

THE SOCIO-CULTURAL DIMENSIONS OF SCIENCE

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ABSTRACT

Logical positivism and empiricism embody the scientific spirit that puts science autonomous from culture and society. This can be questioned from a cultural perspective, which accommodates the various contexts of human knowledge. In this perspective, science as a system of human knowledge is deeply rooted and colored by the socio-cultural context.

Key Words:

•*Knowledge* •*Science* •*Culture* •*Religion* •*Tradition* •*Metaphysics* •*Society*
•*Cultural epistemology* •*Relativism* •*Reflexivity*.

Science as a Socio-cultural Problem

Science is often discussed in a strict separation from culture and society. Logical positivism and empiricism have put the scientific world as an autonomous domain in a way that it may become sterilized from any socio-cultural influence. This seems to have been achieved through an elimination of the 'metaphysical' dimensions of science. This brings serious consequences. Firstly, this tendency has created a hegemony of science; science determines terms of reference.² Science is said to have colonized

societies and cultures. Prominent feminists and well-known Moslem scholars sharply identified with this issue, Sandra Harding and Ziauddin Sardar, for example, believe that beneath the appearance of science there are elements of Western, male construct. As stated by Karl Manheim, all knowledge is a social construction. According to Manheim, we are now dealing with a crisis in our thought because understanding and interpretation “can be a situation which we then strive to view as part of a larger whole.” Here he identifies the phenomena of increasing contingency of scientific knowledge.³ Secondly, there is a wide gap between the community of scientists and the lay people. The lay people are said to lack the bargaining power, which is a horizontal gap, mainly in terms of significant issues in social life such as the environmental and medical ones. Consequently, we can see the emergence of highly scientific control over the societies by means of technology. Science plays the role of the 'regime of significance'.⁴ Thirdly, specialization has blocked communication among the sciences and between the sciences and society, which is a vertical gap. In fact, this results in the fragmentation of human life.

The Autonomy of Science

Before scrutinizing the cultural dimension of science, we must first take a closer look at the disconnection of science from culture. The strong belief in scientific autonomy caused this disconnection. In the history of science, the autonomy of science comes from the radical departure from metaphysics. Firstly, science should be seen as an autonomous domain rather than a direct product of a particular cultural system. Science cannot be shaped or influenced by any value-system, including culture and religion. In this case, science functions according to its own conceptual apparatus and scientific results are justified accordingly. When a significant progress is achieved gradually, science has prerogative rights to establish its own 'domain', which is independent from culture and society. In the relation between science and religion, we can see that both are formatted within a 'distinctive autonomy': “Science seeks knowledge, but the spiritual quest is for wisdom; [...] science explains, but religion reveals; science informs, but religion reforms.”⁵ This reminds us of the fact that we are no longer living in ancient Greece where it was believed that there is a 'mother of science', so that all aspects of life are from the same convergent root or the same substratum.

Secondly, the true science means 'empirical' science. Autonomy and the independence of science assume that science should be purified from all 'metaphysical dimensions', including theological interventions and transcendental explanations. The Vienna Circle, for example, proposed an anti-metaphysical approach in the empirical sciences; rational man was treated as the prominent parameter. "In science there is no 'depth'; there is surface everywhere: all experience forms a complex network, which cannot always be surveyed and can often be grasped only in parts. Everything is accessible to man; and man is the measure of all things."⁶ As a consequence, there exists a strict dichotomy between the metaphysical and the empirical. Then desacralization and secularization are considered preconditions for scientific growth; the escape from transcendental and theological concepts is considered as an absolute prerequisite. Moreover, the emphasis on the man as the measure of all things asserts the function of 'reason' as a superior instrument for assessing 'truth', and not, for instance, 'revelation' or philosophical speculative notions. Then the emphasis on the empirical implies a tendency to materialize everything so "that science operates in an I-It mode, whereas religion operates in the I-Thou mode."⁷ Thus, autonomy and the purification of science from metaphysical dimensions can actually be considered parallel to the liberation of the world from myth and superstition by monotheistic religions.

