largely as a result of its use to describe relationships within Native American cultures.²² It began as a term that had been defined in connection with special class privileges to engage in certain activities in its original Roman context; but by the mid-eighteenth century it had become identified with universal rights to absence of interference.

Origin of the Distinction of Ranks also suggests that the more-sophisticated human scientists of the eighteenth century were considerably more critical in their use of travel narratives than their nineteenth-century critics were inclined to admit. Millar, for example, insisted that no factual claim be accepted unless it met three conditions: it had to be confirmed by another independent observer separated from the first by a significant period of time and coming from a different national and religious background, so that biases and fictive claims could be controlled; it had to be about an issue regarding which the observers could be assumed to have no prior theoretical expectations; and it had to be explicable as an illustration of some general system of thought with wide applicability. If all these conditions were met, he argued, “the evidence becomes as complete as the nature of the thing will admit.”²³

LEGAL LOCALISM, MORAL PHILOSOPHY, AND PHILOSOPHICAL HISTORY: THE TRIUMPH OF ENVIRONMENTALISM AND THE STADIAL THEORY OF SOCIAL CHANGE

If one looks at the backgrounds of those figures who were major philosophical historians, a vastly disproportionate number were associated in one way or another with legal studies. Montesquieu, Vico, Millar, Henry Home, Lord Kames (1696–1782), and James Burnett, Lord Monboddo (1714–1799) were all trained in the law and practiced as lawyers or judges. Hume and Adam Ferguson served as legal librarians, and Francis Hutcheson and Adam Smith lectured on jurisprudence and modeled their moral philosophy courses on Samuel Pufendorf’s *On the Duties of Man and Citizen according to Natural Law* of 1673.

Donald Kelley has argued that this fact is a direct consequence of early modern legal conflicts that emerged as part of the growth of centralized nation-states.²⁴ In connection with Renaissance humanist legal studies a strong

²¹ John Millar, *The Origin of the Distinction of Ranks* (1779 ed.), reprinted in William C. Lehman, *John Millar of Glasgow, 1735–1801* (Cambridge University Press, 1960), pp. 184–200.

²² William Brandon, *New Worlds for Old: Reports from the New World and their Effect on the Development of Social Thought in Europe, 1500–1800* (Athens: Ohio University Press, 1986).

²³ Millar, *Origin of Ranks*, pp. 180–1.

²⁴ Donald R. Kelley, *The Human Measure: Social Thought in the Western Legal Tradition* (Cambridge, MA: Harvard University Press, 1990), passim.

Romanist tradition developed within university culture. According to this tradition, Roman law, especially as it was codified by Emperor Justinian, was universally valid, and its source lay in natural law, or the very nature of humans. On the other hand, throughout Europe there were locally varying common law traditions. Princes and kings seeking to consolidate power wanted both to appropriate the authority to establish their own laws and to institute a sense of national identity by emphasizing the uniqueness and aptness of local legal systems. This nationalism led to an important justificatory literature.²⁵

By the beginning of the eighteenth century, the question of just exactly *why* there should be so much local variation in human customs and laws had become one of the central puzzles for legal scholars and for moral philosophers. This was an especially critical issue in regions such as Scotland and southern Italy, which saw the rapid growth of commercial-cosmopolitan centers such as Edinburgh, Glasgow, and Naples in regions that had large rural precommercial populations and where the local common law traditions were not well suited to commercial activities.²⁶ Similarly, it was true in nations, such as France, where there was major conflict between local authorities, who sought to retain some autonomy, and the central monarch, who claimed a virtually unlimited authority to legislate for the nation. It was also true toward the end of the century in Germany, where patriotic scholars were battling French intellectual and political hegemony.

The first major eighteenth-century attempt to confront these issues was that of the Neapolitan, Giambattista Vico in his *Principi de una scienza nuova d'intorno alla natura delle nazione* (first edition, 1725, expanded in 1744). Vico viewed the historical development of societies as the working out of God's providential plans through humans' creation of their own languages and institutions. He was, however, certain that humans seldom anticipated all the providentially ordained consequences of their decisions; thus he articulated a principle – since known as the principle of unintended consequences – that became central to the arguments of virtually all philosophical historians and to conservative thinkers throughout the next 250 years.

Vico also argued that the growth of the human individual, from infancy through young adulthood to full maturity, provided the fundamental pattern for the development of civil societies. Just as the human infant is incapable of the same kind of rationality as the adult, societies are not fully rational in their early stages, when most critical institutions such as religion, marriage, and burial are established. Religion is established by anthropomorphizing natural entities; proto-legal customs are formed as humans project their desire

²⁵ See, for example, Jean Bodin, *The Six Bookes of the Commonweal*, ed. Kenneth D. McRae (Cambridge, MA: Harvard University Press, 1972).

²⁶ See especially David Lieberman, "The Legal Needs of a Commercial Society: The Jurisprudence of Lord Kames," in Hont and Ignatieff (eds.), *Wealth and Virtue*, pp. 203–34.

for vengeance against those who injure them onto powerful divinities and use divine oracles to pronounce judgments; and the values of the society are expressed in myths and fables. During the adolescent stage of societies, values are incorporated into stories of heroes to be emulated, and justice remains largely uncodified and within the domain of the personal. Only in the final, adult stage can the values of a society be incorporated into a systematic moral philosophy and can justice be formulated in terms of an abstract set of principles.

Although all aspects of society in a particular stage are consistent with one another, it makes no sense to evaluate the mores and institutions of a society in one stage in terms of the expectations and presuppositions of another. Societies at the same stage of development can be assumed to share some characteristics; so, for example, the early history of European cultures can be illuminated by considering contemporary American ones. But even societies at the same stage of development must be shaped by local physical conditions and linguistic developments; thus each society is unique and should be understood on its own terms. Even human nature is different from one stage to another; so there are no universal standards by which to judge the institutional, moral, or even aesthetic preferences of a society.

