

Islam & Science

Muslim Responses to Science's
Big Questions

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Citation:

Muslim World Science Initiative, 2016, Report of İhsanoğlu Task Force on Islam and Science, London and Islamabad

Produced by:

Muslim World Science Initiative (formerly Muslim-Science.Com)

Islamabad, Pakistan

Tel: +92 51 8443224 and Email: editor@muslim-science.com

Organised by:



With Support from:



John
Templeton
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In Collaboration with:





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**Report of the İhsanođlu Task Force on
Islam & Science**

**Foreword by:
Ekmeleddin İhsanođlu
Chair of the Task Force**

**Edited by:
Usama Hasan and Athar Osama**

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Task Force on Islam and Science

The Task Force on Islam and Science is the second in a series of Task Forces aimed at catalysing a dialogue, debate, and discourse on big questions and subsequent policy actions on issues of critical importance at the intersection of science, society, and Islam. In doing so, it also seeks to reclaim the narrative of science within the Islamic Community - a narrative that, in the recent years, has been imposed from outside rather than created from inside - and hence begin an inside-out process of scientific revival within the Islamic World.

The 'Big Question' that the Task Force sought to address is:

Is a reconciliation between Islam and Science desirable or possible? How do Muslim responses to Science's Big Questions help bring about such a reconciliation?

Working with the leadership of the Task Force, the Muslim World Science Initiative notified the following Members of the Task Force in November 2014:

Task Force Leadership:

Chair: Prof. Ekmeleddin İhsanoğlu, Former Secretary General of the OIC and Founding Director General of IRCICA

Convenor: Dr. Usama Hasan, Senior Researcher in Islamic Studies, Quilliam Foundation

Co-Convenor: Dr. Tuncay Zorlu, Secretary General of the Turkish Society for History of Science (TBTK)

Members of the Task Force:

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External Expert Resource People:

Prof. Philip Clayton, Ingraham Professor of Theology at Claremont School of Theology, United States

Prof. Willem B. Drees, Dean of the School of Humanities at Tilburg, and editor-in-chief of *Zygon*, *Journal of Religion & Science*

Dr. Athar Osama, Hon. Senior Associate at UCL Institute of Education, University College, London, and Founder, Muslim World Science Initiative and Project Director of the Task Force on Islam and Science, Pakistan

Task Force Process:

The Task Force Members wrote essays in the fall of 2014 and met in Istanbul on February 12-13, 2015 to discuss and debate issues. A number of issues formed an integral part of the task force's agenda and conversations during these meetings and its subsequent deliberations.

The Task Force has sought to address issues like: Is there room for reconciliation between science and Islam, Is such a reconciliation desirable? It is necessary? What are the implications of such a reconciliation (or lack of it) on science, theology, and practical life in the Muslim World. In particular, specific questions addressed will include:

- 1) The Science & Religion debate - What does Science and Islam say to each other since both are concerned with the search for truth attained through motivated belief? What Islamic perspectives and frameworks can underpin this conversation within the Islamic World?
- 2) Has Science Killed God? - What are the informed Muslim responses to atheist arguments based on Science (e.g. Dawkins, Hitchens, Harris etc.)? Can Muslim Scientists remain people of faith? Addressing, in particular:



A. Allah as Creator: Fine tuning, design, the anthropic principle and the multiverse

B. Miracles: Does God tear up the natural, scientific order to enable miracles, or are there naturalistic explanations of miracles?

3) God, Creation & Biological Evolution – From Origins of Life to Human Evolution; how are these understood through faith in the Divine?

4) Soul, spirit, consciousness & free will – modern understandings of Ruh and Nafs

5) Policy and Ethical Implications – What are implications of this well-informed science religion reconciliation on practical life - policy and societal ethics?

The Muslim World Science Initiative Task Forces are funded partly by John Templeton Foundation and the Islam and Science Task Force is brought together with the partnership and support of Turkish Society for the History of Science (TBTK) and the Islamic World Academy of Sciences (IAS).

Acknowledgments:

The Task Force recognises the contributions of several individuals without whose contributions this work would not have been complete. We would like to thank Dr. Didar Bayir and her staff at Prof. İhsanoğlu's office in Istanbul who very ably and graciously hosted the Task Force on Feb 12-13, 2015 even as heavy snowfall affected the city during those days. We would like to thank Sofia Patel and Imran Fadi - interns at Quilliam Foundation - for their invaluable help with the project. Several individuals at the Muslim World Science Initiative - Nida Athar, Aisha Sarwari, Mirat ul Ain Hyder, Bisma Hayat, Tania Maryum, and Ahmed Azfaar - worked hard throughout the process bring this report together.

We are also thankful to Prof. Bruno Abdulhaq Guiderdoni, Director of the Lyon Observatory in France, and Dr. Moneef Zou'bi, Executive Director of Islamic World Academy of Sciences (IAS), for supporting the work of the Task Force. Bruno originally agreed to be a member, but could not contribute due to logistical reasons. Last but not the least, we want to thank all members of the Task Force but, in particular, the Chair Prof. İhsanoğlu for his leadership and Nidhal Guessoum and Farid Panjwani for meticulously reading and editing several drafts of the Report.

Usama Hasan &
Athar Osama (eds.)



Table of Contents

The Task Force on Islam and Science	4
Foreword: The Relationship between Islam & Science in Recent Centuries by: Ekmeleddin İhsanoğlu, Chair of the Task Force	8
Preface: An Important Question of our Time by: Tuncay Zorlu, Co-Convenor of the Task Force	19
Muslim Responses to Science's Big Questions: Summary Report by: Usama Hasan & Athar Osama, Convenor and Project Director	21
The Istanbul Declaration on Islam and Science	89
Contributed Essays:	
The relationship between science and Islam: Islamic perspectives and frameworks by: <i>Mohd. Hazim Shah</i>	93
Islam' and 'Science': Freedom, Justice and Meaning by: <i>Farid Panjwani</i>	107
Modern Science and Challenges to Some Islamic Theological Doctrines by: <i>Mehdi Golshani</i>	115
Has Science Killed the Belief in God? by: <i>Basil Altaie</i>	129
Evolution and Islam: Is there a contradiction? by: <i>Rana Dajani</i>	142
Islam, Science, Methodological Naturalism, Divine Action, and Miracles by: <i>Nidhal Guessoum</i>	152
The (Im)Possible Medicalization of "Breathing the Soul" (Nafkh Al-Rūḥ) Contemporary Islamic Debates on the Beginning of Human Life by: <i>Mohammed Ghaly</i>	162
Al-Ghazali's Methodical Engagement with the Scientific Tradition by: <i>Afiñ Al-Akiti</i>	175
Meeting Muslims Meeting Science by: <i>Willem B. Drees</i>	186
<i>Reflections on Task Force Contributions</i> by: <i>Philip Clayton</i>	193
APPENDIX A: Translation of a standard mediaeval text of Ash'ari theology regarding naturalism and causality	203
APPENDIX B: A mediaeval text on the soul and spirit	206
APPENDIX C: Primary Theological Objections to Evolution and Scientific Responses	208
APPENDIX D: Extract from Basil Altaie, God, Nature and the Cause	213

Foreword: The Relationship between Islam & Science in Recent Centuries

Ekmeleddin İhsanođlu

9th Secretary General of the OIC (2004-2014),
Founding Director General of IRCICA (1988-2004),
President of the International Union of History,
Philosophy and Science (2001-2005), &
Alexandre Koyre Medal Laureate





Foreword: The Relationship between Islam and Science in Recent Centuries

Ekmeleddin İhsanoğlu
Former Secretary General of the Organisation
of Islamic Cooperation (OIC)
& Chair of the Task Force on
Islam and Science

Islamic Institutions of Learning

The Islamic world developed classical institutions of teaching, learning and research from the Abbasid period onwards. These institutions supported scholarly activities that gained a new vigour and dynamism during the Ottoman period: thousands of students were educated in the hundreds of medreses (schools or academies), both old and new, throughout the Ottoman empire. By 1600, over 300 new medreses had been built. There were also royal institutions, with a chief physician and chief astronomer as well as a Grand Mufti or religious authority.

The sciences or branches of knowledge taught in the medreses were divided into two categories: the *'ulum al-naqliya* (traditional sciences) and the *'ulum al-aqliya* (rational sciences). The traditional or 'high sciences' included: Qur'an-commentary





(tefsir), traditions of the Prophet (hadis) and Muslim jurisprudence (fiqh). The rational or 'ancillary sciences' included grammar and syntax/morphology, rhetoric, logic, Islamic theology, arithmetic, geometry, astronomy and philosophy.

The Ottoman state was partly European, and the Ottoman attitude towards Western science and technology was one of a selective process of transfer, partly via converted scholars as well as some Jewish scholars who had been granted refuge. The Ottomans considered themselves superior to the Europeans, both spiritually and culturally, and were confident of their economic and military power. Their selective approach to the transfer of science and technology was also underpinned by their self-sufficiency regarding their educational system and economy.

The continuous expansion of the early Islamic empires had created a new for new knowledge in the fields of geography, cartography and astronomy. This process was mirrored with the Ottoman empire's expansion. For example, the 16th-century admirals Seydi Ali Reis and Piri Reis produced several maps and cartographic works based on their own voyages and observations, as well as drawing on Eastern and European sources. Their contemporaries Matrakci Nasuh and Suudi Niksari wrote a descriptive geography of Iraq and a history of the West Indies, respectively.

In the 18th-century, following the crushing defeat of the Ottoman navy by the Russians, the Ottomans established new "imperial engineering schools" in Istanbul, teaching modern sciences in three areas: military, navy and medicine. Top-ranking 'ulama inaugurated these new institutions with prayers, and all students also learnt religion and oriental languages. Medrese graduates regularly taught in these new institutes of modern science: for example, in the naval school, Gelenbevi Ismail was professor of mathematics and went on to become a kadi (judge): educated traditionally, he authored books on mathematics, literature, fiqh, theology, logic, philosophy and other medrese subjects.

The mutual scientific interest between Western and Islamic civilizations

Western Europeans, being overwhelmingly Christian, regarded Muslims as "holders of false religion" whilst the latter regarded Christians as "infidels." However, numerous examples show that both sides were interested in the scientific knowledge of the other, especially when it was regarded as superior, irrespective of the religious affiliation of the scientists or civilisation involved.



For example, the Italian nobleman, Comte de Marisgli, lived amongst the Ottomans and wrote in 1732 of his appreciation of the Islamic tradition of science and learning, despite his rejection of the religion of Islam:

“In their schools, the principles of their ‘false religion’ are taught first; one learns about matters of faith and develops a capacity to judge ... They take great interest in logic and other fields of ancient philosophy and especially in medicine ... Alchemy is very pleasant to them ... and [they] have a certain knowledge of botanics. They very seriously study geometry, astronomy, geography and ethics; I can give, as evidence, a catalogue of more than eighty-six thousand authors of the last century, which I have in my library in Bologna, compiled for the use of scholars.”

The Italian priest Toderini, who stayed in Istanbul half a century later, concurred, praising the medreses that he called ‘academies’:

“The Ottoman scholars are knowledgeable and reliable since they do not have any uncultivated intellectual activities and they all know Arabic and Persian ... From the viewpoint of scientific autonomy and other aspects they and academies [medreses] are more advanced than their counterparts in Europe.”

Reaction to new scientific discoveries

During the 17th century, the Atlas Minor of Mercator was translated into Arabic, as was the Atlas Major of Blaeu. The translator of the latter, Abu Bakr al-Dimashqi, critiqued contemporary Islamic science, saying that it was dominated by theory rather than by practical application, and had thus fallen behind European developments.

In 1660, for the first time, Copernicus’ heliocentric model of the solar system was mentioned in an Ottoman text, in a translation from a 1641 French work of astronomical tables. The initial reaction to this new scientific theory illustrated well the complex relationship between Muslims and Christians, who were often at war whilst simultaneously exchanging knowledge: Mehmed Efendi, the Ottoman chief astronomer, remarked, “Such presumptuousness is abundant among the Europeans.” However, he later rewarded the translator after learning how to use the new Copernican tables. Mehmed Efendi’s reaction was typical of the cautious reaction of many Muslims, who were sure



of their own scientific tradition and expertise, and did not immediately accept the West as being scientifically superior.

In 1721, an Ottoman ambassador visited the Paris Observatory and discussed astronomical matters with Jacques Cassini, son of the celebrated astronomer Giovanni Cassini. There was a mutual exchange of scientific knowledge.

Translated European works did not result in any questioning of Islamic faith: for example, the paradigm shift from geocentricity to heliocentricity was regarded as simply a technical detail, because Muslim scientists did not know of any religious dogma opposed to either notion. Dimashqi mentioned the competing theories of Ptolemy, Copernicus and others, without favouring or rejecting any. Later Ottoman translators openly declared that the Copernican model was better, based on rational arguments.

The 18th-century translators Ibrahim Muteferrika and Ibrahim Hakki insisted on the religious requirement to believe that the universe is the work of the Creator: beyond that, religion was impartial and imposed no requirement on belief in a particular shape, arrangement or order of the universe. However, Muteferrika was cautious about the likely reaction to the new Copernican theory amongst the Muslim masses, given what had happened in the Christian world. Hakki's astronomical discussions were impeccably rational and scientific. His view of the compatibility between modern science and religion were inspired by Al Ghazali, who had argued in his *Tahafut al-Falasifa* (Incoherence of the Philosophers) that studying astronomy is not against religious law. Hakki criticised those who used religion to attack science: "A wise enemy is better than a foolish friend."

19th-century developments

Kudsi of Baku maintained that the geocentric (Ptolemaic) or heliocentric (Copernican) theories were unaffected by religion "because these matters are related to reason, not religion. Since imitation (taqlid) would not be lawful in matters pertaining to the intellect, we accept what the intellect prefers." Furthermore, he agreed with some Muslim scholars that not only was the Copernican model better scientifically, it also resonated better with the Qur'an and Hadith. This line of reasoning went further than previous Muslim responses to science, and was to result in the later phenomenon of *al-tafsir al-'ilmi* and *al-i'jaz al-'ilmi*: scientific Qur'an-commentary and the theory of the miraculous scientific nature of the Qur'an.

Meanwhile Christian Arabs continued to argue about this issue: the Egyptian



intellectual and education minister Abdullah Fikri intervened, drawing on Ghazali, and argued that demonstrable astronomical facts took precedence over outward meanings of revelation, and that revelation ought to be interpreted in the light of certain scientific facts.

A divergence of attitudes developed between medrese graduates and those from the new engineering schools. Some researchers describe this as Ottoman "dualism" or a conflict between the traditional and the modern. This eventually led to graduates of modern institutions of learning, beginning to oppose religion.

The first journal with the aim of introducing modern science to the masses in the Muslim world was published in Istanbul from 1862 under the leadership of Munif Pasha, one of the reformist intellectuals of the Tanzimat (Ottoman reform movement). The contents of this periodical show that Ottoman intellectuals did not consider themselves the heirs of a tradition different from that of Europe in regard to science or civilization: there was no talk of a conflict between "Islamic civilization" and "European civilization", no harmonizing of two different civilizations - possibly because both had the common background of the ancient Greek legacy.

The theory of evolution in Ottoman and Turkish thought (19th-century onwards)

Munif Pasha was also the first to introduce the theory of biological evolution to Turkish-speaking intellectuals via his journal articles. A decade later, one of the 'ulama, Hoja Tahsin Efendi, once a director of the Ottoman University, wrote that the universe was created in stages over billions of years and that one needed to know several scientific disciplines in order to understand these stages. He also presented the theory of evolution as the "law of evolution" that rules over the universe and its beings.

Contrary to the situation in the rest of Europe, the discussions of evolution in Istanbul began with social Darwinist thought, influencing their political struggles that culminated in the "Young Turk" revolution of 1908; biological Darwinist thought only became widespread after that.

In the late 19th century, Christian Arabs vigorously debated Darwinism at their academies in Damascus, Beirut and Cairo, all of which were under Ottoman rule. Just as in Istanbul, they began with social Darwinism, especially Herbert Spencer. A famous medical materialist and radical evolutionist, Shibli Shumayyil, was distressed by intra-religious conflicts and expressed



the hope that progress and world peace would follow the dissemination of the theory of evolution and the development of technology and the natural sciences. In contrast, as in Europe, most Arab religious responses favoured natural theology: God controlled nature, and natural phenomena revealed evidence of divine purpose, wisdom and design. These discussions cut across geographic and religious divides.

Shumayyil began to argue for a separation, if not an explicit antagonism, between science and faith. In contrast, faith “in harmony with the laws and sciences of nature” was vigorously defended by Husayn al-Jisr, labelled the new “Ash’ari of his time” by Afghani. Under royal Ottoman patronage, Jisr stated that Darwin’s theory of natural selection was compatible with a Muslim cosmology and faith in a creator. His work also refuted materialism and evolutionary naturalism, reconciling naturalism with faith by referring to God’s work and wisdom in nature. In the introduction to another of his works, Jisr wrote:

“This book corresponds to the will of the Sultan, who desired a short treatise be composed on Islam and replete with rational proofs. This was to be a defense against doubters and unbelievers who formed dangerous errors of opinion based on modern philosophy and science.”

Another remarkable example of the official Ottoman stance towards Darwinism is Dr Bishare Zalzal’s *Tanwir al-Adhhan* (The Enlightenment of Minds), a textbook for schools published in 1880 with the permission of the Ottoman Ministry of Education. The textbook covered natural history, zoology, animal taxonomy, anthropology, human biology, religion, sociology and civilization. The biology section was up-to-date, including comparative anatomy and physiology, cytology, histology and embryology. The animal taxonomy section included Lamarckism, Darwinism, evidence of evolution, natural selection and zoo-geography. This textbook was published before some of the later heated arguments, indicating that science-religion relations would not be controversial if they were separated from political struggles and if the religious beliefs of the masses were not denounced.

Allegations of conflict between Islam and science

At a Sorbonne conference in 1883, the French scholar Ernest Renan stated that previous Muslim successes in science and philosophy were achieved despite Islam, not because of Islam, and claimed that “as European science



spread, Islam would perish." Renan's accusations provoked responses from the famous reformer Jamal al-Din al-Afghani, the Ottoman intellectual Namik Kemal and the Russian Muslim intellectual Ataullah Bayezid. Their writings stimulated discussions about science-religion relationships in the Islamic world.

Afghani argued that Renan's criticisms of Islam were false: Islam was in harmony with the principles discovered by scientific reason and was in fact the religion demanded by reason. He also maintained that reason should be used fully in interpreting the Qur'an: if the Qur'an seems to contradict known facts, it should be interpreted symbolically.

This debate opened up a new area of discussion: was Islam conducive or obstructive towards progress and science? The factors influencing societal progression and regression were debated: sociological and economic reasons, religion, mentality, culture and civilization.

John William Draper's *History of the Conflict Between Religion and Science* (1874) was published in Turkish translation by Ahmet Midhat between 1895 and 1900, along with a lengthy supplement presenting what he saw as the specific Islamic attitude to science. Midhat argued that Draper's criticism of religion applied to Catholicism, and that these arguments did not hold true for Islam. He added that Islam encourages scientific endeavours and that Muslims throughout history had made important contributions to science. To achieve wisdom, young Muslims should not stray from Islam but complement the new philosophy and science with Islamic belief.

The 20th-century

The Muslim world experienced the systematic introduction of modern science through the expansion of education and the establishment of the first faculties of science (Istanbul 1900; Cairo 1925). Any dispute was not now between Islam and science but between Islam and modern philosophical currents such as positivism, naturalism and social Darwinism that challenged religion and the belief in God, or attempted to take their place.

Going further than Kudsi of Baku in the previous century, the Ottoman grand-vizier and astronomer Gazi Ahmed Muhtar Pasha published his *Secrets of the Qur'an* in 1918, relating verses of the Qur'an to discoveries in the modern science of his time, specifically in the following three areas: the creation of the universe and the beginning of life; doomsday and the end of the world; resurrection after death. He argued that the divine revelation of the Qur'an, being of eternal value, must be congruent with truth attained by science. If



there was a conflict between science and the holy verses, the latter must be interpreted appropriately.

The above approach was taken further by the famous Bediuzzaman Said Nursi, a traditional medrese graduate who was well aware of the danger of turning a blind eye to the challenge of modern scientific worldviews: in some of their ideological formulations, Darwinism and scientific materialism (scientism) had questioned the very foundations of medieval worldviews, including those of Islam. Nursi responded to the materialistic and anti-religious claims of the scientistic worldview. He was certain that modern science was not opposed to religion in general and Islam in particular: Islam had already produced one of the most enduring traditions of science. The problem was the misinterpretation of modern scientific findings in order to discredit religion.

Nursi's work was innovative in that it included numerous references to scientific discoveries: this became known as *al-tafsir al-'ilmi* or scientific commentary on the Qur'an.

The approach of Kudsi and Muhtar Pasha was later extended to the approach of *al-i'jaz al-'ilmi*: the "scientific inimitability" of the Qur'an, in addition to its *al-I'jaz al-Bayani* or "rhetorical inimitability." This was further popularised by Maurice Bucaille and resulted in *al-i'jaz* societies all around the Arab world.

Further phases

The work of Karl Popper and Thomas Kuhn established that scientific knowledge is socially constructed, at least partially. This led to interest in Muslim societies in practising science in a way that embodies Islamic culture, tradition and ethics.

Seyyed Hossein Nasr has argued that there is an Islamic alternative to "Western science," since the latter has become illegitimate and highly dangerous, being completely divorced from higher forms of knowledge. He posits that "Islamic science" historically had the capacity to synthesize and transform any ideas coming from outside, such as Greek scientific knowledge, to bring it in line with its own worldview, and that this approach must be revived. Nasr dismissed evolution "as an ideology and not as a scientific theory which has been proven." This anti-evolution stance was popularised amongst Muslim masses by the Science Research Foundation of Adnan Oktar (Harun Yahya), who at times collaborated with American young-earth creationists.



A glimpse of the future

In the 21st century, science in the Muslim world has moved towards more pragmatic and practical application. The importance of scientific enterprise and the need for excellence in research are more keenly felt.

A new vision to meet 21st-century challenges was forged in 2005 at the OIC summit, which highlighted the need to reform higher education and prioritize science and technology whilst emphasizing the tolerate and moderate understanding of Islam. It also urged OIC member states to strive for quality education that promotes creativity and innovation, and to increase expenditure on research and development.

The convening of the "Task Force on Islam and Science" is a major intellectual endeavor to tackle the relation between Islam and science in a rather comprehensive manner. I would like to congratulate the Task Force members for their brilliant work in debating and addressing core issues around Islamic theology and science that lay a basis and foundation for future work in this field.

I am also looking forward to the creation and dissemination of the Istanbul Declaration that seeks to identify some general principles on how Muslim scientists, in particular but also the general population - should think about the Islam/Science interface.

I hope this important declaration by an eminent assembly of scientists, philosophers, religious scholars, and theologians will be an important step forward in the right direction for the Muslim World and a catalyst for an important conversation in the future.

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**Preface:
An Important Question
of Our Time**

Tuncay Zorlu

Secretary General, The Turkish Society
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Preface: An Important Question of Our Time

Tuncay Zorlu

Secretary General of the Turkish Society for
History of Science (TBTK)

It gives us great pleasure to formally host the meeting of the Task Force on Islam and Science at the Turkish Society of History of Science. As the foremost professional society responsible for looking at the glorious past of the Ottoman and Islamic Science, we're very pleased to host such an august gathering of some of leading scholars - scientists, philosophers, theologians - from across the Muslim World to ponder over whether a reconciliation between Islam and Science is possible or, indeed, even desirable. As a historian of science, I am amply aware that science enjoyed a far more harmonious relationship with religion in the Muslim World than it did in other parts of the world. However, in recent centuries this harmony seems to have broken apart and there is a dire need to make an attempt to reconcile Islam with modern science both at a personal and an institutional level. This is an important question of our time and I am happy that TBTK has a role to play in convening a group of eminent scholars to address it.



Muslim Responses to Science's Big Questions: Summary Report

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Muslim Responses to Science's Big Questions: Summary Report

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1 Introduction

Are Science and Religion/Islam compatible with each other? Or must they be separate as if operating in two very different and almost non-overlapping spheres? Could scientists be believers, or does embracing modern science also mean embracing a certain atheistic or agnostic viewpoint in one's personal life? Should choosing to do science force an individual to live and practice in a never-ending series of contradictions or could a 'reconciliation' of sorts be achieved that allows one to practice both his or her religion and modern science without explicitly or implicitly denying either or both? What are the parameters of such a reconciliation? What





are the key flashpoints where science and religion appear to clash with each other and how men and women of science and faith seek to explain or reconcile their differences?

A time of great scientific advances

These are important questions, particularly in this age of rapidly advancing pace of scientific development where the contours of disciplines, motivations, and methodologies are constantly changing and sometimes overlapping. Just a few decades ago, the idea that life can be created from non-life (essentially a soup of chemicals) may have been difficult to imagine, yet today it can be considered almost a certainty that this can not only be done but is probably the most likely mechanism through which life appeared and evolved on our planet. The scientific evidence in support of evolution being the prime driver of life on this planet since its creation has also become overwhelming and a fact that most scientists, and many in the general public, have come to accept even though there are disagreements in the details – and particularly on those dealing with human evolution.

Similarly, recent discoveries in Physics and Cosmology (such as the discovery of hundreds of billions of planets, stars, and galaxies and the probable existence of life on planets around other stars) brings into sharp focus the anthropocentric view of most religions and further adds fuel to this perceived conflict between modern science and religious belief. Further advances in fields as diverse as regenerative medicine, neuroscience, and artificial intelligence points to the dawn of new era of science that may usher in even more mind-boggling discoveries that may fundamentally alter the foundations of science and technology, as we know it, and will certainly further complicate the science-religion debate.

Hopeful transition for science in the Muslim World

This is also a period of a hopeful transition for science in the Muslim World. We are seeing somewhat of a revival of science and technology – or at least the yearning of it – as evident from significant investments in several Muslim Countries such as Turkey, Iran, Malaysia, Pakistan, Egypt, Saudi Arabia, and Qatar. Whether or not this will result in a revival of science in Muslim context may depend, in part, on to what extent these societies are able to become producers and not just consumers of science, thereby contributing to pushing the boundaries of knowledge further. Yet there is little, if any, evidence that this is happening in a systematic way anywhere in the Muslim World. The investments in science and technology need to be supplemented with



effective institutions and the emergence of a true scientific culture before it would deliver results on the ground.

The 'Golden Age' of Muslim Science

The above challenges notwithstanding, there is considerable support for application of human reason and empirical observation within the Muslim holy scripture and there is a strong and glorious tradition of science and technology within early Muslim history starting from the its foundation in Baghdad in the 8/9th Century CE and spanning several centuries . On hundreds of occasions in Qur'an, God has ordained Muslims to wander in the world and observe and reflect upon Nature and His creation, to understand not just the objective reality of the creation but the Creator Himself and the purpose of the creation.

The great Muslim scholars of the time - *Ibn Sina* (Avicenna), *Al Razi* (Rhazes), *Al Khwarizmi*, *Al Farabi*, *Ibn al-Haytham* (Alhazen) and *Nasir al-Din al-Tusi*, among others - were scientific giants of their era who managed not only to comprehend and translate but also significantly improve upon the contributions of Greek and Indian scientists and philosophers and took the body of scientific knowledge then available to newer heights, ultimately laying the foundation of the scientific renaissance in Europe.¹ Among these were inventors of modern medicine, of algebra, of optics, of geometry, and even the scientific method. They established the world's first University in Fez, Morocco as well as some of the earliest observatories and libraries and succeeded in creating a culture in which knowledge and scientific inquiry could flourish.

The scientific decline and its causes

The golden age of scientific discovery within the Muslim East and West that spanned over seven centuries came to a halt by the 14th and 15th Century CE. A number of causes have been hypothesized for bringing this Golden Age to a close and scholars have long argued over how, when, and why this began and what caused it to happen in the first place.² Reasons range from historical factors such as the invasion of the Mongols that broke the back of the Muslim

1 George Saliba, 2007, *Islamic Science and the Making of European Renaissance*, MIT Press, Cambridge, MA

2 For a detailed history, see: Ehsan Masood, 2006, *Science and Islam: A History*, Icon Books and Jim Khalili, 2012, *House of Wisdom: How Arabic Science Saved Ancient Knowledge and Gave Us the Renaissance*, Penguin Books



political project, to the advent of colonisation starting in 17th and 18th centuries and ending with the dismantling of the Muslim dynasties in Mogul India in 1857 and of the Ottoman caliphate in Turkey in 1921, to the inability of the Muslim scientific enterprise to embrace or fully develop modern methods of organisation³ – such as scientific societies, scientific publishing and peer review, intellectual property rights, national scientific endowments, etc. – that began in the 16th and 17th Century CE in Europe (particularly Britain) and spread to America shortly thereafter, thus leaving them farther and farther behind in the rapidly accelerating world of science.

These political and economic factors aside, there has long been another line of argument advanced by many and often influential quarters both within and outside the Muslim World that blames the decline of science in the Muslim World to a conflict between Islam and science. Clear injunctions in the Holy Qur'an and historical precedence to the contrary notwithstanding, the proponents of this view suggest that there is some inherent property of Islam (the religion) that restricts (or forbids) Muslims from fully embracing modern science. Many even point out to a specific period within the Muslim history to which this 'closing off' and subsequent decline can be attributed.

Revelation trumps reason in the Muslim World

Many critics point, in particular, to the teachings of the great Muslim theologian and jurist *Abu Hamid Al Ghazali* who wrote passionately and decisively of the failures and danger of Philosophy – and many elements of the science of the time – in many of his works – the most famous of which is '*Tahafut al Falasifa*' (The Incoherence of the Philosophers). In *Tahafut*, Al Ghazali systematically demolished a major part of the arguments not just of Greek philosophers but also their adherents amongst the great Muslim scientists such as *Al Farabi* and *Ibn Sina* (Avicenna). Though many Muslims, and certainly a number of the Task Members, most notably Mohammed Ghaly, Afifi Al-Akiti, and Basil Altaie maintain that Al Ghazali's attack was against the part of philosophy he considered against the teachings of Islam and not against reason or science per se.⁴

3 In his *The Technique And Approach Of Muslim Scholarship*, (Analecta Orientalia, 24:XI), Rome, Pontificium Institutum Biblicum, 1947 Franz Rosenthal claims that many of these elements already had their roots in the Islamic tradition but failed to develop these pre-modern ideas further.

4 Task Force Member Ghaly said: "Al Ghazali' did not attack philosophy in toto but certain aspects of it and still considered by many as the Muslim philosopher rather than anything else... Ghazali, for instance, condemned Muslims for not learning 'medicine' and being obsessed with learning fiqh, just for worldly reasons to make money."



Thus, it was perhaps the misunderstanding of Ghazali's teachings, not the teachings themselves, that led some to adopt anti-scientific and anti-rationalist positions.⁵ However, if the matter was very clear, Ibn Rushd would not have written his point-by-point rebuttal to Ghazali's *Tahafut*, the *Tahafut al-Tahafut* (Incoherence of the Incoherence) in which, for example, he dismissed Ghazali's arguments against causality as "sophistry ... very objectionable, and contrary to common sense."

Similarly, although the later theologian Ibn Taymiyyah wrote a voluminous work explaining how unequivocal texts of revelation could not conflict with clear intellectual matters, there is no doubt that many contemporary religious scholars who are followers of Ibn Taymiyyah dispute basic scientific facts such as the sphericity of the earth, the heliocentricity of the solar system and biological evolution.

In summary, it could be argued that there has always been some tension, as well as agreement, between interpretation of revelation and reasoned analyses. There is no doubt that the great Muslim philosophers and theologians: Farabi, Ibn Sina, Bayruni, Razi, Ghazali, Ibn Rushd, Ibn Taymiyyah and others, were all aware of this tension and tried to address it in their thought. It is also fair to say that in the minds of many Muslims historically and today, revelation always trumps reason: "we cannot think about it, because God has said so!" is a common rejoinder to the Muslim intellectual attempting to rationalize his or her faith. One of the objectives of this Task Force is to explore this area and suggest new ways of reconciling conflicts.

Conflict between science and religion?

But is there really a conflict between science and Islam, as there was between the Christian Church and the early-modern scientists like Galileo and Copernicus? Scientific historians have argued the relationship between

⁵ Altaie: "Al-Ghazali never opposed science, to the contrary he supported science and the scientific quest. He tried to refute the philosophical dogma of claiming superiority by providing correct metaphysical arguments [to support religion]. The attached extracts from chapter 6 of my book (God, Nature and the Cause) clearly show the position of al-Ghazali as it is in the *Tahafut*. It is an in-depth analysis of the indirect dialogue between al-Ghazali and Ibn Rushd showing the genius of both great scholars, but also shows how al-Ghazali was much more advanced in his free thoughts than Ibn Rushd. I feel this document could be sufficient to refute any doubts about the incoherence of those blaming al-Ghazali for the decline of science in the Islamic world. Furthermore, the later works until al-Fakhr al-Razi and studies that followed him in science and theology by the Ottoman mutakallimun is clear evidence of some serious philosophical contributions. Moreover, the advanced studies performed by the Maragha school in astronomy which extended till the fifteenth century CE is more evidence that blaming al-Ghazali is an incoherent statement." (See Appendix D for more).



Science and Islam has been somewhat different than that between Science and Christianity.

There are usually two likely and common, almost automatic and even knee jerk, responses one gets if one questions about the real, perceived or potential conflict between science and religion in the Muslim World.

The most common, almost knee jerk reaction, is that there is no conflict between science and Islam. This would probably be a good news, if this response was based on clear-headed and careful thinking on the subject. In many parts of the Muslim World that discussion and discourse is either extremely muted or is entirely absent.

The second most common, again somewhat kneejerk, response is that there is indeed a conflict between science and Islam and this has been ongoing for several centuries now and, unlike the West, it only seems to be intensifying rather than fading away. This conflict manifests itself in many ways.

For instance, a vast majority of people in the Muslim world, including many within the scientific community, may reject scientific truths without collecting or analysing information to make an informed opinion, often just because it does not seem to agree with their religious beliefs. A 2013 Pew Survey of Muslim Attitudes towards Religion and Public Life asked Muslims around the world about their perceptions of perceived conflicts at the intersection of religion, science, and modernity.

Most Muslims around the world thought there was no conflict between religious life and modernity, with the exception of some countries in Africa and South Asia, with countries in South East Asia (Indonesia), MENA (Jordan and Egypt), and Central Asia (Azerbaijan and Kazakhstan) demonstrating the least conflict.

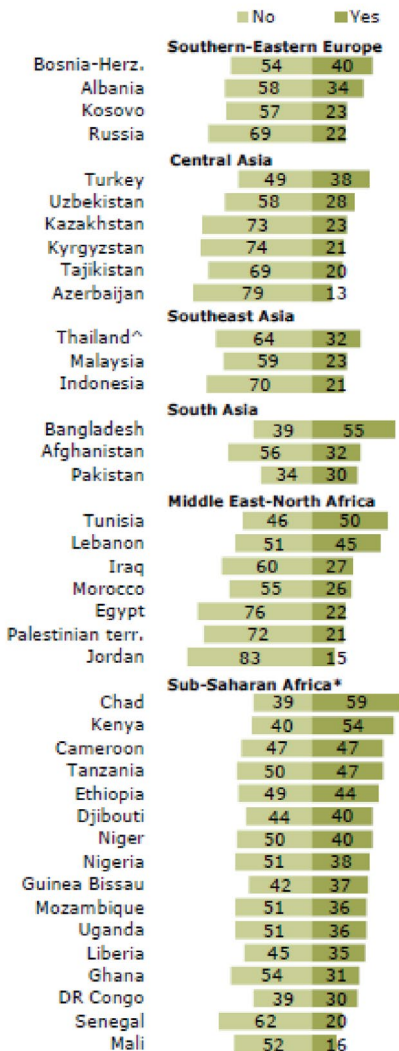
Similarly, most Muslims in most Muslim countries believed there was no conflict between religion and science. In just two of the 23 countries (Albania and Lebanon) do more than half of Muslims say there is a conflict between faith and science. In fact, at least half of Muslims in 17 countries say no conflict exists. A high percentage of Muslims in Lebanon (53%) and Tunisia (42%) say there is a conflict. There are no significant differences on this question by frequency of prayer, gender, age or education.

The gulf widens when asked specifically whether they believe in the truth and implications of one particular scientific theory, namely, the theory of evolution, a majority of people in only 13 of the 22 countries said that humans and other



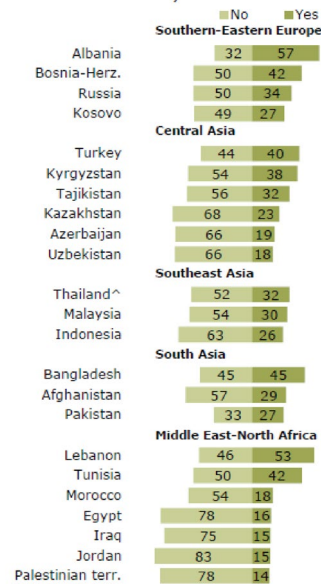
Is There a Conflict Between Religion and Modern Society?

% of Muslims who say ...



Is There a Conflict Between Religion and Science?

% of Muslims who say ...



Belief in Evolution

% of Muslims who believe humans and other living things have ...

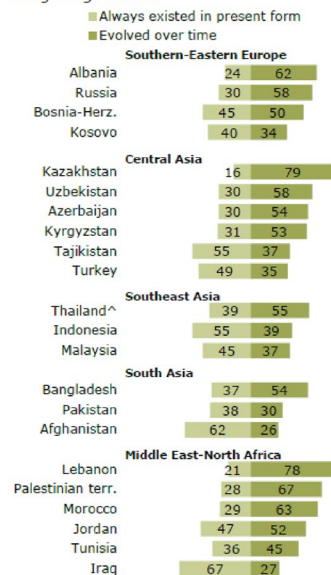


Figure: Results of Pew Survey of Muslim Attitudes towards Religion and Public Life



living things have evolved over time. Again, there are regional differences with broad support of the idea in South Central Europe and less so in South East Asia, MENA, and South Asia.

Salman Hameed, Director of the Study of Science in Muslim Societies (SSiMS) at Hampshire College in Massachusetts, has carried out a survey of Muslim medical doctors and medical students in 8 countries (Malaysia, Turkey, Pakistan, Egypt, and Indonesia; and 3 diasporas). While there are variations across countries, the picture that emerges is quite confusing and contradictory, at best. In the United States, for instance, just over half of those medical professionals surveyed accepted evolution with a slightly smaller proportion – but still a majority – accepting human evolution as well. A majority of participants, including some who did not wholly accept or reject evolution, thought that accepting evolution can go alongside believing in Allah.⁶

While these results may, at best, be preliminary because of potential challenges to question wordings as well as general level of scientific literacy within the society and hence need to be interpreted with a pinch of salt, they are nevertheless indicative of the general tendencies within the society. A closer qualitative examination may reveal the fault lines of this conflict.

The confusing mix of science and religion

In addition to the selective acceptance of various theories (and hence rejection of others) that form the basis of modern science, there is also a mixing of science and religion that goes against the underlying logic that drives either or both thus producing entirely non-sensical and even counterproductive outcomes.

Pervez Hoodbhoy, a noted physicist and a vocal social critic of the Muslim World, was perhaps the first academic to draw attention to this worrying development. He wrote a stinging critique of the practice of science in the Muslim World in his 1991 book titled *“Islam and Science: Religious Orthodoxy and the Battle for Rationality.”*⁷ In this thesis, Hoodbhoy musters up considerable anecdotal evidence to support the unholy mixing of science and religion that results in distorting the former but also, probably, to some extent the latter.

6 Everhart, Donald and Hameed, Salman, 2013, Muslims and evolution: a study of Pakistani physicians in the United States, *Evolution: Education and Outreach*, 6:2

7 Hoodbhoy, Pervez, 1991, *Islam and Science: Religious Orthodoxy and the Battle for Rationality*, Zed Books, Islamabad



One particularly striking, and oft quoted, example mentioned in detail in the book is that of Bashiruddin Mahmood, as senior scientist in the Pakistan's Atomic Energy Commission who is also the founder of Holy Qur'an Research Foundation and reportedly reads a paper at an 'Islamic Science' Conference on 'Djinnns' - the genies or Qur'anic creatures of another world that are made of fire. A suggestion was made, albeit one that was contested by Bashiruddin Mahmood, that these could be harnessed to solve the world's energy shortage. This idea that somehow one can mix the theories of science with verses and statements in the Qur'an or that literal interpretation of what is said in Qur'an constitutes scientific information has become a fast growing industry in the Muslim World.

