

A Sociology of Science Interpretation of the Merton Thesis

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Abstract: Taking the Merton thesis as its core, this paper examines the interaction between the Puritan ethic and modern science in seventeenth-century England and its influence on the institutionalization of science. The Merton thesis holds that Puritanism, as a dominant cultural value, unintentionally promoted the development and professionalization of science through its rationalism, empiricism, and utilitarianism. The paper analyses the theoretical origins of the thesis, including Weber's theory of the Protestant ethic, Parsons' structural functionalism, and Marxist views on ideology, and elaborates the common ground shared by Puritanism and the ethos of science in rationality, the belief in natural order, and experimental method. The paper then discusses the implications of the Merton thesis for science development in contemporary China, proposing to excavate the scientific potential of traditional Chinese culture and to build a modern science system that integrates Chinese and Western culture, thereby offering a new perspective on the union of science and culture.

Keywords: Merton Thesis; Puritan Ethic; Ethos of Science; Sociology of Science

1. Introduction

The development of science depends not only on technical and methodological advance but also on the sociocultural environment in which it is embedded. The Merton thesis, advanced by the twentieth-century sociologist Robert K. Merton, revealed the deep connection between the Puritan ethic and the rise of modern science in seventeenth-century England, providing an important perspective for understanding the cultural foundations of the institutionalization of science. Merton argued that the rationalism, empiricism, and utilitarianism advocated by Puritanism fitted closely with the internal requirements of scientific activity, and thereby unintentionally created the conditions for the professionalization and institutionalization of

modern science. The thesis extended Weber's theory of the Protestant ethic and the spirit of capitalism and opened a new path for research in the sociology of science. This paper aims to analyse systematically the theoretical substance and practical significance of the Merton thesis. It first traces the theoretical origins of the thesis, including the influence of Weber and Parsons; it then examines the internal connections between the Puritan ethic and the scientific ethos in values and methodology; finally, in the Chinese context, it reflects on the possibility and the challenges of integrating traditional culture with modern science. Through this study we can understand more deeply the sociocultural dynamics of scientific development and gain insight for promoting technological innovation and cultural construction in contemporary China.

2. Theoretical Origins of the Merton Thesis

2.1 Historical Background

The background against which the Merton thesis was proposed must be studied from the social reality of seventeenth-century England. Merton chose England in that century as his object of study, when Britain was gradually becoming the centre of world science and the interaction between science, technology, and society was especially prominent and typical. Research by scholars in China and abroad indicates that in the second half of the seventeenth century science achieved professionalization in England and became an organized social activity. The deeper cultural background of this change was the dominant social culture or value system of English society at the time, namely Puritanism, or the spirit of the Protestant ethic. Puritanism, the ascetic branch of Protestantism, unintentionally promoted the development and institutionalization of modern science. In the social conditions of the time, Puritanism was both a ruling social force and a dominant cultural value, and it therefore had the capacity to influence, and the possibility of supporting, science. The Merton thesis was proposed against precisely this background.

2.2 Theoretical Foundations

The Merton thesis was directly inspired by Max Weber's *The Protestant Ethic and the Spirit of Capitalism*. Weber held that the Protestant ethic, above all the Calvinist doctrines of predestination and calling, progressively moralized money-making and fostered the capitalist spirit of rationalization, diligence, and thrift. By freeing the pursuit of gain from traditional moral condemnation and encouraging rational calculation and systematic management, it supplied a key cultural and psychological impetus for the development of modern capitalism [1] (p. 62). This argument stressed the shaping power of religious ideas over economic behaviour. From the religious angle, Weber's theory seems to have reminded Merton that economic transformation cannot do without cultural and psychological support, and Merton went on to extend Weber's theory into the domain of science.

The thesis was also shaped by empirical research on the social history of English science in the seventeenth century. Through statistical and documentary analysis, Merton examined the proportion of Puritans in the early scientific community and found that among the early members of the Royal Society the proportion of Puritans far exceeded their share of the total English population. Puritan-dominated universities, such as the Puritan colleges of Cambridge, trained large numbers of scientists, and Puritan circles such as the Invisible College became important networks of scientific exchange [1] (pp. 96-100). These phenomena gave the Merton thesis rather direct empirical support. Why were most scientific societies in England at that time composed of Protestant members, and why could Protestant organizations advance the cause of science so quickly? Kuhn's theory of scientific revolution seems unable to explain these facts, and this obliges us to recognize the value of studying the Merton thesis.