Ideen zur Philosophie der Geschichte der Menschheit (1784–91), by Johann Herder (1744–1803), incorporated many of Vico's views into a system that posited the progress of humanity through the successive flowering of different cultures, or *Völker*, only then did the emphasis on the uniqueness of each people, the organic growth of cultures through various life stages, and the critical role of language as the unique shaper of each culture reenter the human sciences to become cornerstones of the German *Geisteswissenschaften*. With respect to law codes in particular, J. S. Putter (1725–1809), long-term professor of law at Göttingen, and his student Gustav Hugo initiated a historical school of law that, although it apparently developed independently of Vico's ideas, shared his emphasis on local reason and the fit of law to particular stages in cultural development.²⁷

More immediately important than Vico's *New Science* was Montesquieu's *Spirit of the Laws* (1749). As a young president of the Bordeaux *parlement*, Montesquieu began a long career criticizing the central monarchy and defending local privilege and custom in his *Lettres Persanes* (1721), which exploited the interest in travel literature by purporting to be a series of observations on Parisian customs and institutions by two visiting Persian diplomats. In 1734 he turned to ancient European history, giving it a philosophical twist by focusing on causal relationships rather than narrative in his *Considerations of the Greatness of the Romans and their Decline*. In 1749 he published his masterpiece, *The Spirit of the Laws*, which sought to provide a more comprehensive

²⁷ See Kelley, *The Human Measure*, pp. 239–42. Also see Peter Reil, *The German Enlightenment and the Rise of Historicism* (Berkeley: University of California Press, 1975).

understanding of why different laws and customs existed in different places than had ever been offered before.

Insisting, contrary to Vico, that human nature was constant over time and space and that there were universal physical and moral laws that account for human interactions, Montesquieu argued that behaviors nonetheless vary widely because the preexisting conditions, or “general spirits,” of different nations shape the way in which the universal laws operate, much as the initial conditions and boundary conditions produce radically different-looking solutions to physical problems governed by the same physical laws.

From classical political theory, Montesquieu argued that the governing structures under which people live (republican, monarchical, or despotic) and their corresponding dominant principles (virtue, honor, or fear) influence the customs and laws they are capable of living under. From Jean Bodin (1530?–1596), Montesquieu borrowed the idea that physical environment plays a major role in suiting people to a particular set of laws; although he replaced the old humoral basis for this claim with a theory grounded in the physiological arguments of John Arbuthnot (1667–1735), whose 1733 *An Essay Concerning the Effects of Air on Human Bodies* suggested that different temperaments dominated in different regions because cold temperatures cause tissues to contract and to respond more slowly to stimuli. Other factors, such as religion, the quality of the soil, and population density received Montesquieu’s consideration; but perhaps most important and innovative was his discussion of the relationship between laws and “the manner in which the several nations procure their subsistence.”²⁸

Montesquieu developed a fourfold classification of societies into hunting, pastoral, agricultural, and commercial, and he argued that the laws would be radically different in nations according to which economic activity predominated. Laws would be very simple in hunting societies because there was little private property to protect; they would be slightly more complex in herding nations; more complicated in agricultural nations in which private land ownership emerged; and most complex in commercial nations in which the variety of forms of property was greatly increased. Although Montesquieu was convinced that commercial activities bred peace among nations because of the need among traders to establish relations of trust and cooperation, he was the first of many to suggest that peace among nations was bought at the unfortunate cost of increasing competition and lessening social bonds within local communities.

One likely reason that Montesquieu’s emphasis on subsistence became important was that it corresponded with changing social circumstances in reorienting our theoretical understanding of the relationship between political and economic activities. For classical political theorists, including Aristotle

²⁸ Montesquieu, *The Spirit of the Laws*, trans. Thomas Nugent, 2 vols. in 1 (New York: Hafner, 1949), vol. 1, p. 275.

and Machiavelli, productive and reproductive activities were understood as somehow less significant than “public” political activity, whether it was represented by deliberation about law, administering the state, or taking part in military activity. For virtually all the developers of Montesquieu’s ideas, on the other hand, this valuation is inverted, and governments and political life are seen as serving broader social and economic interests that matched those of a growing bourgeoisie throughout Europe.

Montesquieu’s fourfold taxonomy of societies was temporalized and turned into a theory of the progress of societies – from the earliest and most primitive hunting stage through pastoral and agricultural stages into the commercial stage – by Anne Robert Turgot (1727–1781) in France and by the whole school of Scottish philosophical historians including Ferguson, Smith, Millar, and Kames, each of whom offered his own modifications of Montesquieu’s basic themes.²⁹

Among the most interesting of this group was Adam Ferguson, whose *An Essay on the History of Civil Society* (1767) initiated a revision of traditional ideas regarding the functions of conflict in society. Ferguson argued that social and legal progress emerge all but exclusively from conflict between parties and classes. Moreover, he insisted that community solidarity depends in large measure on the perception of hostile outside enemies and that humans have such a taste for competition that when there are no military activities to allow them to exert themselves, they make up competitive games to take their place.

The only kind of competition that Ferguson saw as destructive was the privatizing economic competition that developed in commercial societies. Ferguson was at one with Montesquieu and his earlier Scottish colleagues, such as Francis Hutcheson (1694–1746), in believing that social passions offer the greatest scope for human happiness and that private ones are more often the source of anxiety, jealousy, fear, and envy.

Although they were sometimes ambivalent about the consequences of the development of societies from one stage to the next, Adam Smith and his student John Millar had no question that what we now call economic considerations, growing out of self-interest, were the foundation on which all human institutions – familial, social, and formally legal – were built and that all other aspects of society thus had to change as patterns of economic activity did. In his lectures on jurisprudence delivered from about 1750 to 1765, Smith explored a broad range of factors dependent on the stages of economic development.³⁰ In *Origin of the Distinction of Ranks* (1771), Millar focused attention on the relation of two particular issues to the four-stage theory: the roles of women and of slaves.³¹ In both cases Millar argued that exploitative

²⁹ Perhaps the best brief account of the rise of the stadial theory of social development is Ronald Meek, *Social Science and the Ignoble Savage* (Cambridge University Press, 1976).

