

Chapter 1 : What was the impact of World War I in shaping the modern world?

The conflict of opposing world-views is not unique to our modern world. The Bible reveals a story of conflicting approaches to life from the very beginning. One of these ways was characterized by the Tree of Life, and the opposing way by the Tree of the Knowledge of Good and Evil.

Cultural historians necessarily deal in broad generalizations. Whatever is affirmed of a period, a people, or a nation, no matter how well-grounded by factual study and reflection, is subject to qualification. Exceptions to broad characterizations may always be found without mitigating the value of the broader insight. We grasp something when an author refers to the Greeks, to Roman civilization, to the Hellenic period, to Christendom, to the Benedictines, to the Renaissance, or to the Enlightenment. These designations, all generalizations formed by an examination of a host of particulars, indeed refer to something intelligible, something quite apart from the mind. There is always the danger of unscrupulous forces manipulating history for present purposes. Then, too, in the study of history there is always the propensity to judge the past in the light of contemporary categories of experience. With that caveat in mind, this essay purports to examine with the aid of a host of distinguished twentieth-century scholars the reciprocal influence of science and culture with particular attention to the role of religion at the birth of modern science. Detached narrative is rare, yet, for example, those acquainted with the life-long work and studied objectivity of Christopher Dawson are likely to give credence to his insight when he speaks of the great movement of thought which passed over the ancient world about the middle of the first millennium B. Similarly, Dawson is convincing when he writes that with the advent of Christ, "the Absolute and the Finite, God and the World were no longer conceived as two exclusive and opposed orders of being standing over and against one another in mutual isolation. The two orders interpenetrated one another. He makes a like generalization about the advent of modern science and its medieval antecedents. Scholars are nearly unanimous in recognizing that something dramatic occurred in the culture of Europe around the turn of the eleventh century. Explanations vary, with some emphasizing technological advancement, others the recovery of Greek learning, still others the practical influence of Christianity. Whitehead, it must be noted, was writing a generation before the in-depth studies of Marshall Claggett, A. Crombie, and Anneliese Maier, and before the monumental work of Pierre Duhem became available in English translation. Examining the relation between science and culture, Whitehead put to himself a fundamental question: That question has entered public consciousness again with the reemergence of militant Islam. Contemporary scholars in their attempt to understand an adversarial Islam ask why the scientific revolution that we associate with Europe bypassed Islam, when for centuries Islam was in many respects at the forefront of human civilization and achievement. Bernard Lewis, the noted Middle East scholar, pointedly asks, "What went wrong? Compared with its millennial rival, Christendom, the world of Islam had become poor, weak, and ignorant. The Arabs, Crombie relates, preserved and transmitted to medieval Europe a large body of Greek learning, adding to it to be sure, but what they added to its content was perhaps less important than the change they made in the conception and purpose for which science ought to be studied. The speculative or theoretical aspect of science interested them less than its application. In the judgment of Crombie, the most important and original contributions that the Arabs made to the history of European science were those of alchemy, magic, and astrology. This was due partly to the Arabic approach to the study of nature where power over nature, rather than rational explanation of fact, led enquirers to seek "the Elixir of Life," the magic properties of plants and minerals, instead of the causes of the properties of the things they experienced. Their first encounter with Greek learning came from the Syriac-speaking Nestorian Christians of eastern Persia. Under the Abbasid caliphs after , Muslims established contact with both Christians and Hellenized Persians. The Abbasid caliphs and other patrons of translating activity were primarily interested in works of immediate practical utility, that is, technical treatises on medicine, astrology, logic, and the mathematical sciences. Texts already available in Syriac, the language of the Nestorian Christian community, were translated into the Arabic. Works not available in Syriac were rendered directly from Greek into Arabic. Lindberg finds that the story of the transmissions of Greek learning to the West is largely a tale of individual scholars responding in personal ways to unique historical