The thesis further bore the imprint of Talcott Parsons' structural functionalism. Structural functionalism attends to social institutions and cultural values and to how they shape scientific activity, holding that science as a social institution requires specific cultural support, such as the rationalism and empiricism of the Puritans. Through social structures such as education and the division of labour, the Puritan

ethic worked to promote the institutionalization of science [1] (pp. 60-85).

At the same time, the Merton thesis was influenced by Marxism and the sociology of knowledge. Merton drew in part on the Marxist discussion of the relation between the economic base and ideology, but laid greater stress on the unintended consequences of religious ideas. The development of science was never the direct goal of the Puritans, yet their values, such as rationality and utilitarianism, objectively furthered scientific research [1] (pp. 142-145).

3. The Substance of the Merton Thesis: The Affinity between Puritanism and the Scientific Ethos

As two major subsystems of human civilization, science and religion each have their own spiritual concerns and value pursuits. Science values truth and deals with problems of reason, while religion values goodness and faces problems of faith. In the traditional view, the two stand in binary opposition. Yet human society needs the unity of truth and goodness, and the unity of methodology and epistemology. How the truth-seeking enterprise of science and the good-seeking enterprise of religion could be joined therefore remains a problem that needs, and must, be solved. Taking the process by which science gained legitimacy and social standing at its birth as his example, Merton offered a tentative answer: Puritanism and science were opposed in many respects, but at the cultural level the Puritan ethic and the ethos of science crossed and coupled. The merging of the scientific ethos with the Puritan ethic as the dominant social value laid the logical starting point for the marriage of science and religion and propelled the institutionalization and legitimization of science [2].

3.1 Convergence of Ethos

(1) Science as a sacred enterprise of praising God. In seventeenth-century England, the Puritans raised scientific research to a height approaching religious mission. This distinctive shift in outlook originated in the Puritan theological reinterpretation of the Book of Nature. Puritan theologians held that God revealed himself to humanity in two ways: through Scripture, the book of revelation, and through nature, the book of creation. As the well-known Puritan divine John Wilkins put it, to study nature is to decipher God's second

revelation [1] (p. 89).

This theological conception lent scientific activity an unprecedented sacredness. In the Puritan view, the astronomer observing the motions of the stars, the physicist studying the laws of motion, and the biologist probing the mysteries of life were all in essence reading the sacred text God had written into nature. Robert Boyle stated plainly in *The Christian Virtuoso* that the study of nature does not weaken religious faith but rather strengthens our worship of the Creator's wisdom and power [1] (p. 92). Under this conception, scientists of the day regarded their work as a religious practice, and scientific discovery was seen as a witness to the glory of God.

The fusion of religion and science had far-reaching social effects. First, it supplied a powerful spiritual motive for scientific activity. Many Puritan scientists, Newton and Boyle among them, saw the exploration of natural law as an important path toward God. In the preface to the *Principia Mathematica*, Newton wrote that the chief aim of the work is to demonstrate by mathematics how perfect and orderly is the world God created [3] (p. 25). Second, this conception changed how society perceived scientists. Under the influence of the Puritan ethic, the scientist was no longer regarded as a dangerous heretic but became a priest deciphering the divine will, which to some degree recognized the legitimacy of the scientist's vocation.

(2) The fit between the utility of science and the Puritan concern for this world. Another marked feature of the Puritan ethic was its stress on the importance of the present life. Unlike medieval Catholicism, which emphasized salvation in the afterlife, the Puritans held that believers should glorify God through diligent work in this world. This idea resonated deeply with the practical value of science. The Puritan divine Richard Baxter stressed in his *Christian Directory* that every art and invention that can improve the material life of mankind deserves encouragement, for it manifests God's grace toward humanity [1] (p. 102).

This utilitarian bent was fully expressed in the charters of the earliest scientific organizations. The statutes of the Royal Society of 1663 stated explicitly that the aim of the Society was to advance knowledge of natural things through experimental inquiry and to apply that knowledge to the improvement of trades and

manufactures [4]. A considerable proportion of the founding members of the Royal Society were devout Puritans who firmly believed that scientific discovery should serve the lofty purpose of improving human life.