³⁰ See Adam Smith, *Lectures on Jurisprudence*, eds. R. L. Meek et al. (Oxford: Clarendon Press, 1978).

³¹ See William C. Lehman, *John Millar of Glasgow: 1735–1801: His Life and Thought and His Contribu-*

and oppressive arrangements had developed naturally and appropriately in earlier societies but that they were inappropriate to the emerging commercial society of lowland Scotland.

Henry Home, Lord Kames, with whom Millar had lived as a law student, produced one of the most comprehensive, eclectic, and eccentric philosophical histories – in his eight-volume *Sketches of a History of Man* (1774) – when he was nearly ninety. Although far less coherent than that of Smith or Millar, Kames's work seems to have had a substantially wider audience, most likely because his religious and social conservatism were less disturbing and because his intense Scottish nationalism and antipathy to Native American cultures had substantial local appeal. This work was carried to America by Scottish educators, where it was widely embraced by those of European background, who found in it a rationalization for their sense of superiority.

In France, at least two self-consciously anti-Montesquieu traditions of philosophical history emerged. One, associated initially with Claude Adrien Helvétius and with some political economists, saw Montesquieu's tendency to justify practices simply by their existence as fundamentally perverse. Since most institutions emerged before humans had the knowledge and wisdom to design them well, the history of human institutions read more as a history of mistakes entered into from ignorance than a history of desirable rational arrangements. For Helvétius, one of the clearest examples of this phenomenon occurred as a consequence of the growth of money-based economies that used durable goods as mediums of exchange. In his *Treatise on Man* of 1774, Helvétius argued that the convenience of using long-lasting and easily transportable commodities for exchange was, unfortunately, accompanied by the ease of hoarding and of creating huge distinctions of wealth which eventuated in the exploitation of the many by the few and led to open class warfare. No money-based economy could avoid the establishment of some divergences of wealth. No society that also allowed for the legal passage of unlimited property to a single heir could avoid the amplification of initially small distinctions of wealth into huge and destructive ones.³²

The second French anti-Montesquieu tradition of philosophical history was initiated by Jean Jacques Rousseau in his *Discourse on the Sciences and the Arts* (1749) and *Discourse on the Origin and Foundation of Inequality Among Men* (1755). Drawing very heavily from the noble savage literature to form his picture of natural man, Rousseau argued that virtually every feature associated with increasing "civilization" – refinements in knowledge and the arts, the multiplication of forms and amounts of wealth, cosmopolitanism, and so on –

tions to Sociological Analysis (Cambridge University Press, 1961), and Paul Bowler, "John Millar, The Four-Stage Theory, and Women's Position in Society," *History of Political Economy*, 16 (1984), 619–38.

³² Claude Adrien Helvétius, *A Treatise on Man*, trans. W. Hooper (New York: Burt Franklin, 1969), especially pp. 103–27. For an excellent general evaluation of Helvétius's works, see D. W. Smith, *Helvétius: A Study in Persecution* (Oxford: Oxford University Press, 1965).

tended to the corruption rather than to the improvement of morals and to the destructive creation of artificial inequalities among people.

RACE AND THE PLACE OF HUMANS IN THE
NATURAL ORDER: THE BACKGROUND
TO PHYSICAL ANTHROPOLOGY

During the second half of the eighteenth century, two new sets of issues emerged among those who were trying to formulate a natural history or philosophical history of man. The first of these had to do with the relationship between humans and “orangutans,” a term used to describe chimpanzees and apes as well as what we now call orangutans. The second issue had to do with the characteristics and origins of the different “races” of humans. Before mid-century the traditional Judeo-Christian notion that humans were radically distinct from all other creatures because of their immortal souls, by virtue of which they alone were made in God’s likeness and by virtue of which they alone could exhibit moral choices, was seldom challenged. Nor were there many serious scholars who questioned the descent of all present humans from Adam and Eve. But in the second half of the century increasing numbers of scholars were either irreligious or antireligious; and even religiously orthodox scientists often insisted on completely naturalistic accounts of humans. At the same time, increasing evidence was amassed suggesting the close anatomical and physiological similarities between apes and humans as well as a growing range of anatomical differences among groups of humans.

The first explicit inclusion of humans in a comprehensive classification of natural organisms appeared in the first (1735) edition of the *Systema naturae sive regna tria naturae* of Carl Linnaeus (1707–1778). There, the medical student and taxonomist included the genus, *Homo*, with a single species, *sapiens*, having four varieties (*europeanus albus*, *americanus rubescens*, *asiaticus fucus*, and *africanus niger*) under the order Anthropomophora. As increasing information came in, especially from South America and the South Pacific, Linnaeus’s organization of the genus *Homo* became increasingly complex. By the tenth edition of the *Systema* in 1758, the new order of primates had been introduced; the genus *Simia* had been much expanded; two new varieties, *Homo sapiens ferus*, “wild man,” and *Homo sapiens monstrosus* (including Hottentots and Patagonians) had been added; and an entirely new species of *Homo*, *Homo Troglodytes* (including orangutans), had been introduced, implying the possibility of polygenetic origins of humans. Thus, when the learned Scottish jurist Lord Monboddo argued in his *On the Origin and Progress of Language* (six volumes, 1773–1792) that it was the capacity for language that distinguished humans from other animals and that orangutans had been shown to have vocal cords capable of producing sounds varying in pitch and loudness,

he accepted the conclusion that there was no legitimate reason to deny that orangutans were indeed human, although of a precivilized sort.

Monboddo's colleague Lord Kames was inclined to accept the traditional monogenetic source of humans; but he was careful to point out that accumulating evidence on the geographical distribution of groups of humans was consistent with the alternative hypothesis of independent origins of different races of humans in different places.