Nidhal Guessoum, the author of a 2013 book titled "*Islam's Quantum Question: Reconciling Muslim Tradition and Modern Science*"⁸ counts a number of similar conferences across the Muslim World - often quite influential ones supported, at times, by the State itself - that bring together groups of scholars and pseudo-scholars, serious scientists and religious authorities to share and debate the wares of this flourishing industry that he calls *I'jaz* which is the practice of finding "miraculous" scientific facts in the Qur'an. There is considerable anecdotal evidence to suggest that the practices such as *I'jaz* may be even more prevalent within the Muslim scientific community than are sometimes acknowledged.

This confused mixing of science and religion results, often, in disastrous consequences for both, but most certainly for science since it diverts the energies of well-meaning and often capable scientists into endeavours that are inherently non-scientific and forces them to look for scientific information even if they have abandoned the core principles - the scientific method of rational inquiry - that distinguish scientific from the non-scientific.

The result often is, at best, a selective application of scientific rigor to nature and to scientific discoveries or, at worst, the complete abandonment of science and the scientific culture as being contrary to one's faith. Examples of both can be amply found in the Muslim world and amongst Muslims living and studying in the West. For example, biology texts in the Muslim world often do not include or teach modern developments in evolutionary biology and, even when they do, trivialise them by quoting, alongside, Qur'anic verses that seemingly differ from scientific theories. Furthermore, some in the Muslim diaspora living in countries where such basic scientific theories are taught refuse to attend classes.⁹

⁸ Guessoum, N. 2011, *Islam's Quantum Question*, IB Taurus

⁹ cf. Jack Grimston, *Muslim medics boycott lectures on Darwin and evolution*, The Sunday Times



2. The need for a reconciliation between Islam and Science

This is an untenable situation and clearly there is the need for a reconciliation between science and Islam to reverse the idea that there is a real (or perceived) conflict between the two, but also to allow Muslim scientists to engage with science in a more meaningful manner that is in line with and not opposed to their faith.¹⁰

This is only possible through a systematic effort from within the Muslim scientific community to formulate a well-thought through response to the conflict flash points, such as modern developments in cosmology and evolutionary biology, medical ethics, artificial intelligence, etc. This response would have to be somewhat sympathetic to religion since it, by definition, is one that is seeking to reconcile and not break free, but it must also seek to fulfil a high standard of scientific rigor. This conversation must engage, alongside the scientists, theologians and Islamic scholars as well as other relevant stakeholders who demonstrate a willingness to engage with this question in a thoughtful manner.

The primary audience of this Task Force, therefore, is the Muslim scientific community that is in dire need of guidance on how to reconcile their personal faith with developments in modern science. There could be several possibilities for this reconciliation project, namely:

(UK), 27/11/2011

10 **Dissenting Note** – Dr Farid Panjwani disagreed with the Task Force’s aim of reconciling science and Islam/religion. He argued that we should move towards an outcome that accepted non-overlapping, distinct spheres of science and religion. As articulated in his paper in this report, he saw the need to go beyond the notions of conflict and reconciliation and towards seeing science and religion as belonging to different ‘language games’, neither compatible nor incompatible. He observed that there is a dimension of understanding material facts and there is the dimension of the significance of these facts. These two dimensions belong to different ‘forms of life’ – science and religion. The domain of religion should be the problem of meaning to which it should endeavour to provide solutions that the believers may find persuasive, inspiring and spiritually fulfilling. This does not mean science and religion have nothing to do with each other. We cannot understand science simply as a culture-free method but must also bring in the ways in which scientific problems are formulated and how the resulting knowledge is applied, at the levels of individual psychological and socio-economics. Religion can have an ethical voice when it comes to how scientific knowledge is put to use, raising questions about equity, fairness, impact of human relations and question of meaning. He further noted that none of the above precludes reconciliation between science and religion at a personal level. Believers can be scientists and there are many examples of this. These are matters of individuals finding ways of connecting faith and science. The distinction and autonomy is required at institutional and methodological levels.



• A careful and thoughtful examination may reveal that Islam and Science are impossible to reconcile, whether in their entirety or in specific cases, and hence they must be practised within totally non-overlapping domains.

Should this be the case, it would then, for instance, require for scientists, in particular, and the public, in general, to fully understand and demarcate those domains i.e. where does one draw insights and inspirations from science and where should religion be the guiding force. One must also then determine how to navigate the boundaries and their limits where conflict is most likely to be found.

• A complete reconciliation between Islam and Science in that either one forces the other to totally relent (i.e. one subsumes the other) or both co-exist but with enough room for accommodating key differences where they do not entirely agree with each other.

This shall entail a certain degree of flexibility from both ends. Fortunately, there has traditionally been, and still is, room for this flexibility. Qur'an, most Muslims believe, is the literal word of God but it is subject to human interpretation which is not only fallible but also changes and evolves over time. Science, on the other hand, almost by design not only improves but can even undergo complete paradigm shifts over time.

• There is a deadlock whereby some contentious issues may be reconciled but other major ones shall remain and this could lead to one of several possibilities.

The polarization between science and religion may increase as a result of this conversation as differences become more apparent and come into sharper contrast. Alternatively, the discourse may actually result in a better understanding of the arguments and limitations among the proponents of each of the viewpoints and this would result in decrease in the polarization of the two positions.

In each of these circumstances, however, there are considerable details that need to be worked out and this requires working with diligence and care to define, precisely, what is meant by various constructs, what are the positions and arguments for each, and then taking those arguments apart to arrive at their essence before a new consensus can be formulated. Regardless of the outcome, however, if done in earnest and with the right intentions, this process will bring the two sides closer on issues that can be reconciled and create a conversation where none currently exists.



At a broader societal level as well, the project that seeks to reconcile the differences within the general scientifically literate public between Science and Islam will be beneficial since the attitudes and aptitudes of the general public within the society play a critical role in the formulation of conducive environment – one that encourages critical inquiry and celebrates doubt – for the flourishing of science and that is something that cannot be created by the scientist alone. Society must be an informed and willing participant in this.

Adil Najam, the Dean of Frederick S. Pardee School of Global Studies at Boston University, writes:

“That a spirit of enquiry is central to the cultivation of good science is not a controversial idea. However, the corollary that such a spirit of enquiry requires a celebration of doubt and will be stifled in an environment of certitude can instil some agitation. Science is uncomfortable with certitude precisely because it is in the business of forever seeking new truths. Where religiosity undermines questioning, doubt and uncertainty, it can stifle the conditions that nurture good science.”

Abū ‘Alī al-Ḥasan ibn al-Ḥasan ibn al-Haytham (or Alhazen) – arguably the father of the scientific method – writing in the very early 11th century made the most persuasive case for the special place of doubt in the advancement of science:

“Truth is sought for its own sake [but] truths are plunged in obscurity... Thus the duty of the man who investigates the writings of scientists, if learning the truth is his goal, is to make himself an enemy of all that he reads, and, applying his mind to the core and margins of its content, attack it from every side. He should also suspect himself as he performs his critical examination of it, so that he may avoid falling into either prejudice or leniency.”

(From Doubts Concerning Ptolemy, c1028CE)

The Task Force on Islam and Science seeks to advance the debate by



bringing together a well-informed group of Muslim scientists, theologians, and religious scholars to ponder over and create well-informed Islamic responses to some of science's big questions. As people of faith, these individuals delve into these matters with great care and respect for the religion but also a high standard of scientific rigor to identify, take apart, and put back the issues that are at the very centre of the conversation between Islam and Science.

The Task Force has sought to draw upon centuries of scientific and religious tradition and scholarship – including the works of giants like Imam Ghazali, Ibn Arabi, Ibn Taimiyah and others, on the one hand, and the likes of Ibn al-Haytham, Ibn Sina, Ibn Rushd, on the other – as well as latest developments in each of these fields to create a new more coherent narrative of Islam and of Science that creates the necessary room for this conversation to move forward.

In this respect this effort is not unlike that which has been undertaken in the Christian West, and for that matter in the Golden Age of Science in the early Muslim world, though never anywhere near the level of the conflict that existed within the Christian world, where as one observer puts it:

“The rise of the modern science has been accompanied by struggles with religious authorities as well as theological reflection on the new science and its products. These inner tensions and dynamics have produced an impressive amount of literature that deals with issues related to various aspects of Christianity and science. From Augustine to Newton, every major philosopher and scientist has reflected on the implications of the scientific discoveries on their faith...”¹¹

3. Historical Perspectives & a Framework for Reconciliation

Before we delve into the specifics of the various conflict flashpoints between Islam and Science, it is important to lay out a framework for this conversation to take place. This must be informed by the efforts in the recent times to bring about a reconciliation between Islam and Science and a keen understanding of where and why they fell short. There have been several attempts to reconcile Islam with modern science since the twentieth century.

¹¹ Muzaffar Iqbal, undated, Science and Islam, Suhail Academy, Lahore



Leif Stenberg, in his book titled *Islamisation of Science*, identifies four major positions of Muslim attempts to embrace science and modernity. These, associated with their chief proponents are: Syed Hossein Nasr's '*Sacred Science*', the school of I'jaz (*miraculous scientific content in the Qur'an*) associated with Maurice Bucaille, Ziauddin Sardar's '*Ethical Science*', and Ismail alFaruqi's '*Islamic Science*'.¹²

Each of these categories, though motivated by the particular ideas and ideologies of its Founder, has had many followers and adherents and thus has contributed to this important discourse. There are also other, smaller or newer, approaches that are becoming common.

Stefano Bigliardi, partly inspired by Stenberg's work, studied approaches to the Islam-Science discourse by the following six individuals: the Turkish religious leader and author Adnan Oktar (writing with the pseudonym Harun Yahya, b. 1956); the Egyptian geologist Zaghoul El-Naggar (b. 1933); the Iranian physicist Mehdi Golshani (b. 1939), the Iraqi physicist Mohammed Basil Altaie (b. 1952), the French astrophysicist Bruno Guiderdoni (b. 1958), and the Algerian astrophysicist Nidhal Guessoum (b. 1960).¹³ Bigliardi thus adds yet another category – the 'new generation' scholars – to this mix.

3.1 Historical Perspectives on the Islam-Science Discourse

We use a 5-part taxonomy that seeks to take Stenberg's and Bigliardi's classifications, build upon and modify or add to these, and analyse each of these from the perspective of their ability to provide a framework for a reconciliation between Islam and science. These are:

3.1.1 The 'Sacred Science' school

One of the most influential of the modern schools of thought in the Islam and Science debate is the one formed by Seyyed Hossein Nasr, one of the foremost philosophers of science and religion in the Muslim World today who, after graduating from Harvard University, returned to his native Iran in the 1960s to establish one of the first programmes in Islamic Philosophy of

12 Leif Stenberg, 1996, *Islamisation of Science: Four Muslim Positions Developing an Islamic Identity*, Coronet Books, New York

13 Bigliardi, Stefano, 2014, "The Contemporary Debate on the Harmony between Islam and Science: Emergence and Challenges of a New Generation." *Social Epistemology* (2013); Bigliardi, Stefano. *Islam and the Quest for Modern Science: Conversations with Adnan Oktar, Mehdi Golshani, M. Basil Altaie, Zaghoul El-Naggar, Bruno Guiderdoni and Nidhal Guessoum*. Istanbul: Swedish Research Institute in Istanbul (Transactions), 2014.



Science.¹⁴ Nasr returned to the United States after the 1979 Iranian revolution and spent the rest of his life in that country as a prolific scholar and teacher who created a large following of his ideas. Nasr made a distinction between “Western” science and “Islamic” (or Sacred) Science, claiming that the latter asked its followers to follow certain religious limits and ideas as they embark upon their ‘sacred’ duty of seeking knowledge.

The ‘Sacred Science’ approach of Seyyed Hossein Nasr, Frithjof Schuon and others thus takes an exception to the advancements in modern science and considers it as anomalous and responsible both for disconnecting man from God and for major environmental and social ills, fragmentation and disorder. According to this view, whereas modern science pursues objectives such as accuracy and confirmation by repeatability, scientific thinking in Islamic civilisation considered nature as sacred and consequently gave priority to values such as purpose, meaning and beauty.

This then is enough reason for the followers of this school of thought to embark upon a far more ambitious task of creating a new philosophy of science that draws inspiration from the Qur’anic teachings to the Muslims rather than attempting to reconcile modern science with the major articles of Islamic faith. The sacred science approach seeks to put a religious filter on the practice of science often resulting in constraints on what science is, or should be, its ultimate purposes and ends.

According to this view, for example, science must be constrained by metaphysics and theology. Nasr notes:

“Science is natural to man, but it is important above all to choose between the different levels in the light of the axiom: ‘My kingdom is not of this world’; all useful observation of the here below expands science, but the wisdom of the next world limits it, which amounts to saying that every science of the Relative which does not have a limit which is determined by the Absolute, and thus by the spiritual hierarchy of values, ends in supersaturation and explosion.”¹⁵

14 Leslie S. W., Korgan, R., 2006, Exporting MIT: Science, Technology, and Nation-Building in India and Iran in *The History of Science Society* quoted in Muslim-Science.Com, 2015, Sharif University of Technology: Iran’s MIT Redeemed available at: <http://muslim-science.com/sut-irans-mit/>

15 Frithjof Schuon, 1976, *Logic and Transcendence*, trans. P. Townsend, New York, 1975, p.



In essence, therefore, Nasr's project is meant to be more of a critique of 'modern science' than an attempt to embrace reconcile it with faith. Nasr notes, elsewhere:

*"The traditional cosmological sciences therefore concern man in an ultimate sense and on a level not to be compared with the modern sciences. The traditional cosmologies are related to man's inner perfection and to his ultimate end. They are inseparable from angelology and eschatology. The devastation of nature could not have come about until the traditional cosmological sciences were forgotten and the sacred view of nature upon which they are based became rejected as remnants of 'primitive animism'. The destruction of nature in modern times is due also to another factor which is directly connected with the very nature of modern science in contrast to the traditional sciences. The Islamic sciences ..., like other traditional sciences, never sought to satisfy the thirst for the Infinite in the realm of the finite ... In contrast, modern science has sought to quench this profound thirst for the Infinite on its own level of finiteness, forgetting the limits which have always been set upon the sciences from on high."*¹⁶

As one delves deeper into Nasr's description of the Sacred Sciences, it is quite evident that this is not an attempt of reconciling with the modern science but further accentuating the differences between it and his own view of what he described as "sacred" or "traditional" science. He acknowledges this right at the beginning of the introduction of his book "Sacred Science":

"The very term 'sacred science' may appear contradictory to those for whom 'science' is identified with the particular mode of knowledge which has come to monopolise almost completely the term science since the seventeenth century in the West. Science, thus understood, has by definition

135, quotes Seyyed Hossein Nasr, 1976, *Islamic Science: An Illustrated Study*, World of Islam Festival Publishing Company, London

16 Seyyed Hossein Nasr, 1976, *Islamic Science: An Illustrated Study*, World of Islam Festival Publishing Company, London, p. 237



nothing do to with the sacred, a term which is meaningless in its worldview, while what is called sacred, to the extent that this category still possesses meaning in the contemporary world, seems to have little to do with science.”¹⁷

He goes on to explain:

“For all intents and purposes the sacred sciences are none other than the traditional sciences cultivated in traditional civilisations... Today... only one science of nature is officially recognised in the mainstream of Western modern thought.... many of the traditional sciences are avidly cultivated in a truncated and mutilated fashion which makes veritable superstitions.”

He closes this introduction by stating:

“Our goal ... has not been to simply criticise the modern science, which is legitimate if kept within the boundaries defined by the limitations of its own philosophical premises concerning the nature of physical reality as well as its epistemologies and methodologies. Our aim has been to present at least some elementary notions concerning the sacred sciences and the meaning of such sciences in the contemporary world”¹⁸

In Nasr’s world, therefore, there is little room or even need for a reconciliation or a two-way exchange of ideas between Islam and modern science since the latter is relegated to a second class status with respect to the sacred sciences of the ancients, and certainly the theology which he describes as the ‘Queen of all Sciences.’¹⁹

¹⁷ Nasr, S. H., (2001), *The Need for a Sacred Science*, Suhail Academy, Lahore

¹⁸ Nasr, S. H., (2001)

¹⁹ Nasr, S. H., (2001)



3.1.2 “Islamic” Science school

An important, though controversial, contribution to the Islam and Science debate from the late 1970s through 1990s was made under the “Islamisation of Knowledge” thesis, its foremost proponents being Malaysian Scholar Syed Muhammad Naqib al-Attas and Arab-American scholar named Isma’il Raji Al-Faruqi who established the International Institute of Islamic Thought (IIT) in Virginia, United States, to advance his ambitious project. Beginning in Switzerland in 1978, the movement held international conferences in Islamabad (1981), Kuala Lumpur (1984), and Sudan (1987) and these attracted scholars from disciplines as diverse as Economics, Sociology, Psychology, Anthropology, Political Science and International Relations, and Philosophy.²⁰

While the Islamisation of Knowledge project, having created a significant following around the Muslim World and the West, has evolved since its launch, Al Faruqi described the primary objective of this ambitious endeavour in the following words:

“The task of Islamizing knowledge is to recast the whole legacy of human knowledge from the stand point of Islam ... i.e. to redefine and reorder the data, to rethink the reasoning and relating of the data, to re-evaluate the conclusions, to re-project the goals - and to do so in such a way as to make the disciplines enrich the vision and serve the cause of Islam.”²¹

This project called for the returning back to its “Islamic” roots all knowledge and even considered defective the early forays of Muslim scholars and scientists such as Ibn Sina and Al Farabi in Greek philosophy and science. It planned to purify the knowledge by going back to the first principles of Qur’an and Shariah, thus rubbishing all that was contrary to this and only accepting that knowledge that could follow through these first principles.

This has many implications for science, and some potentially quite perverse ones. However, one of the contributions of the Al-Faruqi’s Islamisation project

20 Ahsan, M. A., Shahed, M. K., M., and Ahmad, A., 2013. “Islamization of Knowledge: An Agenda for Muslim Intellectuals”, In Global Journal of Management and Administration Research and Management, v 13, issue 10, Global Publishers, USA

21 Ahsan et al., 2013



is to stress that science, like other disciplines is not value neutral, and thus acknowledge the philosophical undertones of anti-religious (as opposed to religiously neutral) secularism that pervades modern science today, according to some of its critics, and then ask the question: Is an authentic Islamic epistemology possible?²²

Others such as Osman Bakar and Ziauddin Sardar would also fall under the banner of Islamisation although the latter, perhaps, disagreed with and offered an alternative to Al-Faruqi's thesis. Ziauddin Sardar suggests that Muslims need to innovate around two paradigms. The first of these is to create knowledge paradigms for different fields of study that are in line with Islamic teachings and the second is to create behavioural paradigms that will establish boundaries for practitioners of these disciplines – scientists and scholars – to operate.

The “ethical science” approach of Ziauddin Sardar and his associates – the Ijmalis – placed emphasis on restoring ethics and values to science whilst castigating modern science and technology for allegedly abandoning ethical thinking. Influenced primarily by Sardar's own background as a Briton of Pakistani descent living in post-Colonial Britain, the Ijmali view also rests on the claim that the West (its civilization, culture, economic and military power) is a threat to the Muslim world. This interpretation is sometimes described as a post-colonial critique.²³ Modern science is seen as being flawed and dangerous in both its ‘metaphysical’ bases and its social effects.

Sardar's proposed solution, then, is to redefine science for the benefit of all humanity by grounding it in core Islamic principles and values such as divine unity [tawhid], human trusteeship of the Earth [khilafah], knowledge [‘ilm], justice [‘adl] and the public interest [maslaha]. While Sardar rejects the notion of an Islamic (or for that matter Hindu or Christian) Science, his idea of science firmly puts him in the Islamisation camp. For instance, elsewhere he notes:

‘It is not Islam which needs to be made relevant to modern knowledge, it is modern knowledge which needs to be made relevant to Islam.’²⁴

22 Anees, Munawwar, undated, Islamization of Science: A Crisis of Knowledge, accessed on Feb 21, 2016 from: <http://www.metanexus.net/essay/islamization-science-crisis-knowledge>

23 Iqbal, M., Review of Leif Stenberg's Islamisation of Science: Four Muslim Positions Developing an Islamic Modernity, accessed on Feb 21, 2016 at: <http://www.cis-ca.org/reviews/4-pos.htm>

24 Ziauddin Sardar, 1986, Islamic Futures - The Shape of Ideas to Come, Mansell Publishing, New York, p. 101.



To the proponents of the 'Islamic Science' school of thought, there is something inherently Islamic about their science – not just the fact that it is done by Muslims, and not just that it is relevant to the Muslim World, but something about the epistemology and methodology – that makes this a unique position.

Clearly, this position does not leave much room for a two-way conversation between Islam and science and amounts to an attempt to make science subscribe to Islam and hence is biased in its approach towards one (Islam) over the other (Science).

3.1.3 The "Universal Science" school

The Universal Science approach has been put forth by noted scientists such as Abdus Salam, the first ever from the Muslim World to win a Nobel Prize in the Sciences, and his followers such as Pervez Hoodbhoy, and others. This approach calls for a recognition of the international and universal nature of modern, collaborative science, with an appreciation for political issues such as the science gap between the advanced and developing world.²⁵ In this view, while the applications of science are affected by cultural factors, science itself is universal and – in contrast with the sacred science and Islamic science approaches – there are no serious 'metaphysical' or conceptual problems warranting a reconstruction of modern science.

Needless to say that, it follows from the universality of science that there is no 'Islamic science,' just as there is no Hindu or Jewish science. Salam and his followers are deeply sceptical and opposed to the Islamisation Project. Abdus Salam has, in the foreword of Hoodbhoy's book titled "Islam and Science" noted, for instance:

"[Hossein] Nasr and [Ziauddin] Sardar are doing a great disservice to science in the Muslim countries if they are calling for a religiously and not culturally motivated 'Islamic Science', whatever that means. There is only one universal science, its problems and modalities are international and there is no such thing as Islamic science just as there is no Hindu science, no Jewish science, no Confucian science, nor Christian science."²⁶

25 The International Centre for Theoretical Physics in Trieste, Italy, set up by Prof. Abdus Salam, is an example of an attempt to bridge this gap.

26 Hoodbhoy, P., 1991, Islam and Science: Religious Orthodoxy and the Battle for Rationality, Zed Books, Islamabad.



Salam does, however, make the provision for some science to be 'inspired' from religion when he acknowledges that his thinking on the unification of the forces was inspired by the Islamic notion of a Unified God,²⁷ though some of his followers, most notably Pervez Hoodbhoy and other modernists may not agree with using religion as a source of inspiration for science (see the section on *I'jaz*).

Salam's empiricist and objectivist approach has led to him being labelled by his critics as a 'conventionalist' and a 'modernist' in his approach.

While Salam himself has not, one of his disciples Hoodbhoy has directly asked the question:

"Is Islamic faith in harmonious complementarity with the science of the natural world or is there rather an irreconcilable conflict between a metaphysical system based on faith and the demands of reason and empirical inquiry?"

Hoodbhoy goes on to say:

"At the heart of the dispute is the fundamental issue: science is a secular pursuit, and it is impossible for it to be otherwise. The secular character of science does not mean that it necessarily repudiates the existence of the Divine. But it does mean that the validation of scientific truths does not rely on any form of spiritual authority; observation, experimentation, and logic are the sole arbiters which decide what is true or false. Scientists are free to be as religious as they please, but science recognizes no laws outside its own."

It may seem from the above that Universal Science approach does not allow any conversation to take place between Islam and Science, Hoodbhoy's position, however, is to push for:

"a framework for thought and action, based upon science and reason, but in harmony with the inherited cultures of the Muslim people."

²⁷ Hoodbhoy, 1991



For bringing modern science out of the zone of conflict and making it amenable to the Muslim World, Hoodbhoy describes a set of principles to be aspired for in contemporary Muslim societies. These include: first, the renunciation of the idea that there exists a simple and unique – mostly dogmatic – solution to all dilemmas of the society; second, that we must fight the tendency to confuse modernization with Westernisation and that a rational creed – as espoused by *Ibn Sina*, *Ibn Rushd*, and *Al Razi* – is the seed of modern life; third, that there needs to be a truce in the continuing opposition to modern science as an epistemological enterprise; and finally, that scientific and technological progress is a universal idea and not just the prerogative of the developed West.

From each of these four principles, other sets of ideas follow and many of these may require a conversation between Islam and science. Needless to say that, unlike the Sacred or the Islamic Science approach, the Universalist approach does leave room for that conversation, even if it rings of secularism and lays the ground rules for this conversation that are biased towards modern science.

3.1.4 Miraculous Scientific Content of the Qur'an

The Qur'anic Miracles approach became extremely popular in the Muslim world from 1976 when Maurice Bucaille, a French surgeon who served the Saudi Royalty wrote a book titled 'The Bible, Qur'an, and Science' in which he systematically examined the two scriptures for potential scientific information as now known in the light of modern knowledge. His conclusion, that *"it is impossible not to admit the existence of scientific errors in Bible...[but] Qur'an most definitely did not contain a single proposition at variance with the most firmly established modern knowledge,"*²⁸ was, as expected, received very well in large parts of the Muslim World as a proof of the idea that Qur'an had divine roots and contained knowledge coming directly from a higher source (i.e. God).

This has since gained so much popularity that it has almost become one of the most popular ideas related to science amongst Muslims and a whole industry was born that seeks out scientific miracles in the Qur'an and Hadith (Zindani, Moore, Naggari, and others) and attempts to prove them. The *I'jaz* school – as it is commonly known now – is neither scientific (or for that matter,

28 Sardar, Z., 2008, Weir Science, In The New Statesman, accessed on Feb 22, 2016 available at: <http://www.newstatesman.com/books/2008/08/quran-muslim-scientific>



traditionally theological) in its own approach.²⁹

There is serious criticism of the *I'jaz* school which has benefited from considerable state patronage, particularly in the Gulf but also, to a lesser extent, in Pakistan and Malaysia with the first conference of this school taking place in Islamabad in 1987. Sardar notes:

*“Both Bucaille and Moore played on the inferiority complex of influential Saudis, suggesting that the Quran was a scientific treatise and proof that Muslims were modern long before the modern world and modern science. The Saudi government poured millions into I'jaz literature. The Commission on Scientific Signs in the Quran and Sunnah was established.”*³⁰

Guessoum seriously questions the scientific basis or predictive power of the outputs and equates it with cherry picking of Qur'anic verses and assigning them meanings that fit a set of pre-determined ideas. He notes:

“They start with a verse of the Quran and look for concordance between scientific results and Quranic statements. For example, one would start from the verse “So verily I swear by the stars that run and hide...” (81:15-16) and quickly declare that it refers to black holes, or take the verse “[I swear by] the Moon in her fullness; that ye shall journey on from stage to stage” (84:18-19) and decide it refers to space travel. And so on. [Thus] what is meant to be allegorical and poetic is transformed into products of science.”

Muzaffar Iqbal is also very sceptical of the use of Qur'anic verses as scientific facts and notes for instance that the early Islamic scientific works, though profoundly influenced and imbued by the Qur'anic worldview of their times, hardly mentioned scientific verses from the Qur'an in any direct way. He notes, for instance:

²⁹ For a critique of the *I'jaz* school, see Guessoum (2011), Chapter 5

³⁰ Sardar, Z. (2008).



“The Algebra of Al-Khwarazmi, a pioneering work in its field, neither refers to a Qur’anic verse in the text of the book, nor uses a verse like ‘God set all things in numbers’, as invocation at the beginning of the book, its purpose is purely practical”³¹

The same is true of Ibn Sina’s *The Canon* (of Medicine) where references from Qur’anic verses are absent even though the author seeks divine help in the preface of the book, as is customarily done by devout Muslims before embarking upon any action.

The same is also true across the vast majority of scientific texts of the time and stands in sharp contrast to non-scientific texts, such as the religious ones, that liberally quote from the Qur’an. Needless to state that Iqbal finds the phenomenon of scientific exegesis (*al-tafsir al-ilmī*) as a purely twentieth century phenomenon that is ‘inherently flawed’ and ‘amounts to gross injustice to both the Qur’an and science.’³²

There is a considerable and growing consensus within the Islam and Science community that there is something quite not right with the I’jaz school and yet this continues to be, probably, the most popular position amongst both religiously literate (and illiterate) scientists and members of the general public within the Muslim World. And it is easy to understand why, since it requires little in terms of inconvenient higher-level thinking and invokes the Qur’an in a rhetorical approach to conveying religion in a simplistic way to the masses.

3.1.5 The New Generation’s Reconciliast school

Of the six Muslim scholars studied by Bigliardi, he identifies four (Mehdi Golshani, Basil Altaie, Bruno Guiderdoni and Nidhal Guessoum) as representing a “new generation” of thinkers and different from the “old generation” studied by Stenberg. These four, he noted, could be distinguished by the following common characteristics:

- (1) The “new generation” are natural scientists who are, or have been, engaged in scientific teaching and/or research at university level.

31 Iqbal, Muzzaffar, 2004, *Islam and Science: Explorations in the Fundamental Questions of the Islam and Science Discourse*, Published by Suhail Academy, Lahore, Pakistan, p.37

32 Ibid, p. 38



- (2) They recognize that the scientific method cannot be changed and therefore do not advocate any kind of "Islamization" of science.
- (3) They are open towards the possibility of theistically interpreting biological evolution.
- (4) They distance themselves from the "scientific exegesis" of the Qur'an, often deemed unscientific.
- (5) They simply accept that Islam can be in harmony with science qua religion or at least on a footing of equality with other monotheistic religions. The older generation considered Islam to be in harmony with science by virtue of a privileged relationship (as the exclusive repository of concepts with which science should be reformed or as the only scientifically validated religion).³³

This new generation – not all young, by any means – of scholars, in which one could also add, perhaps, Rana Dajani, Usama Hasan, Jamal Mimouni, and others, aspire for a modernist approach to reconciling Islam and Science. This group has several features in common with the Universal Science approach in the sense that they, like Salam and Hoodbhoy, are scientists by profession and hence have a keen appreciation of science and the scientific method. However, this group is different from others in that they are simultaneously sympathetic to both Islam and Science and hence seem to genuinely seek a reconciliation between the two rather than simply a capitulation of one to the other.

Guessoum in his book *"Islam's Quantum Question: Reconciling Muslim Tradition with Modern Science"* proposes an "Averroesian harmonization" between Islam and modern science with an optional, theistic interpretive layer that allows a believer to understand the religious or metaphysical significance of scientific facts that are themselves agreed upon by universal science and arrived at via the scientific method. It also calls for a universal imposition of stringent ethical standards, consistent with Islamic ethics, for the practice of science. Since the possibility of apparent contradiction between Islam and science remains, we are to resort to hermeneutics in any such cases, keeping in mind the multi-level meanings (polysemy) inherent in the Qur'an when interpreting verses dealing with natural phenomena, as mentioned in Ihsanoğlu's foreword, Abdullah Fikri and Jamal al-Din al-Afghani had made

33 Bigliardi, Stefano. "On Harmonizing Islam and Science: A Response to Edis and a Self-Criticism." *Social Epistemology Review and Reply Collective* 3, no. 6 (2014): 56-68. Cf. Edis, Taner. "On Harmonizing Religion and Science: A Reply to Bigliardi." *Social Epistemology Review and Reply Collective* 3, no.2 (2014): 40-43.



similar proposals in the previous centuries.³⁴

While there are points of agreement between members of this new generation school, there are also significant differences as obvious from the deliberations of this Task Force and documented later. On the point of 'methodological naturalism' of science, for instance, Nidhal Guessoum adopts a very strong position requiring it as one of the basic principles ('usul') that any reconciliation effort to bring science and Islam closer must honour. Several others, while acknowledging parts of material causality, do not agree with that being a requirement for Islam and modern science to be fully reconciled. There are other issues such as Spirit (*Nafs* or *Ruh*) and Miracles whose existence and nature in theology is even harder to reconcile with the methodology and findings of modern science.

However, this is a promising start and one that will require considerable more work in the future.

3.2 A Guiding Framework for the Reconciliation Project

Drawing from the analysis of the above-noted five schools of thought that have sought to reconcile Islam and Science during the latter part of the twentieth and early twenty-first century, one can begin to put together some general principles or a guiding framework for a reconciliation project. We identify five basic principles that should be at the foundation of an effort to reconcile Islam and Science. These are:

Principle 1: A genuine reconciliation between Islam and Science will require that neither is irreparably distorted or compromises its fundamental principles or methodologies. For instance, the reconciliation shall be of little use if it means changes in epistemology (or scientific method)

³⁴ Dissenting Note - Basil Altaie: "This proposal simply says that if there is an apparent contradiction between the Quran and science we should resort to hermeneutics. But unfortunately this will not work for two reasons (1) science might be wrong; there are several examples in history of modern science which shows that scientific theories have radically changed, e.g. Newton's theory and Einstein's theories of gravity. Why should we then consider science more reliable than the Quran? (2) Hermeneutics is a scientific methodology of analysing texts and it would successfully apply in most cases to standard innovative text, but not the Quran. The structure of the Quran verses do not render itself to a hermeneutic analysis. This was discussed on high academic level with specialists of hermeneutics from Cambridge University and Birmingham University during a symposium held in Amman last January. Examples were given supporting this claim and the specialists agreed that there is a problem in the case of the Quran."



so as to render the resulting 'science' fundamentally flawed. Same applies to Islam.

Principle 2: A genuine reconciliation must be able to distinguish the basic essence of Islam and Science from the philosophical, cultural, or historical baggage on both sides that often ends up undermining efforts for reconciliation. If a philosophical layer added on top of the essence of science produces an 'atheistic' interpretation of its results, it shouldn't necessarily poison science per se and the reconciliation project should be able to do away with that additional layer and take science for what it truly is.

Principle 3: A genuine reconciliation cannot be about one subsuming the other, but instead it must acknowledge that both are distinct spheres – partially overlapping, softly overlapping, or non-overlapping – that provide answers to questions not necessarily answerable by other, and hence must both live side by side intersecting where they must whilst also maintaining their distinctiveness.

Principle 4: A genuine reconciliation must, at the very least, engage theorists and practitioners of both science and religion (or theology) and not be driven by experts of either one or neither of these disciplines. Ideally, though, it should also engage other stakeholders such as philosophers, ethicists, and social scientists, etc.

Principle 5: An ideal reconciliation shall produce an outcome whereby the whole is greater than the sum of the parts, and not one that will either diminishes the value of the sum or each part individually.

We believe that a genuine reconciliation between Islam and Science must adhere to most (if not all) of these principles, and a complete reconciliation may, initially, be only aspirational and would require careful engagement by scholars from multiple disciplines to resolve and reconcile differences.

Having derived the basic principles underlying a genuine reconciliation, we can now evaluate each of the five schools of thoughts on whether or not they satisfy these. The following table presents a quick analysis:



Schools of Guiding Thought	Sacred Science	Islamic Science	Universal Science	Miraculous Qur'an	New Generation Reconciliasts
P1: <i>Neither discipline is fundamentally distorted or compromised</i>	Limits the domain of modern science	Compromises scientific method, if against Islam	Yes...But with some reservations	Completely undermines science and probably religion too	Yes
P2: <i>Separates the basic essence from philosophical, cultural, historical baggage, etc.</i>	Strong critique of Western Science	Strong critique of Western Science	Yes for Science, No for Religion	No	Yes
P3: <i>Both co-exist side-by-side maintaining distinctiveness</i>	Religion completely trumps science	Religion significantly limits science	Possible but in a limited way	Both are distorted	Possible
P4: <i>Reconciliation advances not undermines (Whole is greater than sum of the parts)</i>	Totally undermines Modern Science	Seriously Undermines Modern Science	Trivialises religion, often for wrong reasons	May enhance faith in science and Islam but in a profane rather than insightful way	Possible
P5: <i>Engage genuine theorists and practitioners from both (multiple) disciplines</i>	Nasr was a physicist first, philosopher second	IIIT mostly focussed on social sciences and humanities, excluding natural scientists	Mostly scientists with little involvement of religious scholars	Engaged experts of both disciplines but in a profane rather than insightful way	Yes, But with some reservations

Figure: Application of Guiding Framework for Reconciling Islam and Science



The table also clearly indicates gaps in the ability or the intention of the five competing schools of thought on Islam and Science to bring about a genuine reconciliation - with the 'New Generation' reconciliast school, on the one end, to Sacred Science school on the other and Islamic Science, and Miraculous Qur'an approaches in the middle, in decreasing order of their amenability to a reconciliation project. The "universal science" school, by separating the domains of science and religion, stands outside any arena of conflict or reconciliation. The table also, ideally, provides a rubric on which the success or amenability of future efforts towards a reconciliation can be evaluated. It is also evident that the approach of 'New Generation' reconciliast school is the most fruitful of the five major approaches considered for this analysis.

The current Task Force on Islam and Science builds upon the work of this 'new generation' of scholars and seeks to address the deficiencies as identified in the above rubric as a first step towards ultimately achieving a genuine reconciliation between Islam and Science.

In seeking to do so, the Task Force's deliberations were carefully designed to create the environment necessary to achieve the following interim objectives:

Interim Objective 1: Use a few test cases (or flashpoints) to understand how a possible reconciliation may be achieved and to stress test these to see where and how they break down and build upon this experience to systematically move forward;

Interim Objective 2: Define the *Usul* - fundamentals - on which this reconciliation can be built and worry about the *Furu* - branches (specifics or details) - later;³⁵

Interim Objective 3: Develop a mechanism for building (but not forcing) consensus by using the well-established legal framework of identifying where the absolute majorities stand, entertain split decisions and minority opinions or dissents.

The following section lays out the salient points of discussion for a range of different test case areas such as epistemology and methodology, biological evolution, cosmology, belief in God and miracles, etc. and seeks to draw conclusions on its amenability to bring about a reconciliation in Islam and Science.

³⁵ The adoption of this idea as an intermediate output of this Task Force is attributed to Task Force Muhammed Ghaly who suggested this as a principle of what the Task Force should seek to achieve.



4. Muslim Responses to Science's Big Questions

4.1 Epistemology of Islam and Modern Science - Muslim Scientific Responses to the Nature of Knowledge

Several of the most important issues at the intersection of the Islam-Science conflict have to deal with issues of epistemology – namely, what constitutes Islam (revelation) and science (reason), what are their methods, what are the key underlying principles or axioms, what are their spheres of influence, and what are their respective limitations; what are their truth claims and their validities, etc.

In Muslim history the real epistemological divide was between those who saw revelation as the sole (e.g. some *Hanbalis*) or predominant (e.g. some *Ash'aris*) source of knowledge and those who saw reason as the sole source (e.g. some philosophers) or at least equally important source of knowledge (e.g. the *Mu'tazilah*). A seminal contribution in this regard has been made by Task Force Member Basil Altaie in his work *Daqiq al-Kalam* which seeks to modernise theology (Kalam) by drawing upon the old Kalam literature of the Asharia and *Mu'tazillah* and reinterpreting it for the modern times.³⁶

There were also questions about differences between types of knowledge, such as: how do we define “rational sciences”? Is it those in which we can “rigidly demonstrate facts” by providing clear proof (*burhan*)? If so, is this limited to mathematics, logic and physics, or does it extend to politics and ethics also?

The epistemology of science today, however, rests on principles of objectivity (truths or facts must be confirmed by anyone, independently of who claims the result) and, many but not everyone, insists on a methodology whereby the causes and processes of any phenomenon must be limited to nature, without any involvement of any type of supernatural agents (demons, angels, spirits, God, etc.). The principle of “methodological naturalism” does not imply a rejection of the possible existence of God or non-natural agents; they are just not to be included in the methodology of modern science. This is a point of high contention among a number of scientists and philosophers, Muslims and others, and this became one of the main (and few) points of disagreement among members of the Task Force.

36 Muhammad Basil Altaie, 2010, *Daqiq al-Kalam: al-ru'yah al-Islamiyyah li falsafat al-tabi'ah* [Subtle theology: the Islamic view of natural philosophy], 2nd ed., Al-Kalam Research and Media



4.1.1 Nature, Sources, and Uses of Knowledge

There is a huge body of traditional scholarship and a number of knowledge classifications advanced by leading Muslim scientists, philosophers, and theologians of their time, such as: Al-Farabi in his *Ihsa' al-'Ulum* (Enumerating the Sciences), Al Ghazali, Ibn Khaldun and the 16th-century Ottoman scholar Taşköprüzade.