The Puritan endorsement of the practical value of science had multiple effects. First, it promoted the union of science and technology. Under Puritan influence, many scientists began to attend to the conversion of theory into application: Boyle, while working on the gas laws, devoted himself to improving mining technology, and Newton, alongside his theoretical research, took part in practical work such as currency reform. Second, this practical orientation altered the pattern of patronage. Puritan merchants and entrepreneurs were readier to fund research that might yield practical benefits, which to some extent shaped the direction of English science.

(3) The secularization of religion and the legitimization of science. A further contribution of the Puritan movement was to advance the secularization of religion, a process that unwittingly created the conditions for the institutionalization and professionalization of science. As Puritan thought developed, traditional rituals and dogma gradually gave way to concern with the actual world. The Puritan theologian William Perkins proposed that true religion is shown not only in church but, more importantly, in daily life [5]. This shift in outlook gave practical scientific activity religious legitimacy.

This secularization positively affected the development of science in three ways. First, it weakened ecclesiastical control over research. In the period of Puritan dominance, scientists no longer had to fear persecution for conclusions that conflicted with doctrine. Second, it spread scientific education. Many colleges founded by Puritans, Harvard among them, began to include natural science in their curricula. Third, it fostered the formation of the scientific community. In a comparatively tolerant religious climate, scientists could exchange ideas and form learned societies more freely.

3.2 Shared Background Assumptions and Experimental Rationality

(1) The dialectical unity of rationalism and empiricism. A revolutionary breakthrough of Puritan thought lay in its redefinition of the relation between reason and faith. Traditional

Catholic theology tended to place reason beneath faith, holding that human rational capacity is limited and must submit to the authoritative interpretation of the Church. Puritan theologians advanced a new epistemology: faith is ultimate, but reason is an essential instrument for understanding God's will. This outlook agreed closely with the spirit of rational inquiry emphasized by modern science.

Puritan thinkers laid particular weight on empirical observation. William Ames noted in his theological writings that true knowledge comes not only from books but, more importantly, from direct observation of God's creatures. This empiricist bent coincided with the experimental method of science advocated by Bacon. Bacon himself was not a Puritan, yet his methodology won wide acceptance among them.

In scientific method this union of reason and experience appeared as the integration of mathematical deduction and experimental verification. Newton's *Principia Mathematica* is the model of this union, combining rigorous mathematical derivation on the one hand with insistence on testing theoretical prediction against experimental data on the other. Puritan scientists generally accepted this method, for they believed that mathematical laws reflected the wisdom with which God created the world, and that experiment was the means of testing whether human understanding of those laws was correct.

(2) A shared belief in natural order. The deeper agreement between science and Puritanism lies in a fundamental metaphysical presupposition they share: that nature possesses a stable and intelligible order. This presupposition is foundational to scientific activity. As Einstein remarked, the most incomprehensible thing about the world is that it is comprehensible [3] (p. 28). Puritan theology held the same conviction, believing that a world created by God must possess perfect order.

This belief in natural order appears most clearly in the Puritan theology of Providence. The Puritans believed that God not only created the world but continually sustains its operation through natural law, a conception fully consistent with the presupposition of scientific research. When Newton explained the law of universal gravitation, he regarded it as one of the ways in which God maintains the order of the universe [6].

This shared metaphysical background assumption produced important epistemological consequences. First, it gave scientists confidence to search for natural laws. Were the world chaotic and disorderly, systematic scientific research would lose its meaning. Second, it secured the universality of scientific discovery. Puritan scientists believed that the natural laws they found in England held equally in every other corner of the world, for all were universal laws laid down by God.

(3) The religious roots of experimental rationality. Another key element of modern scientific method, experimental verification, likewise finds roots in Puritan thought. The Puritan understanding of the word experiment carried a double meaning: experiment in science and experience in religion. Just as believers must test the truth of faith through personal experience, so, they held, scientists should test the truth of theory through experiment.

This analogy recurs constantly in the writings of Puritan scientists. Boyle compared the laboratory to a temple of nature and the experimental procedure to a religious rite [7]. Under this conception, scientific experiment was not merely a cognitive activity but a religious practice, and this sacralized view of experiment gave the scientific method a distinctive authority. The Puritan esteem for experimental rationality also appears in its educational ideals. Schools founded by Puritans gave particular weight to experimental teaching, regarding it as the best way to cultivate both rational thinking and devout faith. This educational tradition produced generation after generation of English scientists skilled in experiment, and so laid the foundation of England's leading position in experimental science.

