

Charles T. Wolfe
Ofer Gal
Editors

Studies in History and Philosophy of Science 25

The Body as Object and Instrument of Knowledge

*Embodied Empiricism in Early
Modern Science*



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The Body as Object and Instrument of Knowledge

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Unit for History and Philosophy of Science
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Embodied Empiricism

Charles T. Wolfe and Ofer Gal

Introduction

It was in 1660s England, according to the received view, in the meetings of the Royal Society of London, that science acquired the form of empirical enquiry that we recognize as our own: an open, collaborative experimental practice, mediated by specially-designed instruments, supported by civil, critical discourse, stressing accuracy and replicability. Guided by the philosophy of Francis Bacon, by Protestant ideas of this-worldly benevolence, by gentlemanly codes of decorum and integrity and by a dominant interest in mechanics and a conviction in the mechanical structure of the universe, the members of the Royal Society created a novel experimental practice that superseded all former modes of empirical inquiry – from Aristotelian observations to alchemical experimentation.

It is enlightening to consider that this view is imparted by both the gentlemen of the Royal Society, in their official self-presentations, and by much of the most iconoclastic historiography of our time. Lines like “Boyle’s example ... was mobilized to give legitimacy to the experimental philosophy;”¹ are strongly reminiscent of Bishop Sprat’s 1667 eulogy of the “Lord Bacon in whose Books there are everywhere scattered the best arguments for the defence of experimental philosophy; and the best directions, needful to promote it.”² One reason for the surprising agreement is that this picture of openness, benevolence and civility does capture some of the moral-epistemological mores of the empiricism of the New Science, but this very agreement of historians and apologists also harbors a paradox. In interpreting the emergence and *modi operandi* of early modern empiricism through the writings of its public champions, we are attending to the rhetoric which supported the new empirical practices – practices that aspired and promised to replace rhetoric.

¹ Shapin 1994, 185.

² Sprat 1667, 35.

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This paradox in the way historians of science approached empiricism is compounded by a similar paradox in the way it is studied by historians of philosophy. Here, it was a *theory* that received the title ‘empiricism’ – a particular speculative account of the way human individuals acquire their knowledge of the surrounding world. It is yet more obvious in the modern interpretation of this theory, which is completely disinterested in empirical practices. This interpretation of empiricism put at its center an ahistorical, disembodied, isolated ‘mind’ – quite the opposite of what the savants of the New Science were experiencing or advocating.

Recent scholarship has done much to undo these paradoxes. We know much more about the array of practices of producing and marshalling experience that the New Science benefited from and was instrumental in developing: sophisticated experimentation, instrument-supported observation, astronomical navigation, surveying and mapping, collection and taxonomy. We are also much more familiar with the cultural context in which these were developed: commerce and seafaring, court and city, counter-reformation and education reform. Yet we are still far from a comprehensive view of the arena in which practitioners of various empirical traditions were learning from and competing with those of other traditions for epistemological primacy; in which new empirical practices were being formed as reliable ways of creating and validating knowledge; and in which philosophical reflection and public argumentation sought to legitimize and institutionalize new and reformed empirical habits.

This volume is a contribution towards filling this gap. It explores one aspect of the development of empiricism which the traditional use of the term obscured: the keen interest in the body as both an *object* of research and an *instrument* of experience.

The need to re-embodiment our understanding of empiricism is enforced, to begin with, by empiricism’s patent indebtedness to the sciences of the body – medicine, physiology, natural history and chemistry. It is in those traditions that early modern savants could find paradigms of empirical inquiry which did not suffer from the low esteem accorded to artisanship. Indeed, a quick survey of the active members of the Royal Society reveals that many of them were physicians, and a significant number of those – disciples of William Harvey. Through Harvey’s tutelage, these physicians-virtuosi were inheritors of the empirical anatomy practices developed in Padua during the sixteenth century. Furthermore, the primary research interests of the early Royal Society were concentrated on the body, human and animal, and its functions – much more so than on the mechanics the Society is usually associated with. Similarly, the Académie des Sciences devoted a significant portion of its *Mémoires* to questions concerning life, reproduction and monsters, consulting empirical botanists, apothecaries and chemists. Directly contradicting its self-imposed mandate to investigate Nature in ‘proper’ mechanistic fashion, the Académie kept closer to experience than to the Cartesian standards of well-founded knowledge. ‘Empiricks’, throughout Europe and through the seventeenth century, were primary agents of ‘empiricism’.

As reflections on experience and the acquisition of knowledge by embodied, affective agents, meditations on ‘first philosophy’ and essays on ‘human understanding’

are closer to treatises on the passions, hysteria, the curing of fevers or vertigo, as well as to tracts on the construction and use of instruments, than they are to critiques of pure reason or proofs of the external world. Empiricism meant a new attention to the senses and their function from a physiological, practical and epistemological point of view, and all those were never far apart. The bold knowledge claims of new techniques and technologies of observation required justification, which was offered by the analysis of natural and instrumental perception and the relation between them. These optical, physiological and practical inquiries comprise much of the writings of early modern thinkers who are commonly read as pure, contemplative ‘philosophers’. Conversely, significant reflections on the epistemological ramifications of these inquiries are to be found in the most ‘scientific’ of early modern texts.