Al Farabi categorised the types of sciences (knowledge) into the following: language sciences; logical sciences; mathematical and physical sciences; natural sciences; metaphysical sciences and “sciences of society,” i.e. social sciences that, according to him, included jurisprudence (*fiqh*) and theology (*Kalam*).³⁷

Hierarchy or unity of knowledge?

Ibn Khaldun distinguished between “rational sciences” (*'ulum 'aqliyyah*) that were commonly available to all humans and “transmitted sciences” (*'ulum naqliyyah*) that came from revealed scriptures. For Ibn Khaldun, the “transmitted” or traditional sciences comprised: Qur’anic sciences; Islamic jurisprudence and its principles; speculative theology; Sufism and dream interpretation. The rational or intellectual sciences, that he also calls “the sciences of philosophy and wisdom” comprised: logical sciences, physical sciences, metaphysical sciences and mathematical sciences.³⁸

While classifications are plenty, there was also an underlying hierarchy implicit in these classifications. The revealed sciences were usually assumed to be at a higher level than the rational sciences. The tricky relationship of the revealed versus the rational sciences is most obvious in Al Ghazali’s famous showdown with Ibn Sina where the former demolished a major part of philosophy (i.e. the precursor to ‘modern’ science), putting the revealed sciences or the scripture clearly at the pinnacle of knowledge. Thus, as Hazim Shah describes, the rational sciences were marginalised by the religious sciences.³⁹

However, many outstanding scholars of the time also emphasized the ‘unity of knowledge’ – which does not make a distinction between the religious and the

³⁷ Nasr (1976), p. 15

³⁸ Cf. Ibn Khaldun, *The Muqaddimah – An Introduction to History*, trans. Franz Rosenthal, Princeton, 2005, pp. 343-398

³⁹ See Hazim Shah’s contribution in this volume.



profane – and this too has, over time, also existed side-by-side.⁴⁰ Even though there have been attempts in recent years, particularly from the Sacred Science and the Islamic Science schools, to redefine and restore that hierarchy,⁴¹ the rational sciences have gradually managed to emerge from the shadow of revelation to claim their own distinct place alongside the latter.

Today, the question of the nature and sources of Islamic and Scientific knowledge is well-understood and the complementarity is agreed upon by many, though still disputed by others. Islamic knowledge is based on revelation while scientific knowledge is based on reason and rationality. But many seek a rapprochement between the two. Afifi Al-Akiti, for instance, describes revealed knowledge as “*an intellect from outside of this world*” and scientific knowledge as “*a scripture from within ourselves*.”⁴²

The primary sources of Islamic knowledge are then Qur’an – the Scripture – and the tradition of the Prophet Muhammad (Peace be Upon Him)⁴³ while that of Science is the collective body of knowledge created as a result of efforts of innumerable individual scientists over several thousand years of human history and the ‘scientific tradition’ created as a result of what these scientists do and how they do it.

There is some disagreement on whether one of these (primarily, Islamic knowledge as contained in the Qur’an) can be a legitimate source of input for the other (primarily Science). The I’jaz school discussed earlier argues that it does, and it enjoys considerable support from the ‘ordinarily informed’ scientific community and general population in the Muslim world, but most other well-informed schools of thought deny the existence of such a relationship.

Task Force Members agree with their colleague Nidhal Guessoum who argues that the Qur’an is not a book of science and its verses should not be read as containing scientific facts. It provides what appears to be scientific information (or facts of nature) in allegorical form as a way to inspire or drive home a lesson to the believers.⁴⁴

40 Beg, M. A. J. undated, accessible at: <http://www.muslimheritage.com/article/origins-islamic-science#sec2.3>

41 Nasr (1976), p. 16

42 See Shaykh Afifi Al Akiti’s contribution to this volume.

43 Task Force Member Farid Panjwani noted that for the Shii traditions, sayings of the Imams is another primary source of religious knowledge.

44 Guessoum, 2011, Islam’s Quantum Question.



The general consensus is that science and religion generally address different problems for the society and neither can replace the other. In Guessoum's words, Science addresses the 'How' – a domain on which the Qur'an does not have much to add, while the Qur'an addresses the 'Why' on which science is silent.

4.1.2 The Overlap between Islam and Science

Task Force Member Farid Panjwani argues for a total separation of science and religion as far as scientific method and modes of enquiry are concerned.⁴⁵ This position is in line with that of many others in the Universal Science and Reconciliast schools. It is also similar to Stephen Jay Gould's famous hypothesis that science and religion constitute "Non-Overlapping Magisteria" or NOMA.⁴⁶ Dallal provides detailed evidence that early Muslim scientists and philosophers such as Avicenna and Al Biruni were very clear that scientific problems required only scientific investigations.⁴⁷

Others, such as Task Force Member Hazim Shah,⁴⁸ speak of "Partially-Overlapping Magisteria" or, as in the case with Guessoum, "Softly-Overlapping Magisteria."⁴⁹

It should be noted that while arguing for an autonomous sphere with regard to the scientific method and analysis, Panjwani also stresses that science operates within culture and economy which significantly shape how scientific questions are determined and how scientific findings/knowledge is put to use. He argues that religion, as an ethical voice, have much to do with the how society decides to apply scientific knowledge. Religious voices should bring up the question of ethics, justice and meaning to these matters.

Is a total separation possible?

Guessoum believes that a total separation of science and religion is not possible within the Muslim World. Although there is a realm of science and a realm of faith and they address different types of questions, there are still areas of human endeavour where science has something important to say but so

⁴⁵ See Farid Panjwani's contribution in this volume.

⁴⁶ Gould, Stephen. J., 1997. "Nonoverlapping Magisteria." *Natural History* 106 (March): 16-22.

⁴⁷ Dallal, Ahmad, 2010, *Islam, Science and the Challenge of History*, Yale University Press

⁴⁸ See Hazim Shah's contribution in this volume

⁴⁹ Nidhal Guessoum, 2011



does Islam. Hence, he proposes a “Softly-Overlapping Magisteria” conception to allow for these two sources of knowledge to overlap and gently resolve any conflicts through mutual accommodation.

4.1.3 The methodologies and underlying principles

An important part of the difference between Islamic and scientific epistemology is the respective methods of these distinct bodies of knowledge. Religion is often portrayed as backward looking, referring back to the original sources, and dogmatic⁵⁰ – and sometimes for a good reason because it is by definition a conservative force that seeks to bind the society together to the fundamentals. However, some disagree with this characterization as Task Force Member Rana Dajani points out that, in principle, Islam is also progressive drawing on Ijtihad as an example where we have to deal with ever new issues and phenomena to reach new conclusions that are forever changing. Science, on the other hand, is portrayed as a forward-looking, living, changing, and self-correcting endeavour that rests on a methodology that creates new knowledge through a process of experimentation resulting in either falsification or validation.⁵¹ The dependence on different, sometimes diametrically opposite, methodologies for determining what is (and is not) knowledge creates possibilities for conflict.

In addition to the methodology of science, there are several underlying fundamental principles – such as causality and the ‘laws of nature’ – that dictate how (and why) science works. As mentioned earlier, the concept of methodological naturalism (MN) is one such crucial and largely under-appreciated pillar of modern science, and it is one which explicitly or implicitly leads to conflicts, or at least to difficulties, in the “harmonization” of Islam/Religion.⁵² (For additional discussion on methodological naturalism, please see the next section).

4.2 Has Science killed belief in God? – Muslim Scientific responses to atheist arguments

Modern science has, in recent times, provided scientific explanations to phenomena that were for centuries considered within the realm of faith alone;

50 Hoodbhoy, 1991

51 Hoodbhoy, 1991

52 See Nidhal Guessoum’s contribution in this volume.



for example the appearance and evolution of life, and other such topics. For some, this has created a crisis of faith which is under pressure to justify its continued relevance or usefulness. While there are questions that are still, and will probably continue to, remain firmly within the realm of faith for which science does not (or cannot) have a possible answer (spiritual and super-natural questions such as the after-life), there are others that have provided fodder to atheistic arguments.

The phenomenon of atheist arguments based on science – such as propounded in theoretical physics by Hawking⁵³ and Krauss⁵⁴ and in biology by Dawkins.⁵⁵ – are now very well-known, and need answers from Muslim perspectives. For instance, the creation/origin of the universe, the fine-tuned order in the cosmos, the evolution of life and humans, have elicited debates and strong views from atheists and theists alike. While some members of this Task Force, and others, have addressed such issues in the past, e.g. Guessoum,⁵⁶ Guiderdoni,⁵⁷ Altaie,⁵⁸ Golshani,⁵⁹ Dajani,⁶⁰ and Hasan⁶¹, there needs to be more systematic and detailed treatment of the issues.

Muslim responses to atheistic arguments

53 Stephen Hawking, *The Grand Design*, Bantam, 2010

54 Lawrence Krauss, *A Universe From Nothing*, Atria, 2013

55 Richard Dawkins: *The God Delusion*, Mariner, 2008; *The Blind Watchmaker*, Penguin, 2006;

56 Guessoum, 2011

57 Bruno Guiderdoni, 2001, "Reading God's Signs," in *Faith in Science: Scientists Search for Truth*, Routledge

58 Muhammad Basil Altaie, 2010, *Casting the Universe: Runways of Science Trajectories for Religion*, published in Arabic; and also MB Altaie, 2016, *God, Nature and the Cause: Essays in Islam and Science* KRM publications, in press.

59 Mehdi Golshani, 2004, *Issues in Science and Religion*; 1999, *The Holy Qur'an and the Sciences of Nature*; 1998 (ed), *Can science dispense with religion?*; 1997, *From Physics to Metaphysics*

60 Dajani, R, 2012, *Evolution and Islam's Quantum Question* Zygon vol. 47 no. 2 page 343-353

61 Usama Hasan, 2010, *Intellect can only take you so far at:* <http://www.theguardian.com/commentisfree/belief/2010/aug/03/faith-choice-philosophy-islam>; 2009, *The Triumph of Traditionalism (Can Islam Be Reconciled With Science? at:* <http://www.theguardian.com/commentisfree/belief/2009/nov/27/islam-science-ghazali>; 2008, *Knowledge Regained (On Islam & Evolution) at:* <http://www.theguardian.com/commentisfree/2008/sep/11/religion.darwinbicentenary>; 2010, *What breathes fire into the equations? A Muslim Response to Stephen Hawking's Latest Pronouncements about God at:* <https://unity1.wordpress.com/2010/09/17/a-muslim-response-to-stephen-hawking%E2%80%99s-latest-pronouncements-about-god/>



In summary, the above Muslim authors – all of them with a scientific background – have advanced the following arguments:

- 1) Science (and rational logic in general) cannot prove or disprove the existence of God.
- 2) The apparent fine tuning of basic cosmological constants may be an indication (or sign) of God.
- 3) If the multiverse exists, it would be a manifestation of God's power, and not a counter-argument to the existence of God.
- 4) Thus belief in God is not irrational, has a rational basis and is intellectually satisfying, unlike atheism. Belief in God is not irrational, i.e. it is supra-rational, and has a rational basis, in the sense that the problem of "first cause" is not solved by rational logic. Rational logic has limitations, as shown by Godel's theorem.
- 5) In Qur'anic language, everything in creation is a sign (*ayah*) of God.
- 6) Naturalistic explanations of miracles may be part of theistic explanations.

4.2.1 The Existence of God

The first and foremost of the atheists' challenges is to sustainability of the belief that God exists in the light of modern scientific explanations of phenomena that was considered within the domain of the faith. Atheists point to this to claim that God does not exist since the Universe – and life within it – can be created without a supra-natural agency and things can run under the laws of science without the direct involvement of one. Theists have pointed out that this may not be quite that simple and note that we still require a supra-natural entity to formulate/choose the laws of nature and fine tune them to make everything else work as well as it does.

Atheist scientists entertain the possibility of a Creator

Basil Altaie quotes a number of scientists – otherwise believed to be atheists – including Hawking, Krauss, and even Weinberg who have acknowledged that God 'could' exist even if they believe that He does not.⁶² Task Force Members

⁶² See Basil Altaie's contribution in this volume.



Mehdi Golshani and Basil Altaie have both liberally quoted Paul Davies – a scientist who does not believe in a theistic God – who in his famous work *“The Mind of God”* acknowledges that it is, perhaps, simpler to accept a Creator God; he says:

“However successful our scientific explanations may be, they always have certain starting assumptions built in. For example, an explanation of some phenomenon in terms of physics presupposes the validity of the laws of physics, which are taken as given. But one can ask where these laws come from in the first place. One could even question the origin of the logic upon which all scientific reasoning is founded. Sooner or later we all have to accept something as given, whether it is God, or logic, or a set of laws, or some other foundation for existence. Thus, ‘ultimate’ questions will always lie beyond the scope of empirical science as it is usually defined...I belong to the group of scientists who do not subscribe to a conventional religion but nevertheless deny that the universe is a purposeless accident. Through my scientific work I have come to believe more and more strongly that the physical universe is put together with an ingenuity so astonishing that I cannot accept it merely as a brute fact. There must, it seems to me, be a deeper level of explanation. Whether one wishes to call that deeper level “God” is a matter of taste and definition.”⁶³

He goes on to say:

“As long as the laws of nature were rooted in God, their existence was no more remarkable than that of matter, which God also created. But if the divine underpinning of the laws is removed, their existence becomes a profound mystery.”⁶⁴

Weinberg has once remarked that the one should not underestimate the fix

⁶³ Paul Davies, 1992, *The Mind of God*, Simon & Schuster, London, pp. 15-16

⁶⁴ *ibid.*, p. 81



that atheists are in: that consistent mathematical results cannot be guaranteed to be describing realistic states since there are many consistent mathematical formulations that do not find real presence in nature.⁶⁵

Theists, including many scientists, have pointed out that the fact that the Universe does not require God to exist does not necessarily mean that He does not. Making the transition from modern discoveries to the atheist thesis requires philosophical assumptions that do not naturally follow from science. As Keith Ward has pointed out:

"It is not science that renders belief in God obsolete. It is a strictly materialist interpretation of the world that renders belief in God obsolete, and which science is taken by some people to support."

Thus Task Force Member Mehdi Golshani argues that the challenge for Muslims has been the philosophical interpretations of modern science, not science *per se*.⁶⁶

The Supranatural God

But Basil Altaie, in his essay, goes a step further and notes that answering whether science has killed the belief in God requires one to precisely define what is meant by God. This question is at the same time both philosophical as well as theological. One must also wonder if the need for God is psychological, physiological, epistemological, or otherwise practical. He also notes that we must understand if our need to engage in this question is temporal – because of the lack of information – or is it a fundamental part of the truth of our world.⁶⁷ In all cases we should remember that our views are always bounded with the extent of our knowledge at the given time; for no one can claim that science has reached ultimate knowledge. He notes, for instance, that the Muslim faith does not describe a 'natural' God:

"The Qur'an describes Allah as the Creator, the Sustainer, the Omniscient, the Omnipotent who can hear, speaks and see. The point to make here is that

65 See: Basil Altaie's contribution in this volume.

66 See: Mehdi Golshani's contribution in this volume.

67 M.B. Altaie, 2007, Creation and the need for a Personal Creator in Islamic Kalam, in Science and Theology vol. 11 edited by W. Drees, H. Mesisinger and T. Smedes, Lund University, Sweden, pp. 149-166.



along with these personal attributes the Qur'ān also mention that 'Nothing resembles Him'."

He quotes Michael Shermer, the publisher of *Skeptical* magazine:

"Science traffics in the natural, not the supernatural. The only God that science could discover would be a natural being, an entity that exists in space and time and is constrained by the laws of nature. A supernatural God would be so wholly Other that no science could know Him."⁶⁸

The challenge then, as Keith Miller – a professor of biology at Brown University – points out is to look for the right definition of God. He says:

"The categorical mistake of the atheist is to assume that God is natural, and therefore within the realm of science to investigate and test. By making God an ordinary part of the natural world, and failing to find Him there, they conclude that He does not exist. But God is not and cannot be part of nature. God is the reason for nature, the explanation of why things are. He is the answer to existence, not part of existence itself."⁶⁹

The Task Force noted that more than a 'Muslim' response, the atheist arguments need answers from a scientific perspective showing that science has nothing to do with such conclusions drawn in its name.

"What is required in response is a better understanding of science and its scope, and not an Islamic response or a Christian response, etc."

4.2.2 Methodological Naturalism - as an Underlying Principle of How the World Works

Once the question of the existence of God has been settled, there is the issue of His properties and capabilities and whether or not these create a potential

68 Michael Shermer, 2014, Does Science Make the Belief in God obsolete? available at: <https://www.templeton.org/belief/essays/shermer.pdf> accessed on February 25, 2016

69 Kenneth Miller, 2014, Does Science Make the Belief in God obsolete? available at: <https://www.templeton.org/belief/essays/miller.pdf>



conflict with modern science. This question is important since it forms the basis of our understanding of how does the *“world really function, in the most fundamental way? And what is God’s role in it?”*⁷⁰

Task Force Member Guessoum notes:

“These are two ‘big questions’, among the biggest that there are, and one may wonder whether we humans could possibly reach any satisfactory and consistent answers that would not just be “sophisticated views” but have solid ground underlying them. After all, humans deciding what God’s role is supposed to be, what He can and cannot do, will certainly seem presumptuous.”

After all, one may recall the well-known Qur’anic verse:

*“He cannot be questioned concerning what He does, and they shall be questioned (for theirs).”*⁷¹
(Q 21:23)

He further adds:

“The first question, however, about how the world functions, seems much more within reach of human effort and purview, and indeed, on one level at least, that is what science has been doing, to greater and greater success. Science has identified many (most?) of the essential processes underlying phenomena in nature. Most importantly, it has identified ‘laws of nature’, or at least ‘laws of science’⁷², that seem to regulate the observed order and regularity in the world.

70 See: Nidhal Guessoum’s contribution in this volume.

71 It must be noted that this verse has been interpreted in various ways.

72 A distinction is often made between “laws of nature” and “laws of science”, for science can only hope to approach (as closely as possible) the “real” or “ontological” laws that regulate nature, but at no point, certainly not now, can humans claim that the laws they have “discovered”, or actually “formulated”, are identical to the actual ones of nature (or what Muslims sometimes call “the laws of God”).



And the huge progress that humans have made on that first question is indicative of the validity of that quest. This then lends encouragement to the pursuit of the second one.”

God is in the details

These issues, however, are contentious and have been a source of vigorous debate within the Islamic tradition and questions like these were a major part of the 20 questions that constituted Al Ghazali’s rebuttal of ‘Philosophy’ in the famous *Tahafut al Falasifa*. In fact, three of those questions, on which Al Ghazali declared *Ibn Sina* a heretic (non-believer), precisely dealt with issues like whether God (self-)imposes constraints on his capabilities or actions – issues that are fundamental to the orderly world that modern science seeks to create.⁷³

The Ash’ari school has been the dominant theological school in Sunni Islam since Al Ghazali, who was one of its leading exponents (d. 505/1111). Appendix 1 summarises some of its key teachings on naturalism and causality, via an original translation of extracts from a standard, canonical pre-Newtonian text of the school⁷⁴ that is still widely taught in seminaries and Islamic universities worldwide. These teachings have an obvious relevance for the discussion of science within Islam. The pre-Newtonian Ash’ari denial of causality is a source of tension between modern science and some received Muslim theologies.⁷⁵

To summarise, leading Ash’ari theologians assert the following basic principles:

- 1) Occasionalism or denial of secondary causation: all that exists in nature is coincidental conjunction;

⁷³ See: Afifi Al-Akiti’s contribution in this volume.

⁷⁴ Muhammad bin Ahmad bin ‘Arafah al-Disuqi al-Maliki, *Hashiyah al-Disuqi ‘ala Umm al-Barahin wa sharhiha* [Disuqi’s *Marginal Notes on the Source of Proofs and the Commentary upon it* by Imam Muhammad bin Yusuf bin ‘Umar bin Shu’ayb al-Sanusi], al-Maktabah al-‘Asriyyah, Beirut, 1424/2003. The author of the source text, Sanusi, lived 832-895/1428-1490, whilst the commentator, Disuqi, died in 1230/1815. Thus the author is pre-Newton whilst the commentator was almost a contemporary of Darwin.

⁷⁵ Dissenting note – Basil Altaie: This is a limited view of the Ashari tradition. Please read *Daqiq al-Kalam* and the book of Frank Griffel, *Ghazali’s Philosophical Theology* for a more detailed account of the Ashari theology and al-Ghazali’s position on causality.



- 2) Denial of intrinsic or extrinsic causal powers;
- 3) Assertion of metaphysical determinism: free will is an illusion.

These are deemed so fundamental to the Islamic faith that their rejection is deemed as blasphemy or polytheism, expelling a person from the fold of Islam. However, other Ash'aris within the same school dispute this, finding room for secondary causation. Hence, addressing these issues is crucial for a conversation between Islam and modern science, since causality is a basic axiom of the latter.

Separating the philosophical from the natural

Guessoum takes, by far, the strongest position with respect to naturalism and causality as he makes the case for the need for Muslims to accept 'methodological naturalism' as a fundamental underlying principle of how modern science works and studies the world. He distinguishes between 'philosophical' or 'metaphysical' naturalism which leads to the denial of existence of all supernatural activities and hence leads to atheism and materialism and methodological naturalism that is an underlying principle of science and does not, by itself, necessarily lead to atheism.⁷⁶ Practically speaking, the least that methodological naturalism requires is that *"one should appeal to the supernatural only when one has [very strong] reason to believe that what he calls one's 'empirical resources' are exhausted."*⁷⁷

Guessoum acknowledges that while there is a possibility of this being a source of potential conflict between Islamic theology and modern science, he also notes:

"Clearly such a framework for Science poses a challenge to at least some Islamic conceptions of the world and nature, as Muslims often claim and insist that God acts physically and directly in the world, in cases of miracles or in everyday events, either at large scales (earthquakes, floods, etc.) or small, individual, personal scales (in responses to prayers, in particular).

⁷⁶ Since philosophical naturalism is a metaphysical and not a scientific position, it is not directly relevant to the Islam and science discussion. However, since 'naturalism' is often invoked in these discussions, it is very important to distinguish between philosophical/metaphysical naturalism and methodological naturalism.

⁷⁷ William Dembski (1994, 132) quoted in Draper (2005, 296)



More generally, methodological naturalism keeps God "out of the picture", looking at the world and nature as if God does not exist or does not act."

But he believes that it does not necessarily have to be in conflict with Muslim perspectives. He notes that there is room within the Islamic theology to absorb methodological naturalism such as through some self-imposed restrictions on action mentioned in the Qur'an (e.g. one that claims that He acts with 'adl' i.e. fairness in the Universe) and, owing to the fundamental importance of this to the scientific enterprise, this must be undertaken by Muslim scientists and theologians in complete earnest.

Task Force Member Rana Dajani believes that this apparent conflict (i.e. how things don't appear to be harmonious) should be further catalyst for us to keep exploring to find the truth. She notes:

"This is our purpose of life. A never ending journey of exploration of meaning at every level in every discipline, i.e. if we can't understand now this only means we have to search more not that there is no solution."

There was little agreement amongst the Task Force Members on the question of accepting methodological naturalism as a fundamental underlying principle of science ('all science') so as to necessitate its incorporation in Muslim theology. Golshani suggested that science does not always simply state the results of direct experimentation but that philosophical interpretation is often attempted on the basis of this scientific data.⁷⁸ Panjwani also points out that this represents

⁷⁸ Dissenting Note - Mehdi Golshani: "It is true that the scientific method is based on experimentation and theoretical work, but it is not true that all of our understanding of nature is simply based on direct experimental results, as is shown in the philosophy of science (through the thesis, "under-determination of theories by empirical data." But this does not imply physicalism. The world is more than meets the eye, as the distinguished physicist Freeman Dyson said. The Qur'an says: I swear by what you see and what you do not see." (Quran - 69:38). Even physicist who were insisting on positivism in the first half of the Twentieth century changed their mind about it in the second half of the twentieth century. Now, even some distinguished atheist physicists talk against positivism. Thus, I think it is naive to support methodological naturalism, as we cannot avoid supra-scientific assumptions (like the comprehensibility of the universe) in the scientific work. here are other criticisms of methodological naturalism that merit careful investigation. Robert Larmer, for instance (in *Philosophia Christi* 5:1, 2003), argues that rejecting methodological naturalism in no way prohibits scientists from searching for natural causes of physical phenomena but 'the issue is not whether it is legitimate to look for natural causes of physical phenomena, but...that under no circumstances is it permissible ever to posit the direct intervention of a non-natural agent



fundamental conflict with some of the Muslim positions. For instance, it can be argued that God's actions in the world are an underlying assumption behind prayer, and hence all Islamic conceptions that accept prayers are in conflict with naturalist assumption. However, this argument assumes a strictly transcendent view of God.

There needs to be more work by contemporary Muslim theologians, scientists and philosophers on these matters: in particular, whether or not a rejection of metaphysical naturalism coupled with an acceptance of methodological naturalism, is an acceptable solution to the problem of naturalism when viewed through an ethos of monotheism in Islam.

4.2.3 Occasionalism and Causality – Re-thinking Al-Ghazali's alleged opposition to Science

The Task Force discussed Ash'ari occasionalism, miracles and rejection of causality from both an Islamic and a non-Islamic perspective. Nancey Murphy of the Fuller Theological Seminary in California, United States was quoted as an example of a Christian philosopher who rejects the idea of occasionalism.⁷⁹

In the Muslim tradition, the questions around occasionalism and causality arose in the early days of the Muslim Golden Age of Science when scholars like *Ibn Sina* and *Ibn Rushd* began using the philosophical work of Aristotle and other Greek philosophers and making them accessible to Muslims. A showdown with the theologians followed. Imam Al Ghazali is a central figure in this and his detailed writings on philosophy and attacks on Muslim philosophers remain very influential, despite the more rationalist *Ibn Rushd* (Averroes)'s point-by-point rebuttal in what was one of the great debates of Islamic intellectual history. *Ash'arism* – Al Ghazali's theological school was explicit in its rejection of causality and adoption of occasionalism, and this is seen by many as having contributed to the decline of Islamic science by eroding its intellectual foundations.

Al Ghazali, at least in his writings aimed at the masses, seemed to deny causality, in conformity with the normative Ash'ari school. However, there were many leading Ash'aris after Al Ghazali, such as Al Razi, Al Amidi and others, some of whom endorsed belief in secondary causality, i.e. that God did create causal effects in created things. And there were vigorous discussions

into the physical order'."

79 Cf. Nancey Murphy, "Divine Action, Emergence, and Scientific Explanation", in *The Cambridge Companion to Science and Religion*, P. Harrison (ed.), Cambridge, 2010



on these matters amongst the Ash'aris, Maturidis and Mu'tazilis.

The Task Force's discussion on causality was based additionally on the Shaykh Afifi A-Akiti's new research whose central thesis is that Al-Ghazali was secretly more rationalist than he appeared in his texts aimed at the masses, and that his method enabled the rational and natural sciences, seen as heretical in his time, to be accepted into the mainstream of Islamic scholarship and discourse in later centuries.

Reinterpreting Al Ghazali's alleged opposition to science

Akiti's paper was based on his study of Ghazali's recently-discovered work, *al-Madnun bihi 'ala ghayri ahlihi* ("That which is restricted from those unfit for it"). Akiti refers to "The good, the bad and the ugly" of Ghazali's conception of rational or philosophical knowledge, denoting respectively the knowledge he set out in his *Madnun*, *Tahafut al-Falasifah* (Incoherence of the Philosophers) and *Maqasid al-Falasifah* (Objectives of the Philosophers). In the latter, he had reproduced Ibn Sina's *Hikayah*.

Afifi Al-Akiti refers to Al-Ghazali as Sunni, orthodox, Ash'ari, Sufi, Aristotelian and rationalist and claims that although he single-handedly managed to get rational and natural sciences admitted by the backdoor into theological scholarship, some of his contemporaries and successors saw through this. For instance, his "appropriation" (*talwih*) of Greek rational sciences was condemned by Ibn Taymiyyah as "deception" (*talbis*), but described by Sabra as "naturalisation" (*tatbi*).

Nevertheless, claims Al-Akiti, Al-Ghazali was so effective that within a century of his passing Muslim theological schools and madrassas were churning out major influential works in rational and natural sciences.

Little agreement on Al Ghazali's legacy towards Science

There was much discussion amongst the Task Force members about Ghazali's views on causality, among other things, and his alleged role in degrading the support for science at the height of the Muslim Golden Age of Science. The members expressed concerns about Al-Ghazali's dissemination of knowledge and his views according to three levels of his audience: the elite, the scholars and the masses as to whether he was right to restrict promotion of the rational sciences, which he had sometimes seemingly attacked in other works written for the masses, to the elite, or whether he had a duty to be more transparent and consistent.



For example, he wrote that “*natural sciences are a mixture of truth and falsehood, correctness and errors.*” Furthermore, mathematics had to be avoided because it was often the preliminary and foundational science to “*erroneous sciences*”: “*We forbid the study of the science of Euclid and Ptolemy (the details of calculation and geometry) – although it makes the mind and the spirit stronger – because of what it leads to; indeed, it is the preliminary to the sciences of the ancients, which contain wrong and harmful creeds ...*”

It was noted that Ghazali clearly said different things in different books and at different times, and his authorship of various works is sometimes disputed. For example, his *Jawahir al-Qur’an* (Substances of the Qur’an), in which he again addresses some of these controversial topics, is one of his last works, and there is also his *Qawa’id al-’Aqa’id* (Principles of Creeds). Montgomery Watt severely doubted whether the *Mishkat al-Anwar* was by Ghazali, especially the last chapter.

Other topics relevant to the Task Force that had been addressed by Al Ghazali were his assessment of the validity of philosophical proofs of God, and his view on causality: Ibn Rushd said in his reply to Ghazali, *Tahafut al-Tahafut* (The Incoherence of the Incoherence), that Al Ghazali had used a causal argument to refute causal effects: in short, he had “used causality to deny causality!” The hadith scholar Ibn al-Salah also attacked Al Ghazali in this regard. Frank argues that Al Ghazali used atomistic language but ultimately argued against atomism.⁸⁰ Griffel⁸¹, in his discussion of the 17th chapter of the *Tahafut*, argued that Al Ghazali denied deterministic causality, i.e. that things had intrinsic causal powers.

With regard to the emphatic denial of causality and *takfir* (judgment of heresy or blasphemy) of naturalism found there, Task Force Members suggested that this is disputed within the Ash’ari school, with many Ash’ari theologians endorsing God acting through secondary causality. And Al Ghazali seems to have endorsed secondary causality in the *Madnun*.

Skepticism and the challenges of re-writing and re-interpreting centuries of scholarship and its harm aside, Al Ghazali’s influence and legacy in the Islamic world, both Sunni and Shia, is so immense and that the Task Force members agreed that discussion of some of these issues is crucial to the “Islam and Science” conversation, although some members questioned how relevant pre-modern theology was to the advancement of modern

80 Richard M. Frank, *Ghazzali and the Ash’arite School*, Durham and London, Duke University Press, 1994

81 Frank Griffel, *Al-Ghazali’s Philosophical Theology*, OUP, 2009



science in contemporary Muslim-majority societies. The next steps should be “integration” of the rational and natural sciences into Islamic worldviews.

4.2.4 Divine Action and Miracles - the Most Difficult of Theology’s Challenges to Science?

The question of divine action is essentially another side of the issue of naturalism: does God act in the world if we claim that all phenomena in the world have natural explanations? If God does indeed act in the physical world, does He do so only through the normal processes of nature or, at least sometimes, by direct interventions, going beyond the laws of nature?

Task Force Member Nidhal Guessoum’s essay provides helpful background to the idea of divine action and to Miracles as a special case of divine action. Indeed, it notes that many thinkers make the important distinction between “direct” and “indirect” divine action,⁸² the former being ones where God “acts outside of the ordinary course of nature” (i.e. “without using natural causes to do so”), and the latter being ones where God “uses natural causes to bring about an effect.”

Thinkers also make the distinction between “General Divine Action” (GDA) and “Special Divine Action” (SDA), the former being God’s general “sustaining” of the universe (laws and phenomena only working through His presence and permission)⁸³, and the latter representing actions at specific points/moments, whether directly (“interventions”, suspending the normal laws) or “indirectly” (by using “openings” in the laws of nature).

On the Muslim side, there have been very few, if any, fully argued proposals for viewing God’s action in the world, perhaps due to its high sensitivity. Al Khalifi explored the views of key classical philosophers (Al Farabi and Ibn Sina) and theological schools of Islam (Mu`tazilism and Ash`arism) and noted that while Ash`arites’ view of God’s action is totally free and unconstrained, Mu`tazilites’ position is that while God’s act of creation was free but that God has constrained himself by being Just and Good and rewarding/punishing for following/disobeying divine directives to us to be just and good.⁸⁴

⁸² Draper 2005, p. 281

⁸³ This is most clearly expressed in Q35:41: It is Allah Who sustains the heavens and the earth, lest they cease (to function): and if they should fail, there is none - not one - can sustain them thereafter: Verily He is Most Forbearing, Oft-Forgiving.

⁸⁴ Abdelhakim Al-Khalifi, 1998, “Divine Action between Necessity and Choice”



There are several potential avenues for reconciling Muslim belief in Divine action with the modern scientific universe and these could be approached from both theological and the scientific standpoints. Muhammed Basil Altaie has found in Al Ghazali's views some richness and fruitfulness that could be exploited and it would be very useful to see those ideas unpacked (using Al Ghazali or other sources).⁸⁵ Others have postulated that using the intrinsic indeterminism of quantum mechanics could be a doorway for God's action in nature.⁸⁶ Another idea is to postulate that God acts only on minds/spirits - with the latter being *the* communication channel and connection between God and humans as well as *the* fundamental "driving force" that God infused in humans.⁸⁷

Miracles as special case of Divine Action

A related issue that is Miracles which could be considered a very special case of Divine Action. Miracles constitute one of the most contentious issues in the debates of Religion and Science. Miracles are not as fundamental to some religions as to others, but in their direct connection to the more important issue of divine action in the world, they are essential to address.

Guessoum notes that it is important to define and delineate the concept of Miracles and the extent of their manifestation:

- 1) Are miracles "violations of the laws of nature", or are they simply striking events that may point to God or supernatural agents but are scientifically only improbable?
- 2) Do miracles occur only at the hands of prophets, or do they also happen with saints and even with ordinary people (today)?
- 3) Did Prophet Muhammad (PBUH) perform physical miracles? What about those that the Qur'an relates for other prophets (Abraham, Moses, Jesus)?

While early Muslim scholars and theologians considered miracles to be a result of direct action of God to suspend laws of nature, in modern times, several famous Muslim scholars and thinkers have adopted rationalistic or

85 M.B. Altaie, *Matter: an Islamic Perspective*, in *Matter and Meaning*, edited by Michael Fuller, Cambridge Scholar Publishing, 2010, pp. 87-99.

86 Divine action through quantum processes became a favorite of a number of western thinkers, most notably the physicist-theologian Robert J. Russell (1997, 2006, 2009).

87 See: Nidhal Guessoum's contribution to this volume.



even naturalistic views with respect to miracles. Muhammad Abduh has presented naturalistic explanations to events that were often considered direct interventions by God; Shibli Nu`mani proposed scientific interpretations of miracles; Sir Seyyed Ahmad Khan is famous for having rejected miracles (as violations of natural laws) because God has established a covenant (or "trust") with human by having set up laws in the entire universe; Muhammad Asad's commentary on the Qur'an coherently included rationalistic reinterpretation of miracles; etc.

Scientific explanations of Miracles

On miracles, Bigliardi has characterised views of modern Muslim scientists – many of whom are part of the Task Force – as being quite different as follows:

- (1) Miracles are acceptable in their literal description. They might be controlled by a different set of laws.
- (2) They are very low probability events that occur extremely rarely, perhaps only once in the universe's lifetime.
- (3) Miracles are cited in religious texts figuratively, and are not intended to be true events in a literal sense.
- (4) A miracle constitutes a "spiritual experience."⁸⁸

In particular, Mehdi Golshani considers miracles as specific occurrences that fall under different laws or combination laws resulting in their apparent suspension maintaining that there is no violation of the laws of nature but keeping open the possibility of their being explained in the future by new knowledge about nature.⁸⁹ Altaie resorts to quantum explanations to 'explain' miracles or considers them extremely rare events that fall under the laws of nature, even though we may not yet have the knowledge to explain them.⁹⁰ Bruno Abd-al-Haqq Guiderdoni maintains that God does not suspend laws of nature and proposes to interpret extraordinary 'miraculous' events spiritually.⁹¹ Rana Dajani believes that miracles are not unnatural events but natural events

88 Kamal, Abdali S. 2014, "On Bigliardi's *Islam and the Quest for Modern Science.*" *Social Epistemology Review and Reply Collective* 3, no. 9, pp. 55-56

89 Bigliardi 2014, pp 57-60

90 Bigliardi 2014, p. 81

91 Bigliardi 2014, pp. 145-146



whose 'laws of nature' we haven't discovered yet.⁹²

Guessoum also addresses these possibilities in his Task Force paper, adding the Averroesian principle that may be of help: that the Qur'an is to be read at different levels, so that the "miracles" described in the Qur'an may be understood variously by different groups of people: "ordinary" Muslims, theologians, philosophers, etc.

Here, some Task Force members advanced the following argument: it may be fruitful to focus on the Qur'anic concept of *ayah* (sign or miracle), that is used for extraordinary events such as the parting of the Red Sea, Moses' staff turning into a serpent, etc. as well as for "ordinary" or daily yet wonderful events linked to the sun, moon, seas, rain, life, etc. This suggests that some "miracles" do indeed have naturalistic explanations. The term *mu'jizah* (inimitable miracle) is arguably a later one from the *kalam* (theology) literature, as are related theological discussions about *kharq al-'adah* (tearing up of the habit of nature) that imply arbitrary or capricious divine action.

4.3 God, Creation & Biological Evolution – From Origins of Life to Human Evolution; how are these understood through faith in the Divine?

Darwin's *Origin of Species* was fully translated into Arabic only in 1928 by Isma'il Mazhar. Previous to that, there had emerged both pro- and anti-Darwin camps at the American University of Beirut. Although this debate was largely amongst Arab Christians, its influence extended to the wider Muslim nation.

Modern Muslim positions on evolution

Muslim responses to biological evolution since Darwin may be broadly categorised into three types:⁹³

- 1) A complete rejection of all evolution: all species were created by God as they are now.

Proponents of this view include Harun Yahya (the pen-name of Adnan

92 Dajani, R Evolution and Islam's Quantum Question, *Zygon* vol. 47 no. 2 page 343-353 June 2012

93 David Solomon Jalajel, 2009, *Islam and Biological Evolution*, University of the Western Cape; Mohammed Ghaly, "Evolution and Muslim Responses to It," *The Oxford Encyclopedia of Philosophy, Science, and Technology in Islam*, ed. Ibrahim Kalin, OUP, 2014



Oktar)⁹⁴, Martin Lings⁹⁵, Seyyed Hossein Nasr⁹⁶ and Muzaffar Iqbal.⁹⁷

2) A complete rejection that humans evolved from non-humans; acceptance of the evolution of other species.

Proponents of this view include Nuh Keller⁹⁸ and Yasir Qadhi.⁹⁹

3) A complete acceptance of evolution: all species were created by God via evolution, including humans.

Proponents of this view include most of the members of our task force, as well as others.

For intellectual background, it should be noted that the contribution of pre-Darwin Muslim thinkers to evolutionary theory is now widely-recognised: e.g. a whole chapter on al-Jahiz in a recent book on precursors to Darwin¹⁰⁰, where the author states that he “came close to a theory of evolution and natural

94 See www.harunyahya.com and numerous publications by his Bilim Arastirma Vakfi (Foundation for Research and Science) such as *The Evolution Deceit: The Scientific Collapse of Darwinism and Its Ideological Background*, *The Disasters Darwinism Brought to Humanity*, *New Fossil Discovery Sinks Evolutionary Theories*, and *Thermodynamics Falsifies Evolution*.