The Cultural and Religious Dimensions in Sciences

1. The perspective of cultural epistemology

In the spirit of multiculturalism, more people and cultural movements claim that they have the right to their own 'cultural epistemology'. Cultural epistemology is primarily pertinent to the sources of human knowledge that put human as the prime source.⁸ It reveals that science is part of a deeper reservoir of human knowledge. Science is also part of 'lived experience', i.e., the totality of meaningfulness.⁹ Therefore, cultural epistemology is sensitive to human contextuality, particularity and cultural elements, including tradition and religion. From the perspective of cultural epistemology, science is regarded as an achievement of the human race, a product of cultural continuities, and it exists within a web of broader systems of meaning. Consequently, it assumes that knowledge cannot have an autonomous position. Cultural epistemology is pertinent to the diversity of

human knowledge. As a system of human knowledge, science can be constructed by various cultural backgrounds.¹⁰ Modern science, for instance, was structured and shaped by the revolution of knowledge, namely rationalism, positivism and empiricism, which are derived from Western culture, and primarily from the Enlightenment. As such, the anti-metaphysical position can be read as a representation of autonomy and disconnection of science from the wider cultural context.¹¹ Meanwhile, non-Western cultures live precisely by the systems of knowledge that accommodate metaphysical elements of culture such as myths, worldviews, traditional values and the belief systems of religions.¹²

In the context of cultural epistemology, traditions as 'lived experience' reflect the system of knowledge in continuity with modernity. The structure of the scientific world is then understood as existential and contextual, deeply rooted in tradition, and not positivistic and autonomous. Science is a matter of shaping of meaning where meaning is associated with tradition:

“Even an invented tradition, if it is to have any resonance, must connect with a collective memory, so that it cannot be entirely new and discontinuous. In other words, when both the 'traditional' and the 'modern' are continually remade, traditions are reanimated to become new concepts; modern institution in turn – when placed in the context of these 'sense-making', 'meaning-giving' improvisations, reformulations, and reconfigurations of traditional concepts – stand colored by virtue of their location.”¹³

Now, it is possible to claim different 'facets of science', that is, ethnic sciences, indigenous sciences, Islamic and Vedic sciences, etc. These are 'forgotten dimensions' in the development of the sciences. New generation of scientists and culturalists make every effort to break up the strict autonomy of science in order to make it more accommodative; science, after all, has cultural dimensions.

2. Spiritual culture

There is thus a changing awareness of the role of sciences. Traditions can be valuable sources of knowledge. It is possible to reconsider science as part of human progress and tradition provides the needed cultural elements for such progress. For a long time, 'progress' has been associated with

monumental scientific inventions, while there is a neglect of what makes people truly human, namely spirituality. If we put the system of meaning at the center of life, then the scientific rationalization of meaning will be irrelevant.¹⁴ Science cannot replace meaning. Meaning is shaped by primordial elements that penetrate the worldview, virtues, the inner-world, salvation, and so forth. Authentic tradition, including religious tradition, emerges from the living aspirations of communities. Then, tradition is authentic if its content contains a spiritual culture. This spiritual culture frames the ultimate concerns of life as the basis of meaningfulness. It rests precisely in the web of internal components that shape the human perception of reality as a whole.¹⁵

The rationalization of tradition, i.e. the transformation of tradition through science and technology, never leads to an internalization of tradition. Non-Western societies have dynamical dialogues with their spiritual roots to establish meaning systems and sources for human progress.¹⁶ Positivistic science is therefore not the dominant determinant, meaning that the principles of causality are not regarded as the basis of life. In causality, there is no room for ultimate concerns, meanings and wisdom. Ultimate concerns are actually rooted in a web of human values, and they are a matter of interiority and organic cohesion. Hence, from the perspective of spiritual culture, the reservoir of human epistemology is basically transcendental, inclusive, existential and holistic.¹⁷ In contrast, the positive sciences are empirical, exclusive, abstract-artificial and reductionist. And, part of the classical belief, positive sciences put a clear-cut demarcation between the scientific and non-scientific knowledge.

3. Metaphysics for integral meaning

The existence of cultural-religious values is a necessary condition for science. From the perspective of cultural epistemology, the systems of human knowledge should be reintegrated. The pursuit of all forms of knowledge should be put within the metaphysical framework that embraces eternal values.¹⁸ Due to the lack of integration, positive sciences are actually mythical and superstitious. As a matter of fact, many societies live with a metaphysical worldview that embraces all spiritual narratives inherited by the culture. These narratives are regarded as part of the human advancement toward transcendence.¹⁹ A rejection of this metaphysical framework means that the dynamical tradition of human knowledge in general and the

symbolic-interpretive functions of epistemology in particular are undermined.