Most students of humanity rejected Monboddo's suggestions, but they tended to accept morphological criteria for deciding the issue. Thus, for example, in his *De generis humani varietate nativa* (1775), Johann Friedrich Blumenbach (1752–1840) emphasized the absence of an “intermaxillary” bone in humans and their upright posture to distinguish between apes and humans; and Peter Camper conducted anatomies on orangutan vocal organs, emphasizing their differences from those of humans. On the other hand, Blumenbach turned Kames's rejected suggestion regarding the separateness of different races into the foundation of a racial taxonomy that was immensely influential during the nineteenth century.

Offering a radical alternative to the Linnean-morphological-approach to species in general was George Louis le Clerc, comte du Buffon (1707–1788). Buffon argued that the term “species” should be reserved in natural history for collections of organisms that are reproductively connected with one another over both time and space. Especially in volumes two and three of his *Histoire naturelle des animaux* (1749–67), he argued for the monogenetic origins of all humanity; but he turned monogenism into a strongly Eurocentric doctrine by arguing that humans had originated in the Eastern Mediterranean and, like other species, had degenerated as a consequence of environmental differences when they moved away from their place of origin and as world climates changed over time.³³ Buffon was at times puzzled about the relationship between humans and apes, suggesting as a possibility that the apes were extreme examples of human degeneracy.

ENRICHING THE STATE AND ITS CITIZENS: CAMERALISM AND POLITICAL ECONOMY

The term “political economy” was coined by Antoine de Montchretien (1575–1621) around 1615, but it came into prominence only after the 1767 publication of Sir James Steuart's (1713–1780) *Inquiry into the Principles of Political Economy*:

³³ For Buffon's anthropology, see *Buffon: De l'homme*, ed. Michelle Duchet (Paris: Maspero, 1971). For Blumenbach's, see *The Anthropological Treatises of Blumenbach*, ed. Thomas Bendyshe (London: Longman, Green, Longman, Roberts, and Green, 1865).

Being an Essay on the Science of Domestic Policy in Free Nations, In Which Are Particularly Considered, Population, Agriculture, Trade, Industry, Money, Coin, Interest, Circulation, Banks, Exchange, Public Credit, and Taxes. The term was used almost immediately by Adam Smith, among others, to identify any work that focused, although not often exclusively, on the revenue of both the people and the state. Steuart's usage was unusually broad, for he had composed the *Inquiry* while in exile at Tübingen and under the influence of the cameral sciences favored by German-speaking authors, who were unwilling to isolate economic issues from issues associated with general administration, public health and safety, political autonomy, the perceived quality of life, and even national character. Most non-German political economists, on the other hand, tended to exclude issues that did not have an immediately "economic" content. In what follows, I will use "political economy" to identify the more narrowly construed discussions favored by French, English, Dutch, Scottish, and Italian authors, using "cameral sciences" to identify the broader approach favored in the German states, Austria, Scandinavia, and Russia.

One critical feature of the difference between cameral science and political economy was a consequence of the medical training of many of the most important seventeenth-century founders of the disciplines. The German physician-cameralists, such as Johann Becher (1635–1682) had been trained in anti-Greek alchemical and Paracelsian medicine. According to Paracelsus it was the physician's task to improve on Nature by proactively intervening in the life of a patient to see that such things as diet, sanitation, and even working conditions were improved to promote well-being. By the same token, the cameralist physician to the body politic advocated a broad range of state interventions, including the central planning and regulating of social and economic affairs, to enhance the well-being of the nation. The medical founders of political economy, such as William Petty (1632–1687) and John Locke, on the other hand, were trained in the Hippocratic/Galenic tradition, enriched by the iatromechanist approaches of William Harvey and the Cartesians. According to this version of medical theory, Nature was essentially self-regulating and self-perfecting. Illness or disease occurred because some pathological entity was present, impeding the natural processes. The primary function of the physician was simply to remove the impediment and stand aside. Although he was a clergyman rather than a physician, Josiah Tucker (1713–1799) expressed the laissez-faire implications of this perspective for eighteenth-century Anglo-French political economy particularly well in his *Elements of Commerce* (1755):

Hence, therefore, the physician to the body politic may learn to imitate the conduct of the physician to the body natural, in removing those disorders which a bad habit, or a wrong treatment hath brought upon the constitution; and then to leave the rest to nature, who best can do her own work. For after the constitution is restored to the use and exercise of its proper fac-

ulties and natural powers, it would be wrong to multiply laws relating to commerce as it would be to be forever prescribing physic.³⁴

Seventeenth-century political economy and cameral science had been produced all but exclusively as advice to government officials (usually heads of state, but in the British case, to Parliament as well) by court officials or persons seeking patronage. They thus tended to center on ways in which princes or the governments for which they stood could enrich themselves; and they tended to be uncritical of established authorities, seeking gently to sway them into developing policies intended to increase the wealth of citizens because it was accepted that the wealth of a prince was dependent on the well-being and wealth of his subjects. Throughout the eighteenth century the cameral sciences continued to be formulated as friendly advice to paternalistic princely rulers; but political economy took on a much more critical character in Western Europe. Most works of political economy still offered policy advice to governments; but virtually all of them did so in the name of the general good; and they often reflected the interests of particular groups. Moreover, as the century went on, both among cameral scientists and among political economists, increasing numbers of works sought to provide comprehensive theories or systems of the functioning of commercial economies in order to provide a general framework for the formation of specific policies.