95 Lings repeatedly rejects evolution completely on the basis of purely metaphysical, not scientific, arguments in his *The Eleventh Hour: the spiritual crisis of the modern world in the light of tradition and prophecy*, Archetype, 2010

96 Nasr, lecture on *Islam and Science*, World of Islam Festival (audio recording), 1976. In this lecture, Nasr stated that the theory of the evolution of human beings from “lower” life forms was “absurd, because it implies that the greater can come from the lesser.” This argument is itself absurd due to very numerous counter-examples, e.g. humans coming from a sperm cell and ovum, or an oak tree arising out of an acorn. Nasr calls this argument “logical criticism” without reference to empirical biology, and was still employing it 30 years later - see Nasr, ‘On the Question of Biological Origins’, *Islam & Science*, Vol. 4 (Winter 2006) No. 2, pp. 181-197

97 Cf. Muzaffar Iqbal, 2010, “Darwin’s Shadow: Evolution in an Islamic Mirror”, *Islam and Science*, 8:1, also “Built into the basic meaning of the word *Ummah* (of which *umam* is the plural) is the concept of the sanctity of species. Not only does each species preserve its characteristics, but it also receives Divine command (*wahy*) and acts accordingly, the Qur’an tells us. The ant and the honeybee have always been the ant and the honeybee and will always remain so.” (Muzaffar Iqbal, “On the sanctity of species”, *Islam & Science*, Vol. 4, No. 2, Winter 2006, p. 89)

98 Nuh Ha Mim Keller, 1996, *Islam and Evolution*, <http://www.masud.co.uk/ISLAM/nuh/evolve.htm>

99 Yasir Qadhi, contribution to debate on *Have Muslims Misunderstood Evolution?*, Deen Institute, London, January 2013. Note that, of the other panellists, Oktar Babuna took position (i) above, whilst the remainder (Ehab Abouheif, Fatimah Jackson and Usama Hasan) took position (iii).

100 Rebecca Stott, “The Worshipful Curiosity of Jahiz - Basra and Baghdad 850 [CE],” Chapter 3 of *Darwin’s Ghosts*, Bloomsbury, 2012



selection that would not be matched for a thousand years,"¹⁰¹¹⁰² and John William Draper's 19th-century description of "the Mohammedan theory of evolution of man from lower life-forms."¹⁰³

Pre-modern Arab-Islamic intellectual tradition

In addition to pre-modern Muslim evolutionary thinkers, e.g. al-Jahiz, al-Farabi, Ibn Miskawayh, Ikhwan al-Safa and Ibn Khaldun, it is worth looking at Muslim reactions to Darwin.¹⁰⁴ During the 19th and 20th centuries, evolutionary theory found acceptance amongst a number of Muslim theologians, e.g. Abu l-Majid al-Isfahani, H. Mustafa al-Mansuri, Hasan Husayn, Muhammad Iqbal, Inayatullah Mashriqi, Ahmad Afzal, Israr Ahmad, Absar Ahmad, Süleyman Ateş and 'Abd al-Sabur Shahin.¹⁰⁵

One recent author wrote that:

"A number of influential Arab thinkers of modern times ... denied the fact that the theory of evolution was a discovery of Darwin and Wallace. Others indicated that what Darwin explained was a part of Arab elaborations on the whole notion of transmutation ... Muslim writers ... provided a religious sanction to Darwin's science ... If one uses the phrases, 'evolution occurred by God's control,' 'the universe was created for a purpose' and 'materialism is a neutral idea', one finds total support among Arab religious thinkers, Muslim and Christian ... Were there any differences between Muslim and Christian Arab religious thinkers, concerning Darwin's theory of evolution? The answer is not difficult to find. While

101 Stott, 2012, p. 42

102 Though some, such as Task Force Member Nidhal Guessoum, believe that these claims may be exaggerated.

103 John William Draper, 1875, *History of the Conflict between Religion and Science*, Appleton, New York

104 This section is based on Nidhal Guessoum, *Evolution and Islam*, presentation at *Islam and Science* workshop, London, 2013 and *Islamic Theological Views on Darwinian Evolution* (2015), unpublished.

105 'Abd al-Sabur Shahin, 1998, *Abi Adam: qissat al-khaliqah bayn al-usturah wa l-haqiqah* [My Father Adam: the story of creation between fable and reality], Akhbar al-Yawm, Cairo



*both were open to Darwinism, this study suggests that Muslims were more ready to accept Darwin's evolution than were the Christian Arabs.*¹⁰⁶

Husayn al-Jisr (1845–1909), who was of Azhari training and was dubbed “the Ash’ari of our times” by Jamal al-Din al-Afghani, wrote *al-Risalah al-Hamidiyah fi haqiqat al-diyana al-Islamiyah* [The Hamidi Treatise on the Reality of the Islamic Religion] (1887), which won an Imperial prize from the Ottoman Sultan Abdulhamid. In it, al-Jisr discussed evolution and its mechanisms at length, gave a number of everyday examples of those mechanisms (variation, inheritance, struggle for life and natural selection), modern geological information, and paleontological findings in favour of evolution. He concluded that the case for evolution was not yet totally established, but that evolution did not disturb one’s belief in Allah as the Creator. Further, he explained that the Qur’an can be subjected to *ta’wil* (interpretation away from apparent meaning) when its verses are related to “established knowledge.”

Nadim Al-Jisr (1897 –1980), son of Hussein Al-Jisr and Grand Mufti of Tripoli, wrote in *Qissat al-Iman* [The Story of Faith], “When such certain rational evidence establishes the existence of the human being by way of evolution, it is possible to reinterpret these texts and reconcile them with the certain evidence. This does not contradict with the beliefs of the Muslims in any way, as long as the underlying principle with them remains that God is the Creator of the human being in any event.”

We may also mention an interesting position voiced by the contemporary and influential cleric, Sheikh Yusuf Al-Qaradawi in 2009 (during the global discussions on evolution on the occasion of the Darwin double anniversary):

*“Even research into the beginning of creation [is allowed in Islam], as long as one keeps in mind that we are looking into creation, meaning that there is a Creator ... Even if we assume that species evolved from species, this is only by the will of the Creator, according to the laws of the Creator ... If Darwin’s theory is proven, we can find Qur’anic verses that will fit with it ...”*¹⁰⁷

106 Adel A. Ziadat, 1986, *Western Science in the Arab World: The Impact of Darwinism, 1860-1930*, Palgrave Macmillan, London

107 *Al-Shari’ah wal Hayat* [Sharia and Life], Al-Jazeera TV (Arabic), 3rd March 2009



It is worth noting the primary theological and scriptural objections that many Muslims, including theologians and religious scholars, have regarding the idea of human evolution:

- (i) Miraculous Adam;
- (ii) Adam's humble origins;
- (iii) The story of the Fall having occurred in a heavenly Paradise, and not on earth;
- (iv) Belief in evolution leads to atheism;
- (v) Belief in evolution denies teleology, or the idea that there is (divinely-ordained) purpose to creation.

These matters are discussed further, with brief theological responses, in Appendix C. The Task Force members were agreed that the first four of these objections are superficial and easily answered from Islamic theology. The fifth objection, about teleology, is more complex and requires scientific and philosophical responses: some of these are also summarised in Appendix C.

Task Force Member, Rana Dajani, in discussing Evolution and Islam, reminds us that, according to traditional Islamic teachings, seeking knowledge is a type of worship. She also dwells on the importance of *ijtihad* (use of intellect to solve religious and worldly problems), both individual and collective, and on the importance of free thought. Although she agreed with other Task Force members that evolution should be uncontroversial in the Muslim world, she recommends that science teachers in the Muslim world should encourage their students to make up their own minds about these issues. Not all Members agreed with this suggestion: some feel that evolution, including human evolution, is an undeniable scientific fact and should be taught uncompromisingly to all students, whether Muslim or not.

Task Force Member Farid Panjwani sees the tendency of literalist reading of the Quran as the main hurdle in reconciling Islam and science and observed that in light of our understanding of modern science, such literalist readings of the Quranic texts needs to be reconsidered and replaced by a more symbolic understanding.¹⁰⁸ He contrasts a descriptive-empirical Darwin with a metaphorical-spiritual Qur'an. But many of the traditional *tafsirs* and hadiths speak about creation in a very descriptive manner that many Muslims take

¹⁰⁸ However, Farid Panjwani also observed that while seeing the Quranic verses as symbolic can help resolve questions around science and Islam, this approach can create problems in some other areas such *fiqh*, theology and rituals.



to be empirical. In fact, this is perhaps the main source of the perception amongst many Muslims that there is indeed a contested space between science and Islam.

For example, Dajani has suggested that the Qur'anic term *ahsan* ("in the best of form", cf. 32:7 and 95:4) could be understood as "best fit" (to its environment) in an evolutionary sense.

The Task Force was generally agreed that the scientific fact of biological evolution, including human evolution, cannot be disputed scientifically, and that alleged objections on the basis of Islamic theology and tradition can be answered.¹⁰⁹

However, some Task Force members insisted that a "purely naturalistic," neo-Darwinian view of evolution necessarily leads to atheism and denies purpose in creation. Although this is disputed by other members, teleological views of evolution (although rejected by mainstream scientists today) may help to bridge this disagreement.

Thus, the following future steps will be helpful for this debate within Muslim societies:

- 1) A comprehensive engagement with, and refutation of, the arguments of Muslims who deny the fact of evolution, whether these arguments are based on theology or science (or pseudo-science), or a combination of the two. This will include developing "pro-evolution Islamic theologies" and allow more Muslims to move on in the debate towards the next step.
- 2) A comprehensive engagement by Muslims, once they have sufficiently defeated the pseudo-scientific arguments of creationism and accepted the fact of biological evolution, with the philosophy of science and alternative "theories of evolution" such as those involving teleology (e.g. Gould, Morris and Coakley),¹¹⁰ with the only proviso being that these theories remain scientific, i.e. subject to well-known conditions such as testability and falsifiability.

109 Dissenting Note – Mehdi Golshani: "My support for evolution is not an unqualified one. Forget, for the moment about creationism, but even among evolutionists you have Dawkins and you have Collins who do not agree on a single definition of evolution. Richard Dawkins is an atheist and Francis Collins is a theist, and Dawkins makes use of evolution to deny the existence of God."

110 See Appendix C for elaboration and references.



4.4 Soul, Spirit, Consciousness & Free Will – modern understandings of *Ruh* and *Nafs*

In Islamic metaphysics and theology, the Spirit (*Ruh*) was usually regarded as related to the Soul or Self (*Nafs*), Intellect (*'Aql*) and Heart (*Qalb*). In modern science, we speak about Life, Consciousness and Intelligence, so it is an interesting and important area of the conversation between Islam and science to explore how traditional metaphysics and theology may be understood in terms of modern scientific concepts, and vice-versa.

4.4.1 Task Force Discussion and Future Challenges

There were no specific papers presented on this subject, but related topics were often discussed. In particular, some Task Force members agreed with a tentative proposal from Dajani:

We should apply a “threshold of complexity” of neuronal interconnections, such that once a critical mass or threshold of these cellular or neuronal interconnections have been exceeded, we may speak of a “soul.”

Ancient ideas of a mineral, vegetable, animal and human soul were also discussed in this context. Some members disputed such an approach by arguing that human consciousness is not explainable by physical sciences, referring to the Qur'anic teaching about God “breathing His spirit into Adam,” understanding this as a unique, spiritual dimension of humanity. Others responded that the “breathing of God’s spirit” refers precisely to processes that unfold in the natural, physical realm.

It was also suggested by Dajani that we need more Muslim cell and developmental biologists to contribute to this debate around possible scientific definitions of “soul”, and that we need new and “naïve” people to contribute, unhindered by previous interpretations that might have become obstacles.

This topic needs more treatment and detailed work in the future. The following steps were recommended by the Task Force:

- 1) An interdisciplinary approach to further investigate the merits of the above intellectual proposal, involving insights from theology, neurophysiology, artificial intelligence and other disciplines.



2) A similar approach as for “soul” to be applied to concepts such as consciousness and free will.

4.5 Policy and Ethical Implications for Islam Science Reconciliation

There were no specific papers presented on this subject, but related topics were often discussed. The Shari’ah (Sharia) is properly understood as Islamic ethics and law, intertwined. The theory of maqasid (universal objectives or purposes of law/ethics) is one that unites all the major schools of Sunni and Shia law and ethics. According to a number of leading Muslim jurists from the past and present, the major universal objectives of Sharia are: justice, mercy, wisdom, and the common good. There is a growing field of Islamic scientific ethics, including medical ethics, which has immense implications for Muslim-majority societies and public policy in those societies and countries.¹¹¹

The Sharia (Islamic sacred law) is based on both universal and specific texts, principles and judgments from the Qur’an and the *Sunnah*, the example of the Prophet, peace be upon him. Far from being set in stone, the problem of specifically applying universal principles in sacred law has led to a vigorous debate throughout Islamic history and the complex evolution of an extremely diverse body of legal schools and opinions. Within three centuries of the founding of Islam, there were dozens of legal schools, of which about seven remain influential across the Islamic world, both Sunni and Shi’i. An important early debate that continues today was between traditionalists and rationalists over whether the universal principles of God’s law were to be known by revelation or reason, or both. The four main areas covered by classical Sharia were: *ibadat* (ritual worship), *mu’amalat* (economics), *munakahat* (marriage, divorce and family) and *jinayat* (crime and punishment).

A significant development in Islamic law between the 5th/11th and 8th/14th centuries was the approach to legal purpose known as the theory of *Maqasid*, or the higher objectives of law. Imam Ghazzali (d. 505/1111) argued from a holistic reading of the Qur’an that the purpose of Shari’ah was to fundamentally preserve five matters: faith, life, wealth, intellect and family.¹¹²

111 Cf. e.g. Tariq Ramadan, *Radical Reform: Islamic Ethics and Liberation*, OUP, 2009; Jasser Auda, *Maqasid al-Shari’ah - A Beginner’s Guide*, International Institute of Islamic Thought, London/Washington, 1429/2008; Mohammed Ghaly, *Human Cloning Through The Eyes Of Muslim Scholars: The New Phenomenon Of The Islamic International Religioscientific Institutions*, Zygon, vol. 45, no. 1 (March 2010); Usama Hasan, *Health, Sickness, Medicine, Life and Death in Muslim Belief and Practice*, European Journal of Palliative Care, Volume 19 Number 5, September-October 2012, pp. 241-5

112 Al Ghazali, *al-Mustasfa min ‘Ilm al-Usul*.



This development occurred six centuries before John Locke's articulation of a similar approach to law in England. Over the next three centuries after Ghazali, theologians such as Ibn Taymiyyah added a number of other "fundamental purposes" of law: preservation of reputations, neighbourhoods and communities; fulfilment of contracts; moral purity; trustworthiness; the love of God. The culmination of this theory came with Shatibi (of Jativa, Andalusia, d. 790/1388), who explicitly synthesised traditionalist and rationalist approaches¹¹³ but Islamic legal theory and practice, once centuries ahead of other civilisations, fell into relative decline for the next half-millennium.

The last century has seen a renewed interest in *Maqasid*, especially amongst Muslim reformers, thinkers and revivalists, since this approach avoids legalistic hair-splitting and attempts to holistically recapture the essential spirit of Islamic law. The significance of this approach may be illustrated by the following quote from one of its masters, Ibn al-Qayyim (d. 751/351), "The Islamic Law is all about wisdom and achieving people's welfare in this life and the afterlife. It is all about justice, mercy, wisdom, and good. Thus, any ruling that replaces justice with injustice, mercy with its opposite, common good with mischief, or wisdom with nonsense, is a ruling that does not belong to the Islamic Law, even if it is claimed to be so according to some interpretation."¹¹⁴ Recent thinkers such as Hashim Kamali of Malaysia have suggested that the following are "legal purposes" that must be protected and promoted by the Shari'ah: fundamental human rights and liberties; public welfare; education; scientific and medical research; the environment.¹¹⁵

In conclusion, it could be said that *Maqasid* theory derives a set of rational legal principles based upon a holistic reading of tradition. The aim is thus to achieve a perfect balance between tradition and reason.

Furthermore, as noted by Kamali, **the promotion of life, education, scientific and medical research and the protection of the environment and promotion of ecology are Islamic imperatives, according to the agreed-upon principles of the Sharia.** This should provide a rigorous basis for the promotion of science and ethics within an Islamic framework.

113 Shatibi, in the introduction to his *Muwafaqat*, states that his work is an explicit synthesis of the principles of Ibn al-Qasim and Abu Yusuf, i.e. of Maliki and Hanafi or traditionalist and rationalist principles of jurisprudence.

114 Quoted in Jasser Auda, *Maqasid al-Shari'ah - A Beginner's Guide*, International Institute of Islamic Thought, London/Washington, 1429/2008.

115 Muhammad Hashim Kamali, 2001, *Issues in the Legal Theory of Usul and Prospects for Reform*, Islamic Research Institute, International Islamic University, Islamabad



For example, issues as diverse as: organ donation and transplantation; contraception, family planning, fertility treatments and abortion; genetic engineering of plants, crops, animals and humans; the development of increasingly-sophisticated and lethal weapons in warfare – all of these involve science as well as ethical issues that will draw on religion in the Muslim world. Thus, a coherent approach to the ethical aspects of the Islam and Science discourse has enormous practical consequences for science, technology and religious attitudes towards them in the Muslim world.

As discussed earlier, one of the jurists on the Task Force, Ghaly, emphasised the value of collective *ijtihad* in scientific ethics. He highlighted the different perspectives of religious scholars (jurists) and scientists; the disagreement within both camps leads to further disagreement even when collective *ijtihad* is employed, with mixed alliances of religious scholars and scientists on both sides of the debate. He suggested that philosophers of science can help both sides out of this impasse by helping both sides understand the strengths and limitations of pure science that must be complemented by ethics, whether philosophical or religious. One particular example of such multifaceted and multi-stakeholder coalition, as pointed out by Task Force Member Rana Dajani in her essay, was the writing and passage of the Stem Cell Law in Jordan which was developed according to *ijtihad* and engagement with multiple stakeholders.¹¹⁶

The Task Force agreed with the value of collective *ijtihad*, the input of scientists as well as religious jurists into ethical questions involving scientific matters, and the importance of philosophers of science in such discussions.

4.5.1 Future Challenges

- 1) How may collective *ijtihad* in scientific ethics be improved? Given the different perspectives of religious scholars (jurists) and scientists, and the disagreement within both camps leading to further disagreement even when collective *ijtihad* is employed, with mixed alliances of jurists and scientists on both sides of the debate.
- 2) Is it possible for philosophers of science to help both sides out in such debates, by explaining the strengths and limitations of pure science that must be complemented by ethics, whether philosophical or religious?

116 Dajani, R Jordan, 2014, Stem-cell law can guide the Middle East. Nature, Jun 12; 510(7504):189.



5. The 'Usul and Furu' of Islam and Science Discourse

5.1 The General Principles: 'Usul' of Islam and Science Discourse

The discussion above provides several points of agreements amongst members of the Task Force. Collectively, these not just help reconcile theology with modern science by refining interpretations and pushing boundaries but also provide for the creation of several general principles ('usul') for engaging in the Islam and Science discourse for the future. Here, we lay out the key issues discussed and points of agreements reached between Members of the Task Force in the table below and the general principles follow in Section 5:

	Traditional Muslim Position	Task Force Position
Epistemology		
Nature of Knowledge	Unity of knowledge with Islam knowledge superseding scientific knowledge.	Qur'an and Science are complementary and answer different questions: The 'Why' and 'How', respectively.
Sources of Knowledge	Qur'an is revelation (literal word of God) and tradition. Science draws from theory and experimentation.	While the literal word of God, Qur'an is subject to interpretation. Science is ever-evolving, self-correcting.
Uses of Knowledge	Qur'an contains scientific facts or at the minimum 'hints' to scientific facts that can be explored	Qur'an is a book of signs, not science. It should not be read as scientific facts.
Overlap between Islam and Science	Qur'an and Science are fully or partially overlapping bodies or systems or knowledge.	Qur'an and Science are "Non-overlapping" or "Softly Overlapping" bodies/systems of knowledge.
Methodology of Science		
Causality	Everything in the Universe is directly caused by God.	Secondary Causation is allowed in Islamic theology (Al Ghazali's position)



Methodological Naturalism	There are non-natural causes of events as well.	There was consensus that Methodological Naturalism, though not its philosophical implications, was a necessary principle of modern science but no consensus on whether this could be incorporated in theology. On the latter, Task Force was divided equally on both sides.
Divine Attributes		
Existence of God	<p>Muslim: God exists and this must be 'believed' without a rational proof.</p> <p>Atheists: Science makes God a convenience, at best, and redundant, at worst.</p>	<p>1) Science cannot prove or disprove the existence of the 'Supranatural' God.</p> <p>2) The Atheist argument does not follow from science and requires an additional philosophical layer.</p>
Divine Action	There are no limits on Divine Action.	No agreement, except that suitable theology must not clash with observed phenomena. A variety of perspectives, inspired by the Ash'aris, Mu'tazilis, Al Ghazali, Ibn Rushd and Islamic natural theology.*
Miracles	Miracles are a result of direct divine action into the universe.	Miracles need to be reconciled as extreme rare and exceptional events with scientific explanations.
Case A: Cosmology		
Beginning of Universe	Life came about as a result of intelligent design after a big bang.	Big Bang or not, universe cannot evolve without purpose, or teleology.
Case B: Biology: Evolution		

* Mohammed Ghaly: "I would speak of the need to approach Divine attributes from a holistic perspective. God's Omnipotence should be understood in the light of His All-Justice and vice versa. This is a Qur'anic phenomenon when it frequently combines between attributes like al-Aziz al-Hakim [Mighty, Wise] although both the Mu'tazila and Asha'ira vehemently debated which one should have supremacy over the other. To put it in a nutshell, to recognize that the names of attributes of God are all Husna [Beautiful], it will not be possible to tolerate the supposition that one name or attribute would put limits on the other."



Darwinian Evolution as a general process	Darwinian evolution process is probably true.	1) The evidence in support of evolution as a basic process through which life and its diversity came about is overwhelming.
All Species except Human	Non-human evolution is acceptable.	2) There is room in scriptural metaphorical interpretation, as shown by some religious scholars, on the basis of which all forms of evolution, including human evolution can be accommodated within the Islamic tradition.
Human Evolution	Human evolution goes against the scripture and hence is unacceptable.	

Spirit and Consciousness

Existence and Nature	The soul is a "subtle body" drawn from the world of spirits (spiritual world).	Spirit and Consciousness is from God, though it may be possible to explain these through biology and physical quantum theories.**
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Policy and Ethics

Collective Ijtihad in Islam & Science conversations	Islam trumps science. There is no room for conversation.	There is a need and room for collective 'Ijtihad' in Islam and science conversations
Use of Science for Ethics	Islam is the sole source of ethics. Science may be used to help specify the precise ethical question that must be answered by religious authorities.	Scientific information can be used to determine or implement principles of scientific and medical ethics.
Use of Social Sciences	Islamic knowledge is all-encompassing and makes redundant every other form.	Social sciences can inform ethical and policy questions through the idea of <i>Maslaha</i> (public welfare).

*Rana Dajani: "God is above the laws of nature and hence cannot be subject to them." As discussed earlier, Nidhal Guessoum notes that there is room within the Islamic theology to absorb methodological naturalism such as through some self-imposed restrictions on action mentioned in the Qur'an (e.g. one that claims that He acts with 'adl' i.e. fairness in the Universe) and, owing to the fundamental importance of this to the scientific enterprise, this must be undertaken by Muslim scientists and theologians in complete earnest.

** There may be other theories advanced to explain these. For instance, Read: Steve Weinberg's "Lectures on Quantum Mechanics" (2015).



5.2 The Details (“Furu”): Agreements, disagreements, & future directions

The Details (‘Furu’) of the Islam and Science discourse outline the agreements, disagreements, and future directions for the discourse and are summarised below:

5.2.1 The Science & Religion debate – Islamic perspectives, frameworks and approaches underpinning the discussion

There was broad agreement on, and discussion of, the following major themes:

- 1) The ideal in Islam, as in other religious traditions, of “the **unity of knowledge.**”
- 2) Many of the issues related to the science-religion discussion in Islam stem from the fact that this idealised, unified knowledge has two major, and very different sources: **reason and revelation.**
- 3) Taking a long view of history, **two incomplete theories exist for the science-religion relationship within Islam:**
 - (i) **the marginality thesis** (of reason with respect to revelation), and
 - (ii) **Barbour’s typology**, applied to Islam.
- 4) Since the early 20th century CE, there have been **five major schools of thought** with regard to the science-religion relationship in Islam:
 - (i) **sacred science**, with a strong emphasis on sufi metaphysics;
 - (ii) **ethical science**, based on Islamic values;
 - (iii) **universal science**, that recognises the objective, collaborative, international nature of modern science and is religiously-neutral;
 - (iv) the I’jaz school that finds hundreds of so-called “**miraculous scientific facts**” in the Qur’an and Hadith;
 - (v) the “**Islamization of knowledge**” project, inspired by the “unity of knowledge” idea. This project was championed by Ismail Al-Faruqi and



his disciples at the International Institute of Islamic Thought (IIIT) for several decades;

5) The above schools have all taken different positions on whether or not science and religion, taken as a whole, represent **Non-Overlapping Magisteria** with regards to knowledge, or **Partially-Overlapping Magisteria**.

6) Since the late 20th and early 21st centuries, there is developing a “**new generation**” of thinkers in this field, as described by Bigliardi. This includes a new approach that endorses universal science and, for some, methodological naturalism, yet reconciling scientific facts and theories with religious teachings via some **harmonization** process, e.g. Ibn Rushd’s.

7) Future debates will largely be shaped by the directions taken by the following schools: (i) sacred science, (ii) Islamic science, (iii) universal science and (iv) the “new generation” described by Bigliardi and others.

5.2.2 Has Science killed belief in God? - Muslim responses to atheist arguments based on Science

Future directions in this debate will revolve around the following themes that were vigorously discussed by the Task Force:

- 1) Is it the philosophical interpretations of modern science, not science *per se*, that pose challenges to religions, including Islam? Does anything intrinsic to modern science raise problems or objections from Islam/ Religion?
- 2) Review and discuss the examples of modern science having implications for theology (e.g. attributes of God, e.g. creator, sustainer, omnipotent, omniscient, etc.) and other traditional Islamic sciences, such as *Tafsir* (*interpreting verses describing the Divine, miracles, etc.*).
- 3) Has science weakened belief in the traditional understanding of a personal God but strengthened belief in a more abstract, impersonal and highly transcendent understanding of God?
- 4) Naturalism poses a problem for strict Islamic monotheism, in terms



of God's action in the world. Is a rejection of metaphysical naturalism, coupled with an acceptance of methodological naturalism, an acceptable solution to the problem?

5) Do arguments for atheism from science call for answers from religion, or answers from scientific perspectives, arguing that science has nothing to do with such conclusions drawn in its name?

6) Are the "miracles" accepted in Islam to be regarded as literal (with a very low probability of occurrence), or non-literal (figurative, metaphorical and/or spiritual)? Is the Averroesian principle of "multiple truths" helpful here, i.e. that the Qur'an is to be read at many levels, appropriate to the understanding of different people?

7) What is the significance of the fact that the Qur'anic term *ayah* (sign or miracle) is used for extraordinary events as well as for "ordinary" or daily yet wonderful events? Does this suggest that some "miracles" do indeed have naturalistic explanations? Also, the term *mu'jizah* (inimitable miracle) is arguably a later one from the *Kalam* (theology) literature, as are related theological discussions about *kharq al-'adah* (tearing up of the habit of nature) that imply arbitrary or capricious divine action. How do these *Kalam* theories fit with modern science, causality and the physical laws of nature?

8) Is the basis of consciousness physical or non-physical? Likewise for 'spirit'.

5.2.3 God, Creation & Biological Evolution - From Origins of Life to Human Evolution; how are these understood through faith in the Divine?

The Task Force was generally agreed that the scientific fact of biological evolution, including human evolution, cannot be disputed scientifically, and that alleged objections on the basis of Islamic theology and tradition can be answered.

However, some Task Force members insisted that a "purely naturalistic," neo-Darwinian view of evolution necessarily leads to atheism and denies purpose in creation. Although this is disputed by other members, teleological views of evolution (largely rejected by mainstream scientists today) may help to bridge this disagreement.



Thus, the following future steps will be helpful for this debate within Muslim societies:

- 1) A comprehensive engagement with, and refutation of, the arguments of Muslims who deny the fact of evolution, whether these arguments are based on theology or science (or pseudo-science), or a combination of the two. This will include developing “pro-evolution Islamic theologies” and allow more Muslims to move on in the debate towards the next step.
- 2) A comprehensive engagement by Muslims, once they have sufficiently defeated the pseudo-scientific arguments of creationism and accepted the fact of biological evolution, with the philosophy of science and alternative “theories of evolution” such as those involving teleology (e.g. Conway-Morris, Shapiro, McGrath), with the only proviso being that these theories remain scientific, i.e. subject to well-known conditions such as testability and falsifiability.

5.2.4 Soul, Spirit, Consciousness & Free Will - modern understandings of Ruh and Nafs

Some Task Force members agreed with a tentative proposal:

We should apply a “threshold of complexity” of neuronal interconnections, such that once a critical mass or threshold of these cellular or neuronal interconnections have been exceeded, we may speak of a “soul.”

It was also suggested that we need more Muslim cell and developmental biologists to contribute to this debate around possible scientific definitions of “soul”, and that we need new and “naïve” people to contribute, unhindered by previous interpretations that might have become obstacles.

This topic needs more treatment and detailed work in the future. The following steps were recommended by the Task Force:

- 1) An interdisciplinary approach to further investigate the merits of the above intellectual proposal, involving insights from theology, neurophysiology, artificial intelligence and other disciplines.
- 2) A similar approach as for “soul” to be applied to concepts such as consciousness and free will.



5.2.5 Policy and Ethical Implications of an Islam Science Reconciliation

1) How may collective *ijtihad* in scientific ethics be improved? Given the different perspectives of religious scholars (jurists) and scientists, and the disagreement within both camps leading to further disagreement even when collective *ijtihad* is employed, with mixed alliances of jurists and scientists on both sides of the debate.

2) Is it possible for philosophers of science to help both sides out in such debates, by explaining the strengths and limitations of pure science that must be complemented by ethics, whether philosophical or religious?



Istanbul Declaration on Islam and Science

Athar Osama

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Istanbul Declaration on Islam and Science

After two days of intense discussions in Istanbul on the submitted papers and in-person presentations, followed by months of further discussions, the task force members agree to issue the following declaration. This summarises some general principles of engaging in Islam and Science discourse and hopes to inspire Muslims today, and in the future, to continue thinking about these important questions at the intersection of Islam & Science:

1) Understanding and practising science properly and in a manner that is faithful to its methodology and tradition is critical to the creation of a productive scientific environment and a scientific culture in the Muslim World.

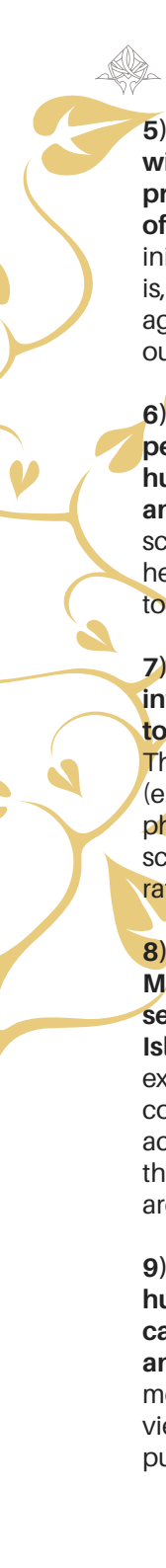
Mixing science with religion in a confused and uninformed manner undermines science. This requires a discourse within the society so that these issues can be highlighted, reflected upon, and corrected, where necessary.

2) The relationship between religion and science is one of complementarity and each can help elevate or understanding of the other: Science attempts to answer the question of how God has created the universe; religion and faith attempt to answer why God has created the universe.

3) The Qur'an should not be read as a Book of Science (or scientific facts). It is a Book of guidance (*hidaya*) with the focal aim of achieving success in this life and salvation in the hereafter. **The practice of finding scientific miracles (or facts) in the Qur'an is not only counterproductive but may even be harmful both to Science and to the Qur'an.**

4) Science cannot prove or disprove the existence of God; however, the deep order, beauty, majesty and wonder of nature that science continues to reveal, are powerful "Signs of God" indicating higher, metaphysical and divine realities, i.e. Creator, purpose, etc.





5) Approaching either “science” and “Islam” as monolithic without differentiating between their fundamental and principals or details usually leads to deep misunderstanding of both science and Islam. This hinders the possibility of initiating a constructive dialogue between the two of them. It is, therefore, important to approach this critical conversation by agreeing on some basics while allowing for details to be worked out later.

6) Muslims must celebrate the diversity of approaches and perspectives on Islam and science with the tradition of humility, tolerance, and respect toward other views (Muslim and non-Muslim). Islam has always produced a rich variety of schools of thought, theology, exegesis, jurisprudence, etc., and hence one can only expect a rich variety of Muslim approaches to the relationship between Islam and modern science.

7) There is enough flexibility within the Qur’an, by not interpreting it literally or through the evolution of meanings, to reconcile most (if not all) findings of modern science.

The claimed conflicts between modern science and Islam (e.g. on biological and human evolution) are mainly caused by philosophical add-ons to modern science, rather than by the science itself, and by dogmatic interpretations of the Qur’an, rather than by the Qur’an per se.

8) There still remains the need for more work by contemporary Muslim theologians, scientists, and philosophers to address several outstanding contentious issues at the intersection of Islam and science and also within each of these domains. For example, whether or not a rejection of metaphysical naturalism coupled with an acceptance of methodological naturalism, is an acceptable solution to the problem of naturalism when viewed through an ethos of monotheism. This, and others, should be key areas for future discussions.

9) The scientific facts of biological evolution, including human evolution that cannot be disputed scientifically can be reconciled with Islamic theology and tradition by answering the alleged objections. However, some Task Force members insisted that a “purely naturalistic,” neo-Darwinian view of evolution necessarily leads to atheism and denies purpose in creation. Although this is disputed by other members,



as well as by mainstream science today, teleological views of evolution involving ideas such as “channelled randomness” and “convergence” may help bridge this disagreement. This is a key area for future discussion.

10) Muslim science teachers should train their students to develop a rational methodology of examining the natural world around them and to think critically and independently. This will help in reaching truths beyond the “received wisdom” of the elders, and will contribute to the creation of generations of Muslim scientists who are both free thinkers and deep believers.

11) The creation of a truly productive scientific environment requires ‘freedom of thought’ and expression as well as opportunities for critical inquiry, questioning of authority, and celebration of doubt. In seeking to regain the lost glory of the past, it may be valuable for Muslim Societies to tolerate (if not actively encourage) individuals and institutions who produce or thrive in such conditions.

12) Muslims should fully engage with science and with its wider implications in technology, philosophy, theology, society and morality.

13) There is a rigorous basis for the promotion and incorporation of science and ethics within the Islamic framework. The promotion of life, education, scientific and medical research and the protection of the environment and promotion of ecology are Islamic imperatives, according to the principles of the Sharia recognised by the greatest Islamic theologians and jurists over the past 1,000 years.

14) Muslims must encourage and undertake collective ijihad, the input of scientists as well as religious scholars into ethical questions involving scientific matters as well as that of philosophers of science in such discussions. Brining scientists and philosophers into these wide-ranging conversations shall sensitise us to the strengths and limitations of pure science and complement the latter with ethics, whether philosophical or religious.



The Relationship between Science & Islam: Islamic Perspectives & Frameworks

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1.0 Introduction

I will begin by briefly looking at the discourse on science and religion in the West, using the typology proposed by Ian Barbour, and suggesting that although it might serve as a useful starting point, its application to the issue of science and religion in the Islamic world is problematic, thus necessitating a different framework.

In section two of the paper, I will review the discourse on science and religion/Islam as presented by several selected Muslim thinkers, namely Seyyed Hossein Nasr, Syed Naguib al-Attas, Ziauddin Sardar, Pervez Hoodbhoy and Ismail Faruqi. Although no systematic framework has been developed in the discourse on science and religion in Islam, contemporary Muslim thinkers have developed their own intellectual responses to the issue of science and Islam which can serve as a useful point of reference. I will classify their responses into three categories, viz.:





- 1) the metaphysical approach: Nasr and Naguib;
- 2) the value-ethics approach: Ziauddin Sardar;
- 3) the scientific autonomy approach: Hoodbhoy and Abdus Salam

In section three, I will take up the question of the relevance and use of history (of science) in dealing with the question of science and religion in Islam. The relationship between science and religion in the Muslim world cannot be understood outside of its historical and cultural context, and therefore reference to history is essential in dealing with the issue. Some of the issues dealt with here are:

- 1) misconceptions in the use of history of science in dealing with the question of science and religion
- 2) the historical sociology of science in Islam
- 3) the influence of colonialism on science in the Muslim world
- 4) lessons to be drawn from history, and its relevance to the contemporary world of science in Islam

Finally, I will end the paper with concluding remarks on the following:

- 1) the epistemology of science and religion
- 2) the use of science and technology for development in Islam
- 3) the relevance and use of history

Since the issue is multidimensional, the various salient dimensions as outlined above have to be dealt with, with a view to getting a good grasp of the issues involved in the relationship between science and religion in Islam, and suggesting the way forward.

2.0 Is Ian Barbour's Typology of the Relationship between Science and Religion Applicable to the Islamic World?

Barbour's typology, being more sociological rather than historical, cannot be straightforwardly applied to the analysis of the relationship between science and religion in the Islamic world. This is because of the different historical and cultural contexts that existed between science in the western world as compared to science in the Islamic world. For example, in Barbour's typology conflict appears as a rather dominant theme; given the history of conflict between Galileo and the Roman Catholic Church in the 17th century, and between Christian theologians and Darwinists in the 19th century, this makes sense. Thus the metaphor of "warfare" and "battle" used to describe the relationship between science and religion in the west, seems



appropriate, given such a background. Also the victory of the scientists over the theologians/religionists in those two episodes, seemed to seal the fate of religion in its battle with science in the West.

This, coupled with a history of increased secularisation of western society, prompted at least two of the categories postulated by Barbour, namely: (i) conflict and (ii) independence.

The victory of science over religion, and the autonomy of science from religious authority, seems to imply 'conflict' and 'independence'.

However, in Islam there was no such schism between faith and science. Although this does not necessarily suggest total compatibility between Islam and science, the 'disagreement' or 'incompatibility' between the two is of a different nature, and should be approached with a more nuanced analysis that is sensitive to the subtleties of Islamic history. For instance, instead of a direct conflict between science and Islam, it was suggested that science was 'marginal' in medieval Islamic culture and education, i.e. the so-called 'marginality thesis' put forward by Von Grunebaum (Lindberg, 1992, p. 173). This marginality did not entail conflict, but only reflects the priorities in Islamic culture, where religious sciences prevail over the natural sciences.

Also, the rise of science in Islamic civilisation was partly attributed to the Muta'zilitic Caliphs such as al-Ma'mun and their rationalist tendencies. Although it is tempting to draw parallels with the influence of Protestantism on science in the west, such a comparison is flawed in view of the fact that the Muta'zilah was not really a separate religious sect in Islam, unlike Protestantism in Christianity.

What this suggests is that "Patronage" was an important factor in the development, rise and fall of science in Islamic culture, where this patronage is connected to 'religious ideology'. This 'power factor' in determining the fate of science in Islamic society is something which cannot be analysed using Barbour's typology. Barbour's typology, like Merton's norms, assumes the distinct identity of science as an autonomous form of knowledge which is not 'socially constructed'.

Recent literature on the history and sociology of science, however, has shown how the development of science was shaped and influenced by its social and cultural contexts. Thus, my suggestion is that we work from the historical ground upwards, rather than impose neat sociological categories and impose on the ('mismatched'?) historical realities.



3.0 Existing Views on the Relationship between Science and Islam by Muslim Writers

The relationship between science and religion has been discussed by both Muslim and non-Muslim writers. Western scholars have discussed the issue mainly through Ian Barbour's four-fold typology, and drawing on the works of historians, philosophers and sociologists of science. In the Islamic world, the discourse on science and Islam have been influenced and dominated by the works of a few Muslim intellectuals namely Seyyed Hossein Nasr, Syed Muhammad Naguib al-Attas, Ziauddin Sardar, Pervez Hoodbhoy, and more generally the late Ismail Faruqi (Shah, 2001).

Any attempt to formulate an Islamic approach to the relationship between science and Islam must therefore begin by acknowledging and discussing the contributions made by these thinkers to the question of the relationship between science and Islam. I have selected the thinkers above because apart from their influence in shaping the discourse, they can also be regarded as representing the major positions in contemporary Islamic thought on science and Islam.

