

**Michigan Technological University**

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**From the Selected Works of Steven Walton**

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Brenda J. Buchanan (Editor).  
Gunpowder, explosives, and the  
state: A technological history

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Available at: <https://works.bepress.com/steven-walton/16/>

Because of cognitive science's complex interdisciplinary structure, Boden's insider perspective on her field is invaluable. Owing to the field's numerous subdivisions, the circulation of important findings in unpublished working papers, and its members' practice of attending nonoverlapping conferences, it is no simple matter to track which places and contexts are the most important. One of the book's critical contributions is therefore its survey of the specific media forums in which cognitive science materials and debates initially emerged.

In seeking to explain how and why particular approaches received attention, Boden is also quite sensitive to the relevance of who the person associated with a particular approach was, the importance of writing style, and the location in which a new report was published. She explains, for instance, how certain connectionist ideas such as Hopfield nets received attention and acclaim because they were advanced by a physicist rather than by a psychologist (p. 940). Similarly, Boden notes how the idea of back propagation reached a wide audience via the Parallel Distributed Processing (PDP) handbook of David Rumelhart and Jay McClelland. Because of this work's design as a textbook and its accessible format, credit for back propagation was initially given to Rumelhart and McClelland, despite the fact that similar ideas had been proposed earlier (pp. 953–955).

Although Boden's perspective as an insider enables her to provide a detailed picture of the intellectual structure of cognitive science, it offers less help in explaining broader issues, including the relationship of cognitive science to other elements of the intellectual, political, and cultural world. For instance, Boden uses "countercultural" as an epithet with which to dismiss critics of positivism, empiricism, or cognitive science—unless those critics happen to have been fellow philosophers.

This book will be most useful to historians of science as a map of cognitive science. Because of its length and structure, many readers will be tempted to treat the text as a reference work, to be negotiated via the table of contents and the index. However, reading the book this way would undermine its argument for the interconnections among the various parts of cognitive science. *Mind as Machine*, then, is not a buffet from which the reader may sample one or another dish. It is a seventeen-course sit-down meal.

JAMIE COHEN-COLE

**Brenda J. Buchanan** (Editor). *Gunpowder, Explosives, and the State: A Technological History*. Foreword by **Bert Hall**. xxiii + 425 pp., figs., tables, index. Burlington, Vt.: Ashgate, 2006. \$99.95 (cloth).

It is always surprising to discover that an area of scholarship has effectively been ignored when the subject matter is both commonplace and fundamentally important in geopolitics. Such is the case for the nontechnical study of something Francis Bacon called "obscure and inglorious" in his *Novum Organum* (1620): gunpowder. The obscurity of its origins and properties—where gunpowder was invented, how it came to Europe, whether it was independently rediscovered there, and especially why Europe rather than Asia turned it into a particularly deadly weapon—has of course been rehashed endlessly and has become so commonplace that it is simply explained and dismissed in precollegiate lectures. Surprisingly, though, a deeper understanding of its manufacture, trade, and status is hard to come by. The inglorious nature of gunpowder has hindered any wider and deeper appreciation of the substance until quite recently. In the late nineteenth century—just as it became a historical curiosity for military use—a number of scientists delved deeply into its chemical properties (but only partially exhausted that study), but sociocultural understanding of gunpowder has not effectively received its due until now.

Brenda Buchanan can rightly be said to be the doyen of academic gunpowder studies, on the basis of this and her previous edited collection, *Gunpowder: The History of an International Technology* (Bath, 1996), both of which bring together a diverse array of historical researchers in pursuit of a broader understanding of the topic. This volume collects nineteen essays, presented at various biennial conferences of the International Committee for the History of Technology in the last decade, into a very strong argument that gunpowder studies need not be shunned in academia as they have been. Gunpowder is as much an economic product as cotton, as much an industrial concern as iron and steel, and as politically crucial a national resource as shipbuilding ever was. In fact, this and its companion volume make a strong case that gunpowder may well have been more crucial, particularly to governments from the fifteenth to the nineteenth centuries, than these other commodities—perhaps even combined. Gunpowder was the linchpin without which empires would fall, trade would cease, and power would crumble; it was crucially, as Buchanan notes, "an invisible factor in the historical process" (p. 1).

