

Passive Elec Oil Sensor Krautli

This book is open access under a CC BY-NC 2.5 license. On April 22, 1915, the German military released 150 tons of chlorine gas at Ypres, Belgium. Carried by a long-awaited wind, the chlorine cloud passed within a few minutes through the British and French trenches, leaving behind at least 1,000 dead and 4,000 injured. This chemical attack, which amounted to the first use of a weapon of mass destruction, marks a turning point in world history. The preparation as well as the execution of the gas attack was orchestrated by Fritz Haber, the director of the Kaiser Wilhelm Institute for Physical Chemistry and Electrochemistry in Berlin-Dahlem. During World War I, Haber transformed his research institute into a center for the development of chemical weapons (and of the means of protection against them). Bretislav Friedrich and Martin Wolf (Fritz Haber Institute of the Max Planck Society, the successor institution of Haber's institute) together with Dieter Hoffmann, Jürgen Renn, and Florian Schmaltz (Max Planck Institute for the History of Science) organized an international symposium to commemorate the centenary of the infamous chemical attack. The symposium examined crucial facets of chemical warfare from the first research on and deployment of chemical weapons in WWI to the development and use of chemical warfare during the century hence. The focus was on scientific, ethical, legal, and political issues of chemical weapons research and deployment — including the issue of dual use — as well as the ongoing effort to control the possession of chemical weapons and to ultimately achieve their elimination. The volume consists of papers presented at the symposium and supplemented by additional articles that together cover key aspects of chemical warfare from 22 April 1915 until the summer of 2015.

This book is divided into two sections. The first section is concerned with the emergence and expansion of a form of mechanical knowledge defined by us as pre-classical mechanics. The definition purports to the period roughly between the 15th and the 17th century, before classical mechanics was formulated as a coherent and comprehensive mechanical theory in the sequel of Newton's work. The investigation of problems that were isolated from each other at the time but cohered into some kind of stable broad intellectual framework characterizes pre-classical mechanics. The second section is dedicated to specific case studies that present the application of a pre-classical framework to determined problems and to the investigation of specific natural phenomena. It consists of five case studies that illustrate in detail a reconstruction of pre-classical mechanics in particular constellations. Early modern theoretical, technical and social contexts transformed ancient and medieval mechanical knowledge in the course of its transmission.

Why has it taken so long to make computers work for the museum sector? And why are museums still having some of the same conversations about digital technology that they began back in the late 1960s? Does there continue to be a basic 'incompatibility' between the practice of the museum and the functions of the computer that explains this disconnect? Drawing upon an impressive range of professional and theoretical sources, this book offers one of the first substantial histories of museum computing. Its ambitious narrative attempts to explain a series of essential tensions between curatorship and the digital realm. Ultimately, it reveals how through the emergence of standards, increased coordination, and celebration (rather than fearing) of the 'virtual', the sector has experienced a broadening of participation, a widening of creative horizons and, ultimately, has helped to define a new cultural role for museums. Having confronted and understood its past, what emerges is a museum transformed – rescripted, re calibrated, rewritten, reorganised.

In 1984, Noel Swerdlow and Otto Neugebauer argued that Nicolaus Copernicus (1473–1543) explained planetary motion by using mathematical devices and astronomical models originally developed by Islamic astronomers in the thirteenth and fourteenth centuries. Was this a parallel development, or did Copernicus somehow learn of the work of his predecessors, and if so, how? And if Copernicus did use material from the Islamic world, how then should we understand the European context of his innovative cosmology? Although Copernicus's work has been subject to a number of excellent studies, there has been little attention paid to the sources and diverse cultures that might have inspired him. Foregrounding the importance of interactions between Islamic and European astronomers and philosophers, *Before Copernicus* explores the multi-cultural, multi-religious, and multi-lingual context of learning on the eve of the Copernican revolution, determining the relationship between Copernicus and his predecessors. Essays by Christopher Celenza and Nancy Bisaha delve into the European cultural and intellectual contexts of the fifteenth century, revealing both the profound differences between "them" and "us," and the nascent attitudes that would mark the turn to modernity. Michael Shank, F. Jamil Ragep, Sally Ragep, and Robert Morrison depict the vibrant and creative work of astronomers in the Christian, Islamic, and Jewish worlds. In other essays, Rivka Feldhay, Raz Chen-Morris, and Edith Sylla demonstrate the importance of shifting outlooks that were critical for the emergence of a new worldview. Highlighting the often-neglected intercultural exchange between Islam and early modern Europe, *Before Copernicus* reimagines the scientific revolution in a global context.

