

Raymond J. Jirran

## A. *Introduction*

Until very recent times, United States culture has been decidedly anti-intellectual in according prestige to intellectuals responsible for scientific development, especially in terms economically meaningful. In the sense of what science gave to society, a lot was given. In the sense of what society gave to scientists, not that much was given. The course goal for this topic is **to evaluate the impact of science upon society during the Seventeenth Century** according to a criteria of the people, places, and times involved and the degree of certitude warranted.

## B. *Religion*

Students are generally sensitive to how religion is able to do harmful political damage. Religion has also had problems with science. The Seventeenth Century produced a complex culture in Western civilization.

The contrasts presented by the Seventeenth Century stand out in one of its great men, the Frenchman, Blaise Pascal (1623-1662). As a mathematician and physicist, Pascal enjoys an important place in the history of science. But he was also a profoundly religious man, troubled in an age when people seemed to be deserting religion in the name of reason. He left behind a great unfinished work on religion which is known as the Pensees, or Thoughts. He could write, for example: "Man is . . . filled with error," something quite foreign to the attitude of the later Enlightenment, which still permeates the academy.<sup>1</sup>

Not only Protestants, but Catholics, too, were involved. Galileo, an Italian Catholic, had challenged the Aristotelian view that the earth is the center of the universe.<sup>2</sup> He was also challenging Biblical appearances. The Inquisition was able to silence Galileo in Rome, but not in Paris, where thinkers continued to struggle with what he had found. It is wrong to hold, as is frequently done, that science virtually ceased in Catholic countries after Galileo was condemned in 1633. What did happen was that Catholic scientists became more circumspect, but there was plenty going on in France, which was outside the reach of the Roman Inquisition.<sup>3</sup>

The issue is the relevance of truth to both science and religion. The truths of Galileo were challenged by the obedience of the Jesuits. The truth won out, as Pope John Paul II proudly proclaimed in 1979 in an address to the Pontifical Academy of Sciences. In 1988 a scholar responded to the pope as follows: "The Pontiff's hope (for consonance with theology) seems born in physics only to die in biology." The issue is artificial means of birth control and abortion.<sup>4</sup>

Science used a criteria of the logic of empirical verification. Religion used a criteria of central institutional authority, in other words politics. Western civilization has consistently supported the principles of truth over the principles of central authority.<sup>5</sup>

## C. *Inductive Science*

### 1. Astronomy

In 1610, the Italian Galileo was using the telescope to search the heavens and by about 1680, the Dutchman Antoine van Leeuwenhoek (1632-1723) was using it in the form of a microscope to

discover the tiny creature, protozoa, hitherto unknown. The Englishman, Isaac Newton (ca. 1725), building on the work of earlier astronomers, especially Nicolaus Copernicus (ca. 1492), Johann Kepler (ca. 1610), and Galileo, made the great theoretical generalization formulating the law of gravitation: bodies are attracted directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

The professor does not regard the scientific revolution of early modern times as a change in pure thought, but rather as a change in experience resulting in a change in thought. The microscope and telescope, for example, gave new experiences which needed explanation. "The homely observers, instrument-makers, engravers, and printers whose labors gave the micro-mechanical account of the world its local credibility" stood in the face of the "great theoreticians and metaphysicians" usually given credit for the change in thought.<sup>6</sup>

## 2. Physics

Galileo's studies of projectiles, pendulums, and falling and rolling bodies helped to establish the modern ideas of acceleration. The mechanical views of the physicists, meanwhile, were invading a science of life itself, biology. In 1628, William Harvey, the physician of Charles I, published his demonstration that the human heart is in fact a pump, and that human blood is driven by the heart along a system of circulation. And in 1679, the Italian, Borelli, showed that the arm is a lever, and that the muscles do mechanical "work."

### ***D. Implication of Scientific Progress***

Natural science does not give people ends, purposes, but rather means; and the theories it provides are always explanations, not justifications. Yet historically, the rise of modern science has been associated with a very definite world view and system of values, for which the best name is rationalism. This is a wide term. Historically, the balance of the influence of rationalism in the West has been to banish God entirely, or at any rate reduce him to a First Cause who started this Newtonian world-machine going, but does not--indeed cannot--interfere with its working.<sup>7</sup>

### ***E. Conclusion***

In this lesson, students have seen the impact of ideas on life. They have seen life changed by the new thoughts in science that were developed in this Seventeenth Century, the century of genius. By studying the Introduction to Science; Religion; Inductive Science; Implications of Scientific Progress, students have been better able to evaluate the impact of technology upon society. Students are to do this according to a criteria of the people, places, and times involved and the degrees of certitude warranted. Students are reminded to read, study, and think and be sensitive to dates. Students are reminded to prepare a comment.