I will begin by briefly outlining their respective positions, giving brief commentaries on each one of them, and suggesting how the discourse as a whole can be carried further or whether any policy implications can be drawn from them.

3.1 The Metaphysical/Traditionalist Approach: Seyyed Hossein Nasr and Syed Naguib al-Attas

Nasr (Nasr, 1981) and Naguib (al-Attas, *Islam and the Philosophy of Science*, 1989) privilege Islamic philosophy and metaphysics when dealing with knowledge, including scientific knowledge. Nasr is more familiar with modern science compared to Naguib, having been educated in physics and geophysics at Harvard in the 1950s. However, the epistemological position they took when discussing scientific knowledge, is almost similar. This is because of their commitment to Islamic metaphysics and cosmology, through which they view scientific knowledge.

They can be considered as 'globalists' in their approach to scientific knowledge because they conduct their analysis mainly at the general epistemological level rather than dealing with specific issues in science, or with any specific scientific theory. Even when Nasr deals with the biological theory of evolution, the arguments made are philosophical rather than



scientific, unlike the approach taken by someone like Harun Yahya. Thus both of them consider science as a 'lower form of knowledge' based on rational and empirical sources only, in contrast to the 'higher forms of knowledge' accessible through religious intuition, gnosis or *Irfan*. Thus the knowledge of the Prophets and the Saints would be of a higher order compared to that of scientists.

Nasr calls himself a 'Traditionalist' on this account because he would not accede to the claim that modern science has advanced beyond religion in giving us ultimate truths about the world, including the natural world. Instead, Nasr sticks to his guns and preserve the authority of the Qur'an and the Hadith (as interpreted by him) even in the face of modern challenges from science and technology. Thus his uncompromising and unapologetic position against the theory of evolution in the face of scientific orthodoxy can be understood against this background.

The upshot of their metaphysical approach to knowledge is that they are able to preserve traditional beliefs in the 'supernatural' or Unseen worlds such as the world of angels and *jinn*, which modern science has written off or suspended belief in. Instead, they returned to traditional sources and traditional interpretations of reality as understood by earlier Muslim thinkers especially the Sufis, instead of 'going with the times'.

Unlike the approach taken by some writers such as Frithoj Capra (Capra, 1976), who attempted to engage with both modern science (quantum physics) and traditional cosmologies such as Taoism, and in a sense 'updating' the traditional cosmology through a modern scientific interpretation, Nasr chose to opt for a 'Traditionalist' (Jahanbegloo & Nasr, 2010) approach and avoided such engagements. His own autobiography revealed the conscious decision he took in this matter, when he was a physics student at Harvard.

Now, the question is: is there an unbridgeable gulf between the two or is a rapprochement possible?

For Nasr a rapprochement does not seem possible because science and religion are based on different premises regarding the nature of reality. In science reality is ultimately physical, and that the only sources of valid knowledge are the rational and the empirical. In western thought, this issue has been more or less clinched by Immanuel Kant in the 18th century, when he rejected the possibility of metaphysical knowledge in his *Critique of Pure Reason*. Since then, western thought has imposed boundaries on genuine or valid knowledge, more or less along the lines set out by Kant and later revised



by the Logical Positivists. Even when Wittgenstein in his later work, tried to rescue non-scientific discourse from being consigned to the flames and the realm of the 'meaningless', he ended up by giving a secular humanistic account in terms of 'language games'.

In other words, the west has not been able to re-assign the realm of the spiritual back into mainstream intellectual discourse (note the writings of Rorty (1999) for instance), while in the Islamic world following Al-Ghazali, the spiritual and metaphysical realm has remained cognitively respectable even today.

3.2 The Ethical Approach by Ziauddin Sardar

Unlike Nasr and Naguib, who chose to view science through Islamic metaphysics, Sardar (Sardar, 1977) instead looks at science through Islamic ethics. Familiar with western critiques of science, Sardar adds to the growing dissenting voices against science in the west, but by bringing in his own Islamic background and perspective into the picture.

In the 1970s, critics of science—apart from philosophical critiques by Kuhn, Feyerabend and the Edinburgh School—point to the damage caused by science and technology to the environment through industrial pollution, to human security through the nuclear arms race, and the dangers of a 'brave new world' brought about by advances such as 'human cloning'.

Sardar's diagnosis is that the ills of modern science results from the fact that it is a by-product of a secular western civilisation that has abandoned religion and religious values in the transition from medievalism to modernity. The solution therefore, is not to reject science but to envelop it within an Islamic value-system, so that science can be practised according to Islamic values and hence be of benefit to humanity.

Sardar begins by criticising the notion that science and technology are 'value-free'. To him, science and technology are not value-free but are infused by values adopted throughout western history and civilisation such as the Enlightenment, Capitalism etc. These values which are 'man-made', in contrast to a divinely-inspired value-system, could not deliver men out of his ills. Thus despite the promise heralded in the Baconian vision of the 17th century of human salvation on earth through advances in science and technology, and the Enlightenment ideal of a rational approach to life and thought, we have not seen a better world despite advances in scientific knowledge and modern technology.



Sardar's argument and solution is that since science is not value-free (both in a descriptive and a normative sense), it is best if science is practised according to Islamic ethics, which is universal since Islam is a universal religion for the whole of mankind. He outlined several of these ethical principles such as justice, conservation, balance, avoidance of wastage etc, which could act as guiding ethical principles in the practice of science and technology.

The advantage of Sardar's approach for Muslims is that he does not advocate turning away from modern science and technology, which the metaphysical approach indirectly does. Although critical of science like his other western colleague, Jerome Ravetz, Sardar still entertains the hope that science re-directed can be harnessed for a better world. In so doing, his approach also helps Muslims cope with modernity by accommodating science within the Islamic value-system.

Although Sardar's approach remains programmatic and lacking in details (eg. 'What does an Islamic science policy look like?'), it is hopeful in that it allows for the retention of an Islamic identity in the attempt made by Muslim societies to modernise through science and technology. In fact he was quite critical of Nasr's approach to modern science and technology, which he regarded as not useful in practical terms given the backwardness of Muslim countries in science and technology in relation to the West, and how this failing hampered the Muslim Ummah and was partly responsible for its history of being colonised.

3.3 The Scientific Autonomy Approach: Pervez Hoodbhoy and Abdus Salam

If Zia Sardar was considered a radical by some, it is more so with Pervez Hoodbhoy (Hoodbhoy, 1992), who in his book *Science and Islam*, advocated for autonomy of science from control by Islamic religious authority. Hoodbhoy drew his inspiration from the history of science in western civilisation, although he was equally aware of the history of science in Islamic civilisation. In the west, science and scientists had to go through a long history of struggle against religious authority, before it finally became independent from religious control.

This was symbolised and epitomised by the conflict between Galileo and the Roman Catholic Church in the 17th century. Although this was not the whole story, since religion was also a factor in the rise of modern science in the west as shown in the Merton thesis and in the institutionalisation of science in religiously-controlled medieval European universities, it cannot be denied



that the advancement of science took place amidst a secularised European society, where the support from the secular state enabled science to operate quite freely, though now under the control of state authority.

In Islam, because of its all-encompassing nature, secularisation has never gained ground. Thus no sphere of modern life, be it political, economic, legal, educational, or even cultural, can be totally free of religious injunction or authority. Hoodbhoy himself when writing his book, personally experienced this when there was an attempt to revive “Islamic Science” and to “Islamise” science, when Pakistan was ruled by the Islamist General Zia ul-Haq. Hoodbhoy regarded any attempt at what he considered as ‘religious interference’ in the development of science, as unwarranted and even detrimental to the Muslim cause.

To him the problem is not that science is “un-Islamic”, or at odds with Islam in certain respects. The problem rather, is contemporary Muslim backwardness in science and technology in relation to the west and other advanced countries such as Japan and South Korea. This sentiment is shared by his mentor, Abdus Salam, ironically, was a man of immense faith (Salam, 1984), and most aspiring modern Muslim governments today. But Hoodbhoy does not want to cut himself off totally from his Islamic roots, citing the pre-eminence of Muslim science in the past in support of the argument that science and Islam are not necessarily incompatible. However, he was aware of the rationalist ideology of the Mu’tazilah, whom he credited for the support they gave to science in Islamic civilisation that led to its pre-eminence. That same spirit, he believed, should be exercised in our age.

Thus it is not Islam per se that is to be blamed for the decline of science in Islam, but instead the attitude adopted by certain Muslim thinkers and leaders, that have been responsible for the current malaise. What is needed therefore, is an ‘enlightened’ Islamic approach to modernity, including science and technology. It smacks of a ‘missed Protestantism’ in Islamic history, and suggests remedial action along those lines.

4.0 Science and Islam and the Challenge of History: The Social and Cultural Context of Science in Islam

The relationship between science and Islam cannot be properly understood outside of its historical and cultural context (Dallal, 2010). Even then, the history of science in Islam needs to be properly interpreted in order to draw the right lessons, thus making history relevant for contemporary science policy in the Muslim world. Science and technology policy in the



contemporary world is heavily influenced by western models, such as the OECD models, namely the so-called Oslo and Frascati Manuals, which in turn is based on a different historical experience, and tied to a certain view of economic growth. It is more relevant to western countries that have achieved a high level of economic growth based on the K-Economy with substantial inputs from R&D. Muslim countries would do well to reflect on their own historical experience in the relation between science and Islam, instead of slavishly imitating the west. Even if Muslim countries succeed in achieving similar success by adopting those models, it might be at the expense of cultural stability and authenticity based on Islamic values.

Thus it is important for Muslims to understand the historical challenge in charting their own paths towards modernity, through the incorporation or assimilation of science and technology. In this regard, we cannot strictly separate the thematic from the historical/chronological, the synchronic from the diachronic, because the past is still very much with us. We carry a greater historical and cultural baggage as compared to the west, which has discarded much of that baggage throughout its history.

In trying to draw positive lessons from history, I will first begin by discussing what I construe as the 'misinterpretations' of history, or the 'wrong' lessons that have sometimes been drawn from history, in thinking about the role of science in contemporary Muslim society.

1) Firstly, there is the tendency to 'glorify' past Muslim achievements in science and technology, perhaps as a reminder of what Muslims were capable of in the past, and thereby act as a psychological motivator in the attempt to revive science and technology in today's Muslim world. However, despite its nobility, it conceals more than it reveals. It conceals the actual status of science in medieval Islam (marginality thesis), and the role played by rationalist Muta'zilah caliphs such as al-Ma'mun in the propagation of science in Muslim society. Are contemporary Muslims willing to abandon or change some of its conservatism, to promote science and technology?

2) Secondly, the glory of Islamic science was achieved through the works of individual scientists such as Ibn Sina, Ibn Haytham, Al-Khwarizmi and others (Nasr, 1968). Science was not institutionalised in Islam, and thus there was no continuity in the development of science after them. Also, the 'great individual scientist' model is no longer appropriate in today's "Big Science" which is capital-intensive and based on teamwork. So what works for science in the Muslim world in the past is not necessarily what works today.

3) Thirdly, the role of colonialism in Islamic history has not been adequately



and properly factored in, when considering the relationship between science and Islam. The effects of colonization are so deep in the Muslim world so that institutions and scientific activities carried out in the Islamic world today is the extension of the colonial heritage rather than the Islamic. Scientific institutions in most of the developing world today is a legacy of the colonialists.

Although in terms of history, we are proud of the glorious days of science in Islamic civilization, but the fact is that scientific institutions as well as various other institutions that we have inherited after independence are a legacy of colonial rule. Although we cannot turn the clock back and resume from where we had left before colonial rule, it does present a challenge if want to rethink the science-Islam relationship. Colonial influence is not necessarily intrinsically bad, especially since if we realise that western science owes to Islamic civilization in its revival in the 12th century through translation works from Arabic to Latin, via Spain and Sicily.

Science in today's Muslim world has been subjected more to nationalistic concerns, rather than the Islamic, as a result of post-colonialism. Therefore in order to relate Islam to science in the present Muslim world in practical terms, this has to be done in the context of nation-states rather than in terms of some abstract "Islamic or Muslim world". The OIC can perhaps act as a bridge or starting point in this respect, since it is an organization of nation-states with Muslim majorities.

Thus history has to be properly understood and interpreted in order for it to serve as a guiding light in articulating a genuine and authentic Islamic response and science policy for the contemporary Muslim world. The social and cultural conditions existing then, and how it contributed to past success in Islamic science, must not be assumed as equally valid in today's world. The historical colonial experience and its effect on the Muslim world also has to be understood. Thus while history might serve as an encouragement for Muslims trying to develop their own science and technology in today's world, they must also learn to draw the right lessons from history if that success were not to remain purely historical.

5.0 Concluding Remarks

My concluding remarks will refer to the following three major points, namely: the epistemology of science and religion the use of science and technology for development, and the relevance and use of history.



The epistemology of science and religion. Broadly speaking, as forms of knowledge, they are based on different assumptions, methodologies, scope, and purpose. Their overlap, if any, is partial and may or may not result in conflicting claims. In areas where they do not overlap, for example in the realm of morals and ethics that is mostly the province of religion rather than science, one turns to religion for guidance rather than science. However, there are cases where the application of religious principles and moral codes would require an understanding of science if it involves technical issues such as reproductive technology (bioethics).

Claims made by religion with respect to the spiritual realm and the Unseen world, are ontological claims, which cannot be verified by or through science. However, it is belief in these realities that underwrite the moral and social codes of Islamic societies. To me, it is best to keep an 'open dialogue' regarding these issues, rather than make any dogmatic pronouncements. It could be more enlightening as it could open up more vistas of understanding that is hitherto unknown. In any case, science is 'fallible knowledge' (Popper, 1972) and makes no claim to absolute truth. The history of science has shown that our scientific understanding of the world has changed over the centuries, with there being no 'ontological convergence'. In any case, with regard to knowledge regarding the metaphysical world, science can best be looked at as being 'agnostic' rather than 'antagonistic' regarding such metaphysical knowledge.

One is therefore entitled to believe in both science and religion without there necessarily being any deep or irreconcilable conflict. The belief in the reality of the spiritual world however, should not be used as an excuse for rejecting the pursuit of scientific knowledge, given that we have delimited the boundaries of science in relation to religion. Furthermore, Islam encourages its followers to seek knowledge of the world, conceived as God's creation. Here one can draw upon the examples of past Muslim scientists who were at home in both science and Islam.

The Use of Science and Technology for Development. Muslim thinkers such as Zia Sardar (Sardar, *Explorations in Islamic Science*, 1988), or even government policy makers in Muslim countries, have correctly pointed out that weaknesses in science and technology have been partly responsible for the current 'backwardness' of the Muslim Ummah. In so agreeing, I am not thereby adopting a totally 'modernist' perspective with respect to religion and development, but acknowledging contemporary realities. Islam was successful and respected in the past because of its political, economic, scientific, and military strength, not weakness. That strength enabled Islam to flourish throughout the world.



Present-day Muslims therefore, cannot afford to ignore modern science and technology, for its own survival as a Muslim Ummah. The spiritual strength of the Muslim must be supported and accompanied by its material strength acquired through science and technology. However, the pursuit of modern science and technology must be guided by Islamic values and ethics to ensure that in the long run, science and technology will serve humanity and the Muslim Ummah, and not lead to its eventual destruction, which is a real possibility looking at the way the west is using its science and technology within the framework of Capitalism. In fact even the capitalistic world had to resort to 'regulatory measures' based ultimately on some moral or ethical values, in order to ensure sustainability.

The Relevance and Use of History. The question of the relationship between science and Islam should not be viewed in an ahistorical manner, because the relationship has been shaped by history which would therefore require a historical understanding in order to suggest the way forward. History is also important because it gives a sense of Islamic identity in our attempt to relate science and Islam. Otherwise we would be caught up in existing frameworks of analysis, largely emanating from the west who has managed to universalise their own history, and provincialise the rest. However, in our attempt to utilise history in order to achieve an accurate understanding of the relationship between science and Islam, we must be cautious not to fall into the trap of nostalgia and jingoism.

We should approach history with a sense of realism, and not as a means of psychological cover for our present weakness and inadequacies. Knowing where we came from (through historical understanding), we would be in a better position to understand the situation we are currently in, which would then make us better informed when thinking of strategies on how to move ahead. History is also important for another reason; that the past is still very much in our present—even in a modified form—and dealing with history is in a way dealing with an aspect of contemporary reality.

However, we also have to learn how to move on from the past and chart a new future which is somehow reconciled with its past, and for that we need a new creativity and a new energy. The challenge is therefore for us, contemporary Muslim thinkers, to help chart out that new future for the Islamic world.



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'Islam' and 'Science': Freedom, Justice and Meaning

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The main question this task force is engaged with is:

**Can Islam's theological teachings be
reconciled with cutting edge discoveries
in the world of science?**

I will begin by raising some queries about the main question itself.

Why is there a need to reconcile 'Islam's theological teachings' with 'cutting edge discoveries of science'? What understandings of science and Islam are presumed by such a need? What are Islam's theological teachings? Which discoveries of science are being considered? What would reconciliation mean given that science and theology are both dynamic and their discoveries and conclusions change over time? In this short paper, I will engage with only the first and the second questions.





Two sides are in need of reconciliation when they are in conflict, which often means some common ground over which the two seek exclusive ownership. For example, two countries may get into conflict over the ownership of a piece of land. Reconciliation occurs when a settlement is reached.

It would seem then that the assumption underlying the question being grappled here is of a shared 'space' (e.g. the question about the creation of the universe or human beings, epistemological authority, causation) over which both science and Islam claim ownership and are in conflict over it because of their differing responses. Reconciliation would mean finding a way to settle the ownership of this space.

But, is this presumption of a shared space between science and Islam correct? I propose that we engage with this underlying assumption.

The assumption of a shared space can be demonstrated with the example of the theory of evolution. The Quran, like some other religious texts, has a narrative about the origin of human beings. For many Muslims, this narrative is a factual account whereby the creation of human beings is seen to be the result of God's direct act. For centuries, the now contested space was occupied by this narrative (though some alternatives always lingered around; for example, the ideas about spontaneous generation found in Ibn Tufayl's [d. 1185] work *Hayy ibn Yaqzan*). However, in the nineteenth century, a new contestant for the question of human origins emerged in the form of the theory of evolution – at least for those who held the Quranic narrative to be a factual description.

Since then, the question of human creation has become a contested territory to articulate various positions between Islam and science. Those who believe in the conflictual relation, use this issue to claim that there is a wide gulf between modern scientific [often equated with atheistic] mode of thinking and Islamic way of thinking. Those seeking reconciliation between science and Islam offer ways of fitting evolution into an Islamic context. For example, in one approach, an Islamic appropriation of evolution is sought by invoking ideas from various Muslim writers from al-Jahiz to al-Rumi (Shanavaz, 2011). In another approach, the idea of Adam is reinterpreted, proposing that it refers to the first living cell and not to the finished human form. God created life and then the evolutionary mechanism took over. Those advocating reconciliation between science and Islam often aim at the integration of Islam and religion, albeit on Islamic terms, sometimes going as far as to claim that modern scientific findings were all mentioned in the sacred texts of Islam.

Common to these different approaches is the assumption that there is a space



that both Islam and Science share and that one can either have a conflict or reconciliation between the two. I would like to propose that there is a need to rethink the assumption that there is a shared space between Islam and science.

We can start with terms: science and Islam. Though the names give an impression of a stable and concrete object of reference, both of these concepts are abstractions. There is no such thing as science or Islam that we can be observed empirically. These refer to discourses and practice which have changed over a period of time and which have been given different meanings by different people. If so, we should only expect a context specific understanding of the relationship between the two. It is for this reason that Brooke (1991) is persuasive when he observes that,

Popular generalizations about that relationship [i.e. between science and religion], whether couched in terms of war or peace, simply do not stand up to serious investigation. There is no such thing as the relationship between science and religion. It is what different individuals and communities have made of it in a plethora of different contexts. Not only has the problematic interface between them shifted over time, but there is also a high degree of artificiality in abstracting the science and religion of earlier centuries to see how they were related (p. 321).

If both science and Islam refer to discourses, one way to investigate their relationship is to analyse the use of the language in the scientific and Islamic narratives. Let us read two passages:

When we compare the individuals of the same variety or sub-variety of our older cultivated plants and animals, one of the first points which strike us is, that they generally differ more from each other than do the individuals of any one species or variety in a state of nature. And if we reflect on the vast diversity of the plants and animals which have been cultivated, and which have varied during all ages under the most different climates and treatment, we are driven



to conclude that this great variability is due to our domestic productions having been raised under conditions of life not so uniform as, and somewhat different from, those to which the parent species had been exposed under nature. ...It seems clear that organic beings must be exposed during several generations to new conditions to cause any great amount of variation; and that, when the organisation has once begun to vary, it generally continues varying for many generations. [Charles Darwin in 'On the Origins of Species' (1859)]

And, indeed, We have created you, and then formed you; and then We said to the angels, "Prostrate yourselves to Adam" - so they prostrated themselves, except Iblis, who was not among those who prostrated themselves. And God said: "What prevented you from prostrating yourself, when I commanded you?" He answered: "I am better than him: You created me from fire, and him You created of clay". God said: "Down with you, then from here for it is not for you to show arrogance here!... And as for you: "O Adam, inherit, you and your wife, the Paradise, eat of what you desire, but do not approach this tree, lest you be of evil doers." (The Quran, 7:11-13; 19)

The strikingly different ways in which the Quran and Darwin speak about the supposedly shared space should make us pause. The language of the Origins of Species is empirical, falsifiable and invites observation. It seeks to draw logical conclusions from premises. The language of the Quran uses terms that do not have concrete referents in the physical world. It reads more like a moral and spiritual tale than a description of physical events. It is hard to see how it can be falsified.

Could it be that the Quran is not seeking to give facts or a scientific theory of creation, rather its discourse may have a different socio-cultural function; in Darwin and the Quran are we not seeing a scientific and a poetic use of language, respectively? ¹

¹ Readers of the Origins of Species may recall that there are places in the book, particularly at the very end, where the language is more poetic and hence they might object that the choice



The question of the creation of human beings – and for that matter other relevant questions, which serve as a flashpoint between Islam and science – has at least two different dimensions. There is a dimension of material understanding of the facts of human life and there is the dimension of the significance of the facts. These two dimensions belong to different ‘forms of life’ – science and religion. The idea of a form of life comes from Wittgenstein and is notoriously difficult to pin down. A plausible way to put it is that a form of life is the social, historical and intellectual context or matrix that enables language to function and within which a particular language use has a meaning. For example, terms like ‘away goals’, ‘bicycle kick’ and ‘penalty shoot-out’ have meaning in the realm of football, which for this purpose can be seen as a form of life, but would not help in understanding a game of chess, another form of life, where terms like ‘opening gambit’, ‘stalemate’ and ‘grandmaster’ make sense.

The dimension of physical facts and their understanding is the domain of science. Here scientific method should be applied free of any religious consideration, leading to the production of scientific knowledge. Darwin’s language use is a reflection of this form of life. The dimension of significance belongs to religion (and philosophy, history and literature) and it is where the Quranic narrative has much to offer. It is evocative and imaginative; its ideal is not empirical verification but to provide, to those who believe in it, a sense of meaning to experience. The domain of religion should be the problem of meaning to which it should endeavour to provide solutions that the believers may find persuasive, inspiring and spiritually fulfilling. In evolving such responses, it should take account of the best scientific answers available but its main purpose should not be to reply to or reconcile with these answers but to employ them to respond to the ‘problem of life’.

To see scientific mode of thinking in a ‘culture free’ way is not alien to Muslim intellectual tradition. The scientific and philosophic disciplines were seen in the Muslim contexts as rational and universal, both by their proponents and opponents. Ibn Khaldun, the famous 14th century historian notes that,

The intellectual sciences are natural to man, in as much as he is a thinking being. They are not

of the above passage accentuates the difference. While it is true that the conclusive lines are elegant and in a sense poetic, they are nevertheless scientific, the poetic style, coming as it does at the end of the book has clear reference to facts and conclusions in the earlier parts of the book. A similar point can be made about the Quran as well, i.e. it too has several different registers of language. Again, while this observation is correct, except for one or two occasions, when referring to natural phenomenon, the Quranic language remains evocative and didactic rather than precise and descriptive. It is in referring to social issues – inheritance, marital relationship and others – that a more precise and descriptive language can be noted.



restricted to any particular religious group. They are studied by the people of all religious groups who are equally qualified to learn them and to do research in them (Quoted in Dhanani, 2002).

The above may give the impression that we are leaning towards the idea of 'Non-Overlapping Magisteria' proposed by Stephen Jay Gould, arguing that science and religion do not have much to do with each other. This impression is true as far as scientific method is concerned. But, science is a broader activity than method, and involves ways in which scientific questions and hypothesis are generated as well as the ways in which the resulting knowledge is employed in society.

Both the production of scientific problems – what gets researched and what does not - and the application of scientific knowledge are deeply value laden, embedded in wider culture and have consequence for the worth of science and quality of life of people. We cannot understand science simply as a culture-free method but must also bring in the ways in which scientific problems are formulated and how the resulting knowledge is applied, at the level of individual psychology as well as at the societal level.

This complicates any easy separation of science and religion. Religion has a proper and legitimate role in the discourses at both these levels, i.e. production of scientific questions and application of knowledge. It can and ought to bring the question of ethics, justice and meaning to these matters. This critical role of religion is particularly important in the contemporary context where both the production of scientific problems and the application of scientific knowledge have to take into account market forces, financial considerations and socio-political contexts. Religion that engages with ethical problems has the potential to inspire moral courage to raise the issue of justice: it must ask whose problems become the concerns of science and who benefits from the resulting knowledge. As Reiss suggests, we should note 'how one makes practical decisions about scientific matters in a world with a multiplicity of values, religious and otherwise. And here religion has a place at the table.' (2014, p. 1653).

Concluding remarks

The paper started by seeking to rethink the commonly held assumption about a shared space between science and religion. It was argued that science and religion should be seen as two different forms of life and as such the idea of a common space needs to be challenged. As far as scientific method and its



subject matter is concerned, there is no shared space; scientific methods have epistemological independence and should be applied free of any religious consideration. At the same time it was observed that science is not only about method but also extends into the production of scientific problem and the use of scientific knowledge. At both of these levels, religion has a legitimate place on the table of dialogue.

In the final analysis, the relationship between science and religion is not just a theoretical issue. It is also a practical issue of socio-political and cultural conditions and what relationships are possible within them. For both the independence and dialogue to occur a society needs a high degree of political freedoms, particularly of freedom of speech. Without such freedom, the most magnificent articulation of this relationship would not mean much. Thus, any discussion of science and religion must simultaneously be seen as a discussion of politics and freedom.

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Modern Science and Challenges to Some Islamic Theological Doctrines

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1.0 Introduction

Modern science infiltrated the Islamic world in the beginning of the nineteenth century. But what affected Muslim intellectuals mostly was not science itself; rather, it was the transfer of various philosophical currents, entangled with science that had a profound effect on the mind of Muslim scientists and intellectuals. Schools like positivism and Darwinism penetrated the Islamic world and dominated its academic circles and posed some challenges to several Islamic theological doctrines. Some scholars attempted to reinterpret some of the Islamic theological issues in the light of modern science.

But some Muslim philosophers differentiated between the findings of modern science and its philosophical underpinnings. They advocated the discovery of the secrets of nature through experimentation and theoretical work, but warned against its positivistic interpretations, advertised in the name of science. In the company of the last group, I believe that the source of the claimed conflicts between modern science and religion is to be found mostly in the philosophical attachments to





science, rather than science *per se*. Here, we elaborate on several crucial challenges that are propounded, in the name of science, concerning the existence of God, life, spirit and purpose in nature.

The Problem of Life and Spirit

According to the Holy Qur'an, human beings have a physical dimension and a spiritual one. The latter comes into being at a later stage in the development of the human body, and has nonmaterial nature. It is a Divine Grace emanated to every human being:

"When your Lord said to the angels, 'Indeed I am going to create a human out of a dry clay [drawn] from an aging mud. So when I have proportioned him and breathed into him of My spirit, then fall down in prostration before him'." (al-Hijr 29)

The idea that human beings have a dual aspect, i.e. physical and spiritual, is an old one and has been a controversial problem since old times. In our time when empiricist philosophy is dominant, the primacy is attributed to matter, and life is considered as a byproduct of physico-chemical processes, leaving no room for the human soul. **Francis Crick**, who was one the discoverers of the structure of the DNA molecule, says this clearly:

The astonishing Hypothesis is that "you," your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules. (1)

The prevalent outlook restricts reality to what is detectable through physico-chemical processes. But this outlook cannot be derived from science *per se*; rather, it is rooted in the naturalistic philosophy ruling over contemporary scientific circles? Roger Trigg describes the matter beautifully:

"Why should not a transformed science one day even be able to accept the existence of 'spiritual' realities? Only a metaphysical decision now that such things



cannot exist would suggest that that is impossible. The question is whether we are concerned with the nature of reality, or with the validity of a scientific method tailored to current human capabilities.” (2)

In response to the position of materialists concerning the problem of life and spirit, Muslim philosophers argue that:

(a) In addition to the material dimension, human beings own a spiritual dimension that appears when the conditions for its appearance is fulfilled. In fact, spirit is a special effusion of Allah to each individual human being. The denial of this spiritual dimension by materialists is not a scientific decision; rather it is a metaphysical decision not rooted in empirical science.

Mutahhari, a contemporary Muslim philosopher, describes the Qur’anic position concerning this matter:

“The Qur’an’s logic concerning life is that an effusion [of Allah], at a higher level than the sensible body horizon... This logic is based [on the fact that] sensible matter, by itself, lacks life and that life is an effusion and a light from a higher source” (3)

It is interesting that **John Eccles**, a Nobel Laureate in Medicine, says the same thing:

Since materialist solutions fail to account for our experienced uniqueness, I am constrained to attribute the uniqueness of the Self or Soul to a supernatural spiritual creation. To give the explanation in theological terms: each Soul is a new Divine creation which is implanted into the growing foetus at some time between conception and birth. (4)

Neville Mott, a Nobel Laureate in physics, concurs:

“I believe, too, that neither physical science nor psychology can ever ‘explain’ human consciousness ... To me, then, human consciousness lies outside



science, and it is here that I seek the relationship between God and man.” (5)

Furthermore, a number of eminent contemporary physicists, without any reference to metaphysics, believe that consciousness, which is a manifestation of spirit, is not explainable in terms of physics. For example, **Schrödinger** says:

“Consciousness cannot be accounted for in physical terms. For consciousness is absolutely fundamental. It cannot be accounted for in terms of anything else.” (6)

Even **Richard Dawkins**, who believes that science can ultimately explain everything, admits that consciousness is one of the most difficult problems. In an interview from October 2009, he says:

“Consciousness is the biggest puzzle facing biology, facing neurobiology, facing evolutionary biology. It is a very, very big problem.” (7)

Popper, however, believed that the origin of life will probably remain untestable for ever and that even if scientists create life in a laboratory, they can never be sure that life actually began in the same way. (8)

(b) Physico-chemical processes prepare the ground for life, i.e. they are necessary conditions for the emergence of life. But they are not sufficient conditions. Muslim philosophers do not deny the material ground for life, but they believe that at a certain stage of the physical development of a body, it is through God’s effusion that life is developed in human beings. In **Mutahhari’s** words:

“The synthesis, addition, subtraction and combination of the parts of matter are necessary conditions for the appearance of life effects, but they are not sufficient.” (9)

Materialists only see part of the problem, but they claim that they are seeing the whole. A radio is necessary to broadcast the signals sent by a transmitter, but it is not sufficient. There has to be a transmitter.

(c) Even if one day human beings bring about living organisms, theists’ claim



for the existence of a spiritual element is not disproved. Because they can claim that when the material ground of life is ready, Allah will effuse life to it, as He is the owner of infinite effusion. As **Mutahhari** put it:

“If some day human beings discovered the law of creation of living beings ... and discovered all conditions and material parts of a living creature ... does that creature become a living one or not? The answer is that it certainly becomes a living one, as it is not possible that the conditions for the diffusion becomes available but it is not realized... If some day human beings get this opportunity, what is essentially done is the preparation for the appearance of life, not the creation of life.” (10)

Mulla Sadra, an eminent Muslim philosopher of the 17th century, believed that the soul appears at a certain stage of transsubstantial motion of the body. However, the body is not the cause of the soul, but it provides the ground for the emergence of the soul:

“In truth, the human spirit is material in creation and action, but it is immaterial in subsistence and intellection.” (11)

After emergence, however, the soul does not depend on the body and survives the body's death, i.e. it is immortal. In short, soul has a corporeal ground, but a spiritual subsistence.

2.0 Creation of the Universe

Modern cosmology started with Einstein's 1917 article entitled, "Cosmological Considerations about General Relativity." Einstein applied his theory of general relativity (GR) to the whole universe. Einstein's equations have different solutions, but GR cannot choose a solution by itself. In 1929, Hubble noticed that the spectra of light reaching us from galaxies is red-shifted and this shift is proportional to the distance of that galaxy from ours. This was interpreted in terms of the expansion of the universe, and led to the big bang model of the universe that implies an initial time for the creation of the universe.



In the 1940's, Fred Hoyle and his collaborators presented the steady-state model of the universe, which claimed that there was no temporal beginning to our universe. The steady-state theory had appeal for some physicists, because they thought that with this theory they can dispense with the idea of a Creator for the universe. **Weinberg** is very clear about this:

"The idea that universe had no start appeals to many physicists philosophically, because it avoids a supernatural act of creation." (12)

Similarly, **Stephen Hawking**:

"Many people do not like the idea that time has a beginning, probably because it smacks of divine intervention." (13)

The discovery of the microwave background radiation in 1965 gave an impetus to the big bang model of the universe.

In the last three decades, atheist physicists have been after the elimination of the initial moment of time, as they considered this as an indication of the creation of the universe by an external agent. In **Hawking's** words,

"So long as the universe had a beginning, we could suppose it had a creator. But if the universe is really completely self-contained, having no boundary or edge, it would have neither beginning nor end: it would simply be. What place, then, for a creator?" (14)

But the assumption of no beginning in time, does not make the universe self-explanatory, as **Paul Davies** explains:

"The fact that the universe might have no origin in time does not explain its existence, or why it has the form it has. Certainly, it does not explain why nature possesses the relevant fields (such as the creation field) and physical principles that establish the steady—state condition." (15)

Furthermore, as some Muslim and Christian scholars have indicated, creation



does not mean creation in time. Rather, it means dependence on God. As **Arthur Peacocke** put it:

“The principal stress in the Judeo-Christian doctrine of creation ... is on the dependence and contingency of all entities, and events, other than God himself: it is about a perennial relationship between God and the world and not about the beginning of the Earth, or the whole universe at a point in time.” (16)

Furthermore, in **Philip Hefner’s** view:

“Creation for Christian theology is by no means limited to protology. It is not limited by what happened at the beginning when time was first created. Creation also refers to God’s ongoing sustaining of the world. Every movement of the world’s existence depends on the ongoing grace of God.” (17)

This is similar to the view of Mulla Sadra, an eminent 17th-century Muslim philosopher, who believed that our world is recreated at every instant. Mulla Sadra, however, considered no beginning for the creation. In his view, the belief in the uninterrupted effusion of Allah requires eternity of creation. The argument, in **Mutahhari’s** words, goes as follows:

“They have thought that the theory of eternity of matter is inconsistent with the belief in God. But there is no inherent connection between this theory and the denial of God; rather, theist philosophers believe that belief in God requires belief in the eternity and continuation of His grace and creativeness, which requires the eternity of creation.” (18)

On this basis, **Mutahhari** concludes that there could have been other worlds before our world:

“On the basis of monotheistic principles we should say that there is no beginning for the universe. If [it turns out] that this universe has a beginning, there should have been another world, [possibly] in different



form... In order for the world to have a God, who is inherently all-emanating and eternally graceful, there should have been always creatures existent". (19)

Arthur **Eddington** was hesitant about the Big Bang theory on the same grounds:

"As a scientist I simply do not believe that the present order of things started off with a bang; unscientifically, I feel equally unwilling to accept the implied discontinuity in the divine nature." (20)

Does the universe have a purpose?

In the Qur'anic view, God is the Creator and the Sustainer of the universe. He has created everything in measure and has decreed for it a telos. The creation is in truth, not for sport or vanity, and everything has a definite term:

We did not create them, save in truth. (44:38)

We have not created the heavens and the earth and whatsoever is between them, save in truth and for a definite term. (46:3)

We did not create the heaven and the earth, and whatsoever is between them, as play ... (21:16)

We have not created the heavens and the earth, and whatsoever is between them, for vanity ... (38:27)

The above verses imply the creation of the universe by God as well as its guidance by Him. In fact, the Qur'an talks of a universal notion of purpose and a direction to the created universe:

[Moses] said:

"Our Lord is He Who gave everything its creation, then guided it." (20:50)



Imam **Fakhr al-Din Razi**, in his celebrated commentary on the Holy Qur'an, has elaborated on the distinction between the creation of a thing and its sense of direction. (21) This sense of direction is a mysterious dimension present in everything, directing it toward its proper God-assigned role.

Following the Qur'an, Muslim theologians have never ignored teleological considerations, and the silence of modern science about this point has not affected their view, though it has had a silencing effect on Muslim scientists.

Teleology played an important role in medieval science. For the scientists of that era, every created thing had its especial place in the hierarchy of the created world, because it was created by a God who had designed a telos to the universe. The founders of modern science, who were devoted theists, did not deny the presence of telos to the universe, but they did not consider the job of science to deal with teleological considerations. But the negligence of teleological considerations by the scientists of the last few centuries is partly due to their heavy involvement with mathematical manipulations and the predictive aspects of science, and partly due to the false assumption that questions of teleological nature hinder further development of science.

With further development of modern science and the dominance of empiricist outlook, teleology was considered as an avenue for theism. Therefore, atheists have been insisting on denying any kind of teleological considerations. In **Atkins'** words:

A gross contamination of the reductionist ethic is the concept of purpose. Science has no need of purpose. All events at the molecular level that lies beneath all our actions, activities, and reflections are purposeless, and are accounted for by the collapse of energy and matter into ever-increasing disorder. (22)

Similarly, **Steven Weinberg** sees no visible purpose in the universe:

"The present universe had evolved from an unspeakably unfamiliar early condition, and faces a future extinction of endless cold or intolerable heat. The more the universe seems comprehensible, the more it also seems pointless." (23)



But can one, on the basis of data obtained from chemistry or molecular biology at the level of atoms and molecules, claim that there is no telos to the nature? The answer is no, because this conclusion is not drawn directly from science; rather, it is rooted in the metaphysical prejudices of the scientists involved. It is, in fact, a jump from an epistemological statement to an ontological one, and is a direct result of restricting the whole of existence to the material world and the sources of our knowledge to sense impressions.

In response to Weinberg who denies any purpose in the universe, Paul Davies mentions two important points: if the universe has no purpose, then there would be two problems: (i) scientific effort would be meaningless, and (ii) the more we search nature, the more it seems incomprehensible:

"If [the universe] isn't about anything, there would be no good reason to embark on the scientific quest in the first place, because we would have no rational basis for believing that we could thereby uncover additional coherent and meaningful facts about the world. So, we might justifiably invert Weinberg's dictum and say that the more the universe seems pointless, the more it also seems incomprehensible." (24)

Later on, **Weinberg** himself qualified his earlier statement about a pointless universe by saying that:

"I believe that there is no point in the universe that can be discovered by the methods of science." (25)

But, contrary to what Weinberg says, some scientists and philosophers (both in the Islamic world and in the West) think that there are some clues to the teleological aspects of our universe in modern science. One has to be perceptive to discover such clues. For example the notions of purpose and design of the created universe has recently attracted much attention to the so-called anthropic principle, according to which the physical constants of nature are so-finely tuned that if they were slightly different, carbon-based life could not have developed and we would not be here. Anthropic coincidences call for an explanation, and there have been several explanations. In the monotheistic religions, one can take them as an indication that God planned the universe with human beings in mind. Other explanations carry heavy loads of metaphysical assumptions which, in my view, are much more involved



than the explanation in terms of an a priori plan by an intelligent designer. For example, the most serious alternative to the design hypothesis, is the many-worlds hypothesis, in which one postulates infinite universes to explain the fine tuning of fundamental constants. In Stephen Hawking's words:

"The multiverse concept can explain the fine-tuning of physical law without the need for a benevolent creator who made the universe for our benefit." (26)

But, as **Paul Davies** says, this carries too much baggage and the existence of many worlds is not scientifically disprovable:

"Not everybody is happy with the many-universes theory. To postulate an infinity of unseen and unseeable universes just to explain the one we do see seems like a case of excess baggage carried to the extreme. It is simpler to postulate one unseen God ... Scientifically, the many-universes theory is unsatisfactory because it could never be falsified: what discoveries could lead a many-worlder to change her/his mind?" (27)

It is interesting that the idea of the multiverse, which is used by atheists for denouncing God's existence implied by the entropic principle, is used by both Muslim and Christian scientists and philosophers to secure the idea of everlastingness of God's grace. In **Mutahhari's** words:

"Maybe they are right that if we go back so many years, the world did not have the present order. But how do we know that there had not been another world before ours with a different order?" (28)

In addition, some theists have asserted that an all-powerful God could have created many worlds, rather than just one world. In the words of **George Ellis**:

"Does the idea of a multiverse preclude the monotheistic idea of a creator God?... I argue that the



answer is no ... the ideas can exist together. God could have chosen to operate via creation of multiverses. The multiverse proposal says nothing about ultimate causation (chance, probability, design): All the same anthropic issues arise as for a single universe: Why this multiverse and not another one?" (29)

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Has Science Killed the Belief in God?