The metaphysical dimension of science rejected by the Vienna Circle is precisely needed by cultural epistemology as a general principle to establish the integral meaning of science. In light of this integrality, science has relative autonomy only. The function of metaphysics is to place science within a general vision of reality. "Since we still inevitably situate our scientific understanding within one or another general vision of reality [...]"²⁰ Religion is therefore a general, integrative principle, which gives a framework how science should be interpreted in order to be meaningful. There are societies that traditionally and culturally are organized on a holistic mental structure. People who believe that everything is characterized by interconnectedness do not sharply demarcate separate fields of human culture. Holism colors cultural epistemology in what Sardar calls a worldview, which legitimizes meaning. He writes: "The other parameters of a civilization – namely, culture, values and norms, social and political organization and science and technology – derive their legitimacy from the worldview."²¹ Moreover, Golshani and Wyjkstra observe that a worldview penetrates and constructs our whole epistemology. They argue that,

"A worldview is a framework within which our minds operate. It concludes our metaphysical and epistemological presuppositions about God, the universe and humanity. Our worldview affects our decisions, priorities, values and goals. It brings our thoughts to a unified whole." [...A] worldview [...] is the dimension of metaphysics within physics, or meta-science within science."²²

The worldview in many societies is shaped by and deeply rooted in religions. In principle, religions and their value-systems can provide an 'integral meaning' of science. If we define science from the perspective of cultural epistemology, the features of science are also different. Sardar, for example, states that "In contrast to Chinese science, which showed the overwhelming tendency to argue and analyze phenomena in terms of dialectical logic where rigid A or not A categorizations were avoided, Greek science was based on a linear logic and emphasized reduction."²³ Metaphysical elements are a reservoir for integral human knowledge by putting meaning as the context of science. Then, like other products of

culture, science as a system of knowledge is to be understood as a reflection and emanation of such reservoir.

Relativism and Science

1. The Contextuality of Scientific World

The context determines how to view the basic character and development of science. Based on a cultural framework, there is no separation of science from culture and tradition. There is also not one valid model of science. In this cultural frame, science is considered as 'blossoming' from a certain context. Religions and their value-systems provide inspirations, insights and clues for a system of human knowledge so that the feature of science is not fragmentary, materialistic and dualistic. Cultural epistemology therefore characterizes science according to its context, i.e., the culture.

Western science is historically embedded within and develops from ancient Greek epistemology, hence, the most prominent features of science are dualistic, positivistic, empirical, reductionist and anti-metaphysical. Conversely, Chinese and Islamic epistemologies understand science as holistic so that science embraces socio-cultural and metaphysical dimensions.²⁴ Beside these Chinese and Islamic views, it is valuable to embrace the feminists' views and experiences. According to the feminists, the element of universalism in the culture of the Enlightenment should be removed. "Overcoming the (distinctively masculine) Enlightenment dualities will be possible for our culture only after a 'revolution' in human development."²⁵

The dynamics of science is analogous to Kuhn's model of scientific development. Kuhn shows that the notion of truth is relative to time and place. "The notion that scientific paradigms can shift in a revolutionary fashion serves to undermine the belief in the orderly and progressive nature of scientific practice. One historian of science has suggested that Kuhn's conclusions lead to the view that science is practiced by 'mob rule'.²⁶ We can safely assume that science is not necessary universal, or valid for all societies. Then, science and society are not alienated from each other. Society and its values can intervene in the scientific world. In other words, society and culture can be seen as the sources for epistemology; science is therefore contextualized.

2. Instrumental Rationality and Reflexive Rationality

Rationality is one of the factors that shape science. Firstly, it is necessary to put the difference between the two forms of rationality, i.e. instrumental and reflexive rationality. Western rationality treated rationality as an instrument to seek the truth. This disconnects science from the social and the cultural contexts. Instrumental rationality is indifferent to the traditional, authentic truths. In the western epistemology, verifiability is absolute for establishing a rational truth.

“For the Western technological mind, 'to be rational' signifies viewing every experience as a problem which can be broken down into parts, reassembled, manipulated in practical ways, and measured in its effects. The West is indifferent to what older traditions term truth. Speaking epistemologically, verifiability has supplanted truth. An important judgment emerges here: that Western technology is reductionistic in its approach to rationality.”²⁷

However, these ways of treating reality are different from the eastern perspectives. The Hindu theory of the chakra, the Chinese anatomy of human body and the Javanese astrology are some examples of the eastern sciences. These function with a different rationality. In these Eastern sciences, the elements of the knowledge system have been developed through the long spiritual experiences, that is, the reflexive rationality. It involves mythical, mystical and spiritual powers; it shows that rationality is not merely the software of our brain.²⁸ Reflexive rationality gives meaning to life and develops a system of knowledge to observe and interpret reality. The effects of reflexive rationality are broad and can be observed as well as justified through experiences.