UMTA-ITBest of Both WorldsMuseums, Libraries, and Archives in the Digital AgeSmithsonian Books

Testing Hearing: The Making of Modern Aurality argues that the modern cultural practices of hearing and testing have emerged from a long interrelationship. Since the early nineteenth century, auditory test tools (whether organ pipes or electronic tone generators) and the results of hearing tests have fed back into instrument calibration, human training, architecture, and the creation of new musical sounds. Hearing tests received a further boost around 1900 as a result of injury compensation laws and state and professional demands for aptitude testing in schools, conservatories, the military, and other fields. Applied at large scale, tests of seemingly small measure-of auditory acuity, of hearing range-helped redefine the modern concept of hearing as such. During the twentieth and twenty-first centuries, the epistemic function of hearing expanded. Hearing took on the dual role of test object and test instrument; in the latter case, human hearing became a gauge by which to evaluate or regulate materials, nonhuman organisms, equipment, and technological

systems. This book considers both the testing of hearing and testing with hearing to explore the co-creation of modern epistemic and auditory cultures. The book's twelve contributors trace the design of ever more specific tests for the arts, education and communication, colonial and military applications, sociopolitical and industrial endeavors. Together, they demonstrate that testing as such became an enduring and wide-ranging cultural technique in the modern period, one that is situated between histories of scientific experimentation and many fields of application.

Across early modern Europe, men and women from all ranks gathered medical, culinary, and food preservation recipes from family and friends, experts and practitioners, and a wide array of printed materials. Recipes were tested, assessed, and modified by teams of householders, including masters and servants, husbands and wives, mothers and daughters, and fathers and sons. This much-sought know-how was written into notebooks of various shapes and sizes forming "treasuries for health," each personalized to suit the whims and needs of individual communities. In *Recipes and Everyday Knowledge*, Elaine Leong situates recipe knowledge and practices among larger questions of gender and cultural history, the history of the printed word, and the history of science, medicine, and technology. The production of recipes and recipe books, she argues, were at the heart of quotidian investigations of the natural world or "household science". She shows how English homes acted as vibrant spaces for knowledge making and transmission, and explores how recipe trials allowed householders to gain deeper understandings of sickness and health, of the human body, and of natural and human-built processes. By recovering this story, Leong extends the parameters of natural inquiry and productively widens the cast of historical characters participating in and contributing to early modern science. *The Structures of Practical Knowledge* investigates the nature of practical knowledge – why, how, when and by whom it is codified, and once codified, how this knowledge is structured. The inquiry unfolds in a series of fifteen case studies, which range in focus from early modern Italy to eighteenth century China. At the heart of each study is a shared definition of practical knowledge, that is, knowledge needed to obtain a certain outcome, whether that be an artistic or mechanical artifact, a healing practice, or a mathematical result. While the content of practical knowledge is widely variable, this study shows that all practical knowledge is formally equivalent in following a defined workflow, as reflected in a construction procedure, a recipe, or an algorithm. As explored in the volume's fifteen contributions, there are three levels at which structures of practical knowledge may be understood and examined. At the most immediate level, there are the individual workflows that encompasses practical knowledge itself. Probing further, it is possible to examine the structure of practical knowledge as it is externalized and codified in texts, drawings, and artifacts such as models. Finally, practical knowledge is also related to social structures, which fundamentally determine its dissemination and evolution into new knowledge structures. The social structures of professionals and institutions represent the critical means by which practical knowledge takes form. These actors are the agents of codification, and by means of selection, appropriation, investment, and knowledge development, they determine the formation of new structures of practical knowledge. On a more abstract level, the creation of new knowledge structures is understood as constituting the basis for the further development of scientific knowledge. Rich in subject matter and incisive in the theory it lays out, this volume represents an important contribution to the history of science and epistemology. Individually, the fifteen case studies – encompassing the history of architecture, mining, brewing, glass production, printing, ballistics, mechanics, cartography, cosmology and astronomy – are replete with original research, and offer new insights into the history of science. Taken together, the contributions remodel historical epistemology as a whole, elucidating the underlining knowledge structures that transcend disciplinary boundaries, and that unite practitioners across time and space.