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In August 1977 I met Steven Hawking during a coffee break of the 8th conference on General Relativity and Gravitation held at Waterloo University (Canada). I asked him, "Do you think, Professor Hawking, that behind all these equations and mathematical formulations that we are presenting on boards of this conference, there could be something that goes beyond physical and mathematical reality so it cannot be described with mathematical equations?" Hawking paused for a while, turning his head slowly from the left side to the right and said, "If there is something, I believe it has to be logical." Then I asked, "But does your intuition tell you anything about this?" He replied, "I can only say that I am searching for the answer."



About ten years later and after getting a result showing that the universe could have existed for endless imaginary time before its physical existence, Steven Hawking proclaimed: "What place, then, for a creator?" (Hawking and Mlodinow 2008) In this he is ignoring the fact that imaginary quantities are mathematical entities that cannot be directly measured despite their important role in the mathematical formulations of physics.

Investigating the quantum state of the vacuum, Hawking found that the universe could have been created from nothing but gravity alone, accordingly again he claims in his book *The Grand Design* that there is no need for a creator. Similar claims were made by Lawrence Krauss in his book *Something from Nothing*.

Both Hawking and Krauss are ignoring the fact that a very strong gravity (or spacetime warp) is needed in fact to convert nothing into something. Virtual particles, which are assumed to be present within the quantum vacuum, cannot spontaneously pop out without the presence of a strong gravitational field. Paul Davies admits this fact but he argues that it could be a matter of semantics (Davies 1984).

Confronted with facts that points to a kind of transcendental existence in a debate with John Polkinghorne during the SSQ conference (2002), Steven Weinberg exclaimed, "My argument can be falsified if a fiery sword will come from nowhere and hit me for my impiety." In a similar position during a public lecture, Lawrence Krauss agreed that he may believe in God if he finds one evening that the stars are aligned in the sky to read, "I am here." This implies that both Weinberg and Krauss can see the necessity for God only if the universe is run miraculously. A miraculously-run universe is described by the absence of any order or law that can explain it. In fact such a universe may not need God altogether but a mere force to sustain the chaos. This is what usually one would expect out of blind nature.

When Richard Dawkins tried to stretch the hypothesis of multiverse to refute a pre-setting of a fine-tuned universe and has put the question to Steven Weinberg during an interview, Weinberg remarked that one should not underestimate the fix that atheists are in: that consistent mathematical results cannot be guaranteed to be describing realistic states since there are many consistent mathematical formulations that do not find real presence in nature.

Now we ask: Has science killed the belief in God? This is a delicate question indeed, for it involves several terms that have to be identified and precisely defined first. This question comes in a philosophical as well as theological context and may require serious encounter with scientific knowledge on a



specialized level.

The answer could be YES for a certain understanding of the concept God, and could be NO for another understanding of what we mean by God. So, first we need to define what we mean by God. Without such a definition, one may then confuse it with superstition or the idiot's God. Second, we need to discuss whether the world needs God, and whether this need is psychological, physiological, epistemological, or otherwise practical. On the other hand we need to discuss the question whether this need is temporal due to lack of our information, or is it a fundamental part of the truth of our world. In all cases we should remember that our views are always bounded with the extent of our knowledge at the given time; for no one can claim that science has reached ultimate knowledge.

Apart from the religious concept of God, here I shall first discuss the rather minimal view adopted by Keith Ward which says that

“God is a non-physical being of consciousness and intelligence or wisdom, who creates the universe for the sake of distinctive values that the universe generates.” (Ward 2014)

One might consider the terms 'non-physical' and 'consciousness' as being incompatible, for consciousness might be considered to require physical existence of sensors in order to achieve sensation. Accordingly, this definition of God is embedding the assumption that consciousness might exist in a non-physical form. But what is physical and what is non-physical? From our modern understanding, we can construe that a physical entity is something that can always be addressed in real time with validated causal relationships, and by causal I mean the verifiable relationships in which a cause precedes the effect. A physical object has to be measurable. Complex numbers, for example, are not measurable, thus are to be considered non-physical. However, complex numbers are an essential part of the mathematical formulation by which we understand nature.

Therefore, a simple understanding of God perhaps is to say that God is a symbol pointing to a supernatural agency standing behind, but not necessarily limited to, the creation, sustainment and maintenance of the universe. God is an order that validates the laws of nature. Being supernatural, such identity cannot be studied with pure reason alone and might not be fully comprehensible.



1.0 Laws of Nature

What other major factor would render the belief in God obsolete other than saying that the world needs no God because the laws of nature are ruling the whole game? But, then, what are the laws of nature and can they stand for the role of God?

During the seventeenth century the notion of laws of nature started to crystallize; Descartes (1596-1650) was perhaps the first in the West to discuss the existence of 'laws or rules of nature'. In the *Principles of Philosophy* he stated three laws concerning the natural motion of bodies and a conservation rule for the quantity of motion. Descartes connected laws of nature to the activity of a transcendent immutable God.

A very good analysis of the concept of laws of nature in the Cartesian and other philosophies during the seventeenth century can be seen in (Jalobeanu 2001). This claim, and all the other laws, are grounded explicitly in the activity of a transcendent God on his creation. Descartes held a version of the doctrine of continual recreation. Garber tells us that 'the idea of a law of inanimate nature remains quite distinctively Cartesian throughout much of the seventeenth century.' (Garber 2013) The notion of a law of nature cannot be found, for example, in other reformers of the period such as Francis Bacon (1561-1626) or Galileo Galilei (1564-1642).

In contrast, Hobbes (1588-1679) did not think that God has any role to play in natural philosophy. In order to explain how a law of nature works, he resorted to geometry. The way in which Hobbes explained nature through geometry was to say that a body at rest will remain at rest just because it has the possibility to move in any and all directions. Since there is no preferred direction for motion, the body would have to remain at rest. A similar argument applies to a body in constant motion. This kind of understanding is ignoring the need for an active agency to activate the action of such events.

The geometrical argument is similar to saying that a free stone falls on the ground just because there is a gravitational force between the stone and the Earth. But here we are ignoring to ask where gravity comes from and who is activating the gravitational force to work? If you are a free rational thinker you would set up such questions no doubts, but if you would like to ignore such a query you would always be able to attribute the action of the gravity to another cause, the existence of mass according to Newton or the presence of a curvature of the spacetime according to Einstein. Hobbes denied divine intervention as he could not understand how the non-physical can affect the physical. This we can see through the following paragraph of Hobbes as



cited by (Garber 2013)

The subject of [natural] Philosophy, or the matter it treats of, is every body of which we can conceive any generation, and which we may, by any consideration thereof, compare with other bodies, or which is capable of composition and resolution; that is to say, every body of whose generation or properties we can have any knowledge. [. . .] Therefore, where there is no generation or property, there is no philosophy. Therefore it excludes Theology, I mean the doctrine of God, eternal, ingenerable, incomprehensible, and in whom there is nothing neither to divide nor compound, nor any generation to be conceived.

In fact the question of how a non-physical entity can affect a physical entity is one of the big challenging questions at present in the science and religion debates.

Modern sciences, mainly physics and biology, may have contributed to weaken the belief in God by assuming that the universe can be explained through a collection of self-acting laws that can be expressed in mathematical forms. This eventually means that the universe is logically intelligible on the basis of deterministic causality. Classical celestial mechanics, for example, has verified this deterministic causality to the extent that allowed Pierre Laplace (1747-1827) to claim that once the initial conditions for any system are known then one can predict all the subsequent development of the system without the need to invoke intervention of the divine. He said,

We ought to regard the present state of the universe as the effect of its antecedent state and as the cause of the state that is to follow. An intelligence knowing all the forces acting in nature at a given instant, as well as the momentary positions of all things in the universe, would be able to comprehend in one single formula the motions of the largest bodies as well as the lightest atoms in the world, provided that its intellect were sufficiently powerful to subject all data to analysis; to it nothing would be uncertain, the future as well as the past would be present to its eyes.



The perfection that the human mind has been able to give to astronomy affords but a feeble outline of such intelligence. (Laplace 1840)

The view that the world is developing independent of the notion of God was culminated later by the declaration of Friedrich Nietzsche (1844-1900) that God is dead. This same belief in deterministic causality may have motivated Albert Einstein to ask if "God had any choice in creating the universe."

2.0 Modern Views

Some intellectuals believe that the advancement of science has kept no place for God. In replying to the big questions of the John Templeton Foundation, Christopher Hitchens, editor of the Portable Atheist, sees no point in claiming that there remains even a little evidence about the existence of God. "To say that there is little 'scientific' evidence for the last proposition is to invite a laugh. There is no evidence for it, period." (Hitchens 2014). Hitchens asks:

"What plan, or planner, determined that millions of humans would die without even a grave marker, for our first 200,000 years of struggling and desperate existence, and that there would only then at last be a "revelation" to save us, about 3,000 years ago, but disclosed only to gaping peasants in remote and violent and illiterate areas of the Middle East?"

But here Hitchens is dealing with the creator as if he is the employer and God is a contractor. This is not the case. One may object to the way the universe is run, and to how things are designed, for example Dawkins considered the long nerve passing all the way through the neck of the Giraffe a sign of bad design, despite the fact that he does not possess all the knowledge of the function of the animal body. Reality suggests that we are spectators in this universe, we should admit this fact and realize that a ruler would not necessarily care to take the discretion of other creatures into his action or plan.

Stuart Kaufmann, the director of the Institute for Bio-complexity and Informatics at the University of Calgary claims that we need to develop our understanding of God. He thinks that we should abandon thinking of a supernatural God and replace that notion with a natural God. In his response to the question posed by the Templeton Foundation, Kaufmann says:



“The schism between science and religion can be healed, but it will require a slow evolution from a supernatural, theistic God to a new sense of a fully natural God as our chosen symbol for the ceaseless creativity in the natural universe. This healing may also require a transformation of science to a new scientific worldview with a place for the ceaseless creativity in the universe that we can call God.” (Kaufman 2014)

He calls upon us to ‘re-invent the sacred’ despite admitting that this goal is dangerous as it implies that the sacred is invented. However, he asserts that having our understanding of God being under continuous change over the ages indicates that “It is we who have told our gods what is sacred, not they who have told us.” This means that our comprehension of God has defined his sacred status. Well, one may say that this might be true in the case of Christianity and Judaism, but may not be the case in Islam.

Scriptures of the Bible are but the reflections and the understanding of the followers of Moses and Jesus Christ, while the Qur’ān is believed to be the direct word of Allah revealed to Muhammad. Nevertheless, we should admit that as far as the divine attributes are concerned, the Qur’ān presents similar, may be less personal, attributes in Allah. The Qur’ān describes Allah as the creator, the sustainer, the omniscient, the omnipotent who can hear, speaks and see.

The point to make here is that along with these personal attributes the Qur’ān also mention that ‘Nothing resembles Him’; meaning that nothing is like Allah and the given attributes are only meant to be exposed examples. For this reason the Mu’tazilites declared that the attributes of Allah are intrinsic part of his character and is not an additional meaning to be added to him. Wolfson (Wolfson 1976) has studied the problem of the denial of the reality of the divine attributes in much details. However, taken within the practical deliberation of these attributes, the popular concept of God in the mind of an average Muslim has more or less, similar patronage to that in the mind of Jews and Christians. This was established since the early centuries of the Islamic era.

The presentation of the divine as a personal agency places many obstacles against achieving a vivid comprehension of God. With this personal deliberation we face many difficult questions concerning the realization of the notion of the divine in his existence, action and purpose.



But would it be serious to think of God who is unphysical to affect our physical world? Michael Shremer, the publisher of *Skeptic* magazine, approaches this question by reminding us that “Science traffics in the natural, not the supernatural. The only God that science could discover would be a natural being, an entity that exists in space and time and is constrained by the laws of nature. A supernatural God would be so wholly Other that no science could know Him.” (Shremer 2014) On the other side, Keith Ward finds that if we agree on his above definition of God, then “it follows that a non-physical conscious intelligence is possible — so a materialist view that all existent things must be physical, or must have location in space-time and must be subject to the causal laws of such a space-time, must be false.” Clearly then, it is the different concepts of God that cause the difference of opinions in responding to this question.

Kenneth Miller, Professor of Biology at Browns University, criticized the atheists for mistakenly considering God to be part of the natural world and failing to find him there. He says:

“The categorical mistake of the atheist is to assume that God is natural, and therefore within the realm of science to investigate and test. By making God an ordinary part of the natural world, and failing to find Him there, they conclude that He does not exist. But God is not and cannot be part of nature. God is the reason for nature, the explanation of why things are. He is the answer to existence, not part of existence itself.” (Miller 2014)

Indeed, if you believe in God or you are a non-believer, either way it is very important to acknowledge that God is not part of the natural world. Being part of the world, such a God would have to abide by the laws of nature and thus could be brought into laboratory tests or tracked by observations. Miller correctly recognizes once again that “The hypothesis of God comes not from a rejection of science, but from a penetrating curiosity that asks why science is even possible, and why the laws of nature exist for us to discover.”

3.0 God and the New Physics

Quantum physics, which sprung out of the discoveries made during the first quarter of the last century in the atomic realm, has shaken the well-established confidence in deterministic causality. The wave-like behavior of microscopic particles introduced new concepts in the dynamics of mechanical systems. The Heisenberg uncertainty principle does not allow for simultaneous



identification of the momentum and the position of a particle with absolute certainty. Physical parameters of microscopic systems are found to have a spectrum of values that are distributed probabilistically and that any of them can be predicted only with a limited accuracy. Deterministic presentation of microscopic phenomena, like the hidden variables theories of David Bohm, is outside mainstream physics and several experiments have already ruled out such local hidden variables theories, thus confirming the non-local character of natural phenomena.

Here I am referring to Alain Aspect's experiment of 1982 and the other experiments that followed (for non-technical presentation of these experiments, see (Davies 1984)). Literally, no event is known to happen with 100% accuracy. The world is non-local and things are entangled one way or another. This fact is independent of the theories and their involved interpretations, and no matter what arguments are presented in defense of the deterministic view, the established fact is that nature is indeterministic since it has been established by many laboratory experiments. Here we can then ask the question: can the laws of nature stand for the assumed role of God?

In the old kalām cosmological view, especially the Ash'arite description, the world is understood to be composed of atoms, each of which is made of a substance and a set of accidents (Dhanani 1994). The substance, called *jawhar*, is fixed and the accidents (called *a'rad*) are the ever changing properties that the *jawhar* may acquire and which is assumed not to endure two instances. Such a picture allows for the action of an external agency dominating the events and controlling the development of the world through the change that takes place on a microscopic scale. The behavior of the world is said to follow some customized rules that we recognize through the persistent occurrence of the natural phenomena.

The physical theory of kalām suggests that the world is ruled through certain well-respected principles expressing relations that we are accustomed to recognize among its constituents (Altaie 2010). The world is not a collection of miraculous events, but at the same time is indeterministic according to kalām. This understanding has echoes in contemporary quantum physics, although the two approaches and their explanations are quite different. For more details see (Altaie 2009). Perhaps it would be necessary here to point to the fact that the kalām view concerning atomism and the detailed structure of matter is different in many fundamental aspects from the views expressed by the Greek atomists as well as the views of the seventeenth century European philosophers who adopted atomism and some versions of the notion of re-creation. For this reason the critiques that address those views do not apply to the views of kalām. This is a detailed topic that has to be studied on its own



merits.

4.0 Does the world need God at all?

What sort of a need is there that requires the assumption of the existence of God and his action in the world? Sean Carroll, a theoretical cosmologist, says: "It's certainly conceivable that the methods of science could lead us to a self-contained picture of the universe that doesn't involve God in any way" (Carroll 2012). This sort of claim is repeated in many essays and books. But how can the method of science lead us to a self-contained picture of the universe other than through the assumed self-action of the so-called laws of nature?

If we recognize that laws of nature are actually the phenomena that occur in nature, then by the fact that these phenomena are indeterministic it would be legitimate to ask if these laws can act on their own? Well, as long as the efficacies of these laws become probabilistic, I cannot see how these laws would act on their own; being indeterministic, the action of these laws will be pending the decision by another agency. How then can we claim that the universe is self-contained and needs no agency to run it?

To be able to predict the natural abundance of elements in the universe, for example, is certainly something fascinating and is a bold exposition of the ability of the human mind to discover the logic according to which the universe is developing, but by no means can this be considered evidence for the absence of a ruling agency. Our endeavor to understand how the world develops will never end and whatever claim is made for reaching ultimate knowledge is only a dream of the ignorant.

Let us not be deceived by what we call laws of physics, and perhaps we need to read again some of the original arguments presented by Nancy Cartwright in her classic book *How the Laws of Physics Lie* (Cartwright 1983) and also her essay, *No God, No Laws* (Cartwright 2008), in which she argues that "the concept of a law of Nature cannot be made sense of without God." Obviously, Cartwright has treated the subject from a philosophical perspective, whereas here I am presenting the argument from the scientific perspective in the light of the discoveries of quantum mechanics.

We need to assess the value of science and expose whether it can be taken as an absolute reference for the truth. This is needed in order to know the meaning and the value of our scientific knowledge. Experience tells us that science is a product of our cognition and the laws of physics are only our constructions of the observed facts of nature. This we have learned from



the history of science particularly our knowledge about gravitation where Einstein's theory of general relativity offered us a picture about gravity totally different from that of Newton and it was shown that Newton's picture was conceptually in contrast with Einstein's theory despite the fact that the former provided us for centuries with very accurate calculations for movements of the bodies in the solar system.

Then, is it our logic and the structure of our cognitive capabilities which is shaping the need for God? Certainly, yes. It is our built-in logic which tells us that precise systems as the ones that we see in our world and the directive development of these systems: the big bang, biological evolution, the fate of the stars, the presence of black holes as gates to other worlds; all these need to be designed by a supreme power that has knowledge of everything. Chance and necessity, being relevant parts of the structure, play the role of relevant factors for manipulating the game, but certainly the game itself is not played by chance and necessity alone. Therefore, I would agree with Keith Ward in saying that:

"It is not science that renders belief in God obsolete. It is a strictly materialist interpretation of the world that renders belief in God obsolete, and which science is taken by some people to support."

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Evolution and Islam: Is there a contradiction?

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1.0 Introduction

Evolution is used as an example of contradiction between Religion (Islam) and science. I am a scientist and a religious person from the Muslim faith. I see no contradiction. Why then does this contradiction exist? Who created this myth and why?

Islam has always been open minded asking us to seek knowledge and to question phenomenon around us. Islam asks us to observe, think and come up with hypotheses to explain phenomena. In other words it proposes to Muslims to adopt the scientific method as we call it today in discovering the world around us.



"Indeed, in the creation of the heavens and the earth and the alternation of the night and the day are signs for those of understanding, Who remember Allah while standing or sitting or [lying] on their sides and give thought to the creation of the heavens and the earth, [saying], "Our Lord, You did not create this aimlessly; exalted are You [above such a thing]; then protect us from the punishment of the Fire." Quran 3:190-191. Our seeking of knowledge is a form of worship on itself. Because as we discover the elegance and beauty of Allah in the mechanisms He has created we start to appreciate His greatness and feel closer to Him. "Only those fear Allah, from among His servants, who have knowledge." Quran 35:28. It is a way to understand Allah, a journey of discovery so to speak. Allah is the only constant. He does not change. Everything is constantly evolving and changing.

Scientists during the Islamic civilization have been doing just that producing a civilization where scientific discoveries flourished. Amongst the scholars and scientists Ikhwan alsaafa, Al jaheth and Ibn Khaldoun produced theories similar although rudimentary to the theory of evolution as we know it today (1). Al Rumi very nicely described his theory of evolution in this poem:

*"Man first appeared at the level of inanimate matter
Then it moved to the level of plants
And lived year and years a plant among the plants
Not remember a thing from its earlier inanimate life
And when it moved from plant to animal
It did not remember anything from its plant life
Except the longing it felt for plants
Especially when spring comes and beautiful flowers bloom
Like the longing of children to their mothers
They don't know the reason for their longing to their breasts
Then the creator pulled Man -as you know- from its animal state
To his human state
And so Man moved from one natural state
To another natural state
Until he became wise, knowledgeable and strong as he is now
But he does not remember anything from his earlier states
And he will change again from his current state" (1)*

The demise of the Othman empire, colonialism, dictatorships resulted in decline of education and science in the Islamic world in general. Although there was an elite educated sector of the community. Therefore, when Darwin



published the Origin of Species in 1859 (2), the Muslim world did not have the qualified natural scientists to understand what it was about. The actual book was only translated into Arabic in the early twentieth by Ismael Mazhar (3). However, the thesis of Darwin had reached the Islamic world through writings of others. Some of Christian religious groups at that time denounced Darwin as an atheist and that the theory of evolution was against religion. Other Christian groups on the other hand supported Darwin. Noting that this disagreement among Christians did not go unnoticed to the Muslims. Muslim theologian scholars such as Jisr and Ahmad Medhat did not oppose Darwin and actually addressed the issue of evolution in a rational manner (4) However, during the first quarter of the twentieth Darwin's ideas became associated with colonialism, imperialism, the West, atheism, materialism, racism by different thinkers and writers in the Muslim world (4).

Therefore, the Muslim religious scholars gradually took a stand against Darwin and his ideas which the general public adopted. The Muslim scholars used the Creationist Christian arguments to support their stand against Darwin having no natural scientists of their own that were religious Muslims (5). Therefore transferring the war between science and religion to Islam. Although, it had not existed before. Not to mention that there were religious groups who used each side of the argument to their advantage politically at some point.

2.0 Muslim Scientists approach

In teaching science at the university in the Islamic world a number of important points should be taken into consideration on the topic of Islam and Science in general and evolution in particular (6):

A. Theology

1. Evolution is not about who created the universe. We explore what is in the universe. We believe there is a creator who set rules which govern physics, chemistry and biology. Science is about discovering the laws. Religion is about the why and science is about the how.

2. Confusion in terminology: the word create does not necessarily mean spontaneous it could be interpreted as over a period of time. Muslims don't have a problem with the sun and stars taking billions of years to be created but they do have an issue with living things or specifically humans taking millions of years to be created.



3. Time is a dimension and Allah is above all dimensions. Hence, Allah is not governed by time. Therefore Muslims should not have any problem with creation taking a long time.

B. Human fallibility and human religion, including issues of interpretation

1. One point of contention is that Muslims believe that humans are the epitome of perfection and therefore cannot have evolved from a lower form. This is contradictory to the teachings of Islam. The Quran warns us from being arrogant as humans. "man does transgress all bounds" Quran 96:6. We are but one of Allah's creations and that we are part of the bigger plan of creation. We have been created in harmony with the rest of creation and we hold a place in the balance of all things. Islam states that we are khalefa and should take care of this world living and non living with compassion, care and mercy. "Indeed, I will make upon the earth a successive authority." (Quran 2:30). This is important in the context of conservation of the environment and the concept of Global Civics that was coined by Dr Hakan Altany (8). We have developed a course on Global civics from the Science/ Muslim perspective for undergraduate science students in the Arab world.

2. The Quran is not a book of science. It is a guide how to live our lives. Therefore we don't look into it for evidence for every scientific discovery.

3. The interpretation of the Quran is done by humans who try their best. However they are human and may err on one hand and on the other they are interpreting within the scope of knowledge present at that time. "When a judge gives judgment and strives to know a ruling (ijtihad) and is correct, he has two rewards. If he gives judgment and strives to know a ruling, but is wrong, he has one reward" (9).

Therefore when knowledge changes the interpretation may change and that is one of the beautiful tenets of Islam ijtihad. Ijtihad (every adequately qualified jurist had the right to exercise such original thinking, mainly ra'y (personal judgment) and qiyas (analogical reasoning) (10).

4. The story of Adam in the Quran as well as other stories should not be taken literally. They are metaphors to learn lessons. The process of human evolution was gradual and concerned groups of humans who evolved from former ancestors.

5. The development of consciousness is also an argument put forward by those who oppose evolution. They state that the development of consciousness requires divine spontaneous intervention. The response that I



give is that science up till now is still trying to understand the development of the brain let alone coming up with an explanation for consciousness but that does not refute the theory of evolution. Example: In the past people assumed that certain disease were caused by bad spirits and later we discovered that the disease is caused by viruses.

6. Even as science advances and develops, we must keep in mind that we are limited in our cognition by our biology. For example ants can only comprehend two di-mensions because of how their neurons are wired in the brain. Nothing in the world can allow them to comprehend a third dimension. Similarly we are limited by how are neurons are connected which will ultimately put a limit on the extent of our cognition of phenomenon around us.

7. Similarly, I propose that miracles are natural phenomenon that we have not yet discovered the laws for.

8. The soul is the result of complexity of cellular interconnectivity.

C. Science, with fallibility and provisionality, operating within the created order, but within these limitations, knowledge that deserves to be taken very serious

1. Science changes all the time. We may find something in the Quran that sup-ports a scientific discovery and we may not.

2. if there is an apparent contradiction between religion and science we check the science first then the interpretation of the Quran.

D. reflection on religious issues in the light of science

1. As history of science and Islam tells us there has never been a serious strife be-tween religion and science. This new strife around evolution comes from our misunderstanding of our religion on one hand and lack of scientists on the other.

2. Decisions on issues that are not concerned primarily with theology should be made through the formation of committees of stakeholders which should include:

- religious scholars,
- Arabic language experts in order to find the best fit meaning for the Arabic word from the Quran within the circumstances, in this case the scientific discoveries to date,



- experts in the field in this case scientists.

Some members should come in without prior knowledge of the religion matter so that they can be unlimited in their imagination and innovation to think of new solutions, ways of approaching the subject. The members should meet, discuss until they reach a consensus. In addition such a committee should meet regularly to discuss any new advances in the field. Science is dynamic and therefore we must keep up as Muslims in order to advance in both basic and applied sciences. Islam is a religion for all time.

“And those who have responded to their lord and established prayer and whose affair is [determined by] consultation among themselves, and from what We have provided them, they spend.” Quran 42:38.

Such efforts become paramount in issues that have an application such as stem cell research and therapy. A very good example of applying a multistakeholder committee that meets regularly is the example of the stem cell law that was passed in Jordan recently (11). The traditional way of conducting ijtiḥād at least today does not usually take into consideration all stakeholders. Nor do they meet on a regular basis because science is always advancing and changing therefore new issues arise and old issues contentions change. For example the last time abortion was discussed was in 1985

Most of these points could be addressed if there were a course at the university that explored the philosophy of science from an Islamic perspective. As well as encouragement of studying and researching humanities from within the Islamic world to produce our own identity that will be the base for any discussion around any apparent controversy around science and religion.

Another point is that in any discussion which we envision disagreement we should strive to establish a common ground first then start exploring the contentions.

3.0 Conclusion

The important point here is not whether we are able to convince our students to agree or disagree with evolution. What we should strive for is to teach/instruct our students to develop a rational methodology of assessing the natural world around them and to think independently to come up with their



own opinions, hypotheses and theories. If we succeed in that endeavor the rest of the controversies between science and religion will be resolved and we will contribute to the creation of a generation of Muslim scientists who are free thinkers.

There have been a few free, modern thinking Muslim pioneers who have attempted to accommodate evolution from an Islamic point of view. Examples are: *The Book and The Qur'an: A Contemporary Reading* by Mohammad Shahrour, *The book and the mountain* by Mohammad Hassan, *Islam and Biological Evolution: Exploring Classical Sources and Methodologies* by David Solomon Jalajel. *My father Adam* by Shaheen. The approaches adopted vary from author to author. Regardless of the validity of the arguments adopted by each author it is a step towards providing multiple explanations to remove the contradiction and to open the field to research and discovery.

Damina Howard proposes three categories to describe the relationship between science and religion in this case Islam. In my approach towards science I lean towards the following relationship where to me it is an ongoing dialogue between religion and science. Where one (religion) seeks to guide how to live our lives and the other (science) deals with discovering how the world works. Both will cross over each other. For example as science seeks to understand the higher functions of the brain and what does conscience means. One ultimately enters into the realm of religion. Therefore, my approach to both religion and science is an ongoing journey of discovery i.e. the relationship is fluid. It flows like a stream which fits the description stated by Damian Howard:

"Hence, there is a real and pressing need for dialogue and mutual critique. But it's not about achieving "harmony" once and for all as in cognitive propositionalism but a con-stant dialectic of mutual interrogation. Which is rather a good description of one's actual experience of the field. There is no final answer, no ultimate stability."(12)

This is the path I propose Muslim scientists should adopt.

I want to highlight that the notion that evolution contradicts Islam, is a myth, and is an example of what happens when we misunderstand our religion. Islam calls for freedom to think and explore. The lack of freedom to think which comes from misunderstanding of our religion results in borrowing from



other cultures.

Other examples are modern women rights, modern education systems. These issues have all came up against west colonialism, imperialism

Can you think of others?

Our aim is not so much to debate evolution as it is to suggest that the mainstream approach to the theory is a symptom of a larger problem. This problem consists of certain attitudes towards science and culture being imported into Muslim societies in a process of Western globalization that often precludes the development of a uniquely local approach. In the case of Muslim societies, now is the opportunity to think independent of the re-ceived framework in order to pursue more rigorously our relationship to science, and the world at large.

The issue is not religious authority versus scientific authority it is an ongoing process based on rational methodology in seeking the truth.



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Islam, Science, Methodological Naturalism, Divine Action, and Miracles

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“Perhaps more than anything else, the discussion between theology and science today is concerned with the presumption of naturalism; where it is not, it perhaps ought to be.” - Philip Clayton (1997, 172)

1.0 Introduction

How does the world really function, in its most fundamental way? And what is God’s role in it?

These are two “big questions”, among the biggest that there are, and one may wonder whether we humans could possibly reach any satisfactory and consistent answers that would not just be “sophisticated views” but have solid ground underlying them. After all, humans deciding what God’s role is supposed to be,





what He can and cannot do, will certainly seem presumptuous, as one may recall the well-known Qur'anic verse: "He cannot be questioned concerning what He does, and they shall be questioned (for theirs)."² (Q 21:23)

The first question, however, about how the world functions, seems much more within reach of human effort and purview, and indeed, on one level at least, that is what science has been doing, to greater and greater success. Science has identified many (most?) of the essential processes underlying phenomena in nature. Most importantly, it has identified "laws of nature", or at least "laws of science"³, that seem to regulate the observed order and regularity in the world. And the huge progress that humans have made on that first question is indicative of the validity of that quest. This then lends encouragement to the pursuit of the second one.

Critics or skeptics might promptly retort that this line of thinking is tantamount to "jumping the gun", for it implies that nature follows some "laws", that the latter are "real", that in the previous paragraph God was not even mentioned or been given any place or role in the scheme of things other than perhaps to have created the world and its laws. Thus the two questions above are actually intimately related: we won't be able to describe how the world really functions without deciding what God's role is, and vice versa.

Moreover, looking down into our agenda, we won't be able to say something about divine action and miracles without having addressed the concept of naturalism, as presupposed by modern science. We thus understand why Philip Clayton (in the above quote) regards this as the central issue in the mutual dialogue and quest for harmony between theology and science.

2.0 Methodological Naturalism

The concept of methodological naturalism (MN) is a crucial and largely under-appreciated pillar of modern science, one which explicitly or implicitly leads to conflicts, or at least to difficulties, in the "harmonization" with Islam/Religion. It is important to distinguish it from "philosophical" or "metaphysical" naturalism, which is the atheistic claim of non-existence of supernatural entities altogether, what is often referred to as "materialism." The latter is a

² Of course, this verse has been interpreted in various ways...

³ A distinction is often made between "laws of nature" and "laws of science", for science can only hope to approach (as closely as possible) the "real" or "ontological" laws that regulate nature, but at no point, certainly not now, can humans claim that the laws they have "discovered", or actually "formulated", are identical to the actual ones of nature (or what Muslims sometimes call "the laws of God").



position that many philosophers and scientists adopt, but it is not a principle of Science.

As Phil Stilwell explains, "MN is a provisional epistemology and ontology that provides a framework upon which to do science... MN [entails] that science begin each particular inquiry with the assumption that any explanation will fall within the existing matrix of established material definitions and laws... MN also implies that, if a natural explanation does not immediately emerge from the inquiry, we do not default to a declaration of a supernatural cause." (Stilwell, 2009, 229)

MN has become a pillar of modern science for reasons of pragmatism and efficacy: MN has proved itself efficient in advancing scientific exploration and discoveries, and it is a reasonable, minimalist assumption, in accord with "Occam's razor", which then makes it superfluous to call upon supernatural agents when material causes can explain the phenomenon. Indeed, supernatural explanations were soon identified as "science stoppers", an end to the explanatory process, thus a non-productive or even counter-productive approach for progress in finding further truths about nature and devising useful applications.⁴

Clearly such a framework for Science poses a challenge to at least some Islamic conceptions of the world and nature, as Muslims often claim and insist that God acts physically and directly in the world, in cases of miracles or in everyday events, either at large scales (earthquakes, floods, etc.) or small, individual, personal scales (in responses to prayers, in particular). More generally, methodological naturalism keeps God "out of the picture", looking at the world and nature as if God does not exist or does not act. This "cutting off of God's hands" is indeed the main issue that Seyyed Hossein Nasr has regularly brought forward in rejecting the current naturalistic philosophy of modern science.

Other thinkers, however, from Ibn Rushd to Polkinghorne, have insisted on the regularity that God has put in the world (God's "faithfulness", or "reliability" or "consistency"), without which we cannot make predictions, nor even trust any knowledge we construct.

Even opponents of methodological naturalism, most notably Alvin Plantinga, have seen in its universality an important advantage for science (common to

⁴ For example, if a doctor explains some mental disorder as the work of demons, s/he will not be able to understand the deeper brain processes at work there, nor will any medication be found, one which will alleviate the troubles of the patient...



all, regardless of anyone's beliefs, thus permitting more progress). None of the critics and opponents of methodological naturalism propose its full rejection. Draper (2005, 296) tells us that "even William Dembski (1994, 132), a leading critic of methodological naturalism, claims that one should appeal to the supernatural only when one has [very strong] reason to believe that what he calls one's 'empirical resources' are exhausted."

It thus becomes clear that Muslims, in attempts to harmonize Islamic theology today with modern science, must either fully take methodological naturalism onboard or present solid proposals that go beyond it. I, for one, have made the first choice - with its consequences.

Indeed, is there a contradiction between adopting both a theistic worldview and a thoroughly naturalistic methodology for science? I believe not. Methodological naturalism, as explained above, is a neutral standpoint and approach, and it has proven to be fruitful, appearing to correspond to how the world functions. Theologies that are fully consistent with modern science and methodological naturalism are far from trivial and require some sophisticated work. But they can be constructed.

3.0 Divine Action

The question of divine action is essentially another side of the same issue: does God act in the world if we claim that all phenomena in the world have natural explanations? Critics often retort that only deists believe that God's role is limited to the creation of the world, and that theists believe that God does act... somehow. But if God does indeed act in the physical world, does He do so only through the normal processes of nature or, at least sometimes, by some direct interventions, going beyond the laws of nature?

Indeed, many thinkers make the important distinction between "direct" and "indirect" divine action (Draper 2005, 281), the former being ones where God "acts outside of the ordinary course of nature" (i.e. "without using natural causes to do so"), and the latter being ones where God "uses natural causes to bring about an effect." Thinkers also make the distinction between "General Divine Action" (GDA) and "Special Divine Action" (SDA), the former being God's general "sustaining" of the universe (laws and phenomena only working through His presence and permission)⁵, and the latter representing actions at specific points/moments, whether directly ("interventions",

⁵ This is most clearly expressed in Q35:41: It is Allah Who sustains the heavens and the earth, lest they cease (to function): and if they should fail, there is none - not one - can sustain them thereafter: Verily He is Most Forbearing, Oft-Forgiving.



suspending the normal laws) or “indirectly” (by using “openings” in the laws of nature). (See Saunders 2002, for detailed and lengthy discussions of various ways to consider GDA and SDA, particularly the latter.)

I should note that SDA, particularly of the direct type, has elicited critiques of capriciousness or uncaringness on the part of God: why didn't He stop the holocaust and other genocides if he can and does sometime intervene, why does He favor some people over others, etc. (Wiles 1999, 16-17).

Searching for ways by which God could act using natural causes, observers have long noted that the intrinsic indeterminism of quantum mechanics could be a doorway for God's action in nature, since one would normally assume that God (the Omniscient and Omnipotent) is able to set the outcome of the “wave function collapse process” to any preferred choice from among those that the physics of the situation allows. God could then “steer” events in one direction or another, provided that He acts on each and every particle/atom/molecule in a “coordinated” manner. However, acting in this way, God would look too much like the infamous ‘God of the gaps’.⁶

The second proposal of physical divine action is through the non-linear processes that lead to chaos: tiny effects in the initial conditions of a system, whether microscopic or macroscopic leading to hugely amplified results. Here again, since tiny interventions and changes are essentially impossible to notice, God could take such an approach for His actions, but he would still be a ‘God of the gaps’. Saunders (2002, 177) notes that the “underlying deterministic nature of chaos theory raises insurmountable problems for non-interventionist action.” A perfect application of this chaos effect would be the parting of the Red Sea by the “strong east wind” (the Bible's words). However, this would also be grounds for believing in God's intervention in natural catastrophes, which many lay people believe are God's punishing acts, but a viewpoint which raises concerns.

On the Muslim side, there have been very few, if any, fully argued proposals for viewing God's action in the world, perhaps due to its high sensitivity. One article that has tackled the subject is Abdelhakim Al-Khalifi's “Divine Action between Necessity and Choice” (1998), exploring the views of key classical philosophers (Al-Farabi and Ibn Sina) and theological schools of Islam (Mu'tazilism and Ash'arism). The author contrasts the Ash'arites' views that God's action is totally free and unconstrained with the Mu'tazilites' position that God's act of creation was free but that God has constrained himself by

⁶ Divine action through quantum processes became a favorite of a number of western thinkers, most notably the physicist-theologian Robert J. Russell (1997, 2006, 2009).



being Just and Good and rewarding/punishing for following/disobeying divine directives to us to be just and good.

Indeed, the Islamic heritage can be constructively tapped in; for instance, the old rationalist Mu'tazilite theology, which insists on the concept of divine laws, could be revived to help resolve this area of tension. Similarly, M. Basil Altaie has found in Ghazali's views some richness and fruitfulness that could be exploited (Bigliardi 2014, 72-76), and it would be very useful to see those ideas unpacked (using Ghazali or other sources).

I had previously suggested an alternative viewpoint: that God acts only on minds/spirits, but I have not elaborated on this idea. In the western world, this idea has been expressed and elaborated upon, whether one adopts a dualistic or a monistic conception of mind and body (see Polkinghorne 1998, 54-5). In the Islamic tradition, there is a general understanding that the spirit is the communication channel and connection between God and humans as well as the fundamental "driving force" that God infused in humans. More recently, with debates of reductionism in relation to mind and consciousness, the idea that a top-down causation from mind/spirit to the brain, leading from ideas to physical acts which carry on into nature, has become quite reasonably acceptable. George Ellis (1995) has also supported this approach, adding that top-down causation from mind/spirit to the brain could be envisioned via the afore-mentioned quantum processes.

4.0 Miracles

Miracles constitute one of the most contentious issues in the debates of Religion and Science. Miracles are not as fundamental to some religions as to others, but in their direct connection to the more important issue of divine action in the world, they are essential to address.