Western science is, according to Sardar, inherently evil and it is a threat to human civilization. It paralyzes rich epistemological sources in cultures and establishes a monolithic scientific conception and exclusive scientific domination. Western science, according to Sardar, functions as an ideology. “Western science had now become an ideology [...]. Science became an ideology when its method became an exclusive way of knowing reality [...]”²⁹ Western science uses an ideologized form of rationality to interpret reality. Western science is poor, because it cannot accommodate and explain reflexive rationality as a proper way as recognized in the traditions of eastern

epistemologies. Moreover, rather than developing reflexive rationality, western science has developed a form of mechanistic engineering mentality. “The ideology of rationality treats its object of study (both human and non-human) as mere stuff that can be exploited, manipulated, dissected and generally abused in the pursuit of scientific progress.”³⁰

3. Spiritual-Cultural Needs

Science has pragmatic dimensions; it intends to fulfill human needs. However, western science “works in a particular way that is designed to fulfill the needs and requirements of a society and culture with a specific worldview. It is designed to fashion the image of the Western civilization wherever it operates.”³¹ Along with Golshani, science is defined in different ways and in different cultures. Human knowledge is not a matter of 'rationality' separated from human life. Science and rationality devote themselves to humanity. Conversely, science can be 'irrational', namely, when it becomes the enemy of ecology and humanity. It is obvious that this humanistic approach strongly colors the conception of science. According to Golshani, Islam emphasizes human knowledge in general. In this sense, science is not disconnected from the cultural-spiritual needs. This means that “knowledge and their practical by-products (technology) in particular should be developed in such a way that they do not disturb the characteristic elements of an Islamic society.”³² Meanwhile, he views the development of science in the last two centuries as destructive for our planet in terms of environmental exploitation, which is detrimental for humanity as a whole. Knowledge cannot be equated to Baconian faith, i.e. 'knowledge is power'. For Golshani, knowledge embodies humanity. This represents the epistemology of the Islamic world that views science and technology not as merely power instruments, but as expansions of humanity. A general outlook on science and technology will, of course, involve a different discourse on epistemology. In an Islamic epistemology, secular science and technology are confronted with a “theistic metaphysical framework.”³³ In this framework, we can see that scientific knowledge is consistent with divine vocation. Science has an inherent task to fulfill spiritual-cultural values that promote human dignity.

Spiritual-cultural needs can be the basis for a form of epistemological relativism. It claims that “there is more than one way to know the world, [...]

scientific knowledge is relative to the social location or identity of the knower.”³⁴ In this case, the fundamentalist point of view can be a good example of epistemological relativism. The emergence of Islamic and Christian fundamentalism is often associated with a reaction to modernity, the western science and technology and the concerns to defend genuine identity. Science is associated with the problems of modernity, and modernity is then considered contradictory to the spiritual-cultural needs.³⁵ Sunni fundamentalists, for example, regard modern science as too far removed from their real needs. In their opinion, adapting modern science should be accompanied by critical-alternative initiatives. They believe that the Islamic world has its own culture on the basis of Islamic doctrines. The universal model of the modern-western culture is rejected or at least transformed. The empowerment of the Quranic spirit is considered the epistemological foundation for the Islamic civilization. The spiritualization of scientific methodology is the main issue as a counter-culture against western epistemological imperialism.

“[I]n recent decades Muslim fundamentalists have vehemently challenged this assumption [that Western science possesses a universal status]. [...] Muslim fundamentalists reject cultural modernity as a holistic, integrated civilizational project even as they remain cautiously enthusiastic about aspects of modernization. [...] They] reject the application of methodology of natural sciences to the realm of social behavior. This is [...] an example of Western cultural imperialism. Muslim social behavior enacts a worldview drawn exclusively from the doctrine of Islamic civilization and its core issue, monotheism.”³⁶

Thus, fundamentalists claim that religion manages the whole of civilization, from epistemology to authenticity and identity. The need for religion as a doctrinal filter in the re-evaluation of science is parallel to the need for the self-assertion of cultural identity.