New Museum Theory and Practice is an original collection of essays with a unique focus: the contested politics and ideologies of museum exhibition. Contains 12 original essays that contribute to the field while creating a collective whole for course use.

Discusses theory through vivid examples and historical overviews. Offers guidance on how to put theory into practice. Covers a range of museums around the world: from art to history, anthropology to music, as well as historic houses, cultural centres, virtual sites, and commercial displays that use the conventions of the museum. Authors come from the UK, Canada, the US, and Australia, and from a variety of fields that inform cultural studies.

Life Configurations focuses on the analysis and reflection on the various forms in which human beings imagine, design, conjecture, and plan their "becoming", that is to say their lives. Case studies written by an interdisciplinary circle of well-known academics explore how the capacity of designing life, the concept of free will, and the methods to calculate the future have been changed and adopted in different societies and in different ages.

The notion of Endangerment stands at the heart of a network of concepts, values and practices dealing with objects and beings considered threatened by extinction, and with the procedures aimed at preserving them. Usually animated by a sense of urgency and citizenship, identifying endangered entities involves evaluating an impending threat and opens the way for preservation strategies. *Endangerment, Biodiversity and Culture* looks at some of the fundamental ways in which this process involves science, but also more than science: not only data and knowledge and institutions, but also affects and values. Focusing on an "endangerment sensibility," it encapsulates tensions between the normative and the utilitarian, the natural and the cultural. The chapters situate that specifically modern sensibility in historical perspective, and examine central aspects of its recent and present forms. This timely volume offers the most cutting-edge insights into the Environmental Humanities for researchers working in Environmental Studies, History, Anthropology, Sociology and Science and Technology Studies.

First published in 1922 and based on lectures delivered in May 1921, Albert Einstein's *The Meaning of Relativity* offered an overview and explanation of the then new and controversial theory of relativity. The work would go on to become a monumental classic, printed in numerous editions and translations worldwide. Now, *The Formative Years of Relativity* introduces Einstein's masterpiece to new audiences. This beautiful volume contains Einstein's insightful text, accompanied by important historical materials and commentary looking at the origins and development of general relativity. Hanoach Gutfreund and Jürgen Renn provide fresh, original perspectives, placing Einstein's achievements into a broader context for all readers. In this book, Gutfreund and Renn tell the rich story behind the early reception, spread, and consequences of Einstein's ideas during the formative years of general relativity in the late 1910s and 1920s. They show that relativity's meaning changed radically throughout the nascent years of its development, and they describe in detail the transformation of Einstein's work from the esoteric pursuit of one individual communicating with a handful of colleagues into the preoccupation of a growing community of physicists, astronomers, mathematicians, and philosophers. This handsome edition quotes extensively from Einstein's correspondence and reproduces historical documents such as newspaper articles and letters. Inserts are featured in the main text giving concise explanations of

basic concepts, and short biographical notes and photographs of some of Einstein's contemporaries are included. The first-ever English translations of two of Einstein's popular Princeton lectures are featured at the book's end.

A fundamentally new approach to the history of science and technology This book presents a new way of thinking about the history of science and technology, one that offers a grand narrative of human history in which knowledge serves as a critical factor of cultural evolution. Jürgen Renn examines the role of knowledge in global transformations going back to the dawn of civilization while providing vital perspectives on the complex challenges confronting us today in the Anthropocene—this new geological epoch shaped by humankind. Renn reframes the history of science and technology within a much broader history of knowledge, analyzing key episodes such as the evolution of writing, the emergence of science in the ancient world, the Scientific Revolution of early modernity, the globalization of knowledge, industrialization, and the profound transformations wrought by modern science. He investigates the evolution of knowledge using an array of disciplines and methods, from cognitive science and experimental psychology to earth science and evolutionary biology. The result is an entirely new framework for understanding structural changes in systems of knowledge—and a bold new approach to the history and philosophy of science. Written by one of today's preeminent historians of science, *The Evolution of Knowledge* features discussions of historiographical themes, a glossary of key terms, and practical insights on global issues ranging from climate change to digital capitalism. This incisive book also serves as an invaluable introduction to the history of knowledge.