Among early eighteenth-century political economists, Pierre de Boisguilbert (1646–1714), a farmer who also had legal training, stands out as particularly impressive. Boisguilbert was deeply distressed by the French crown's taxation policies as well as by export and price controls on grain. Together, these policies seemed to be driving increasing numbers of farmers into bankruptcy and to a consequent rapid decline in both private and public revenues throughout France. In a series of private and public tracts, including *Détail de la France* (1695), *Factum de la France* (1705), and *Dissertation de la nature des richesses* (1707), Boisguilbert provided compelling arguments that any exchange between two uncoerced parties would inevitably lead to the benefit of both, so that a free and unregulated market would ensure that both farmers and consumers benefited. Thus, he argued against price controls. If the government insisted on setting maximum grain prices in years of poor crops, it should likewise provide price supports in years of overproduction. Furthermore, Boisguilbert emphasized the centrality of consumption for the economy, arguing that consumption is increased by circulation of money and that circulation is increased by putting more money into the hands of the poor, who spend their incomes faster than do the wealthy. Thus, he urged tax policies that were progressive as well as policies that encouraged the creation of increased productive capacities.

Ernst Ludwig Carl (1682–1743) was the first major eighteenth-century

³⁴ Cited in Terence Hutchison, *Before Adam Smith* (Oxford: Basil Blackwell, 1988), p. 231.

cameral scientist. After studying law and the cameral sciences at Halle, Carl was sent to Paris as an agent of the Margraves of Bayreuth and Ansbach. There he met up with the work of Boisguilbert and studied French manufacturing policy. In 1722 and 1723 Carl published his three-volume *Traité de la Richesse des Princes et de leurs États* which incorporated some western political economy into the cameralist framework. Admitting the self-interested motives of economic actors and the potential for natural market regulation of economic exchanges, Carl nonetheless argued that through shortsightedness and ignorance, most individuals subverted the market process, creating a need for state regulation. Among the newly emerging issues Carl addressed were the importance of the division of labor for increasing productivity and the idea that each nation has a comparative advantage in producing some goods for exchange. As a consequence, international trade is not a zero-sum game; but it can be carried out to the advantage of all participants.

After Carl, there was very little originality in cameralist works, although Johann Heinrich Gottlob von Justi (1717–1771), author of numerous works including the widely popular *Staatswirtschaft* (1755) and *System des Finanzwesens* (1766), was inclined to warn his bureaucrats-in-training of how easy it was to simply raise taxes rather than to control spending; thus, he tried to emphasize the responsibility of the governors to those governed to a greater extent than most prior cameralists. Joseph von Sonnenfels, Professor of Cameral Science at Vienna, proved to be such an effective promoter of cameralist ideas that his *Grundsätze der Polizei, Handlung und Finanzwissenschaft* (1763) continued to be the leading textbook of cameral science for nearly a century.

International trade and banking were the chief interests of Richard Cantillon (c. 1690–1734), an Irish-born Parisian international banker, whose comprehensive and immensely influential *Essai sur la nature du commerce en générale* circulated in manuscript for decades before it was finally published in 1755. Although primarily a critical attack on John Law's policies, which had led to the creation and collapse of the Mississippi Company, Cantillon's work was among the most comprehensive economic systems prior to that of Adam Smith. Dividing the costs of production into labor, rents, and profits on capital, Cantillon argued that producers would produce only enough of a commodity to satisfy a demand that would maintain a price that would oscillate around the cost of production. In addition, he particularly focused on the importance of entrepreneurship and the rewards that came from taking risks. He explained the causes of inflation, analyzed exchange rates, and showed that productive capacity was the ultimate source of wealth; as a result, precious metals moved rapidly away from nations that acquired them by mining into the hands of those who produced finished goods.

Between 1756 and 1774, French political economy was dominated by a group of men who identified their movement as physiocracy, the rule of Nature, as opposed to monarchy, aristocracy, or democracy, the rule of the one, the few, or the many. Led by the farm-bred, surgically trained, and autocratic François

Quesnay (1694–1774), who had come to an interest in political economy only in his sixties, the physiocrats sponsored their own journals, *Journal de l'Agriculture, du Commerce, et des Finances* (1765–6) and *Éphémérides du Citoyen* (1768–72) under the editorship of Pierre Samuel Du Pont de Nemours (1739–1817). In general, they adopted Boisguilbert's special concern with agriculture and free market exchanges along with Cantillon's emphasis on investment. Thus, they pushed to ensure an annual net profit from agriculture that would allow for continued investment in capital improvements and hence, productivity; and they expected to achieve this situation by deregulating grain prices and exports. Moreover, they argued for tax policies that would minimize impediments to production. Among their most important technical developments – a mathematical model of circulation of money in an economy – was the *Tableau Économique* (1758).

Among the nonphysiocratic political economists in France during the second half of the century, the most prominent was probably Anne Robert Jacques Turgot (1727–1781), a career administrator who served as finance minister of France, initiating a brief period of unregulated grain trade. Unfortunately, his experiment coincided with several years of very poor crops, and the public outcry against high bread prices forced the king to accept his resignation. Turgot's major general work, *Reflections on the Formation and Distribution of Riches* (1769–79), slightly modified the physiocratic obsession with agriculture, analyzed various forms of capital, and explored how relatively stable exchange values of commodities were established by communities of buyers and sellers. Although of relatively little immediate impact on political economy, the analyses of subjective preference in establishing what economists now call individual utility functions by Etienne Bonnot de Condillac in his *Le commerce et le gouvernement* (1776) have received much attention by twentieth-century utility theorists.

Italy produced several significant liberal political economists, including the Milanese friends Caesar Beccaria (1738–1794) and Pietro Veri, whose mathematical treatment of the relationship between utility, scarcity, and price expresses one of the first mathematical “laws” of political economy. But the greatest of eighteenth-century Italian political economists was probably a Neapolitan, Ferdinando Galiani (1728–1787). As a twenty-two-year-old, Galiani wrote an excellent treatise, *Della moneta*, in the liberal tradition. But twenty years later, after living for some time as a Neapolitan diplomat in Paris, he wrote perhaps the most scathing attack ever against the physiocrats, appropriating the historical perspectives of both Vico and Montesquieu to argue that the effects of the operation of economic laws depend critically on local conditions, including the form of government under which people live and their customs. Thus, for example, in *Dialogs sur le commerce des blés* (1770), Galiani argued that even though deregulating the grain trade would, if accomplished, eventuate in equilibrium prices that would benefit everyone, it should not be attempted in France for at least two reasons. First, freedom of

trade was inconsistent with monarchical government because it would inevitably lead to both higher costs of living and a net transfer of wealth to the peasantry, undermining the inequalities of wealth and status that support monarchical government and increasing pressures in favor of republicanism. Second, but equally important, time may be a critical factor, especially in connection with essential foodstuffs. Although an equilibrium price might eventually be established, it could (as it in fact did a few years later) take so long to do so that masses of poorer people, fearing starvation, would rebel against intolerably high prices in the meantime.