All human groups have a strategy to survive and protect their existence. Gadamer sees this strategy as a reflection of the struggles among people to live with dignity through all their crises.³⁷ As such, societies develop a rationality of existence by synthesizing the needs to survive as a concrete strategy. As part of such a strategy, it is reasonable for communities, particularly for fundamentalist groups, to cherish their 'roots' – religion and

spirituality – and to put identity and dignity as a priority. Hence the Islamization of science is basically addressed to fulfill the need of identity and dignity in the society.³⁸

The fundamental harmony between science and spiritual and cultural needs is the main issue in fundamentalism. First, reason is deconstructed, and then science is put in accordance to the religious values. More than simply a sharp critique of modernity, fundamentalism can be considered a counter-discourse as it discloses the asymmetrical assumptions on culture and civilization in modern reflectivity, and mainly the assumptions of secularization of science, progress and development. It is also a call for a self-interrogation of both the modern cultural mindset and religious tradition on truth in a secular context. Fundamentalists justify their critique on the basis of revealed truth.³⁹

Fundamentalists basically aim for a politics of recognition: their cultural epistemology is contextual so that it will be harmonious with the spiritual-cultural needs. A challenging case is that of bioscience for the Ecuadorian Catholic fundamentalists. Rather than criticizing the western science sharply, they take advantage of modern conditions in a specific context. In dealing with modernity, they claim that they have a different epistemology, because they go through their own path of Enlightenment, which is different from the western enlightenment. The spiritualization – or better: Christianization – of science is the main issue. We can then see a destabilization of classic dichotomies between the profane and the sacred, the secular and the non-secular, the spiritual and the material, the objective and the subjective. In the secular sciences – bioscience in particular – all these dichotomies come together. Here we observe that through the Christianization of the sciences, the profane and the sacred can smoothly meet in harmony.⁴⁰ Here science, modernity and spirituality can in fact be reconciled on the basis of real needs and contextual interests by applying pragmatism.

Conclusion

The cultural dimension of science is helpful to put science in a broader context of human knowledge. It is relevant to fulfill the need of basic meaning. Meaning is deeply rooted in metaphysical realms: the worldview of religions and traditions. Western science lacks such system of embedding the meaning. In non-western societies, metaphysical elements are part of the knowledge system. The need for a synthesis of sciences is much needed for

the sake of humanity.

The cultural dimension of science directly undermines the paradigm of positivism. The western construction of science is problematic when its universal application is seen as legitimate for all societies. In its ontology, western science developed with a mission to solve the problems of human life. Nowadays, the dynamics of the sciences is no longer a matter of problem solving, but somehow the “quest of meaning from synthesis”. Here the meaning is broader than the positivistic truth. It is technology, the applicative dimension of science, that usurps the system of meaning and introduces a sterilization of the world.

“The opposite of alienation, however, is not satisfaction but meaningful living. And here centers the revolutionary impact wrought on the human psyche by technology: It has stripped societies and their members of the source of meaning. Pre-technological societies derived their meaning from synthesis, whereas technology has destroyed the basis for any synthesis other than its own, which is dry and sterile.”⁴¹

From the exploration of the cultural dimension of science, some valuable points can be discerned further.

Firstly, modern science is the product of a certain epistemology in a certain culture, i.e., the western Enlightenment culture. In a socio-cultural framework, cultural values-systems can be, to some extent, the necessary conditions that stimulate and color the emergence and development of science.

Secondly, science disembedded from culture and autonomous from the reservoir of human knowledge cannot be maintained. The need to contextualize science shows a strong dimension of science: the culture. Along with cultural epistemology, which accommodates various sources of human knowledge, science can be interpreted in a cultural context. The cultural dimension of science can be seen through the facets of science coming from the Islamic world, Christianity, feminism, and even fundamentalism as well as local traditions.

Finally, the spiritualization of sciences, in which religious and cultural values can play a role, is implemented in metaphysics and worldviews that function to guide science under a general vision. Along with these, humanity puts the existence of science in a broader context of dignity, authenticity and identity.