One must start with fundamental questions to define and delineate the concept of miracles and the extent of their manifestation: 1) Are miracles "violations of the laws of nature", or are they simply striking events that may point to God or supernatural agents but are scientifically only improbable? 2) Do miracles occur only at the hands of prophets, or do they also happen with saints and even with ordinary people (today)? 3) Did Prophet Muhammad (PBUH) perform physical miracles? What about those that the Qur'an relates for other prophets (Abraham, Moses, Jesus)?

A number of thinkers have proposed interesting ideas w.r.t. miracles. Terrence Nichols (2002) views them as events that are "consistent with, but



transcend, natural processes.” He suggests two approaches for dealing with miracles: a) the phenomenon may be an extreme, singular case of natural processes, akin to black holes (with gravity) and superconductivity (with electricity); b) the event can only be explained by divine action/intervention, and for this he invokes processes from quantum mechanics or chaos theory. Nichols speculates that “in some extreme circumstances, such as the presence of great faith, the laws of nature, while not changed, behave differently from the way they do in ordinary contexts.”

Keith Ward (2002) adopts a similar position. He suggests that “laws of nature... are best seen not as exceptionless rules but as context-dependent realizations of natural powers.” But he leaves open the possibility that miracles may not “fall under formulable scientific laws”; he adds that “there is every reason for a theist to think that there are higher principles than laws of nature.” He concedes, however, that “it is for competent scientists in the appropriate field to say whether a given event transcends the normal operation of the laws of nature. If it does not, however statistically improbable the event may be, it is not a miracle.”

Indeed, the question of miracles cannot be addressed without full reference to modern science. One must be totally cognizant of conservation principles (energy, electric charge) and other principles, as well as of the (in)determinism of various theories of science, all assuming that causality is fully upheld.

In modern times, several famous Muslim scholars and thinkers have adopted rationalistic or even naturalistic views with respect to miracles. Muhammad Abduh’s modernist exegesis of the Qur’an is famous for presenting naturalistic explanations to events that were often considered direct interventions by God; Shibli Nu’mani proposed scientific interpretations of miracles; Sir Seyyed Ahmad Khan is famous for having rejected miracles (as violations of natural laws) because God has established a covenant (or “trust”) with human by having set up laws in the entire universe; Muhammad Asad’s commentary on the Qur’an coherently included rationalistic reinterpretation of miracles; etc. Recently, a few Muslim thinkers have also expressed interesting views on the question of miracles.

Mehdi Golshani (Bigliardi 2014, 57-60) considers “miracles” as only specific occurrences that fall under different laws, or a combination of laws (a magnetic field cancelling out gravity and making an object float in the air, in the example he gives). There is no violation of the laws of nature. However, even though he regards “miracles” as not central to our religiosity, he does not advocate metaphorical interpretations of any of the Qur’anic miracle stories, keeping open the possibility of their being explained in the future by new



knowledge about nature.

A similar view is adopted by Altaie, who first insists that “God does not rule this world miraculously but according to well-defined laws” (Bigliardi 2014, 81), but further stresses that the quantum world has shown that extraordinary events (a person going through a door without opening it) can happen albeit exceedingly rarely. He thus considers “miracles” are extremely rare events that fall under the laws of nature, even though in some cases we may not yet have the knowledge to explain them.

Bruno Abd-al-Haqq Guiderdoni distinguishes between “divine providence”, events that are extraordinary coincidences but violate no laws, and which Muslims consider as divine “intervention”, a “small miracle”, so to speak, and between the events that are described in the Qur’an as apparently supernatural (e.g. a clay bird becoming alive and flying off), and which he proposes to interpret spiritually (Bigliardi 2014, 145-146). For instance, the famous splitting of the moon he interprets as “the splitting of the heart of the believer”, the unveiling of the secrets hidden in one’s heart on Doomsday. He concludes that “the laws of nature are constantly valid” because seeing God as an actor simply “lowers our idea of God.”

I think that one important element in dealing with Qur’anic miracle stories is the full consideration that the Book, as Ibn Rushd (and others) had (have) stressed, speaks differently to people of different intellectual capabilities and different eras. Thus the idea of “real” miracles may (or must) be upheld for the commoners, while the philosophers and the scientists must ensure that causality and the laws of nature are never violated, lest we lose our ability to understand the world and to ascertain knowledge.

5.0 Conclusion

Modern science has forced us to reconsider some aspects of theology. We cannot ignore new, important results and robust understanding of the world/nature and keep to old-style theology. Occasionalism, while dominating Islamic mainstream theology for many centuries, now seems like a strange conception to most people, so ingrained has the regularity and law-like nature of the world become. Indeed, Murphy (1995, 332) rejects occasionalism because it makes God the “sole actor” in creation and turns the natural causation that everyone unconsciously takes for granted into nothing but an illusion...

The concepts of methodological naturalism and causation, and their consequences on one’s consideration of divine action and miracles, are key theological issues that Muslim thinkers must address squarely today. Hopefully the rich intellectual tradition of Islam will provide us with much valuable material to work with, along with the extraordinary knowledge that



modern science and philosophy have developed.

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The (Im)Possible Medicalization of "Breathing the Soul" (Nafkh Al-Rūḥ) Contemporary Islamic Debates on the Beginning of Human Life

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The concept of “soul” (al-rūḥ) has always occupied a significant position in the Islamic tradition and has been hotly debated within a wide range of disciplines including linguistics, theology, philosophy and Islamic law (fiqh). One of the main characteristics common to the debates that took place within these disciplines is the elusiveness of this concept, which has usually led to jungle of confusion about the true nature of the soul (Ibn al-Qayyim n.d.; Langermann 2010, 163—180). As far as Islamic law is concerned, both pre-modern and contemporary Muslim jurists agreed that





determining the beginning and end of human life is related to the soul. According to them, breathing the soul (nafkh al- rūḥ) signals the beginning of human life and taking the soul (naz' al-rūḥ) ushers its end, i.e., death (Wizārat al-Awqāf n.d., 18/265, 39/248). Because of the available limited space here, this article will focus on the concept of "breathing the soul", how available (medical) knowledge contributed to formulating the perception of this concept among both pre-modern and modern Muslim jurists and how the modern global phenomenon of medicalization influenced the contemporary Islamic discourse on the beginning of human life. These discussions have clear bearing on a long array of bioethical issues including abortion, stem cell research, therapeutic cloning and the surplus embryos remaining from an in vitro fertilization process. However, none of these issues will receive distinctive analysis in this article, but hopefully in forthcoming studies, in order to remain focused on the main issue of this article, namely the intersection between the concept "breathing the soul" and biomedical knowledge.

1.0 Breathing the Soul before the Era of Medicalization

The conventional elusiveness of the concept "soul" did not help Muslim jurists to use "breathing the soul" as a standard criterion that can objectively and consistently be measured (mi' yār munḍabiṭ) and through which juristic rulings relevant to the beginning of human life can be construed. Thus, they had to link this concept to more practical criteria that can be somehow more easily and consistently measured. Muslim jurists understood that breathing the soul, based on scriptural references in the Qur'ān and Sunna, takes place during pregnancy. The great majority of pre-modern jurists were in agreement that knowing what is inside the uterus during pregnancy is exclusive to God. In this context, they usually recalled the Qur'anic verse "Indeed, Allah [alone] has knowledge of the Hour and sends down the rain and knows what is in the wombs." (31:34).

The statement of the Shāfi'ī jurist al-Juwaynī (d. 478/1085) is representative of the mainstream standpoint among Muslim jurists in this regard, "There is no dispute that the child during pregnancy (al-ḥaml) is unknowable. Disagreement is, however, whether it should be treated as (a potentially) knowable" ('Irāqī and Ibn al-'Irāqī n.d., 4/60). The Ḥanafī jurist Abū Bakr al-Jaṣṣāṣ (d. 370/981) was even clearer on this point when he spoke about the stages of embryonic development inside the uterus as outlined in one of the Prophetic traditions. He stressed that a human being cannot see the unborn child and thus nobody can distinguish between the embryo, which will later develop into a viable child or that which will not. By quoting a number of Qur'anic verses (13:08, 31:34 and 72:26), al-Jaṣṣāṣ explained that this type of



knowledge belongs to the unseen world (al-ghayb) which is knowable only to God and to the angels who are entrusted with the task of writing down some aspects of the embryo's future life as determined by God (Jaşşāş 1984, 3/338).

In order to develop consistent criterion for determining the beginning of human life, pre-modern jurists tried to base the relevant juristic rulings on the possible moment of breathing the soul into the unborn. Their main tool to discover this moment was a number of references scattered in the Qur'ān and Sunna (Ghaly 2014, 205—208). Based on consulting these references, the overwhelming majority of the pre-modern jurists concluded that the soul gets breathed into the embryo after the lapse of 120 days of pregnancy (Wizārat al-Awqāf n.d., 2/57). A number of Muslim jurists strictly adopted the 120-day criterion and opined that the embryo before breathing the soul is a non-living being (mawāt) or simply spiritless inanimate (jamād) (Ibn Ḥazm n.d., 4/253; Shawkānī 1993, 3/565; Wizārat al-Awqāf n.d., 18/265).

Some of the pre-modern jurists also equated between breathing the soul into the embryo on one hand and on the other hand assuming the shape of a human being which they called of *takhalluq* or *taşawwur* and they believed that both acts take place at the same time, i.e., after 120 days of pregnancy. They argued that before this date the unborn is still "unformed" and therefore not yet a human being (*laysa bi ādamī*). According to other jurists, distinction should be made between breathing the soul on one hand and assuming the form of a human being on the other hand and added that some of the juristic rulings should be based on the former whereas some other rulings should be based on the latter (Ghaly 2014, 168—170).

2.0 Revisiting "Breathing the Soul" in the Era of Medicalization

Some components of the aforementioned pre-modern juristic approach to the concept of breathing the soul was revisited by a number of Muslim biomedical scientists in collaboration with Muslim religious scholars in the light of modern biomedical knowledge which was not available to earlier generations. The direct context of revisiting this key concept in the Islamic tradition was the attempt to demonstrate the relevance of the Islamic religio-ethical system (Sharia) in modern times and that it has inherent capacity to deal with contemporary complicated issues such as the ethical questions raised by cutting-edge biomedical technologies. In 1983, the Islamic Organization for Medical Sciences (IOMS) initiated the series *Al-Islām wa al-mushkilāt al-ṭibbiyya al-mu'āşira* (Islam and Contemporary Medical Issues). The IOMS



solicited both Muslim religious scholars and biomedical scientists to write and debate on contemporary bioethical questions. The second symposium in this series, organized in 1983, had the title *Al-Ḥayāh al-insāniyya: bidāyatuhā wa nihāyatuhā fi al-mafhūm al-Islāmī* (Human life: its beginning and its end from an Islamic perspective). Revisiting the two key-concepts “breathing the soul” and “taking the soul” and their relation to respectively the beginning and end of human life was the linchpin of the symposium. Besides this direct context, one also needs to situate these collective discussions into the broader context of medicalization, which already was in vogue and could assume a global character, as to be outlined below.

The impact of medicine and medical concepts has considerably expanded in the last six decades or so, which resulted in significant shifts in knowledge and power. As a consequence, the number of life problems that are approached and defined through the lens of medicine has increased enormously. These radical changes in the landscape of knowledge and power are usually couched in the term “medicalization”, which is often linked to modernity. Academic researchers use the term medicalization to express “the increasingly global process by which biomedicine has achieved the authority to redefine and treat an expanding array of individual life events and social problems as medical problems and ultimately to make exclusive claims over the body” (Georges 2008, 1).

For more than four decades, sociologists, anthropologists, historians, bioethicists, physicians, and others have been writing about medicalization. They have examined the medicalization of human problems and bracketed the question of whether they are “real” medical problems. Among the various factors that have encouraged or abetted medicalization, analysts speak about the diminution of religion, an abiding faith in science, rationality, and progress in addition to the increased prestige and power of the medical profession (Conrad 2007, 4,8).

Henk ten Have explained that the process of medicalization can assume different forms, e.g. conceptually, when a medical vocabulary is used to define a problem or institutionally, when medical professionals confer legitimacy upon a problem. He also added that medicalization can be a mechanism of social control through the expansion of professional power over wider spheres of life and that it may produce dependency on professional and technological intervention (Ten Have 2001, 299). Although the term “medicalization” was not specifically invoked during the IOMS symposium on the beginning and end of human life, it is clear that many of the abovementioned aspects of medicalization were strongly present during the proceedings of the symposium, as to be detailed in the following section.



3.0 “Breathing the Soul” Through the Lens of Muslim Biomedical Scientists

As mentioned above, the IOMS symposium hosted both biomedical scientists and religious scholars to investigate, among other things, how far modern biomedical knowledge can help the participants in the symposium demythologize some aspects of the pre-modern juristic imagination of “breathing the soul”. The gynecologist Ḥassān Ḥaṭḥūt (1924-2009) said in this regard, “Some of the points to be presented [in this symposium] are entirely novel and the early generations of Muslims did not see or wrote about The problems we discuss here require rational solutions in the first place and textual quotations in the second place. Quoting [early sources] cannot be a valid excuse to circumvent independent legal reasoning (Ijtihād)” (Ḥaṭḥūt 1985, 55—56). As far as the nature of the embryonic phase prior to breathing the soul, Ḥaṭḥūt spoke about some opinions adopted by pre-modern jurists, which will not stand the test of modern biomedical knowledge. He referred to the opinion within the Ḥanbalī school of law according to which it is permissible to get rid of the embryo before breathing the soul. Most probably, Ḥaṭḥūt argued, they based this opinion on their belief that the embryo before ensoulment is not living. Ḥaṭḥūt stressed that this opinion cannot be accepted in the light of modern biomedical knowledge (Madhkūr, Sayf, Jundi, and Abū Ghudda 1985, p. 303).

With the help of modern biomedical knowledge, Ḥaṭḥūt proposed, the pre-modern jurists’ perennial problem of determining the beginning of human life can be solved. He explained that available knowledge shows that embryogenesis is an extremely gradual process characterized by continuity and harmony and thus there is no way to pinpoint a specific moment and claim that here human life should have started. That is why, Ḥaṭḥūt added, the beginning of this life should be counted from the earliest stage in which five main conditions are all applicable to a being, namely:

- 1) the being has a clear and well-known start,
- 2) he has the potential to grow as long as he has not been deprived from the causes of growth,
- 3) his growth would result in a human being as embryo, neonate, child, boy, young man, adult, old man and so forth
- 4) this being in an earlier stage cannot grow to become a human being



5) the being carries the full genetic code of the human race in general and of this being in specific which distinguishes him from all others throughout the ages.

According to Ḥaṭḥūṭ, all these conditions are only applicable to the fertilized ovum and not applicable to any of the stages before or after conception. That is why, Ḥaṭḥūṭ argued, human life starts by the very moment of conception. But what about determining the beginning of human life depending on the timing of breathing the soul, which has been central in the thought of many pre-modern and contemporary Muslim jurists? In response to this question, Ḥaṭḥūṭ said that breathing the soul is from the perspective of medical sciences a purely metaphysical concept which belongs to the *ghaybiyyāt* (matters of the unseen world) and thus it is something to believe in as part of our belief in the unseen world but it cannot be examined through scientific methods (Ḥaṭḥūṭ 1985, 55—61).

Ḥaṭḥūṭ's approach to the beginning of human life and how it should be determined clearly shows the relevance and influence of medicalization for contemporary Islamic bioethical discourse. Central to this approach is the epistemological power of modern science, particularly biomedical knowledge, and thus it should have the final word about the beginning of human life rather than the, at least partially, flawed interpretations of pre-modern jurists. In order to better understand the case of Ḥaṭḥūṭ and his like-minded physicians in the Muslim world within the context of global medicalization, we refer to parallel discussions in the West.

The two associate professors of philosophy at the Canadian University of Sudbury, Carol Collier and Rachel Haliburton, spoke about the influence of the medicalization of pregnancy in Western societies and the development of medical methods for examining whether or not a woman was pregnant. With the medicalization of pregnancy and reproduction from the nineteenth century onwards, Collier and Haliburton explained, it was the physician who would determine if pregnancy began. Within this context of increasing medicalization, physicians started to reject the now "outdated" concept of ensoulment or quickening and to see themselves as responsible for protecting the embryo from the moment of conception.

A statement attributed to a New York physician was seen as summing up the new view of the embryo, "It [ensoulment/quickening] is absurd and false ... there is no time from the moment of conception to the moment of birth when the embryo is not a human being ... its life is as sacred at one period as at another" (Collier and Haliburton 2011, 190). Although Ḥaṭḥūṭ did not go that far by describing the concept of breathing the soul as "absurd", his approach



practically denies it any substantial role in the discourse on the beginning of human life. This point was criticized by some religious scholars like the Jordanian Muḥammad Naʿīm Yāsīn who argued that Ḥaṭḥūt's opinion is an indication of being under the influence of the materialists who denies the existence of the soul at all and thus do not give any special consideration to the the soul-breathing incident as a curial point in the gestational development. Yāsīn objected to setting the soul aside and making it a metaphysical concept with no touchable influence in human life (Madhkūr, Sayf, Jundī, and Abū Ghudda 1985, p. 222).

In response to the critical remark raised by Yāsīn, Aḥmad al-Qāḍī (another physician supporting Ḥaṭḥūt's approach) said that they actually have adopted this approach in order to save human beings, including their souls, (by arguing that abortion is unethical from the moment of conception) which would seem less valuable if they said that human life starts on a later date (Madhkūr, Sayf, Jundī, and Abū Ghudda 1985, 269, 288).

By going deeper than the surface of this discussion, we can observe that the linchpin of the debate is not about recognizing or denying the existence of the soul but rather about who has the authority to determine the beginning of human life (physicians or religious scholars) and how to determine it (through biomedical knowledge or through reading and interpreting relevant references in the religious scriptures).

According to Ḥaṭḥūt and the like-minded participants in the IOMS symposium, the power of modern biomedical knowledge weighs heavier than that of the religious discourse. It should be noted here that the list of those who advocated the thesis proposed by Ḥaṭḥūt included both biomedical scientists and religious scholars and the same holds true for its opponents, as we shall see below. Muslim religious scholars who were convinced and impressed by what Ḥaṭḥūt proposed tried to show how references in the Islamic scriptures could be metaphorically interpreted in order to fit within the "scientific imagination" of embryology and its relevance to determining the beginning of human life.

The religious scholar ʿAbd al-Qādir al-ʿAmmārī tried to reconcile between Ḥaṭḥūt's thesis and the central Prophetic tradition, which is usually quoted in Islamic juristic literature on the question of the beginning of human life, known as the tradition of Ibn Masʿūd (for full text of the tradition, see Ghaly 2014, 2101). The apparent meaning of the tradition (al-zāhir) indicates that the unborn goes through three consecutive stages during pregnancy, each of which takes forty days and after the lapse of the three phases (i.e., 120 days), the unborn gets ensouled by the angel whom God has entrusted



with the task of breathing the soul. According to al-‘Ammārī, holding the opinion that human life starts by the first day of pregnancy is not necessarily contradictory to the purport tradition of Ibn Mas‘ūd because it is open for various interpretations. The text of the tradition, al-‘Ammārī explained, divides between each of the three stages with the conjunction “then” (in Arabic *thumma*), which is usually seen as a coordinating conjunction and thus implies that these stages are chronologically ordered.

However, this is just one of the grammatical functions of “then” (*thumma*) in the Arabic language but not necessarily its only function, al-‘Ammārī argued. For instance, this conjunction can sometimes be used as a synonym for the conjunction “and” (in Arabic *wa*) and in this case does not imply any chronological order. Al-‘Ammārī held that “then” (*thumma*) in the tradition of Ibn Mas‘ūd can best be interpreted as “and” (*wa*). For instance, when reviewing the same stages mentioned in the tradition of Ibn Mas‘ūd, the Qur‘ān sometimes uses the conjunction “then” (*thumma*) (22:05) and sometimes another conjunction, viz., *fa* (also usually translated in English as “and”) (23:13). This means that “then” (*thumma*) is not necessarily meant here to convey specific chronological order. According to this reading, the three stages mentioned in the Prophetic tradition, including breathing the soul, will all take place during the first forty-days of pregnancy. In the light of this proposed metaphorical interpretation, al-‘Ammārī argued that determining the beginning of human life by the moment of conception when the sperm fertilizes the egg will not be contradictory to relevant references in the Islamic scriptures.

Again, one can observe the influence of “medicalization” in al-‘Ammārī’s explanation for the standpoint adopted by pre-modern Muslim jurists. According to him, all Muslim jurists opined that the embryo has no real life before the lapse of four months during pregnancy, basing themselves on the apparent meaning (*zāhir*) of the tradition of Ibn Mas‘ūd, because “Medicine was not as advanced in their time as it is now and they did not have the today’s technologies which monitor the movements of the child inside the [mother’s] abdomen”. Al-‘Ammārī stated that modern biomedical knowledge is equivalent to sense perception (*al-ḥiss*) and to what has been rationally (‘*aql*) and empirically (*wāqi‘*) approved. He added that whenever the apparent meaning of a prophetic tradition proved to be contradictory to sense perception (*al-ḥiss*), rational thinking (‘*aql*) and empirical reality (*wāqi‘*), then it must be metaphorically interpreted (‘Ammārī 1985, 172—79).

Perceiving the thesis presented by Ḥaṭḥūt and others (viz., human life starts by the first moment of conception) as uncontested “scientific fact” equal to sense perception (*ḥiss*) and empirically approved information (*wāqi‘*) was



challenged by other physicians who participated in the IOMS symposium like the gynecologist ‘Abd Allāh Bāsalāma and the neurologist Mukhtār al-Mahdī (Bāsalāma 1985, 77; Madhkūr, Sayf, Jundī, and Abū Ghudda 1985, p. 215). In his paper submitted to the symposium, al-Mahdī presented an alternative “scientific” view about the beginning of human life and its relation with the concept of breathing the soul. Al-Mahdī argued that this concept was so elusive for pre-modern Muslim jurists and with no scientific equivalent to the extent that determining the beginning of human life by examining the nature of this concept was a mission impossible. Now, al-Mahdī explained, embryonic developments can be monitored and in some cases even controlled and manipulated. Thanks to these modern scientific advancements, a specific embryonic development can now be pinpointed and we can state that it is an indication of breathing the soul and thus the beginning of human life (Mahdī 1985, pp. 64—65).

Instead of the five conditions proposed by Ḥaṭḥūṭ, al-Mahdī spoke about five embryonic developments taking place during the twelfth week of pregnancy, exactly after eighty four days, which all indicate the emergence of a distinct human being, namely 1) the movements of the embryo start to become complex and harmonious rather than hectic, 2) the emergence of breathing-like movements in order to get oxygen because the lungs do not work during pregnancy. These movements are strong indicators that the brainstem started to work because respiratory control is one of its functions, 3) the embryo experiences consequent and regular activity-rest rhythms where periods of locomotor activity get usually followed by periods of rest and sleep, 4) some research papers showed that electrical signals produced by the fetal brain emerge in the twelfth week and can also be measured. These signals indicate that both the cerebral cortex and the cerebral hemispheres started to work and 5) the onset of fetal movements which do not have a sudden, jerky or spastic quality and thus convey new significance. These new movements are responses to exterior alerts such as these of the Doppler ultrasound while moving on the belly of the pregnant woman. T

his means that specific brain centers have caused these movements and started to make the embryo aware of anything abnormal that might happen around him and thus enable him to distinguish between these abnormal exterior alerts on one hand and the normal sounds and movements including these of the mother’s heartbeats on the other hand. Al-Mahdī added that these new developments which take place in the twelfth week and which also coincide with the fact that the brain gets fully shaped and starts to function represent a turning point in the fetal development (Mahdī 1985, pp. 68—69).

Mukhtār al-Mahdī was also keen to demonstrate that his (neurological)



thesis about the beginning of human life is not contradictory to the relevant references in the Islamic scriptures, especially the aforementioned tradition of Ibn Mas'ūd. He argued that the three stages mentioned in this Prophetic tradition should not be taken as three distinct and successive stages each of which continues for forty days. He said that the tradition of Ibn Mas'ūd was also reported in another canonical collection of Prophetic traditions (i.e., Ṣaḥīḥ Muslim) with a little addition, viz., instead of "then he becomes a clot of congealed blood (ʿalaqa) for a similar period" according to the text reported in the canonical collection of al-Bukhārī, the text of Muslim reads, "then he becomes in this a clot of congealed blood (ʿalaqa) for a similar period". "In this" here, al-Mahdī argued, means that the ʿalaqa stage starts during, and not after the end of, the nuḡfa stage and the same holds true for the muḡgha stage, which would also start during, and not after the end of, the ʿalaqa stage. So, we have here three overlapping and not three distinct forties and thus the total should not be 120 days but less than this. Bearing in mind that the embryo witnesses a turning point in the twelfth week, then the total of the three overlapping forties should be calculated as eighty-four days and this is the date of breathing the soul (Mahdī 1985, pp.70—71).

The two theses on determining the beginning of human life presented respectively by the gynecologist Ḥassān Ḥaṭḥūt and the neurologist Mukhtār al-Mahdī may look at first sight on opposite poles; one of them tries to exclude the concept of breathing the soul from the discourse on the beginning of human life and the other one tries to bring it to the heart of the discourse. Also lengthy discussions including arguments and counter-arguments, which I reviewed somewhere else (Ghaly 2014, 157—208), took place between the advocates of each thesis during the IOMS symposium. I argue, however, that the two theses share a strong common ground by starting from identical premises, namely (over-)confidence in biomedical sciences and strong belief that "scientific" knowledge can give clear guidance about how to determine the beginning of human life and may put an end, or at least minimize, the jungle of semantic and hermeneutic confusion which characterized the pre-modern Islamic discourse on this issue. To my mind, these shared premises between the two theses indicate the presence of the phenomenon of medicalization in the proceedings of the IOMS symposium, especially at the conceptual level as mentioned above by Henk ten Have, although the term was not explicitly mentioned. Both Ḥaṭḥūt and al-Mahdī shared the vision that biomedical knowledge can help determining the beginning of human life but they disagreed on how this knowledge will be integrated within the context of an Islamic discourse on this issue.

The presence of such two seemingly opposing theses (sharing the same premises but presenting different conclusions) on the beginning of human



life did weaken the power of medical knowledge and its impact on Muslim religious scholars who participated in the IOMS symposium. For instance, ‘Abd al-Qādir al-‘Ammārī, who was first impressed by Ḥathūṭ’s thesis, expressed his confusion and frustration after listening to the differing views presented by the biomedical scientists. He said that physicians should be blamed for disagreeing with each other because, unlike the religious scholars, they have plenty of medical and scientific tools to settle these disagreements (Madhkūr, Sayf, Jundī, and Abū Ghudda 1985, 221). The same holds true for the ex-Minister of Religious Affairs in Egypt, Ibrāhīm al-Dasūqī who got confused because of these disagreements and the Jordanian religious scholar Muḥammad Yasīn who could not find clear answers from the physicians about when the formation of brain starts and when it comes to completion (Madhkūr, Sayf, Jundī, and Abū Ghudda 1985, 223, 225, 250).

Consequently, throughout the proceedings of the IOMS symposium, increasing numbers of both religious scholars and biomedical scientists expressed their doubts if biomedical knowledge can give a decisive answer to the question, when does human life begin? They started to go back to the references in the Islamic scriptures searching for a possible answer to this question (Madhkūr, Sayf, Jundī, and Abū Ghudda 1985, pp. 202, 204, 217, 221). This attitude was exemplified by Jordanian religious scholar Muḥammad al-Ashqar who decided to write a post-script for his paper on the beginning of human life, which was completely dedicated to examining the aforementioned tradition of Ibn Mas‘ūd from the perspective of a traditionalist (muḥaddith) without involving any pieces of biomedical information (Ashqar 1985, 440—444).

In the last session of the IOMS symposium, which was dedicated to discussing the final recommendations, almost all the participants were approaching a compromise in which they tried to achieve a certain degree of balance between biomedical knowledge on one hand and references in the Islamic scriptures on the other hand. Only two physicians remained difficult to convince, namely Ḥassān Ḥathūṭ and Aḥmad al-Qāḍī. Shaykh Yūsuf al-Qaraḍāwī, who chaired the last session of the symposium, addressed the two physicians by saying, “I friendly ask Prof. Ḥassān and brother Dr. al-Qāḍī not to pressurize us [viz. religious scholars] more than this. For three days now, they have been trying to force their opinion. We have given some concessions and now they have to give concessions too” (Madhkūr, Sayf, Jundī, and Abū Ghudda 1985, p.659).

At the end, the final recommendations of the symposium echoed the trial of the overwhelming majority of the participants to achieve the aforementioned balance.



These recommendations read:

The beginning of life occurs with the union of a sperm and an ovum forming a zygote, which carries the full genetic code of the human race in general and of the particular individual, who is different from all other beings throughout the ages. The zygote begins a process of cleavage that yields a growing and developing embryo, which progresses through the stages of pregnancy towards birth.

Second: From the moment a zygote settles (yastaqirr) inside a woman's body, it deserves a unanimously recognized degree of dignity (iḥtirām) and a number of religious rulings, known to religious scholars, apply to it.

Three: When the embryo reaches the soul-breathing stage, the time of which is subject to controversy, being either forty or 120 days, the embryo acquires greater sanctity (ḥurma), as all scholars agree, and additional religious rulings apply to it.

Fourth: Among the most important of these religious rulings are those with pertinence to abortion as pointed out in article seven of the recommendations of the symposium on 'Reproduction in Islam'" (Madhkūr, Sayf, Jundī, and Abū Ghudda 1985, p. 676).



Al-Ghazali's Methodical Engagement with the Scientific Tradition

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I am going to reflect on the historic theological engagement of al-Ghazali (d. 505/1111) with the scientific tradition of the medieval Islamic world, and this relates to a set of works that were discovered in the beginning of the twenty-first century. These concern a number of manuscripts attributed to al-Ghazali, called the *Madnun*. This is an important development because it gives us the knowledge with regards to al-Ghazali's views as a Muslim theologian with regards to the rational tradition in Islam. I would argue that this is the first systematically reasoned synthesis of Sunni orthodox Islam in the work of Islam's own *Doctor Angelicus*, al-Ghazali, celebrated by Muslim throughout the ages as the *Hujjat al-Islam* (the Proof of Islam) and who died in the memorable and arguably providential year of 1111.





Like Thomas Aquinas (d. 1274) in Latin Christendom, al-Ghazali was a theologian-philosopher whose pre-eminence lasted through all subsequent periods. Yet a crucial, unanswered question has blocked the interpretation of al-Ghazali's writings and clouded scholarly understanding of much, if not the whole, of subsequent Islamic intellectual history, inside as well as outside the Muslim community. That issue is the extent to which the Greek rationalist and scientific tradition was incorporated by al-Ghazali in his theological synthesis. Did he exclude *falsafa* (other than logic), or did he embrace Greek metaphysics and natural philosophy (and thus theoretical science)? In my recent work I have identified and systematically considered for the first time a group of philosophical writings, called the *Madnun* corpus, that is to be attributed to al-Ghazali.¹ My discoveries are based on a painstaking survey of around fifty medieval Arabic manuscripts, many of which were unidentified or wrongly identified, and almost all of which were previously unstudied.

Besides acquainting scholars with this remarkable new body of source material, my work presents a critical edition of the most advanced and technical work of this corpus, the manual on metaphysics and natural philosophy called the *Major Madnun*. Al-Ghazali's *Madnun* corpus is characterized best by these *Madnun* manuals, such as the *Major Madnun*, which are philosophical and theological writings of a concentrated, academic nature intended for the ears of the initiates—rather like the so-called esoteric writings of Aristotle, his extant lecture notes, the best known version of which forms the basis of our modern printed texts and was edited by Andronicus of Rhodes. The title '*Madnun*' (which translates as 'esoteric' or equally acceptable are 'restricted', 'confidential', 'private' or even 'unpublished') is an abbreviated form of its full title, '*al-Madnun bih 'ala Ghayr Ahlih*' [That Which Is to Be Restricted from Those Unfit for It]. This is al-Ghazali's own formulation of the title. I have used the term 'corpus', because the *Madnun* is made up of more than one text; in the places where he refers to it, namely in the *Jawahir al-Qur'an* and the *Arba'in fi Usul al-Din*, al-Ghazali explicitly mentions *kutub* (pl.), not *kitab* (sing.) in the *Madnun*.²

1 M. Afifi al-Akiti, 'The Good, the Bad, and the Ugly of *Falsafa*: Al-Ghazali's *Madnun*, *Tahafut*, and *Maqasid*, with Particular Attention to Their *Falsafi* Treatments of God's Knowledge of Temporal Events', in Y. Tzvi Langermann (ed.), *Avicenna and His Legacy: A Golden Age of Science and Philosophy*, Cultural Encounters in Late Antiquity and the Middle Ages, no. 8 (Turnhout: Brepols, 2009); see also, M. Afifi al-Akiti, 'The *Madnun* of al-Ghazali: A Critical Edition of the Unpublished *Major Madnun* with Discussion of His Restricted, Philosophical Corpus', D.Phil. diss., 3 vols. (University of Oxford, 2008).

2 Al-Ghazali, *Jawahir al-Qur'an*, ed. Mu'yi al-Din Sabri al-Kurdi (Cairo: Matba'at Kurdistan al-'Ilmiyya, 1329/1911), 30.⁸⁻¹² (*qism* I, *fasl* 4, *namat* 2, *tabaqa*: 'ulya); al-Ghazali, *Kitab al-Arba'in fi Usul al-Din: fi al-'Aqa'id wa-Asrar al-'Ibadat wa al-Akhlaq*, eds. 'Abd Allah 'Abd al-Hamid 'Irwani and Muhammad Bashir al-Shaqafa (Damascus: Dar al-Qalam, 2003), 39.¹⁴⁻¹⁵ (*qism* I, *epil.*).



In this corpus al-Ghazali reveals the extent to which his theologizing has developed: by relying on the philosophical and scientific community, he has constructed a unified theological system that provides a reasoned explanation of the world, but he expresses his ideas in traditional, religious terms. To put it in reverse order, it is in the *Madnun* that al-Ghazali constructs the theological doctrines in philosophical and scientific terms.

The *Madnun* corpus amounts to al-Ghazali's 'commentary', as it were, with 'religiously correct' revisions, on basic texts of the Aristotelian curriculum in theoretical philosophy, as modified by Ibn Sina (Lat., Avicenna; d. 1037). These are not works on logic, but, astonishingly, the *Metaphysics*, part of the *Physics*, the *De Anima*, and parts of the *Parva Naturalia*—they represent some of the subjects and topics that al-Ghazali himself critiqued, for example, in the *Tahafut al-Falasifa*. These *Madnun* writings of al-Ghazali make it clear that he indeed adopted (and adapted to Muslim doctrine) most of Aristotelian and Avicennian science, even while strategically concealing that indebtedness. The basic results of my investigation show that there is an underlying relationship among three of the philosophical or *falsafi* works of al-Ghazali. The first is the work that I had studied, the *Major Madnun*. The second is the *Tahafut al-Falasifa* (The Incoherence of the Philosophers), the famous work in which al-Ghazali attacks Aristotelian science. The third work is the *Maqasid al-Falasifa* (The Intentions of the Philosophers), which is al-Ghazali's own *Summa* of Aristotelian science that became a famous textbook in the Latin world. In sum, I argued that there is a close and definite relationship exhibited by these three works, which we may characterize as al-Ghazali's version of 'the good, the bad and the ugly' of *falsafa*.

For al-Ghazali, *falsafa* represents the scientific tradition of his time, viz. Aristotelian science. In this medieval period, the prevailing view of 'science' was not the notion of science that we have to come to know today from, say, Newtonian science. Science, for al-Ghazali, was undifferentiated from philosophy, or that natural philosophy and metaphysics were both regarded as science. Before Newton's scientific revolution—whether in the Jewish, Christian or Muslim tradition, and indeed going all the way back to Aristotle—the study of *falsafa* or philosophy was in fact thought of in the medieval mind what we today would take for granted as the pursuit of scientific inquiry. Medieval scholars like al-Ghazali, Aquinas and Maimonides would in fact regard Aristotelian science and *falsafa* as representing the rational tradition—as opposed to the scriptural tradition—science, if you like, as contrasted with religion. So, for al-Ghazali, *falsafa* represents the best of the rational tradition, that is to say, the scientific tradition for him.

So we can now say that al-Ghazali's theological engagement with science



thus can then be characterized as one of good, bad and the ugly. My work demonstrates how the 'good' *falsafa* used by al-Ghazali in the *Major Madnun* excludes the 'bad' *falsafa* he exposed in the *Tahafut* and departs from the 'ugly' *falsafa* he presented in the *Maqasid*.

This crude Hollywood characterization, for me, expresses eloquently the results of this great Imam's engagement with the scientific tradition of the time. They suggest the existence of a positive engagement with science, a neutral engagement with science and also a negative or critical engagement with science—indeed, the three works show al-Ghazali's engagements with Aristotelian science.

(1) The neutral work is primarily a summary of his favourite scientific writer, that is to say, al-Ghazali's *hikaya* of Ibn Sina the *Maqasid* texts. This is the 'ugly' aspect of *falsafa* and science, since it has been left unaltered and contained both the unacceptable as well as the acceptable scientific theories according to Muslim doctrine. (2) The negative work is the *Tahafut*, which addresses the faults of the Aristotelian system presented in the *Maqasid* works by—as he puts it—demolishing [*hadm*] and dismissing as false [*ibtal*] or feeble [*ta'jiz*] certain *falsafi* theories, numbering a grand total of 20. This is the 'bad' aspect of *falsafa*, since he is showing us its problematic doctrines vis-à-vis the Muslim religion. (3) And the final work, which is of positive value to his theological project, is the assertion (or *ithbat*) by what he considers to be demonstrative knowledge (*burhan*) of the parts of the scientific legacy of Aristotle and Ibn Sina deemed fit for appropriation in the *Madnun* corpus. This is the 'good' aspect of *falsafa* and science, since al-Ghazali makes use of the sound or corrected *falsafi* teachings. It confirms his own statements in one *Tahafut* passage, that he will write another work to be called the '*Qawa'id al-'Aqa'id*' (The Foundations of Beliefs), that will be about reassembling these Greek scientific and philosophical theories; just as the *Tahafut* was about disassembling them. So, he says in the *Tahafut*:

In this work we have been committed only to muddying their position [*madhhab*] and throwing dust on the ways of their proofs so as to show their incoherence, and nor have we sought to defend a particular school [*madhhab*]; in this [*Tahafut*], therefore, we have not gone beyond the purpose of this work. Nor will we thoroughly examine the discussion about the proofs arguing for the origination of the world [*hadath*], since our intention [in this chapter of the *Tahafut: mas'ala* I] is to refute [*ibtal*] their claim to a knowledge of its eternity [*ma'rifat al-qidam*]. As for affirming [*ithbat*] the right position [*madhhab*], we will write a work regarding it after completing this one (if success comes, God willing!), and we shall name it, *Qawa'id al-'Aqa'id* [The Foundations of Beliefs]. In it we will be concerned with building up [*ithbat*],



just as in this work we are concerned with tearing down [*hadm*].³

To his great credit, Duncan Macdonald suggested long ago that one should try to understand the *Maqasid*, the *Tahafut* and the *Qawa'id* together.⁴ More recently, Gabriel Reynolds described the scheme of these three works as, respectively, al-Ghazali's construction, deconstruction and reconstruction of *falsafa*.⁵ Of course, at this stage, modern scholars prior to the twenty-first century have not discovered the *Madnun* corpus in its entirety. Yet they have long wondered about the identity of the '*Qawa'id al-'Aqa'id*' referred to in that *Tahafut* passage above. Had previous scholars paid heed to one of al-Ghazali's favourite maxims, 'once the *haqiqa* or meaning is understood, there is no need to quarrel over labels, titles or names',⁶ and thereby unpacked the meaning of the '*Qawa'id*', seen past its name, and thereby recognized its generic nature, namely that it is simply a 'theological project', they would have solved this longstanding problem by associating the *Qawa'id* with the *Madnun*—something possible, even if difficult, without access to the *Madnun* manuscripts.