This book presents a novel methodology to study economic texts. The author investigates discrepancies in these writings by focusing on errors, mistakes, and rounding numbers. In particular, he looks at the acquisition, use, and development of practical mathematics in an ancient society: The Old Babylonian kingdom of Larsa (beginning of the second millennium BCE Southern Iraq). In so doing, coverage bridges a gap between the sciences and humanities. Through this work, the reader will gain insight into discrepancies encountered in economic texts in general and rounding numbers in particular. They will learn a new framework to explain error as a form of economic practice. Researchers and students will also become aware of the numerical and metrological basis for calculation in these writings and how the scribes themselves conceptualized value. This work fills a void in Assyriological studies. It provides a methodology to explore, understand, and exploit statistical data. The analysis also fills a void in the history of mathematics by presenting historians of mathematics a method to study practical texts. In addition, the author shows the importance mathematics has as a tool for ancient practitioners to cope with complex economic processes. This serves as a useful case study for modern policy makers into the importance of education in any economy. The theory which is sketched in the following pages forms the most wide-going generalization conceivable of what is at present known as "the theory of Relativity;" this latter theory I differentiate from the former "Special Relativity theory," and suppose it to be known. The generalization of the Relativity theory has been made much easier through the form given to the special Relativity theory by Minkowski, which mathematician was the first to recognize clearly the formal equivalence of the space like and time-like co-ordinates, and who made use of it in the building up of the theory. The mathematical apparatus useful for the general relativity theory, lay already complete in the "Absolute Differential Calculus", which were based on the researches of GAUSS, RIEMANN and CHRISTOFFEL on the non-Euclidean manifold, and which have been shaped into a system by RICCI and LEVI-CIVITA, and already applied to the problems of theoretical physics. I have in part B of this communication developed in the simplest and clearest manner, all the supposed mathematical auxiliaries, not known to Physicists, which will be useful for our purpose, so that, a study of the mathematical literature is not necessary for an understanding of this paper. Finally in this place I thank my friend GROSSMANN, by whose help I was not only spared the study of the mathematical literature pertinent to this subject, but who also aided me in the researches on the field equations of gravitation.

Wayne Clough, Secretary of the Smithsonian Institution, asks "How can we prepare ourselves to reach the generation of digital natives who bring a huge appetite—and aptitude—for the digital world?" He explains how the Smithsonian is tackling this issue in *Best of Both Worlds: Museums, Libraries, and Archives in a Digital Age*. Libraries and archives have already made many documents available through the Internet. The digital world presents a bigger challenge for museums; producing images of 3D objects is more complicated, and collections are built with exhibitions in mind rather than open access on computers. In 2009, the Smithsonian began digitizing its vast collections to make them accessible to the millions of people who do not visit the museums in person. "Digital access can provide limitless opportunities for engagement and lifelong learning." Clough sees museums gradually moving beyond showcasing collections to engaging the public online so "visitors" can access the objects they find most interesting. Education has always been at the core of the Smithsonian. Today, the Smithsonian offers materials and lesson plans that meet state standards for K–12 curricula; online summits on many diverse subjects; the Collections Search Center website; and apps. The Smithsonian's website, www.seriouslyamazing.com, draws people in with fun questions and then takes them deeper into the subject. The question "What European colonizer is still invading the U.S. today?" reveals not only the answer—earthworms—but also in-depth info on worms from environmental researchers. Clough concludes with this thought: "While digital technology poses great challenges, it also offers great possibilities."