Supplement

## F. *Implication of Scientific Progress* Raymond Julian

### 1. From Medieval to Modern Science

Medieval science, while comfortable with mystery, was psychologically comfortable. Modern Seventeenth Century science, was fundamentally demystifying, decidedly uncomfortable, cheerless, and dehumanizing. The politics of comfort gave way to the truth of discomfort as time progressed.<sup>8</sup>

### 2. Rene Descartes

As one scholar put it, "Sixteenth-Century thinkers found themselves in an epistemological quandary. Not only could they not trust their reason, they could not even trust their senses."<sup>9</sup> Like Blaise Pascal and many other thinkers of his generation, René Descartes (1596-1650) worried about how to square religion with the new science. Following Plato, Descartes, the father of modern philosophy,<sup>10</sup> denied extramental reality. Here is how this most influential thinker put it.

And since all the same thoughts and conceptions which we have while awake may also come to us in sleep, without any of them being at that time true, I resolved to assume that everything that ever entered into my mind was no more true than the illusions of my dreams. But immediately afterwards I noticed that whilst I thus wished to think all things false, it was absolutely essential that the "I" who thought this should be somewhat, and remarking that this truth "I think, therefore I am" was so certain and so assured that all the most extravagant suppositions brought forward by the skeptics were incapable of shaking it, I came to the conclusion that I could receive it without scruple as the first principle of the Philosophy for which I was seeking.<sup>11</sup>

From this start, Descartes arrived finally at God, but a God who in his mathematical orderliness, in his remoteness from this confusing world, must seem most unreal to any believer in a personal God.

### 3. Social Impact

Scientists and rationalists both helped greatly to establish in the minds of educated men throughout the West two complementary concepts that were to give the Enlightenment of the Eighteenth Century a pattern of action toward social change still of driving force. These were first, the concept of a regular 'natural order' underlying the apparent irregularity and confusion of the universe as it appears to unreflecting people in daily experience; and second, the concept of a human faculty, best called 'reason,' buried and obscured in most people by faulty traditional upbringing, but capable of being brought into effective play by a good, that is, rational, upbringing.

Both of these concepts can be found in some form in Western tradition at least as far back as the Greeks. What gives them newness and force at the end of the Seventeenth Century is their being welded into the doctrine of progress, the belief that all human beings can attain here on earth a state of happiness, of perfection, previously in the West thought to be possible only for Christians

in a state of grace, and for them only in a heaven after death. In this way, the Enlightenment served as a new approach to creation and in that way became a sort of new religion.

Only since World War II has the intimate relationship between physical science and political, economic, and military power been clearly understood. The social sciences have their strongest impact following World War II. That notwithstanding, the influence of physical science on culture extended back three centuries, to the time of Galileo. The social sciences have engaged the hard sciences in two different ways: (1) with a purpose to control and direct science; (2) with a purpose to understand how the scientific enterprise functions. The one is about operational problems and technology, the other about cognitive problems and science.<sup>12</sup>

Technology is concerned with the development, application, or use of technologies. Science is concerned with the conditions under which knowledge is obtained. The relationship between science and technology is still poorly understood. This means that many scholars find that the notion that pure science is and should be morally neutral is wrong. Such scholars maintain that the primary purpose of science should be morality and social utility. What this means is that a good, in the sense of convincing, history of science and technology is not available. Like the university, science from one perspective science is a social institution, with social obligations; from another perspective is an autonomous enterprise, without social obligations.<sup>13</sup>

## G. Conclusion

Western civilization had a commitment to truth over politics which stands out in the development of science. In the conflict between physical science and religion, physical science has consistently been the more convincing. This has hurt religion, to the point where religion has lost much of its academic status. The point is that truth is identified with God and that even the church is no exception to having to meet the criteria of truthfulness in Western civilization.

Comments on the Seventh Edition of Chambers, pages 0542-551.

