enthusiasm for the traditional, in his discussion of war art in particular, and almost in contradiction of his thesis, he supports the modern. In so doing, he is reiterating the interpretations put forward by authors such as Modris Eksteins, from whose conclusions he purports to differ, that the war saw the triumph of modernism. In discussing the art of the First World War, for example, Vance consistently asserts that only the modernist painters could capture the horror of modern warfare. The distinguished artist, J. W. Beatty, is dismissed as a landscape artist lacking the appropriate vocabulary for depicting battle. Arthur Lismer's and A. Y. Jackson's criticisms of traditional war art are also quoted to support the value of the modern and to dismiss that of the traditional. Their views, however, are not put in context. As nascent proselytizers of modern art in Canada, how could they have been anything but derogatory of its traditional cousin?

The above observations highlight one of the problems facing historians who chart a course through waters that ebb and flow through many discrete disciplines of research. The enormous expansion in the university world in the past thirty years in Canada has produced a commensurately huge body of research. Combine this with thirty years of generously funded archival practice, the wonders of microfilm, and other technological innovations, and the ability to amass material becomes formidably achievable. It is not always possible, however, to digest this material as thoroughly, and it would seem that his study would have benefited from a more critical analysis of the sources. If these concerns about Vance's use of war art apply to other material, concern naturally arises in regard to other areas. This should not, however, detract from the volume's unquestionable significance in shedding new light on a well-known period of history, and on an evolving topic of historical debate.

Alfred W. Crosby, The Measure of Reality: Quantification and Western Society, 1250–1600

RANDALL C. BROOKS

Crosby, Alfred W. *The Measure of Reality: Quantification and Western Society, 1250–1600.* Cambridge, New York and Melbourne: Cambridge University Press, 1997. xii + 245 pp., 19 illus., cloth, US$24.95, ISBN 0-521-55427-6.

There is always a danger in reviewing a book immediately after having read a particularly fine work. The book I was reading covered a similar period to Crosby's. This was Edward Grant's *Planets, Stars and Orbs: The Medieval Cosmos, 1200–1687*, a masterpiece of research, analysis and thought, and the culmination of forty years of original scholarly effort.

At the same time, a colleague also drew my attention to a paper by Richard Sorrenson, "The Ship as a Scientific Instrument in the Eighteenth Century."[1] This elicited an image of two Aristotelians philosophizing on cosmogony and the relative positions of the Earth and Sun — exactly the type of "science" Galileo so disdained. As amusing as Sorrenson's idea may be as a thought exercise, it is not based in reality. Likewise, I found Crosby's thesis provides an interesting perspective but one that fails under scrutiny.

What is Crosby's hypothesis? Quoting the dust jacket, "*The Measure of Reality* discusses the epochal shift from qualitative to quantitative perception in Western Europe during the late Middle Ages and Renaissance. This shift made modern science, technology, business practice, and bureaucracy possible. It affected not only the obvious — such as measurements of time and space and mathematical technique — but, equally and simultaneously, music and painting, thus proving that the shift was even more profound than once thought." Crosby further postulates that it was the European "utilization of thought that would in time enable them to advance swiftly in science and technology and, in the meantime, gave them decisively important administrative, commercial, navigational, industrial, and military skills."[2]

Crosby, a professor at the University of Texas, believes that Western societies have excelled because of the way we have come to process information, and that the achievements of non-Western and preceding societies were limited because they did not have the required thought and analytical skills associated with measurement. For historians who have argued that our

achievements are based on the works and discoveries of our predecessors, Crosby's ideas will be difficult to accept.

There is a fundamental flaw in his theory. Contrary to Crosby's hypothesis, previous societies were concerned with measurement and its application in various ways. The fact that we still use 360 degrees, 60-minute hours (Babylonian), the Pythagorean theorem, or still have institutions like Tholos[3] (Greek), the Julian calendar (Roman) or the number 0 (Indian) reflects our reliance on the innovative minds of civilizations who have discovered, applied and subsequently influenced those who followed. Each of the above concepts reflects a civilization's interest in measurement in science, technology or business.

Similarly, building on the observational knowledge of the Babylonians, of Hipparchus and Ptolemy and as passed on by the Arabs, the influence on Roger Bacon, Filippo Brunelleschi, Nikolaus Copernicus, Leonardo da Vinci, Tycho Brahe, Giordano Bruno, Johannes Kepler and Galilei Galileo and their followers cannot be underestimated. Much of this book, especially those sections dealing with science and mathematics, travels well-worn roads relating events, individuals and discoveries that are common to existing history of science and technology. However, in concert with this one cannot, despite the reactionary stance of the institution, discount the impact of the Church in the evolution of societal thinking. A most profound influence of the Church was its educational system and libraries developed in support of their clergy. These, along with the emerging universities, provided a widening class of individuals with analytical skills to advance every aspect of human endeavour. One only has to look at other civilizations, such as the Greek and Chinese, to understand the influence of education and to find a pace of advancement that parallels the level of mass education in the past 150 years.

Crosby argues in the preface that "Cyrus the Great, Alexander the Great, Genghis Khan, and Huahna Capac were great conquerors, but they were all confined to no more than one continent and at best a wedge of a second. They were homebodies compared with Queen Victoria, on whose empire ... the sun literally never set." Well, Alexander travelled and conquered in three continents, Genghis Khan in two, while Queen Victoria never left Britain! The scale of the British Empire reflects the skills of successive generations of shipbuilders, astronomers and navigators building on measured and empirical knowledge passed from Greeks, to Romans, to Arabs, and so on. The temporal influence on world affairs of the British stretched from 1588 to, being generous, the Second World War — truly a mere "wedge of a second" compared to the two or three millennia of the Egyptian or Chinese civilizations.