This collective volume in the history of early-modern science and medicine investigates the transfer of knowledge between Germany and Scotland focusing on the Scottish mathematician and physician Duncan Liddel of Aberdeen.

Working with Paper builds on a growing interest in the materials of science by exploring the gendered uses and meanings of paper tools and technologies, considering how notions of gender impacted paper practices and in turn how paper may have structured knowledge about gender. Through a series of dynamic investigations covering Europe and North America and spanning the early modern period to the twentieth century, this volume breaks new ground by examining material histories of paper and the gendered worlds that made them. Contributors explore diverse uses of paper—from healing to phrenological analysis to model making to data processing—which often occurred in highly gendered, yet seemingly divergent spaces, such as laboratories and kitchens, court rooms and boutiques, ladies' chambers and artisanal workshops, foundling houses and colonial hospitals, and college gymnasiums and state office buildings. Together, they reveal how notions of masculinity and femininity became embedded in and expressed through the materials of daily life. *Working with Paper* uncovers the intricate negotiations of power and difference underlying epistemic practices, forging a material history of knowledge in which quotidian and scholarly practices are intimately linked.

This book examines the transmission processes of the Aristotelian *Mechanics*. It does so to enable readers to appreciate the value of the treatise based on solid knowledge of the principles of the text. In addition, the book's critical examination helps clear up many of the current misunderstandings about the transmission of the text and the diagrams. The first part of the book sets out the Greek manuscript tradition of the *Mechanics*, resulting in a newly established stemma codicum that illustrates the affiliations of the manuscripts. This research has led to new insights into the transmission of the treatise, most importantly, it also demonstrates an urgent need for a new text. A first critical edition of the diagrams contained in the Greek manuscripts of the treatise is also presented. These diagrams are not only significant for a reconstruction of the text but can also be considered as a commentary on the text. Diagrams are thus revealed to be a powerful tool in studying processes of the transfer and transformation of knowledge. This becomes especially relevant when the manuscript diagrams are compared with those in the printed editions and in commentaries from the early modern period. The final part of the book shows that these early modern diagrams and images reflect the altered scope of the mechanical discipline in the sixteenth century.

Studies 1 of the Max Planck Research Library for the History and Development of Knowledge.

This book explores how Pugwash scientists established a role in conflict moderation, what held this project together and how state actors in East and West perceived their efforts, complicating existing narratives about "Pugwash" and challenging notions about the naivety of scientists.

This outstanding and highly original study examines the history of collecting in early modern Europe, and describes the myriad treasures, from paintings and antiques to religious relics, that found their way into the private collections and public museums of the time. The author looks at the types of people who formed collections, from the harmless eccentrics to the wily speculators, and examines what they collected and why. He develops a historical anthropology of collecting and sheds new light upon the genesis of the modern museum. Pomian charts the changes in fashion which characterised the world of collecting, arguing that such shifts can be seen as a sign of wider and more profound changes in mentality and can be analysed in terms of a conflict between aesthetic and historical sensibilities.

This monograph investigates the development of hydrostatics as a science. In the process, it sheds new light on the nature of science and its origins in the Scientific Revolution. Readers will come to see that the history of hydrostatics reveals subtle ways in which the science of the seventeenth century differed from previous periods. The key, the author argues, is the new insights into the concept of pressure that emerged during the Scientific Revolution. This came about due to contributions from such figures as Simon Stevin, Pascal, Boyle and Newton. The author compares their work with Galileo and Descartes, neither of whom grasped the need for a new conception of pressure. As a result, their contributions to hydrostatics were unproductive. The story ends with Newton insofar as his version of hydrostatics set the subject on its modern course. He articulated a technical notion of pressure that was up to the task. Newton compared the mathematical way in hydrostatics and the experimental way, and sided with the former. The subtleties that lie behind Newton's position throws light on the way in which developments in seventeenth-century science simultaneously involved mathematization and experimentation. This book serves as an example of the degree of conceptual change that new sciences often require. It will be of interest to those involved in the study of history and philosophy of science. It will also appeal to physicists as well as interested general readers.