Galiani was not alone in trying to link historical and economic issues. Many political economists, including Cantillon and Turgot, had serious interests in philosophical history, and virtually all philosophical historians were concerned centrally with problems of subsistence. But it was in Scotland and particularly in Adam Smith's *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776) that philosophical history and political economy were fused into a comprehensive synthesis so compelling that it made virtually all preceding work in political economy obsolete. Starting with a historical analysis of the role of the division of labor in increasing productivity and the need to increase markets to maximize the benefits of the division of labor, Smith proceeded to a full discussion of the role of markets in setting prices and establishing a distribution of economic resources that would maximize wealth. He went on to argue that only in growing economies with labor shortages will wages be above the subsistence level. He covered all the traditional topics of political economy, drawing heavily from the writings of Turgot and incorporating his own extensive historical evidence; he also included extensive critiques of cameralist, physiocratic, and earlier scholastic discussions of moral economy.

QUANTIFICATION IN THE HUMAN SCIENCES

With rare exceptions, political economists sought mathematical regularities in the phenomena they studied. Some, including the followers of John Graunt and William Petty as well as those of such cameralists as Johanne Becher, argued that both public and private decisions would be improved by being guided by the use of quantifiable information regarding "the lands and hands of the territory . . . according to all their intrinsic and accidental differences."³⁵

Inventories of persons and economic resources had been widely used for establishing tax liabilities throughout Europe since Roman times; but advocates of "political arithmetic" and "statistics" sought to collect more information and to use it in more extensive ways. As early as 1693, Edmund Halley, for example, used birth and death data from Breslau to illustrate how to cal-

³⁵ John Graunt, *Natural and Political Observations . . . Made Upon the Bills of Mortality*, ed. Walter Wilcox (Baltimore, MD: Johns Hopkins University Press, 1939, from 1662 original), p. 78.

culate life expectancies and the prices to be charged for single life annuities or tontines (which were widely used by governments to generate income, much as lotteries are in the twentieth century).³⁶ Abraham de Moivre (1667–1754) soon figured out how to calculate the cost of multiple life annuities. The use of quantitative data for public resource management was pioneered by the German cameralists, who developed techniques in forestry management for estimating the volume of wood in large areas through sampling and so on.³⁷

Sweden was the first nation to establish an effective statistical office when it established an Office of Tables in 1749 through efforts led by Andre Berch, professor of economics at Uppsala University and author of *Politisk Arithmetica* (1746).³⁸ In spite of the enthusiasm of some advocates, however, the effective use of social and vital statistics was virtually impossible everywhere well into the nineteenth century. Although one might be able to calculate life expectancies based on the total population of a specific locale, such a population did not reflect the population of those likely to purchase insurance; thus, insurance companies quite reasonably ignored the theoretical calculations of actuaries until the mid-nineteenth century. Moreover, gathering accurate data was nearly impossible both because relatively weak central governments were unable to enforce uniform procedures for collecting information and because information was deliberately withheld or misreported by nearly everyone out of fear that it might be used by central authorities against their interests.³⁹

Finally, the eighteenth century saw some of the first attempts to supply probability theory to a social issue when Condorcet attempted to explore the conditions under which the majority decisions of representative assemblies should be accepted in his *Essai sur l'application de l'analyse pluralité des voix* of 1786. Again, however, the practical application of mathematical theory to public policy was far in the future.

SENSATIONALIST/ASSOCIATIONIST PSYCHOLOGY, UTILITY, AND POLITICAL SCIENCE

When Condorcet drafted his *Projet de décret sur l'organisation générale de l'instruction publique* for the National Assembly in 1792, he argued that there

³⁶ Edmund Halley, "An Estimate of the Degrees of Mortality Drawn from Curious Tables of Births and Funerals at the City of Breslau, with an Attempt to Ascertain the Price of Annuities upon Lives," *Philosophical Transactions of the Royal Society in London*, 17 (1693), 596–610.

³⁷ See Henry Lowood, "The Calculating Forester: Quantification, Cameral Science, and the Emergence of Forestry Management in Germany," in J. L. Heilbron and Robin E. Rider (eds.), *The Quantifying Spirit in the Eighteenth Century* (Berkeley: University of California Press, 1990).

³⁸ See August Johannes Hjet, *Det svenska tabellrerkets uppkomst, organisation och tidigare verk samhet* (Helsingfors: O. W. Backmann, 1900).

³⁹ On the eighteenth-century resistance to governmental attempts to collect statistical information, see Peter Buck, "People Who Counted: Political Arithmetic in the Eighteenth Century," *Isis*, 73 (1982), 28–45.

should be three lecturers on the social or human sciences at each *lycée*. One would be responsible for philosophical history, one for political economy, and the third and most important would combine the analysis of sensations and ideas, scientific method, morality, and “the general principles of political institutions.”⁴⁰ In the late twentieth century the functions of this third lecturer would be spread across departments of psychology, philosophy, and political science, members of which would probably deny any connection with one another. But during the eighteenth century they were frequently linked because many thinkers argued that the structures of governments should be suited to their function, which was to meet the needs and wants of the citizens or, in terms used by eighteenth-century theorists, to increase their happiness and allay their fears. If governments were to truly serve these functions, it was first necessary to determine precisely what made people happy and fearful and how they might act so that the needs of the general population, rather than those of a small segment, were met – that is, to address issues of psychology and morality. Finally, through the use of scientific methods, one could determine how to organize societies so that people were made or allowed to act to serve the general good.