circumstances. Yet there were important centers, such as Toledo and Palermo, where significant, if not cooperative, work was being done. In , for example, the provincial chapter of the Dominicans in Toledo sent eight friars to the studium arabicum in Tunis. By that time the works of Aristotle were diffused and understood throughout the Latin West. Interest in Aristotle was accompanied by interest in the philosophical works of the great speculative thinkers al-Kindi, al-Farabi, and Avicenna, all Persians. The most influential Arabic thinker of the period was undoubtedly Averroes ⁹⁸ , who was regarded as the interpreter of Aristotle par excellence and was frequently referred to simply as "the Commentator. There may have been some deficiency with respect to practice. But the idea never for a moment lost its grip. It was predominantly an epoch of orderly thought, rationalistic through and through. Equally important is the habit of definite and exact thought, which Whitehead attributes to the Greek philosophers, a legacy carried through the Middle Ages. Whitehead, in this passage, is less interested in the metaphysics that undergirds induction than he is in the impact of technological advance and the reciprocal influence of the theoretical and the practical. Benedict," he writes, "that the monasteries were the homes of practical agriculturalists, as well as saints, and artists, and men of learning. The alliance of science and technology, by which learning is kept in contact with irreducible and stubborn facts, owes much to the practical bent of the early Benedictines. Modern science derives from Rome as well as from Greece and this Roman strain explains its gain in an energy of thought kept closely in contact with the world of facts. Benedict that he was probably "the pivotal figure in the history of labor. The civilizations of ancient Greece and Rome had rested on the backs of slaves. Reversing this Greek attitude toward labor was St. Benedict, by making labor part of the corporate life of his monastery, by adopting it not merely as a regrettable necessity but rather as an integral and spiritually valuable part of monastic discipline. White suggests that the Benedictine regard for the dignity of labor" marks a revolutionary reversal of the traditional attitude to labor: Benedict had not intended that his monks should be scholars, a great tradition of learning developed in the abbeys following his Rule: The monk was the first intellectual to get dirt under his fingernails. He did not immediately launch into scientific investigation, but in his very person he destroyed the old artificial barrier between the empirical and the speculative, the manual and the liberal arts, and thus helped to create a social atmosphere favorable to scientific and technological development. He emphasizes what he believes are the two most significant results of twentieth-century scholarship: He credits them with transforming the Greek geometrical method into the experimental science of the modern era. Although the conception of scientific explanation accepted by Galileo, Harvey, and Newton is a theory of formal proof developed by Greek geometers and logicians, the distinctive feature of the seventeenth century, Crombie writes, is non-Greek in origin. It is a scientific method based on "a conception of how to relate a theory to observed facts it explained, the set of logical procedures The philosophers of the thirteenth century distinguished clearly among the kinds of questions to be asked under each level of enquiry. Crombie likens this to the role of linguistic analysis in our own time. The object of the experimental method worked out during this period was to discover and to define the conditions necessary and sufficient to uncover the experiential data. It was recognized that a theory defining these conditions could never be certain: The effect of this tendency to regard mathematics as a method rather than a domain or province of study was to change the kind of questions asked. Interest gradually shifted from the physical or metaphysical to the kind of question that could be answered by a mathematical theory within reach of experimental verification. The history of medieval science shifts to the working-out of the consequences of this new approach to nature. Examples of this shift are seen in the sciences of statics, optics, and astronomy. Whitehead and Dawson imply as much. Dawson makes much the same point when he compares the utilitarian view of science propounded by Roger Bacon in the fourteenth century with the speculative view of science entertained by the Greek mind. Bacon is obviously closer to the modern mind than to the Greek when he makes science an instrument of world conquest and exploitation. Dawson suggests that both the utilitarian view and the Greek view of science contributed to the European scientific tradition: Both Dawson and Crombie accord Grosseteste a major role in the history of scientific theory using Grosseteste as a symbol of the fusion of two traditions. Crombie writes, "From the almost pure empiricism of such practical sciences of the twelfth century as practical mathematics, astronomy, and medicine, and the almost pure rationalism of theoretical speculation in contemporary philosophy on scientific method, he [Grosseteste]