"This Supplement builds on a burgeoning body of research that approaches the archive not merely as the object, but also as the subject of enquiry. It explores the phenomenon of record keeping in the early modern period in the context of significant ecclesiastical, political, intellectual and cultural developments that served as a stimulus to it: state formation, religious reformation, and economic transformation; the advent of the mechanical press, the spread of educational opportunity, and the expansion of literacy; changing epistemological conventions, shifting attitudes towards history and memory, and new modes of self-representation. Focusing attention on the impulses behind the surge in public and private documentation in Europe between 1500 and 1800, the contributors to this volume place the processes by which individual, collective and institutional records were created, compiled, authorised, and used under the microscope. They examine the activities of curators and scribes, analyse the issues of credibility and authenticity to which their endeavours gave rise, and evaluate the role of textual, pictorial, material and financial records in managing knowledge and giving expression to senses of identity. Stretching traditional, technical definitions of the record and archive, they investigate how writing and document-making of various kinds was shaped by dynamic interactions between ordinary people and by the politics of everyday life. They also illuminate the multiple ways in which archives mediate and construct the past, preserving some traces of it for posterity while consigning others to oblivion."--

An annotated facsimile edition of Einstein's handwritten manuscript on the foundations of general relativity This richly annotated facsimile edition of "The Foundation of General Relativity" introduces a new generation of readers to Albert Einstein's theory of gravitation. Written in 1915, this remarkable document is a watershed in the history of physics and an enduring testament to the elegance and precision of Einstein's thought. Presented here is a beautiful facsimile of Einstein's original handwritten manuscript, along with its English translation and an insightful page-by-page commentary that places the work in historical and scientific context. Hanoch Gutfreund and Jürgen Renn's concise introduction traces Einstein's intellectual odyssey from special to general relativity, and their essay "The Charm of a Manuscript" provides a delightful meditation on the varied afterlife of Einstein's text. Featuring a foreword by John Stachel, this handsome edition also includes a biographical glossary of the figures discussed in the book, a comprehensive bibliography, suggestions for further reading, and numerous photos and illustrations throughout.

The contributions to this volume enter into a dialogue about the routes, modes and institutions that transferred and transformed knowledge across the late antique Mediterranean and the Persian Gulf. Each contribution not only presents a different case study but also investigates a different type of question, ranging from how history-writing drew on cross-culturally constructed stories and shared sets of skills and values, to how an ancient warlord was transformed into the iconic hero of a newly created monotheistic religion. Between these two poles, the emergence of a new, knowledge-related, but market-based profession in Baghdad is discussed, alongside the long-distance transfer of texts, doctrines and values within a religious minority community from the shores of the Caspian Sea to the mountains of the southern Arabian Peninsula. The authors also investigate the outsourcing of military units and skills across religious and political boundaries, the construction of cross-cultural knowledge of the balance through networks of scholars, patrons, merchants and craftsmen, as well as differences in linguistic and pharmaceutical practices in mixed cultural environments for shared corpora of texts, drugs and plants.

Lori Emerson examines how interfaces—from today's multitouch devices to yesterday's desktops, from typewriters to Emily Dickinson's self-bound fascicle volumes—mediate between writer and text as well as between writer and reader. Following the threads of experimental writing from the present into the past, she shows how writers have long tested and transgressed technological boundaries. Reading the means of production as well as the creative works they produce, Emerson demonstrates that technologies are more than mere tools and that the interface is not a neutral border between writer and machine but is in fact a collaborative creative space. Reading Writing Interfaces begins with digital literature's defiance of the alleged invisibility of ubiquitous computing and multitouch in the early twenty-first century and then looks back at the ideology of the user-friendly graphical user interface that emerged along with the Apple Macintosh computer of the 1980s. She considers poetic experiments with and against the strictures of the typewriter in the 1960s and 1970s and takes a fresh look at Emily Dickinson's self-printing projects as a challenge to the coherence of the book. Through archival research, Emerson offers examples of how literary engagements with screen-based and print-based technologies have transformed reading and writing. She reveals the ways in which writers—from Emily Dickinson to Jason Nelson and Judd Morrissey—work with and against media interfaces to undermine the assumed transparency of conventional literary practice.

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