This pattern – of moving in political discourse from an analysis of human perceptions, desires, and aversions, through an analysis of moral “rights” and duties, to a prescription for social and political arrangements – had been well established during the seventeenth century, especially in the writings of Hobbes and Spinoza. Virtually all those who approached the psychology-morality-civil society complex of issues in this way during the eighteenth century shared one other general feature: they began from and refined the empiricist perspective that had been explored in John Locke’s *Essay Concerning Human Understanding* (1690) and in the writings of Pierre Gassendi (1592–1655) rather than the “rationalist” perspective which had informed the works of Hobbes and Spinoza.

David Hume’s difficult *A Treatise of Human Nature* and its more popular expositions in *An Enquiry Concerning Human Understanding* (1762), *An Enquiry Concerning the Principles of Morals* (1751), and *Essays, Moral, Political, and Literary* (two volumes, 1741–42) were among the most important attempts to formulate an empirically based psychology, morality, and politics. One of Hume’s chief arguments was that reason plays a vastly more limited role and our passions play a much greater role in motivating our actions than most moralists and political theorists had admitted. Humans link ideas much more often through their association, which is largely a matter of habit, than through logical connection, which is a product of intentional rationality. Furthermore, the human inventory of passions is much more complex and extensive than had been realized. In particular, humans are driven not only by self-

⁴⁰ See Keith Michael Baker, *Condorcet: From Natural Philosophy to Social Mathematics* (Chicago: University of Chicago Press, 1975), Appendix A, p. 389.

interest but also by a variety of social passions grounded in sexual attraction and attachment to children but extended by habitual associations to family and community members. As a consequence, if institutions were to be effectively devised to accommodate human desires and aversions, they would have to be much more complicated than the primitive and simplistic psychological assumptions of earlier theorists had supposed. Indeed, Hume was so skeptical of the human ability to anticipate all the complex consequences of any new institution that he urged extreme caution in political innovations.

Much more optimistic about our ability to change human behavior by manipulating experiences so as to produce desirable associations and about our ability to design institutions that will promote human happiness was David Hartley (1705–1757). His *Observations on Man, His Frame, His Duty, and his Expectations* (1749) became a kind of holy book for radical reformers in both Britain and America. According to Hartley, as we mature, we naturally develop increasingly benevolent passions, which seek the welfare of others; so if we can simply avoid the pathological development of artificially great divergences of wealth and status, there will be a natural accommodation between the desires of each individual and the well-being of the entire community. Joseph Priestley, James Mill, William Godwin, Benjamin Rush, and even the early nineteenth-century socialist Robert Owen, were all self-styled followers of Hartley, although the moderate Anglican clergyman would probably have been appalled at how far they pushed the egalitarian and democratic implications of his work.⁴¹

More moderate in his political views, and more concerned with the need to force individuals to act in such a way as to benefit society as a whole, was Jeremy Bentham (1748–1832), who popularized the term “utility” and the notion that the aim of all governments should be the greatest good for the greatest number. Beginning in his *An Introduction to the Principles of Morals and Legislation* (1789), Bentham published a series of tracts developing his “Utilitarian” philosophy and his “calculus of felicity,” which was intended to offer a way of quantifying the relative desirability of various policies based on their differential abilities to promote happiness and reduce pain and anxiety. During the nineteenth century and in part through its development by John Stuart Mill in England and Etienne Dumont in France, Utilitarianism became a popular political movement. Its members were instrumental in legal reform, health and sanitation reform, and in the extension of voting rights through the English Reform Bill of 1832.

In France, Condillac played much the same role that Hartley did in England. Although he was not a political reformer, Condillac’s psychological writings and discussions of scientific method in his *Essai sur l’origine des connaissances humaine* (1746), *Traité des systèmes* (1749), *Traité de sensations* (1754), *Traité des*

⁴¹ See Isaac Kramnick, “Eighteenth-Century Science and Radical Social Theory: The Case of Joseph Priestley’s Scientific Liberalism,” *Journal of British Studies*, 25 (1986), 15ff.

Animaux (1755), *Le commerce et le gouvernement* (1776), and *La Logique: ou les premiers développemens de l'art de penser* (1782) provided the starting place for a huge number of attempts at educational, economic, social, and political reforms through the period of the French Revolution.

Claude-Adrien Helvétius was among the most influential and original of those who developed the social and political implications of Condillac's ideas. A member of a wealthy family who increased his fortune by early successes as a tax farmer, Helvétius "retired" at age 42 to become a savant and experimental farmer. His *De l'esprit* (1758) and *De l'homme* (published posthumously in 1774) began by arguing, contra Montesquieu, that most existing human institutions, because they had been founded before the principles of sensationist psychology were recognized, were based on false understandings of human nature and were thus the causes of untold suffering. Self-interest, including the desire to be admired and to exercise authority over others, drives all human actions. But most people come to identify their own interests with those of a group of people with whom they share status and functions. In this way actions come to be shaped by class interests; and in societies where large differences in wealth and authority have come to exist, the clergy, the wealthy, and the governing elites recognize that it is in their interest to keep the mass of human beings ignorant and poor. Immense wealth and power are thus concentrated in the hands of a few, while everyone else toils in misery. The trick is to reverse this situation and create institutions that reward actions that serve the general good. In fact, it was Helvétius who insisted that the goal of government should be to establish the greatest good for the greatest number, a notion later adopted by Bentham with acknowledgment of his debt to Helvétius.

In 1758 Helvétius hoped that educational reform spearheaded by the scientific intelligentsia could succeed in producing peaceful reform; but the hostile clerical and governmental reaction to *De l'esprit* convinced him that progressive change could probably not be achieved short of violent revolution. Thus, Helvétius became one of the first theorists to advocate the creation of an egalitarian and classless society through overthrow of the present authorities.