produced a science in which he tried to show the principles according to which the world of experience could be experimentally investigated and rationally explained. These concepts, Crombie maintains, were not without their effect, for in the fourteenth century we find developments of mathematical technique designed to take advantage of the new methodology and conceptions of explanation. At the same time, extension of the use of experiment and mathematical abstraction had begun to produce results so striking that this movement in itself could well be called a "scientific revolution. Medieval man had learned the use of natural resources and upon this knowledge had built a society in which humans were free from a large part of their former drudgery. Technical advance had led to social change. The slave had been replaced by the serf and the craftsman. In his article, "The Dynamo and the Virgin Reconsidered," White notes that whereas Henry Adams can symbolize an age by the concept of "dynamo," the early Middle Ages can be characterized by the devotion shown to Our Lady: The chief glory of the later Middle Ages was not its cathedrals or its epics or its scholasticism: The labor-saving power machines of the later Middle Ages were produced by the implicit theological assumptions of the infinite worth of even the most degraded personality, by the intrinsic repugnance towards subjecting of any man to monotonous drudgery which seems less human in that it requires the exercise neither of intelligence nor choice. It has often been remarked that the Latin Middle Ages first discovered the dignity and spiritual value of labor—that to labor is to pray. But the Middle Ages went further: In the opinion of Pierre Duhem, author of the classic ten-volume history of the physical sciences from Plato to Copernicus, *Le système du monde*,³³ if we had to assign a date to the birth of modern science, we would be compelled to choose the year, when Etienne Tempier, Bishop of Paris, solemnly condemned philosophical and theological propositions then currently entertained within the Arts Faculty and the Faculty of Theology of the University of Paris. His example was followed in the same year by the Archbishop of Canterbury, John Pecham. It is to be remembered that Aristotle arrived in Paris with considerable baggage, imperfect translations, to be sure, but more damaging were the often misleading commentaries of Averroes. Of the theses condemned by Tempier, many were Averroistic in nature. Although no names were mentioned in the condemnations,³⁴ many were presumably held by Siger of Brabant and Boethius of Dacia. Some of the condemned theses were held by Albertus Magnus and Thomas Aquinas. Just how many of them were clearly Thomistic depends, Gilson remarks, on whether the list "is compiled by a Franciscan or a Dominican. With Albert and Thomas, scholars began to sort out what in Aristotle was merely outmoded science or cosmology from the time-transcendent value of his philosophy of nature and its supporting metaphysics. Whereas Gilson speaks of the condemnation as a "landmark," Stephen Gaukroger employs the notion of a "paradigm shift" to suggest the magnitude of the change. The investigation of the physical world or natural philosophy until the thirteenth century was regarded as part of a single philosophical activity. Its purpose was to discover the enduring and intelligible reality behind the changes perceived through the senses. With the condemnation of the deterministic Averroistic view of Aristotle, the authority of Aristotle was challenged, thus undermining confidence in his entire system. In the judgment of Crombie, the natural philosophers of the thirteenth century, "because of the skepticism of Christian theologians," were freed from the authority of Aristotle and thus free to develop the empirical habit of mind within a rational framework. Stephen Gaukroger³⁹ speaks of the "rich productive scientific cultures, in which fundamental and especially intractable, physical, medical, astronomical, and other problems are opened up and dealt with in an innovative and concerted fashion, producing cumulative results over several generations. Not only that, but the scientific revolution was so spectacular that it not only displaced competing accounts but was extrapolated to all cognitive disciplines. In a relatively short period of time, Copernicanism and Darwinism came to replace firmly held philosophical and theological views concerning nature and the order in nature that had persisted since Biblical times. Christianity took over natural philosophy in the seventeenth century, setting its agenda and projecting it forward in a way quite different from that of any other scientific culture. Science and the Shaping of Modernity," In demonstrating the continuity of science and technology through the later Middle Ages into modernity, Gaukroger contrasts the progress of science in the West with that in the cultures of Islam and China:

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