End Notes:

- ¹ Slamet Purwadi graduated from Notre Dame University in Peace Studies in 2000, and now he is a PhD student at ICRS-Yogya (Indonesian Consortium for Religious Studies).
- ² Barry Sandywell, *Reflexivity and the Crisis of Western Reason* (New York: Routledge, 1996), 391.
- ³ Sandywell, 388, 390.
- ⁴ Denis Goulet, *The Uncertain Promise: Value Conflicts in Technology Transfer* (New York: New Horizon Press, 1989), 11.
- ⁵ Holmes Rolston III, *Science and Religion: A Critical Survey* (New York: Random House, 1987), 29.
- ⁶ Otto Neurath, *The Scientific Conception of the World: The Vienna Circle* (1929), 89, <<http://gnadav.googlepages.com/TheScientificConceptionoftheWorldeng.doc>> (3 June 2009).
- ⁷ Rolston III, *Science and Religion*, 29.
- ⁸ Pranarka and A. Bakker, eds., *Epistemologi Kebudayaan dan Pendidikan: Suatu Simposium Filsafat* (Yogyakarta: Kanisius, 1979), 2-5.
- ⁹ Sandywell, *Reflexivity and the Crisis of Western Reason*, 410.
- ¹⁰ Pranarka and Bakker, *Epistemologi Kebudayaan dan Pendidikan*, 18-20.
- ¹¹ Dennis McCallum, *The Death of Truth* (Minneapolis: Bethany House, 1996), 13-18.
- ¹² This is illustrated in the encounter between the modernization project and cultural values that put culture as the 'forgotten dimension'. Thierry G. Velherst, *No Life Without Roots: Culture and Development* (London: Zed Books, 1990), 17-23.
- ¹³ Velherst, 18-19.
- ¹⁴ Velherst.
- ¹⁵ George McClean, ed., *Hermeneutics for A Global Age* (Washington: The Council for Research in Values and Philosophy, 2003), 47.
- ¹⁶ Velherst, *No Life Without Roots*, 45-51.
- ¹⁷ Goulet, *The Uncertain Promise*, 205-206.
- ¹⁸ Ziauddin Sardar, *Explorations in Islamic Science* (London: Mansel, 1989), 82.
- ¹⁹ Goulet, *The Uncertain Promise*, 214.
- ²⁰ Wahyudi Irwan Yusuf, "Mencari Model Integrasi Sains dan Agama: Studi Perbandingan John F. Haught dan Mehdi Golshani," *Religion and Science: International Journal of Interdisciplinary Inquiry* 3, no.1 (2007): 136.
- ²¹ Sardar, *Explorations in Islamic Science*, 70.
- ²² Yusuf, "Mencari Model Integrasi Sains dan Agama," 140.
- ²³ Sardar, *Explorations in Islamic Science*, 78.
- ²⁴ Sardar, 95-97.
- ²⁵ Sandra Harding, *The Science Question in Feminism* (New York: Cornell University Press, 1986), 155.
- ²⁶ Joyce Appleby and Elizabeth Covington, eds., *Knowledge and Postmodernism: Historical Perspective* (New York: Routledge, 1996), 340.
- ²⁷ Goulet, *The Uncertain Promise*, 18.
- ²⁸ McCallum, *The Death of Truth*, 205-6.

- ²⁹ Sardar, *Explorations in Islamic Science*, 98.
- ³⁰ Sardar, 99.
- ³¹ Sardar, 104.
- ³² Mehdi Golshani, *Issues in Islam and Science* (Teheran: Institute for Humanities and Cultural Studies, 2004), 89.
- ³³ Golshani, 48.
- ³⁴ William A. Stahl, Robert A. Campbell, Yvonne Petry and Gary Diver, *Webs of Reality* (New Haven: Yale University Press, 2003), 198.
- ³⁵ Martin E. Marty and Scott Appleby, *Fundamentalism and Society: Reclaiming the Science, the Family and Education* (Chicago: The University of Chicago Press, 1993), 5-6.
- ³⁶ Bassam Tibi, "The Worldview of Sunni Arab Fundamentalists: Attitudes toward Modern Science and Technology," in *The Challenge of Fundamentalism: Political Islam and the New World Order* (California: University of California Press, 1998), 73, 75.
- ³⁷ McClean, *Hermeneutics for A Global Age*, 109.
- ³⁸ McClean, 89, 93.
- ³⁹ Marty and Appleby, *Fundamentalism and Society*, 5-6.
- ⁴⁰ Elizabeth F.S. Roberts, "God's Laboratory: Religious Rationalities and Modernity in Ecuadorian in Vitro Fertilization," *Culture and Medicine Journal* (2007): 507-530.
- ⁴¹ Goulet, *The Uncertain Promise*, 110.

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