In the opinion of the professor, Chambers is the most scholarly textbook on the market. Chambers well represents mainstream thinking in the history profession. The professor, however, disagrees in many significant ways with mainstream thinking. Some of these disagreements are set forth above and others in the following comments.

Page	Column	Paragraph	Line	
0544	1	3	1	"Magic"

Lest Chambers be misunderstood, astrology was taught, officially sanctioned, and featured chairs of medical astrology in colonial universities.<sup>14</sup> On page 546 Johannes Kepler (1571-1630) is described as "... a famous astrologer and an advocate of magical theories ..." at the same time he is identified as an astronomer in the index.

On page 571 Raymond J. Jirran has another section on Magic and Rituals. In the Index, page I-40 Chambers fails to include page 571.

0549 the box "Galileo and Kepler on Copernicus"

Illustrates "the power of truth" assumed in Western civilization.

## Endnotes

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<sup>1</sup> Norma E. Emerton humanizes and explains Pascal in her review of John. R. Cole, *Pascal: The Man and His Two Loves* in *The American Historical Review*, Vol. 102, No. 5 (December 1997), pages 1493-1494.

<sup>2</sup> See, for example, Wilbur Applebaum, review of Klaus Fischer, Galileo Galilei in The American Historical Review 89 (October 1984): 401-402.

<sup>3</sup> Lisa T. Sarasohn, "French Reaction to the Condemnation of Galileo, 1632-1642," The Catholic Historical Review 74 (January 1988): 34-53.

<sup>4</sup> William A., Wallace, O.P., review of Galileo, Bellarmine, and the Bible, by Richard J. Blackwell in The Catholic Historical Review, Vol. 78, No. 1 (January 1992), pages 120-122.

<sup>5</sup> William A., Wallace, O.P., review of Galileo, Bellarmine, and the Bible, by Richard J. Blackwell in The Catholic Historical Review, Vol. 78, No. 1 (January 1992), pages 120-122.

<sup>6</sup> Steven Shapin, review of Catherine Wilson, *The Invisible World: Early Modern Philosophy and the Invention of the Microscope* in *The American Historical Review*, Vol. 101, No. 5 (December 1996), pages 1517-1518.

<sup>7</sup> For example, John B. Gammie, review of Conrad Hyers, The Meaning of Creation: Genesis and Modern Science, in The Catholic Biblical Quarterly, 48 (October 1986): 719 states that Hyers "argues quite convincingly that any stratagem which seeks to point up the compatibility of Genesis I with scientific findings is bound to end in defeat," a position with which Dr. Jirran implicitly disagrees.

<sup>8</sup> A. Mark Smith, "Knowing Things Inside Out: The Scientific Revolution from a Medieval Perspective," *The American Historical Review*, Vol. 100, No. 3 (July 1995), page 743.

<sup>9</sup> A. Mark Smith, "Knowing Things Inside Out: The Scientific Revolution from a Medieval Perspective," *The American Historical Review*, Vol. 100, No. 3 (July 1995), page 735.

<sup>10</sup> Richard H. Popkin, review of John R. Cole, *The Olympian Dreams and Youthful Rebellion of René Descartes* in *The American Historical Review*, Vol. 98, No. 5 (December 1993), pages 1615-1616.

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<sup>11</sup> Rene Descartes, Method of Rightly Conducting the Reason tr. by Elizabeth S. Haldane and G. R. T. Ross in Great Books of the Western World, Robert Maynard Hutchins, editor-in-chief (Chicago: William Benton, 1952), p. 51.

<sup>12</sup> John G. Burke, review of Ina Spiegel-Rosing and Derek de Solla Price, editors, Science, Technology, and Society: A Cross-Disciplinary Perspective, in The American Historical Review, Vol. 83, No. 2 (April 1978), pages 402-403.

<sup>13</sup> John G. Burke, review of Ina Spiegel-Rosing and Derek de Solla Price, editors, Science, Technology, and Society: A Cross-Disciplinary Perspective, in The American Historical Review, Vol. 83, No. 2 (April 1978), pages 402-403.

<sup>14</sup> Jorge Cañizares Esguerra, "New World, New Stars: Patriotic Astrology and the Invention of Indian and Creole Bodies in Colonial Spanish America, 1600-1650," *The American Historical Review*, Vol. 100, No. 4 (October 1995), page 50.