3.3 The Mutual Reinforcement of Puritan and Scientific Values

(1) The resonance of vocational ethic and scientific spirit. There is a deep similarity between the Puritan ethic and the professional ethos of the scientist. The Puritan stress on diligence, thrift, exactness, and discipline names precisely the qualities a good scientist requires. The idea of calling described by Max Weber in *The Protestant Ethic and the Spirit of Capitalism* applies equally to the domain of science [8].

Puritan scientists regarded laboratory work as service to God. Precise experimental records, patient collection of data, and rigorous

theoretical derivation were, they believed, all ways of glorifying God. This religious motive enabled them to endure the difficulties and setbacks of research. Newton spent nearly twenty years before publishing the *Principia Mathematica*, and this astonishing patience and perseverance owed much to his Puritan faith.

(2) The similarity of community paradigms. Basic norms of the scientific community, such as openness, universalism, and disinterestedness, all find counterparts in the Puritan ethic. The Puritans emphasized the universality of truth and opposed privilege and monopoly of any kind, in close agreement with the universalist norm of the scientific community, and the spirit of equal exchange in Puritan gatherings resembled the principle of rational debate in scientific discussion.

This normative similarity allowed Puritans to adapt quickly to the behavioural code of the scientific community. Historical studies show that in the scientific societies of seventeenth-century England, Puritan members tended to observe academic norms more strictly and to share their results more willingly [1] (p. 145). This ethical fit gave cultural support to the healthy growth of the scientific community.

(3) The mutual support of ultimate values. The deepest organic union of Puritanism and science took place at the level of values. Puritanism gave scientific activity its ultimate meaning: research serves not merely to satisfy curiosity or gain practical advantage but to know God's creation and to promote human welfare. This lofty positioning lifted science above mere instrumental rationality and gave it a deeper significance.

In turn, the development of science enriched Puritan religious experience. Through scientific research, believers could feel the wisdom and power of God in new ways. As one Puritan scientist said, the telescope and the microscope have opened for us new psalms of praise [5]. Through this interaction, religion and science achieved harmony at the highest level.

4. Implications of the Merton Thesis for Science Development in Contemporary China

The organic union of the Puritan ethic and the scientific spirit had a profound influence on the institutionalization of science. Within a few decades, science grew from the amateur pursuit of a handful of people into an important enterprise enjoying social respect and standing.

The founding of the Royal Society in 1660 marked the formal establishment of science as a social institution, a process strongly supported by Puritan thought.

This historical experience offers an important lesson for the relation of science and culture today. It shows that the development of science requires a suitable cultural soil. When the spirit of science fits the mainstream values of society, science gains momentum for rapid growth. This bears directly on China's present drive for technological innovation: we need to build cultural values congruent with the spirit of science, so as to give scientific development deep cultural support.

The same historical case also reminds us that the relation between science and religion is not simple opposition. Under certain historical conditions, religious ideas may lend science unexpected support. This opens a new line of thought on the fusion of science and traditional Chinese culture. Just as the Puritan ethic once advanced the growth of modern science, so certain elements of traditional Chinese culture may provide distinctive cultural resources for the development of contemporary science.

4.1 The Scientific Potential of Traditional Chinese Culture and Its Creative Transformation

To achieve an organic union of science and traditional Chinese culture, we cannot simply copy the English Puritan manner of reforming science; we must dig deeply into the characteristics of scientific thinking embedded in traditional Chinese culture. The Needham question posed in *Science and Civilisation in China*, why modern science was not born in China, itself points to the distinctiveness of traditional Chinese scientific thought [5].

Traditional Chinese scientific thinking has several marked features. First, it stresses practical reason. Unlike the Greek tradition of knowledge for its own sake, Chinese science attended above all to the solution of practical problems, as works such as the *Nine Chapters on the Mathematical Art* and the *Tiangong Kaiwu* show. Second, it values relational thinking: Chinese science fixed less on substance itself than on the web of relations among things. Third, it esteems dialectical thinking, of which the yin-yang and five-agents doctrine is the distinctive expression [4].