Crosby also states that, "Every big city taxed themselves severely in order to have at least one clock, which in their first century or so were huge, usually set in towers, and were very expensive. It may be that no complicated machine in the entire history of technology before the seventeenth century spread so rapidly as the clock."[4] Clocks were *the* community status symbol, replacing public sundials. Second, they were large for technical reasons — tools and skills did not yet exist to make them sufficiently accurate in smaller scale. Aside from a few exceptional astronomical clocks, these early clocks most often only had hour hands; minute hands were frequently missing until the eighteenth century both because of poor accuracy and lack of need.

I cannot criticize the sections on music, art and bookkeeping with any depth of knowledge but I can point out a couple of problems. The section on music begins with a quote from Kepler. This otherwise scientifically astute gentleman is, and was, considered a crackpot for having tried to marry the motion of the planets to the "harmonies" of musical scales. This is not a scientist I would choose to associate advancement of music as influenced by measurement. Referring to writings of Giovanni Tortelli, Crosby implies that the pipe organ was invented not long before 1450.[5] In fact, the organ is of Roman origin, ca 250 BC, and is recorded in writings ca 120 BC.

On art, I might venture to observe that one or two artists can have a profound influence on the style for a period. But was the style of the individual artist a result of a preoccupation with measurement? In the case of Leonardo, yes, because he was also an engineer and architect. He worked on Brunelleschi's magnificent Duomo in Florence, and measurement and innovation were certainly a prerequisite for its construction. Measurement was the by-product of engineering necessity, but the intention behind the Duomo was to impress surrounding city-states, and to glorify God. Other artists were not so directly influenced by measurement, but they imitated Leonardo's techniques and hence his use of measurement.

Will Crosby's premise that measurement was a driving force for the advancement of spacial constructs, time keeping, mathematics, music,

art and bookkeeping displace or revise conventional thinking? I suspect not. Western society did not just drift into the mental state he suggests. Rather, a few exceptional individuals exercised a profound influence over other thinkers, practitioners and society as a whole. Certainly measurement was part of the foundation of the scientific revolution, but this went hand in hand with inquisitive minds. Measurement was the tool of enquirers like Galileo.

NOTES

1. Osiris, 2nd series, 11 (1996): 221–236.
2. Crosby, xi.
3. The Tholos in Athens was the equivalent of our Institute of National Measurement Standards or Industry Canada's Legal Metrology group. Merchants were required to take their weights and measures to the Tholos for comparison with the approved standards.
4. Crosby, 84.
5. Ibid., 95.

Barrie Trinder, *The Industrial Archaeology of Shropshire*

R. JOHN CORBY

Trinder, Barrie. *The Industrial Archaeology of Shropshire*. Chichester, England: Phillimore & Co. Ltd, 1996. 278 pp., 215 illus., cloth, £25, ISBN 0-85033-989-8.

Shropshire is England's largest inland county. Long noted for its bucolic delights and as the "green lung" of the West Midlands, it has of recent years become more widely known as the "cradle of the Industrial Revolution," to use a somewhat hackneyed expression. In 1709 at Coalbrookdale in the Severn Valley, Abraham Darby discovered that coke could be used in lieu of charcoal for the smelting of iron ore, thus freeing ironmasters from the use of an increasingly scarce resource: the economic and social changes wrought by this pivotal event have continued to the present day. Industrial activity in the area slowly declined after the Second World War, but the decision of the government in the late 1950s to establish the new town of Telford led to the creation of the Ironbridge Gorge Museum Trust to protect and interpret the extensive remains lining the banks of the Severn River. In 1973 these efforts were rewarded by the designation of the complex as a UNESCO World Heritage site.

Dr. Barrie Trinder, a teacher and scholar, was very much involved with these events and has been a leader among those who have succeeded in elevating industrial archaeology (IA) to the status of a respected academic discipline from what had been previously regarded by some as the purview of eccentric hobbyists. With a long association with Shropshire and already the author of several books on various aspects of its industries, Dr. Trinder's latest work, *The Industrial Archaeology of Shropshire* — British usage adds the second "a" in archaeology — presents an eminently readable and concise overview of the subject that will appeal to the academic and interested layperson alike. From the opening pages one is immediately impressed with the amount of detail in the presentation, obviously the result of many years of study by Dr Trinder and his associates.

The book, though, is no mere catalogue. Rather than simply listing the individual remains of past activities, the author in his introduction emphasizes what he refers to as the "landscape" approach. He contends that the more notable sites and industries have already been exhaustively researched and publicized, citing as examples the Ditherington flax mill (1805), the world's first building framed with iron, and the Sentinal Wagonworks Co. Ltd., whose steam vehicles were a common sight on British roads in the interwar years. (One might note at this point a tenuous Canadian connection to this company: they supplied several self-propelled railcars to Newfoundland in the late 1920s.) Dr Trinder contends it is therefore time to restore some balance by identifying and studying the remains of rural industries and those in the smaller urban centres, how they were affected by changing technologies and economic conditions and what their contribution was to the development of the county as whole. He illustrates this by showing the influence of an industry on the location and design of housing for its workers, particularly in those communities that were company-sponsored.