The papers in this volume are divided according to three perspectives on empiricism and the body. Part I comprises studies of the body as an object of inquiry. In these, empirical explorations of the human body are presented as exemplars and harbingers of early modern empirical practices. The opening paper by Harold Cook lays a claim for the power of ‘matters of fact’ in the advent of medical and scientific empiricism of the seventeenth century. This was not a change of ‘method’, he argues, advanced by the learned, but a takeover of the medical marketplace by practicing empiricks. Cynthia Klestinec looks at this change from the point of view of the medical student in Padua – the leading medical school at the turn of the century. New forms of experience, she shows, required and implied new forms of manual skills, from dissection to preparation, which called into question old divisions between public and private, learned and practical. Both the Paduan empirical medical tradition and the need to re-define the relations and hierarchy of the senses emerge in Alan Salter’s contribution. Salter reveals the experiential empiricism embedded in William Harvey’s work as deeply entrenched in contemporary representations of first-person experience, notably the ‘discourse of the senses’ of English poetry and drama of the period. Victor Boantzsa looks at the seventeenth century Parisian chemist and academician Samuel Duclos in order to stress how natural history in its chemical manifestations also affects our picture of empiricism: it emerged less metaphysics-free than its ideologists hoped. The role of ‘chymistry’ at the heart of early modern thought, whether discussions of substance, body or the program of natural philosophy itself, is also stressed in the following contribution. Peter Anstey presents Locke, the penultimate empiricist philosopher, as a chymical physician; an active pursuer of Helmontian chimiatic medicine.

But the body was not just an *object* of particular ‘sciences’ or ‘practices’, the examination of which colors our construct of ‘empiricism’ in new shades. It was also, as discussed in Part II, the primary *instrument* of empirical knowledge. It was not a transparent instrument at all: both the physiological function of the senses and their epistemological status as means of gathering knowledge presented an ongoing practical and intellectual challenge, with some surprisingly conclusions. As Ofer Gal and Raz Chen-Morris show, the advent of Kepler’s optics and Galileo’s telescope came at the expense of the trust in the human eye. The naturalization of vision implied the poverty of the human sense organ and the estrangement of the

human mind from its objects. Bacon's experimental investigations on the appetites of matter, as discussed by Guido Giglioni, did not at all serve the type of empiricism commonly associated with his philosophy. They implied inescapable subjectivity and necessitated ethical and political consideration of the mechanisms mediating knowledge and appetite in human societies. Mediation through memory presented another challenge to the empiricist project, which had to be met both practically and intellectually. The solution could be provided by the body, as Justin Smith shows in his study of John Bulwer's language of signs and gestures, but this kind of language, despite its apparent immediacy and universality, raised again the tension between nature and artifice associated with instruments of observation. Memory was a challenge and a locus of debate for any régime of sensation and self-possession, as Richard Yeo's paper demonstrates. It demanded the arrangement and condensation of material that Boyle's insistence on matter of facts could not allow but other advocates of Baconian natural history, like Beale and Hartlib, found necessary. The anxiety and wonder concerning knowledge by and of the body did not subside with the triumph of the New Science and its empiricism. Snait Gissis analyzes the interconnections between 'sensation', 'subjectivity' and biological science into the end of the Enlightenment with her discussion of Lamarck on sentiment. As her paper demonstrates, the empiricist approach to the senses continued to cast them as a source of unreliable, highly personal data demanding uncertain deciphering, rather than as neutral particulars to be accumulated inductively.

The embodied approach to the interpretation of empiricism does not turn attention away from the mind. As the contributions in Part III show, empiricist thought extended bodily consideration to all aspects of cognition and mental life. John Sutton attends precisely to embodied cognition in his discussion of inattention, 'mind-wandering' and restlessness in the medico-philosophical context of British Empiricism. Traditional history of philosophy but also, and even more emphatically its contemporary descendents, will seize on a 'concept' or 'problem' – be it personal identity, causality or free will – and extract it from its embedded context. Sutton, in contrast, returns to a richer 'local history', a history of mind-wandering, medicine, and moral physiology, of habit and body and brain. Lisa Shapiro's paper ventures farther into the heart of philosophical empiricism with a new analysis of Locke's account of our simple ideas. Essential to Locke's thought, she shows, and thus to that of sensationist thinkers such as Berkeley and Condillac, were his reflections on pleasure and pain, from which emerged an instrumental and immersed model of experience. Tobias Cheung extends this theme into Enlightenment psycho-physiological discourse with a reconstruction of Charles Bonnet's notion of 'embodied stimuli' in the context of organic models. In Cheung's analysis, Bonnet continues and transcends the work of French empiricists like Condillac by providing models of organic complexity which integrate physical, mental and sensory dimensions of experience. Anik Waldow challenges the primarily epistemological understanding of this 'stance' we have inherited from Kant, by pointing to the Galenic roots of empiricism. Empiricism, she claims, cannot be understood apart from its ever-present relation to skepticism. The volume concludes with Charles Wolfe's

reflections on medically motivated, indeed ‘vitalistic’ bases for empiricism in the early modern period as an embodied yet curiously non-experimental practice. There are many faces to empiricism, his contribution shows, and the mechanistic, gentlemanly, detached version is not the most important of them.

Some of the papers collected in this volume were discussed in a workshop on Embodied Empiricism conducted in February 2009 at the University of Sydney. The workshop, as well as the project on Early Modern Empiricism of which it was a part, has been supported by Australian Research Council grant DP0772706: *The Origins of Scientific Experimental Practices*. We would like to warmly thank Mariela Brozky, Antonio Clericuzio, Stephen Gaukroger, Snait Gissis, Dominic Murphy, Jessica Ratcliff, Justin Steinberg, Yi Zheng and especially Jennifer Tomlinson for their indispensable part in the success of the workshop and the collection.

References

- Shapin, Steven. 1994. *A Social History of Truth: Civility and Science in Seventeenth-Century England*. Chicago: University of Chicago Press.
- Sprat, Thomas. 1667. *The History of the Royal Society of London for the Improving of Natural Knowledge*. London: Printed by T. R. for J. Martyn and J. Allestry.