*Gunpowder, Explosives, and the State* draws together an array of nineteen scholars from across the globe: Australia, India, and the United States, as well as the majority of the authors from Western Europe (curiously omitting any Germans; one school of thought there still subscribes to the idea of an independent Germanic invention of gunpowder). These scholars are in history and economics departments at universities, act as curators and conservators in museums, or are chemists and engineers from industry (mostly retired). As you might therefore imagine, the diversity of subject matter in the volume is impressive. It is organized into five sections: broadly based studies on the perception of gunpowder in various cultures over time, localized production studies (Venice, Portugal, and Sweden), technology transfer from Europe to developing countries in the eighteenth and nineteenth centuries (India, Brazil, Egypt, and the United States), technical studies of military applications of gunpowder (from gun making, cannon founding, and ballistics to the manufacture and testing of gunpowder itself), and a concluding section on twentieth-century developments of and from the black powder industry. The essays are all readable and stand well on their own; all are extremely well researched, and many rely on extensive archival and primary source research. Their very diversity, however, makes drawing out concise threads beyond the main topic difficult.

Gunpowder histories have generally been internalist in their prosecution, and this collection, although about much wider social, economic, and political factors, does not entirely divorce itself from that approach. Many articles are about either objects or scientific frameworks, and most authors are concerned with understanding gunpowder in a focused rather than synthetic manner. The triad of ingredients, markets, and technologies drives this book, so it is understandable that we must be reminded, yet again, of the chemical constituents of powder. Nonetheless, one longs for the day when gunpowder historians can speak more freely about sociopolitical factors without potentially alienating readers with talk of chemical ingredients (you would not expect to be lectured on the species of cotton plant or the bending stress in ships' masts in books on the antebellum South or the Royal Navy, so why do gunpowder historians feel the need to remind us of "optimal" saltpeter-charcoal-sulfur compositions and other technical details?). Still, the volume works well at showing how different countries adapted to gunpowder production and trade in different ways, and it rather obliquely tackles ideas of

colonialism and capitalism (these could be foregrounded if the authors chose to do so) in these engaging stories about the periphery of Europe and its outposts. In the end, though, it is this curious tension between the science of gunpowder and the geopolitical impact it has had that makes the book valuable. Although the essays are too diverse to bring clear closure to any study of either the science or the impact of gunpowder, Buchanan's edited volume goes a long way to rescue the study of gunpowder "from the academic limbo of the unfashionable" (p. ii).

STEVEN A. WALTON

**Michael J. Crowe.** *Mechanics from Aristotle to Einstein*. xxii + 331 pp., illus., bibl., index. Santa Fe, N.M.: Green Lion Press, 2007. \$17.95 (paper).

The gradual unraveling of the mystery of motion makes as fascinating a story as the Copernican revolution or the rise of the theory of evolution. The story begins with Aristotle, who gave the first systematic accounts of motion and gravity and who made the first formal attempts to grapple with the mathematics of time, distance, and speed. Galileo, for his part, overturned Aristotle's principles of motion, establishing in his new science of motion the law of free fall, which, along with a rudimentary principle of inertia, enabled him to prove the parabolic trajectory of projectiles. Then, from three laws of motion (which subsumed the theory of the simple machines and Galileo's new science of motion), Newton developed a general theory of the motions of bodies acted on by forces, applied it to the cosmos to demonstrate universal gravitation, and explained in the process the motion of planets, comets, tides, and much else. The story culminates in Einstein, who reconciled the principle of relativity with the invariance of the speed of light by dissolving Newton's absolute time and space; the resulting time-space continuum, curved by gravitational fields, united accelerated and gravitational motion in the general theory of relativity. Despite the title, then, this book is not a general history of mechanics but treats only that part concerned with gravitational, inertial, and projectile motion. It should also be noted that, for most of the period from Aristotle to Einstein, "motions and tendencies to motions in material bodies"—as "mechanics" is defined on page 1—fell to natural philosophy, not mechanics.

Three different sorts of readers are addressed in *Mechanics from Aristotle to Einstein*: undergrad-