These traits of thought retain strong vitality at

the frontiers of contemporary science. In complex systems science, the traditional Chinese relational way of thinking offers a fresh perspective on emergence; in quantum mechanics, Bohr's principle of complementarity bears a considerable resemblance to the Daoist yin-yang thought; and in the changing pattern of modern medicine, the view of the body as an integrated whole in Chinese medicine receives growing attention.

4.2 Cultural Pathways for Building a Modern Science System with Chinese Characteristics

Building a modern science system with Chinese cultural characteristics requires action on the following levels. At the level of philosophical foundations, a new view of nature should be established that fuses Eastern and Western wisdom, one that keeps the precision and testability of Western science while absorbing the holism and organicism of the Chinese tradition. Emerging fields such as process philosophy and the philosophy of complexity are moving in this direction [6].

At the level of methodology, new methods should be developed that integrate the analytic and the synthetic. The meta-synthesis method from qualitative to quantitative proposed by Qian Xuesen is a successful exploration of this kind: it employs modern mathematical tools while retaining the all-round grasp of traditional Chinese thought, and shows a distinctive advantage in handling complex systems [8].

At the institutional level, mechanisms that support cross-cultural scientific innovation should be built, including research institutes devoted to the modernization of traditional science, the training of scientists at home in both Chinese and Western learning, and platforms for dialogue between traditional knowledge and modern science. Related work at the Institute for the History of Natural Sciences of the Chinese Academy of Sciences has already achieved notable results [7].

4.3 Challenges and Coping Strategies

The marriage of science and traditional Chinese culture faces many challenges. The first is the barrier of language and thought. Traditional Chinese concepts are often polysemous and diffuse and resist direct conversion into modern scientific terms. Meeting this difficulty requires the development of professional hermeneutic methods and the establishment of accurate

correspondences in translation [5].

The second is the difference in methods of validation. Traditional Chinese knowledge rests mostly on accumulated experience and lacks strict experimental verification. To gain recognition from the modern scientific community, validation methods suited to the character of traditional knowledge must be developed. The rise of evidence-based medicine in recent years offers a useful reference [4].

The third is the obstacle of institutional inertia. The modern scientific community has formed a complete set of evaluation standards and operating mechanisms, and absorbing heterogeneous cultural elements requires breaking the existing framework. This calls for guidance and support at the policy level, such as special research funds and reform of the evaluation system.

5. Conclusion

The Merton thesis revealed the deep connection between the Puritan ethic and the spirit of modern science in seventeenth-century England, providing an important perspective for understanding the cultural dynamics of scientific development. By analysing the theoretical origins, substance, and practical significance of the Merton thesis, this paper reaches the following conclusions. First, the rationalism, empiricism, and utilitarianism of the Puritan ethic fit closely with the requirements of scientific activity and laid the cultural foundation for its institutionalization and professionalization. Second, science and religion do not stand in simple opposition; under specific historical conditions, religious ideas may advance scientific progress through unintended consequences. Finally, the Merton thesis has implications for science development in contemporary China, suggesting that we should excavate the scientific potential of traditional culture and build a modern science system that fuses Chinese and Western culture.

Although the Merton thesis rests mainly on Western historical experience, its core idea, that the development of science requires a cultural soil suited to it, has universal significance. Future research may further explore the mechanisms by which different cultural traditions interact with scientific innovation, contributing plural wisdom to the progress of global science.

References

- [1] Merton R K. Science, Technology and Society in Seventeenth-Century England [M]. Fan D N, Wu Z, Jiang X D, trans. Beijing: The Commercial Press, 2009.
- [2] Guo Z Q, Liu C J. The marriage of science and religion: How is it possible and what can be done? A revisit of the Merton thesis [J]. Journal of Shanxi Normal University (Social Science Edition), 2012, 39(5).
- [3] Einstein A. Collected Works of Einstein (Vol. 3) [M]. Beijing: The Commercial Press, 2000.
- [4] Lin J R. Puritanism and the institutionalization of modern science [J]. Journal of Dialectics of Nature, 1995(1).
- [5] Xu D D. The interaction between science and society [J]. Journal of Shenzhen University, 1998(1).
- [6] Ma L P. The theoretical contribution of the Merton thesis [J]. Studies in Dialectics of Nature, 2004(11).
- [7] Wang J. Buddhist culture and scientific paradigms [J]. Science, Technology and Dialectics, 2004(2).
- [8] Liu C J. Approaching the clone: Reflections on power-type science [J]. Social Sciences in Guangxi, 2007(11).