After Helvétius's death, his wife continued the salon that she and her husband had initiated. It was in this environment that Condorcet developed his educational ideas, his proposals to extend the vote to all citizens regardless of sex or race, and his applications of probability to social issues. Similarly, it was at the salon of Mme. Helvétius (and Mme. Condorcet after her husband's death in 1794) that the Idéologues – Pierre Cabanis, Antoine Destutt de Tracy (1758–1836), and Jean-Baptiste Say (1767–1832) – began their careers as social reformers and social theorists.

On the Continent outside of France, Helvétius's ideas were particularly central in the development of the utilitarian arguments of Cesare Beccaria, whose *Dei Delitti e della Pene* (1764) initiated a period of penal reform throughout Europe.

One of the final eighteenth-century movements to derive its foundations

from the psychological theorizing of Condillac's followers was the early feminism of Catherine Macaulay and Mary Wollstonecraft, who, like Helvétius, saw many cultural practices grounded in mere custom as antithetical to the dictates of an egalitarian associationist psychology. Thus, in her *Letters on Education* (1790), Macaulay wrote as follows:

It ought to be the first care of education to teach virtue on immutable principles, and to avoid that confusion which must arise from confounding the laws and customs of society with those obligations that are founded on correct principles of equity . . . There can be but one rule of moral excellence for beings made of the same materials, organized after the same manner, and subject to similar laws of nature. . . . [It follows] that all of those vices and imperfections which have been generally regarded as inseparable from the female character, do not in any manner proceed from sexual causes, but are entirely the effects of situation and education.⁴²

The reaction of many observers to the radical political agendas reflected in feminism and the French revolution was to turn violently against the psychologically based theories that seemed to provide their rationales and to reassert the importance of historically oriented theories. Thus, the very end of the eighteenth century and the early nineteenth century saw a resurgence of philosophical history, keyed by the antirevolutionary sentiments of authors such as Edmund Burke, whose *Reflections on the Revolution in France* (1790) signaled the beginnings of the reactionary historicist trends.

GENERAL EVALUATION OF EIGHTEENTH-CENTURY HUMAN SCIENCES

During the nineteenth century, most of the subject matters discussed by eighteenth-century thinkers under the general category of sciences of man [sic] – or our category of the human sciences – were reorganized under the twofold influences of Comtian Positivism and the professionalization of academic disciplines. When that happened, there was a general downplaying of the scientific significance of the work done by almost all the figures discussed in this essay. For reasons that we cannot explore here, Comte was adamant in insisting that the introspective methods underlying sensationalist and associationist psychology were unscientific and misleading; so as psychology became professionalized in Germany by Wilhelm Wundt and others under Positivist influences, it was recast as a physiological discipline, and eighteenth-century discussions were relegated to the “metaphysical” prehistory of the discipline. As sociology and anthropology became professionalized in the later nineteenth

⁴² Catherine Macaulay, *Letters on Education* (New York: Garland Publishing, 1974, reprinted from 1790 London original), pp. 201–4.

century, the works of Vico, Montesquieu, and the Scottish school of philosophical history, as well as those of Herder and the German historians of jurisprudence, were appreciated for the issues they raised, but their authors were often condemned for being “armchair philosophers” who based their speculations on the uncontrolled and often credulous tales of travelers and ancient historians rather than real scientists who grounded their discoveries in carefully controlled and extensive fieldwork. In political economy, virtually all nineteenth-century professionalizers continued to see Adam Smith’s *Wealth of Nations* as the foundational text of their discipline; but Smith’s portrayal of physiocracy and cameralism as unscientific and politically destructive special pleading also served as a barrier to interest in earlier political economy among nineteenth-century practitioners.

The upshot of all these factors was that nineteenth-century practitioners of the human and social sciences virtually stopped reading and giving serious consideration to their eighteenth-century predecessors, taking literally the Comtian notion that knowledge of human interactions in society attained the status of positive knowledge only in the nineteenth century. In this perception, they were cutting themselves off from their roots in a way that has persisted into the late twentieth century.

The first comprehensive history of science in 30 years, they will be an excellent reference for historians and professionals in the history of science. The contributors, world leaders in their respective specialties, engage with current historiographical and methodological controversies and strike out on positions of their own. This book in the highly respected Cambridge History of Science series is devoted to the history of the life and earth sciences since 1800. It provides comprehensive and authoritative surveys of historical thinking on major developments in these areas of science, on the social and cultural milieus in which the knowledge was generated, and on the wider impact of the major theoretical and practical innovations. Alexander Jones, Liba Taub. This volume in the highly respected Cambridge History of Science series is devoted to the history of science, medicine and mathematics of the Old World in antiquity. Organized by topic and culture, its essays by distinguished scholars offer the most comprehensive and up-to-date history of ancient science currently available. Together, they reveal the diversity of goals, contexts, and accomplishments in the study of nature in Mesopotamia, Egypt, Greece, Rome, China, and India. Intended to provide a balanced and inclusive treatment of the ancient world, contributors c Book 2 of 6 in the Cambridge History of Science Series. See all 5 formats and editions Hide other formats and editions. Price. David C. Lindberg is Hildale Professor Emeritus of the History of Science and past director of the Institute for Research in the Humanities at the University of Wisconsin, Madison. He has written or edited a dozen books on topics in the history of medieval and early modern science, including *The Beginnings of Western Science* (1992). He and Ronald L. Numbers have previously coedited *God and Nature: Historical Essays on the Encounter between Christianity and Science* (1986) and *When Science and Christianity Meet* (2003).

The first comprehensive history of science in 30 years, they will be an excellent reference for historians and professionals in the history of science. The contributors, world leaders in their respective specialties, engage with current historiographical and methodological controversies and strike out on positions of their own.Â This book in the highly respected Cambridge History of Science series is devoted to the history of the life and earth sciences since 1800. It provides comprehensive and authoritative surveys of historical thinking on major developments in these areas of science, on the social and cultural milieus in which the knowledge was generated, and on the wider impact of the major theoretical and practical innovations.