Among medieval Muslim scholars, Ibn Rushd (Lat., Averroes; d. 595/1198) and Ibn Taymiyya (d. 728/1328) described al-Ghazali's engagement with the *falsafa* tradition accurately, listing the works in the order in which they developed: first, the *Maqasid*, then the *Tahafut* and finally the *Madnun*. Thus the *Madnun* corpus is at the top of al-Ghazali's theological project, the *Qawa'id*, and at the very summit is the longest manual, the *Major Madnun*. These new results, I hope, will resolve the original *aporia* stated by Reynolds when he says 'In the *Maqasid*, al-Ghazali builds up a philosophical system. In the *Tahafut*, he tears this system apart. If that is the entirety of his project, then we are left with nothing but ruins.'⁷ The *Madnun* manuals would, I expect, satisfy the yearning of Richard Frank, for instance, who lamented that 'al-Ghazali never composed a complete, systematic summary of his theology in

3 Al-Ghazali, *Tahafut al-Falasifa*, ed. Maurice Bouyges (Beirut: Imprimerie Catholique, 1927), 77.¹⁰-78.⁷ (*mas'ala* I).

4 Duncan B. Macdonald, 'The Life of al-Ghazzali, with Especial Reference to His Religious Experiences and Opinions', *Journal of the American Oriental Society* 20 (1899): 71-132 (p. 98).

5 Gabriel Said Reynolds, 'A Philosophical Odyssey: Ghazzali's Intentions of the Philosopher', in John Inglis (ed.), *Medieval Philosophy and the Classical Tradition: In Islam, Judaism and Christianity*, (Richmond: Curzon, 2002), 43.

6 For the original Arabic, see M. Afifi al-Akiti, 'The *Hikam* or Aphorisms of al-Ghazali: Some Examples', in Rotraud Hansberger, M. Afifi al-Akiti and Charles Burnett (eds.), *Medieval Arabic Thought: Essays in Honour of Fritz Zimmermann* (London: Warburg Institute, 2012), 17 (no. 2).

7 Reynolds, 'A Philosophical Odyssey', 42.



formally conceptual terms.⁸

The philosophical and scientific ideas 'appropriated' by al-Ghazali in the *Madnun* corpus eventually found their way into his famous work, the *Ihya' 'Ulum al-Din* (The Revival of the Religious Sciences), through the use of religious imagery and metaphors—which al-Ghazali calls *talwih* (allusions), but his great nemesis, Ibn Taymiyya calls *talbis* (cloaking), and I call 'naturalization' following the terminology employed by Abdelhamid Sabra.⁹ It is not surprising, therefore, that such progressive ideas caused offence at first, and led to the short-lived campaign to burn the *Ihya'* in the more conservative lands of Andalusia at the time.¹⁰ Disregarding any political incorrectness that may have been the actual *causa cremandi*, it is not unlikely that some of the unorthodox materials were used as the actual legal pretext for the complaints against the *Ihya'*. After all, the naturalized Avicennian materials in it—whether from the *De Anima* or the *Metaphysics*—were detected by theologians like Ibn Taymiyya who could see through al-Ghazali's *talwih* and coded writing. Here, al-Ghazali's success on the naturalization front comes in large measure from his didactic gifts and presentational skills. He belongs to that rare breed of scholars who can communicate specialist knowledge effectively in popular, lay terms. It is appropriate to repeat here Ibn Taymiyya's perceptive remarks about the *Ihya'* and al-Ghazali's incorporation of *falsafa* theories into his *magnum opus*, which show the effectiveness of his naturalization project: There are many benefits in the *Ihya'*, but there are also objectionable elements—unsound elements derived from the theories of the philosophers connected with the subjects of divine unity, prophethood, and the next life. Whenever he speaks of the insights (the *ma'rifa*) of the Sufis, he is like someone who takes an enemy of the Muslims and 'cloaks' him in the garments of the Muslims.¹¹

The dense, academic nature of the three philosophical works—the *Maqasid*, the *Tahafut* and the *Madnun*—are mainly written at the specialist level, that of *burhan*, a style of exposition which is itself a result of al-Ghazali's engagement with the *falasifa* and his appropriation of their ideas. For al-Ghazali, *burhan* (i.e., demonstrative, scientific knowledge), is the 'gold standard' in the art of

8 Richard M. Frank, *Al-Ghazali and the Ash'arite School* (Durham: Duke Univ. Press, 1994), 100-1.

9 The terms 'appropriate' and 'naturalize' are used here, following the seminal article by A.I. Sabra, 'The Appropriation and Subsequent Naturalization of Greek Science in Medieval Islam: A Preliminary Statement', *History of Science* 25 (1987): 225-43.

10 See Delfina Serrano Ruano, 'Why Did the Scholars of al-Andalus Distrust al-Ghazali?: Ibn Rushd al-Jadd's *Fatwa* on Awliya' Allah', *Der Islam* 83 (2006): 137-156.

11 Ibn Taymiyya, *Majmu' Fatawa*, ed. 'Abd al-Rahman b. Muhammad Ibn Qasim al-'Asimi, 37 vols. (Riyadh: Matabi' al-Riyad, 1961-7), 10:551.¹³-552.².



reasoning and argumentation. Yet, it is through his popular writing, such as in the *Ihya'*, that al-Ghazali made the art of *burhan* accessible and, in time, acceptable to the religious scholars of Islam, the *ulama*.

Within a century a number of the *ulama* had taken up where al-Ghazali left off with the Avicennian legacy. The Eastern Islamic world saw the emergence of a completely new kind of religious scholar: the *madrasa*-trained, orthodox Sunni who was an Ash'ari theologian as well as a Shafi'i jurist but also an Aristotelianizing theologian—men such as Fakhr al-Din al-Razi (d. 606/1210), Sayf al-Din al-Amidi (d. 631/1234) and 'Abd al-Latif al-Baghdadi (d. 629/1231)—all emerging from the traditional Muslim Ash'ari school of theology. Indeed, I would argue that al-Ghazali was one of the first among this new breed of scholastic theologians: a committed rationalist of the Aristotelian sort, yet equally a spokesperson for the Sunni, orthodox tradition, who promoted Greek scientific thinking.

However, the earlier debates over the legitimacy of Aristotelian logic still loomed large in the memories of many in the world of religious scholarship to which al-Ghazali belonged.¹² If introducing Greek logic into the religious curriculum, something al-Ghazali managed to do openly, was not controversial enough, the introduction of the *Metaphysics* and the *De Anima* would have been utterly unacceptable. It is no wonder that he could only bring in the theoretical sciences of *falsafa* through the back door. His strategy seems to have paid off, however. Ibn Rushd was a witness to the success of al-Ghazali's enterprise. He said:

Then came Abu Hamid, who flooded the valley by bursting the dam; that is to say, he made known all of philosophy and the ideas of the philosophers to the general public, according to what he was able to understand. This was done in his work called the Maqasid. He claimed that he only composed this in order to refute them. Then he wrote his work called the Tahafut al-Falasifa...

Then he said in his work called the *Jawahir al-Qur'an* that what he asserted in the *Tahafut* were polemical arguments, and that the truth [i.e., what he himself

12 Exhibiting an interest in logic was generally regarded as disgraceful by the religious community at the time; and the grammatical community was precisely the religious scholars who were the jurists and the theologians. See F.W. Zimmermann, *Al-Farabi's Commentary and Short Treatise on Aristotle's De Interpretatione* (Oxford: Oxford Univ. Press, 1981), cxviii-cxxix.



believed to be true] is only to be found in the *Madnun*.¹³

This opening of the flood gates, as described by Ibn Rushd, somehow allowed religious scholars to teach what amounted to *falsafa*, in the name of teaching logic and, euphemistically, *hikma* (ontology, cosmology, and psychology; i.e. the *Metaphysics* and the *De Anima*) in the *madrassa* community. Al-Ghazali's openness to *falsafa* attracted a following, initially in the Eastern Islamic lands but later in the Islamic West as well.

This may sound surprising to those familiar with the view that al-Ghazali was an out-and-out opponent of *falsafa*—and by extension, the nasty accusation propounded by some today of al-Ghazali being anti-science. In fact, having 'disassembled' *falsafa*—as the *Tahafut* passage above indicates—he 're-assembled' the fragments into another version of it. As his autobiography, *al-Munqidh min al-Dalal* (The Deliverance from Error), shows clearly enough, he was not against philosophy and science *per se*, but he was opposed to those theories of Aristotelian philosophy and science that contradicted basic Muslim beliefs.¹⁴ A re-examination of simplistic images of al-Ghazali and a careful re-reading of his established writings, in particular the *Ihya'*, will be enough to lead the present-day reader to the same conclusion as was drawn by medieval scholars—friends and foes alike, men such as Ibn Rushd and Ibn Taymiyya. The contents of the *Madnun* corpus, as my work shows, are the authentic basis for many of the ideas expressed by al-Ghazali in his popular writings.

Al-Ghazali's role as a transmitter of the Greek philosophical and scientific disciplines is easily observed in medieval Europe—where he was known as 'Algazel'—but scholars have not appreciated the part al-Ghazali played in this regard in his own conservative world of the *madrassas*, despite its great importance. As a result of his engagement with both the sacred and profane traditions, the *Hujjat al-Islam* was able to say to the best scholars of his religious community—the orthodox Sunnis, theologians as well as jurists and sufis—that they must not shy away from scientific truth, no matter what its sources: even foreign ones, such as Aristotle and Ibn Sina. In time, this openness attracted a following even among the traditional *ulama*, so that secular subjects, such as astronomy and medicine, and even stigmatized disciplines, such as logic, and controversial ones, such as metaphysics, became acceptable to the religious community and came to be transmitted by the *ulama* of the *madrassas* themselves. Later theologians such as Fakhr al-Din

13 Ibn Rushd, *al-Kashf 'an Manahij al-Adilla fi 'Aqa'id al-Milla*, eds. Mu'ammad 'Abid al-Jabiri and Mustafa Hanafi (Beirut: Markaz Dirasat al-Wahda al-'Arabiyya, 1998), 150.¹⁹⁻²², 151.²⁻⁵ (*fasl IV*).

14 Al-Ghazali, *al-Munqidh min al-Dalal wa al-Muwassil ila dhi al-'Izza wa al-Jalal*, eds. Jamil Saliba and Kamil 'Ayyad (Beirut: Dar al-Andalus, 1981), 112.⁶⁻¹⁶ (*qawl IV, fasl 2, qism 6, afa 1*).



al-Razi (now if al-Ghazali was the *Doctor Angelicus* of the *umma*, then Fakhr al-Din is its *Doctor Subtilis*—another schoolmen lingo here, I know, but one that is very apt I think). The point here is that the theological and philosophical vision of al-Ghazali empowered Muslim religious scholars to teach what amounted to the science and philosophy of that age, transforming what had been almost purely secular—mainly courtly—pursuits.

‘That al-Ghazali’s polemics dealt a death-blow to *falsafa* is an over-hasty generalisation, which sometimes still lingers on in popular textbooks’,¹⁵ says Shlomo Pines. Seventy years on Shlomo Pines’ insightful statement still holds. One must avoid the temptation to use a ‘box approach’ to history, conveniently placing historical figures or disciplines or theories in neat, self-contained compartments—just as al-Ghazali himself resisted that temptation. As it turns out, the *Tahafut*, instead of bringing *falsafa* to an end, opened the world of the *ulama* to *falsafa*, and al-Ghazali was probably the first in the *kalam* tradition to read Ibn Sina seriously and apply his teachings successfully. The *Madnun* corpus presents an entirely new perspective, a sort of previously unspoken truth, which without the *Madnun*, could only be implicitly recognized through his public writings like the *Ihya*: the image of al-Ghazali who is Aristotelianizing. Of course we must not over-generalize. As an Aristotelian—by virtue of his systematic appropriation of Ibn Sina—al-Ghazali was not at all a blind follower, or to use in his own words, a *muqallid*, of the *falsafa* tradition. Instead, to use another maxim of al-Ghazali, ‘the middle way is either devoid of two extremes or a compromise of two points of view’,¹⁶ the true picture is either an uneasy mean between, or mixture of, two stereotyped extremes: Algazel as a *sequax Avicennae simpliciter* at the one end, or al-Ghazali as the author of the *Tahafut* that dealt a death-blow to *falsafa* at the other. The particular example of al-Ghazali’s *Madnun* and, indeed, the wider case of the good, the bad and the ugly of *falsafa* and Aristotelian science by al-Ghazali show that science and religion have been reciprocally relevant and interactive in so rich a variety of ways that quick and easy generalizations are not profitable and that individual densely contextualized studies are what are valuable and necessary.

The *Madnun* not only evokes an amazing intellectual journey of one of Islam’s most gifted masters, but it also confirms al-Ghazali as a man of deep spirituality and with a true faith: traits which together mark him out as one of the world’s great harmonizers. The dependence on God is still there: all true knowledge, indeed whatever is, comes from Him, and all knowledge leads

15 S. Pines, ‘Some Problems of Islamic Philosophy’, *Islamic Culture* 11 (1937): 66-80 (1937): 80 n. 2.

16 Cf. al-Akiti, ‘The *Hikam* or Aphorisms of al-Ghazali’, 17 (no. 4).



back to Him. This suprarational spirit of al-Ghazali is present throughout the works of the *Madnun* corpus. Yet there is an admirable and innovative spirit of rational enquiry, where blind faith in God is challenged and partially delimited, but never trivialized; one which confidently advocates the judgement that there is no true bifurcation between religion and science, but rather a real complementarity between them. All of that is best expressed through the words of Adelard of Bath (d. ca. 1160), the famous English, Christian scientist who was a devotee of the *Arabum studia* and had studied directly under Muslim and Jewish scholars from near here in Anatolia and all the way to Andalusia. He learned from his Eastern masters to lead by reason as far as it could carry him:

I will detract nothing from God...but very carefully listen to human knowledge as far as its limits; only where this utterly breaks down, should a thing be referred to God.¹⁷

Wa-Llahu a'lam

(Only God knows best!)

17 Adelard of Bath, *Conversations with His Nephew: On the Same and the Different, Questions on Natural Science, and On Birds*, eds. C. Burnett, et al. (Cambridge: Cambridge Univ. Press, 1998), 96-98: *Deo non detraho... Que quantum scientia humana procedit audienda est; in quo vero universaliter deficit, ad Deum res referenda est*; cf. Burnett's translation: 'I am not slighting God's role. One should attend to this distinction, as far as human knowledge can go; but in the case where human knowledge completely fails, the matter should be referred to God.'

Meeting Muslims Meeting Science

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Let me begin with a word of gratitude, for the members of the Taskforce on "Islam and Science - The Big Questions" and their work. As an external advisor I had the pleasure to meet a group of highly intelligent, informed and committed people, to attend their discussions and read their papers, and thus to learn from these colleagues. In the remainder of this contribution, I will offer my perspective on some of the basic issues in reflections on a particular religious tradition, such as Islam, and the natural sciences.





1. Natural Sciences, Technology and Languages: Diversity and Convergence

1.1 Science: Global

Scientists are humans. They come from different countries, speak various languages, and do not agree on politics or religion. Despite such differences, mathematicians and natural scientists have come to share knowledge about reality that is accepted by colleagues across all that divides humans from each other. Insights are accepted as genuine knowledge about the way the world is, and how the world came to be the way it is, its natural history. By profession scientists disagree when it comes to the way forward in current research. They try multiple avenues, and propose different models and hypotheses. At the same time, they tend to agree on consolidated science. The Periodic Table describing the elements in chemistry, from Hydrogen and Helium onwards, is the same across the world. And, as a thought experiment, if we would ever learn of the ideas of extraterrestrial scientists, I would expect that their notation would be wildly different, but that they would have come up with the same notions, for materials at that level of description and under those conditions. Natural scientists do not agree by convention; on the basis of experiments, observations and calculations they come to agree that this is the most accurate description of reality, at that level of description. Fallible humans seem to have come to knowledge that is certain and objective to a remarkable degree, even though all such knowledge remains revisable and conditional – perhaps bounded in ways we have not yet realized.

Given the practice of the natural sciences, I am deeply convinced that one has to recognize “the international and universal nature of modern, collaborative science”, which is called in this report ‘universal science’ (section 4.1.1, position iii), and take that as one’s point of departure.

1.2 Technologies: Globalization varies by Context

Some other human products are fairly global as well. Examples are Röntgen diagnostics and smart phones. Such technologies are rooted in shared science, but also fulfill needs we all have as humans – for better and for worse. And if we do not feel those needs, global marketing and media will help evoke them. Alongside intrinsic value, commercial interests drive globalization. In this context, considerations of ethics and policy have to be raised. Which technologies will be used, in what ways, and who has access, and who will profit or suffer? Those questions are context-specific, and therefore the situation is different from the perspective on the development of science



given above.

Given the variety of social contexts in which science and science-based technologies are used, abused, or unavailable, I have sympathy for the approach dubbed 'ethical science' in this report (4.1.1, position ii). I accept this as a major call to pay attention to social effects and conditions. But alongside the reflection on technology and society, one cannot deny the need for engagement with the remarkable, almost universal, type of knowledge that science has become. In the taskforce, Farid Panjwani argued strongly for a combination of autonomy for science, methodologically, combined with a religiously inspired engagement with issues of ethics, justice and meaning (see 4.1.6).

1.3 Languages: Cultures are Specific; Globalization as Dominance

Widespread is also English, not as the highbrow English of Oxford or Cambridge, but as a second language for many, a tool for imperfect but fairly efficient communication on this planet. That is why this report is in English – the language allows it to be shared with colleagues from many different countries. There is a genuine difference between English as a global language and the natural sciences as shared knowledge, or even modern medical diagnostic tools: We could easily imagine that we would have had a different global language. In Europe in the eighteenth and nineteenth century, French seemed destined to have the highest cultural and intellectual status. Early in the twentieth century, the most important developments in physics were published in German. Longer ago, Latin was the common language of scholarship around the Mediterranean and in Europe. Chinese or Arabic have had their share as medium of creativity and scholarship, in the past and present, and may well become more significant in decades or centuries to come.

Linguistic diversity may remind one of forms of diversity that touch more deeply upon culture and personal existence. Such an orientation seems to me reflected in the approach called above 'Sacred science' (4.1.1., i). On the basis of deep understanding of a particular theological and mystical tradition, one might prefer to see the world in that light. As long as one does this as a private exercise, there might not be any reason for concern. However, if this is presented as a way to related to the natural sciences, it seems to me to miss the point. The natural sciences have been successful, absorbing and transforming insights from many cultures, by being irreverent to those sources – not necessarily in an aggressive sense, but in a methodological sense.



Thus, 'sacred science' seems to me not to engage the natural sciences as they are, but rather relate one's tradition to a selected practice that is dubbed science, but is not at all part of the practices recognized in the global scientific communities.

What does these varieties of globalization, with convergence intrinsic to the natural sciences and determined by historical developments and thus more contingent convergence in cultural phenomena such as languages, demand of us when we reflect on religion and on religion and science?

2. Religions with universal ambitions: Multiple strategies

Religious traditions are diverse, just like languages. Though one may well be 'at home' in the practices and texts of one particular way of life and worship, just as one is 'at home' in one's own language, any sensible person has to admit that others speak differently, and draw on other texts and ways of worship. And those people who speak differently and to some extent live differently, are humans too - we all have similar bodies, similar needs, hopes and fears, and seem to be as likely to be mistaken or misled.

That languages are multiple, may be easy to accept. That religious views differ, across traditions and within traditions, is harder to accept. Why would it be more difficult? The answer may be in the nature of religious *belief*, which is not just a tool in life (like language), as it also tends to be a claim about reality. 'God created the heaven and the earth, each of us and everything.' Such a confessional statement may express awe for the Creator, but it also sounds like a description that aims to be universal, just as scientific claims. In my opinion, this triggers various 'programs' in religion and science.

2.1 Natural theologies: scientific support for religious belief?

This element of similarity seems to me to have driven the desire to think about religious beliefs along the same lines as scientific knowledge. Such a desire for a science-like approach to religion has driven the natural theologies that were common in Europe in the 17th, 18th and 19th century; patterns of reasoning that are widespread today as well. Arguments about fine-tuning (the universe seems designed for life, and especially for such nice and smart forms of life as we are) or about interventions in developmental or evolutionary process to create organisms that are 'designed' to function may well tie science to a particular theistic view. As we see in this volume,



the discussion is not exclusive to Western Christianity, but also shared by Muslims.

However, many would say that science does not reach that far. It involves the natural sciences in a metaphysical agenda. Perhaps we should take the consensus in the sciences more seriously, as a consensus that arose by putting aside all metaphysical, religious and political disagreements, and limiting scientific work to that which can be done in laboratories, astronomical observatories, and mathematical modelling. 'Methodological naturalism', as an option discussed in the Muslim-science expert group (see above, 4.2.3), is a view that takes this self-limitation of the scientific discussion very serious – not interfering with science on religious grounds, but neither expecting science to solve fundamental religious issues. Of course, more immediate 'inner-worldly issues', such as the beginning of the new moon, may well be topic of scientific research, while relevant to believers.

2.2 The open ended character of science

If we were to treat religious views not as consolidated science, but as research programs, we might live more easily and comfortably with the diversity of religious views, and the diversity of interpretations within religious communities. We are speaking of issues that so far transcend human existence, that the idea that we ever would know for sure, might be hubris, arrogance. Among the three monotheistic traditions, there has been a shared strand of modesty, sometimes called 'negative theology'. We are familiar with finite things, including ourselves – but God is not-finite, infinite. God is always greater than we can think. Not as a claim that can be used to come to a conclusion, but as an acknowledgment that our explorations are always open-ended, may well be corrected, and fall short of the full, ultimate understanding that is not given to us humans.

If so, as a religious orientation shared by sensitive believers among the three religions 'of the book' as well as by many others, a dispute with science might arise when some scientists (or popularizers of science) claim that they are approximating the final answer. That may seem offensive, not only when the answer does not include the Creator, but also when the answer were to include the Creator – offensive is the suggestion that we could reach that far. Thus, as one might expect, there is also among the colleagues in this taskforce an engagement with recent atheistic arguments that present themselves as based upon science (section 4.2).



2.3 Education and interpretation

Attractive though an agnostic strategy may be, we cannot avoid engaging the best available knowledge. What do we mean by speaking of God as Creator? How do we think of the epistemic, metaphysical and normative claims typically made in our tradition? In my opinion, there is no easy approach, for all circumstances. Emphasizing the existential and personal side, withdrawing from the global, and with that from the scientific view of the universe, is radical and perhaps wise (philosophers may think of Ludwig Wittgenstein). But in the process of separating what can be dealt with scientifically, and what is tenable and what a fair approximation, we have to engage scientific insights of our time.

One area is the engagement with evolution, and the development of a theologically or existentially adequate interpretation of human existence and human nature, given that we have evolved as contemporary biology informs us. It is clear that especially the acceptance of evolution, and the willingness to develop our ideas against this background, is not universal, not in Western countries nor in Muslim majority countries (see 4.4.2). Members of this Taskforce contribute to this much needed project of education and reflection, and rightly see important 'future steps' in this direction (at the end of 4.4.2). One more element that I would like to highlight, was the sense of the community that needs to be involved, and especially the need for collaboration of religious and legal scholars and of scientists, in a process of collective *ijtihad*, as it was labelled by Mohammed Ghaly (see 4.6 above). Especially when we have to deal with real life issues which involve science as well as our ethical, social and existential orientation, for instance in the medical sphere, we cannot avoid the discussion among well-informed Muslims, engaged in nuanced reflections and respectful dialogue. Sitting at the table with the colleagues of this Taskforce, hearing some of that reflective dialogue in practice, was a privilege and a joy.



Willem B. Drees

Editor of *Zygon: Journal of Religion and Science* and dean of the Tilburg School of Humanities, Tilburg University, the Netherlands. For a more extensive articulation of his views, see Willem B. Drees, *Religion and Science in Context: A Guide to the Debates* (London: Routledge, 2010).

Reflections on Task Force Contributions

Philip Clayton

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Reflections on Task Force Contributions

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You will already recognize the difficulty for me as a non-Muslim in responding to your papers. Clearly I cannot stand in judgment on your reflections, for where would I stand to do so? Many of the differences between your positions involve intra-Islamic disagreements; what can I add that would be helpful?

For this reason, I have decided to write of my perceptions of your papers but not to play the role of judge or evaluator. I respond as a person of faith, a believer in God, who has spent much of the last 30 years studying religious responses to science and the implications that follow when people take one position or another on these matters. Over the years I have listened deeply to my Muslim friends and colleagues, learning much from their contributions. After all we are members of the same family of Abraham.

Where my listening is helpful, I am happy. Where I have misunderstood or failed to understand, I hope you will forgive me.





1. M.B. Altaie, "Has Science Killed the Belief in God?"

It was my pleasure to read the paper by Prof. Altaie first. As it turned out, that is also the natural order in which to read the papers; if they are published as a book, this could well be the first chapter in the volume.

Altaie's paper lays out the background for many of the other papers in this collection. By the third paragraph he has introduced the helpful definition from Prof. Keith Ward of Oxford: "God is a non-physical being of consciousness and intelligence or wisdom, who creates the universe for the sake of distinctive values that the universe generates." By the end of the opening section we realize that whether God and science are compatible depends on what notion of God, and what understanding of science, you accept. (I found the mathematical examples here particularly helpful.)

Dr. Altaie's historical survey traces how both scientists and religious people chose interpretations that set the two at odds with each other. From that we recognize that interpretations of natural laws (and their implications) played a particularly important role. In classical Islamic philosophy, and in some of the medieval Christian theologians, one can find theologically rich theories of natural law. In the end, though, those are not the ones that the dominant Western thinkers chose.

The section on "modern views" shows how things have become even worse in recent years. Instead of looking for common ground, thinkers have tended to emphasize the most combative stances. Altaie's final section is likely to produce the most focused debate. He gives Keith Ward the final word: science and God don't have to be at war unless you choose a strictly materialist interpretation of science. But in this section, as also earlier in the paper, Altaie also toys with the possibility of science-based arguments for the existence and necessity of God, quantum-physics based arguments, as well as positions that imply a strong separation and independence of God-language from science-based language. Sorting out the different positions, and assessing which ones are the strongest, will take the closest attention.

2. Rana Dajani, "Evolution and Islam: Is there a contradiction?"

As Prof. Altaie has focused more on the field of physics, Professor Dajani takes on the question of evolution. Perhaps no area of science has raised more resistance within the Islamic world. It is a good thing that this enquiry will be included in the work of the Task Force alongside the other papers.



Prof. Dajani clearly rejects the thesis of incompatibility:

I want to highlight that the notion that evolution contradicts Islam, is a myth, and is an example of what happens when we misunderstand our religion. Islam calls for freedom to think and explore. The lack of freedom to think which comes from misunderstanding of our religion... (p. 6).

This is a programmatic statement — in a sense, a statement of the task of the entire conference. One wants to know in more detail why this misunderstanding arises and how it can be overcome. If it is a misunderstanding, as I also believe, it is without a doubt a widespread one.

The heart of Dajani's paper lies in his ten theses. I presume that each one will be discussed intensely at the conference. In the full version of the paper, it will be important to argue and defend each thesis in some detail. We all know that the compatibilist position on evolution and God, which Dajani espouses, is a controversial one; although we hope for change, we acknowledge that today it is the minority view. (Similarly, 56% of American evangelical Christians reject the core tenets of Darwin's basic evolutionary theory.)

3. Mehdi Golshani, "Modern Science and Challenges to Some Islamic Theological Doctrines"

I first had the privilege of working with Mehdi Golshani some 18 years ago, in the "Science and the Spiritual Quest" program. Since that time we have been together on the podium in many different countries and have contributed articles to each other's books.

In each encounter I have learned new things, and today's paper is no exception. What is uniquely valuable in Prof. Golshani's work is the combination of commitments that he brings to each study. In this paper one sees at least three of those commitments:

- The insistence on listening carefully to science and to scientists, while always keeping Holy Qur'an before us;
- The value of a philosophical perspective. Golshani does not place individual scientific assertions in confrontation with Qur'an; rather, he identifies the broader conceptual positions that are entailed by one or the other and then places his attention there;
- The importance of historical perspective, which allows us see the big



picture.”

Golshani’s method allows him to identify and then to make progress on the major themes. In this paper he organizes his reflections around three central questions: (1) The Problem of Life and Spirit; (2) Creation of the Universe (3) Does the universe have a purpose? Reading these topics, one is immediately aware of two things: first, these are questions that must matter deeply to Muslims; and second, these are questions that science as such does not directly answer. The origins of the universe, yes — at least insofar as they can be empirically reconstructed and described by testable equations — but not the creation of the universe. Similarly, scientists can talk about the functional purposes of specific adaptations in animals, but not about the purpose of the universe as such. Finally, scientists are concerned with problems that living organisms have to solve, but not with “the problem” of life. And “Spirit” is not a term that any scientific explanation can appeal to.

There are many valuable insights that arise from applying this method, both in this paper and in Golshani’s other publications. Here I mention just one. Prof. Golshani’s method allows one clearly to see where atheist and materialist scientists “overreach.” Because Golshani has clearly defined this discourse as philosophical, one can clearly see that Dawkins and Friends are putting forward philosophical claims — even though they claim scientific authority for their pronouncements.

4. Farid Panjwani, “The Science & Religion debate – Islamic perspectives & frameworks underpinning the discussion”

I introduce the paper by Prof. Panjwani here, because it seems to me that he is arguing for a similar point. The series of rhetorical questions that Dr. Panjwani raises, and his introduction of several important passages from Holy Qur’an, have the function of helping us to recognize the different use of language, the different forms of discourse, that are at work in the two cases. He writes perceptively:

Could it be that the Quran is not giving facts or a scientific theory of creation, rather its discourse may have a different socio-cultural function; in Darwin and the Quran are we not seeing a scientific and a poetic use of language, respectively? (p. 3)



Prof. Panjwani's appeal to different "forms of life" (L. Wittgenstein) in the following section also merits further reflection; a number of significant conclusions may follow from this recognition.

The trouble is, Wittgenstein's sharp divisions between different forms of life do not actually hold as neatly in the case of Islam and science — or, for that matter, other religions as well. One could cite many examples. But perhaps it's unnecessary, since Panjwani himself softens his own claim:

The above may give the impression that science and religion have not much to do with each other. This impression is true only if science is understood narrowly as a method. But, this method is itself embedded in culture and connected with other parts of society both in terms of how scientific problems are formulated and how the resulting knowledge is applied. Both the production of scientific problem and the application of scientific knowledge are deeply value laden and have consequence for the worth of science and quality of life of the populace. (pp. 3-4)

That seems exactly right. In that case, however, the Wittgensteinian separation of science and Islam cannot dispel the tensions that sometimes rise between them.

Panjwani concludes with an appeal to Islam's ethical role that is similar to the position taken by Prof. Shah (see below): "Religion has a proper and legitimate role in the discourses at both these levels. It can and ought to bring the question of ethics, justice and meaning to these matters." Each of these three functions — ethics, justice, meaning — merits further reflection and discussion.

5. Mohammed Ghaly, "The (Im)Possible Medicalization of 'Breathing the Soul' (Nafkh Al-Rū): Contemporary Islamic Debates on the Beginning of Human Life."

The paper by Prof. Ghaly presents a detailed case study of the issues that are dealt with more philosophically by Prof. Golshani and others. I am afraid that I am not competent to judge the specific issues that are covered in the symposium on which Prof. Ghaly reports. But I do very much endorse his final conclusion about the result: "The case of the IOMS symposium shows that exactly the opposite (viz. increasing interest in religion) can be the driving force behind medicalization" (p. 13).



The case-study approach is a good reminder of the way that the various participants in this Task Force can complement each other's work. The philosophers and theologians are sometimes in need of more concrete case studies in order to render their work concrete. And the authors of case studies need to achieve the kind of conceptual clarity that the philosophers are famous for. It's my hope that meeting together and discussing will produce both of these improvements.

Prof. Ghaly does offer an attractive programmatic statement at the end of his article:

Thus, medicalization here is not presented as a substitute for religion but as a tool for understanding the religious tradition in a new or better way and to make it compatible with the modern reality... realized that none of them can claim exclusive authority over such sensitive issues and how they should be approached and addressed. Both groups [biomedical scientists and religious scholars] learnt that scientists cannot solve the moral questions alone and religious scholars cannot argue without the updated scientific knowledge (13).

I see three components of an important program in this passage. First, Ghaly calls for humility; no one group should claim "exclusive authority." Second, he rightly insists on the need to recognize complementarity: "scientists cannot solve the moral questions alone," but nor can religious scholars do their work well without "updated scientific knowledge."

That point, finally, calls for new kinds of interdisciplinary groups within the Islamic world — and ideally at the major universities. A number of the papers in this collection make this suggestion in different forms. I hope that the organizers of this week's conference will dedicate some time at the end to a discussion of exactly what form these groups might take. If such groups really did grow out of this consultation and become established at universities across the Muslim world, it might well be the most single important result of our work together.

6. Nidhal Guessoum, "Islam, Science, Methodological Naturalism, Divine Action, and Miracles"

It has been almost ten years since I met Nidhal, and my respect for him has grown constantly over these years. He is the consummate diplomat — whether it is negotiating to bring about consensus, as he did in Doha in



2008 as we worked to formulate the Declaration on Islam and Science, or whether it is representing Islam in the tense discussions within the Templeton Prize Advisory Committee. This semester I am teaching his Islam's Quantum Question and coming to more deeply recognize the many achievements of that book.

I also respect Nidhal's courage. Many of us who represent a religious tradition can "soft-peddle" the conflicts between some traditional religious statements and some parts of science. Nidhal's habits of mind (and of character) lead him right into the most difficult areas and the most difficult issues. Having watched what often happens with one's co-religionists as a result, and having done the same within my own tradition for many years, I am well aware of how costly this approach can be. I believe that those of us who are more cautious in our formulations, more concerned to walk away with answers, owe a debt of gratitude to those of our colleagues, like Nidhal, who keep us honest. For the danger is that, unlike him, we will rush to harmonize science and faith too quickly, papering over areas of tension that actually deserve a closer look. Nidhal's intent is positive, but he wants us to "sit with" the tensions (as my Buddhist friends say) before we move too quickly to formulating our answers.

In this paper Guessoum concentrates in particular on the recent (2014) collection by Stefano Bigliardi. It is a rich source of concepts and approaches. But it is also an ideal field for Nidhal "to do a Guessoum," if I may create a new verb in English. Where others might highlight a series of strong answers, Nidhal probes for the tensions, the uncertainties, the unanswered questions. His attention goes to the concepts of methodological naturalism and causation, and he probes to see what positive and negative effects these concepts have for questions of divine action and miracles.

As he notes, "On the Muslim side, there have been very few, if any, fully argued proposals for viewing God's action in the world, perhaps due to its high sensitivity" (p. 4). Here I should be careful, since the answer to which Guessoum is drawn — "I had previously suggested an alternative viewpoint: that God acts only on minds/spirits" — is one that I have been defending in books over 15 years, mostly recently in *The Predicament of Belief* and in *Adventures in the Spirit*.

Guessoum's response to both topics in his paper (divine action and miracles) reveals the central features of his research program. Let me try to put words on what that program is, in order to show why I think his research program is particularly important. It is this: Guessoum asserts that the conflicts are deeper and the problems harder than many of us acknowledge. He does not believe that Muslim scholars must be driven to secularist answers like those that the



Turkish scholar Taner Edis has advocated. The most fundamental Qur'anic answers can still be affirmed, even in light of the most severe challenges. However, these answers must today be affirmed in a different framework. Accepting methodological naturalism while denying metaphysical naturalism is one example of this approach. Another is affirming divine action in ways that do not break natural law. Here Guessoum's focus on Spirit is particularly interesting: "In the Islamic tradition, there is a general understanding that the spirit is the communication channel and connection between God and humans as well as the fundamental "driving force" that God infused in humans" (4).

7. Prof Mohd Hazim Shah, "The Relationship between Science and Islam: Islamic Perspectives and Frameworks"

I am here meeting Prof. Mohd Hazim Shah for the first time. I profited greatly from the clarity of his paper. It caught my attention right from the start; reading him, one can immediately recognize that the influential four-fold typology composed by Ian Barbour grows out of the specific conflicts between Christianity and science in the context of the modern period. It would be ideal if the Muslim dialogue between religion and science, as it rapidly moves to greater prominence in the Islamic world, could leap-frog over the mistakes of "modernism" and move directly into a postmodern framework. (By "postmodern" I do not mean the deconstructive postmodernism of Derrida and the other French thinkers, but the "constructive postmodernism" of Stephen Toulmin, David Ray Griffin, Wenzel van Huysteen, myself, and others).

Prof. Shah's organization of the three approaches in Section 3 is equally insightful; it lays an excellent foundation for probing discussions of the strengths and weaknesses of each one. I also found his three observations in Section 4 to be remarkably wise. They are deserving of careful attention and reflection.

In the end, Prof. Shah is drawn to the "ethical approach" that he associates with the work of Ziauddin Sardar. I will leave it to the other participants to debate the costs and benefits of de-emphasizing the other two approaches within the field of Islam and Science. Because I am drawn to Prof. Shah's position, I wish I could be present to hear this particular discussion. It is not for me as a non-Muslim to determine whether or not the costs are too high to pay (though I do suspect that they are not as high as one might think).



I do wish to underscore, however, how crucial is Prof. Shah's critique of "value-free science" as it has been practiced in the West. There is deep wisdom in his words:

However, the pursuit of modern science and technology must be guided by Islamic values and ethics to ensure that in the long run, science and technology will serve humanity and the Muslim Ummah, and not lead to its eventual destruction, which is a real possibility looking at the way the west is using its science and technology within the framework of Capitalism. In fact even the capitalistic world had to resort to 'regulatory measures' based ultimately on some moral or ethical values, in order to ensure sustainability. (pp. 7-8)

The growing global gap between rich and poor (countries and individuals), and above all the insane refusal to instigate sustainable practices on the part of the multinational corporations, provide all that evidence we need that Prof. Shah is right. Islamic values — and, I would like to add, values derived from other religious traditions as well — are "make or break" for our planet, and thus for the human species as a whole. If we do not draw from the rich wisdom of Islam (and other traditions), it is likely that secular, capitalist values will drive humanity to the brink of extinction ... and perhaps beyond.





APPENDIX A: Translation of a standard mediaeval text of Ash'ari theology regarding naturalism and causality

The Ash'ari school has been the dominant theological school in Sunni Islam since Ghazzali, who was one of its leading exponents (d. 505/1111). The following translation summarises some of its key teachings on naturalism and causality, from a standard, canonical pre-Newtonian text of the school¹ that is still widely taught in seminaries and Islamic universities worldwide.]

[Sanusi/Disuqi: Denial of secondary causation: all that exists in nature is conjunction]

Customary judgments are those in which we posit a connection of existence or non-existence between two things in virtue of the constant conjunction between the two in our perceived experience. An example of this is judging that fire burns. This is a customary judgment as it means that, for many bodies, burning follows contact with fire, based on the constant conjunction we perceive between the two. The judgment does not mean that it is the fire itself that is causally effective in burning what it touches ... as constant conjunction cannot possibly establish this ... The only way we come to know the identity of the agent responsible for the effects that follow from such things is from the intellect and scripture. And both are agreed that it is God alone who brings all things into existence, without exception, and that nothing else has any causal effect on anything whatsoever.²

Some people have erred about those customary judgments, making them causal, by attributing effects to those things their existence is customarily conjoined with, either via their own nature or via a power deposited within them, thus falling prey to a dishonourable madness, a shameful innovation in credal foundations and a major type of polytheism: there is no movement or

1 Muhammad bin Ahmad bin 'Arafah al-Disuqi al-Maliki, *Hashiyah al-Disuqi 'ala Umm al-Barahin wa sharhiha* [Disuqi's Marginal Notes on the Source of Proofs and the Commentary upon it by Imam Muhammad bin Yusuf bin 'Umar bin Shu'ayb al-Sanusi], al-Maktabah al-'Asriyyah, Beirut, 1424/2003. The author of the source text, Sanusi, lived 832-895/1428-1490, whilst the commentator, Disuqi, died in 1230/1815. Thus the author is pre-Newton whilst the commentator was almost a contemporary of Darwin.

2 Sanusi/Disuqi, 58-61



*power, except by God, the High and Magnificent.*³

[Denial of intrinsic or extrinsic causal powers]

*No existent thing [other than God] has any causal effect on any other. For if it did, that effect would be independent of God, yet God is the One upon whom everything else is dependant without exception and in all circumstances. This is if you suppose that an existent thing has causal effects by its nature. But if you suppose that it has causal effects by a power that God has placed in it, as many ignorant people think, then that is also impossible, because in that case God would be dependent upon a [causal] intermediary in order to achieve certain actions, and that is false because God is necessarily independent of all that is not Him ...*⁴

This shows the falsity of the view of the naturalists according to which natures, humours and the like have causal power, such as: the power of food to satiate hunger; of water to quench thirst, grow plants, purify and clean; of fire to burn; of cloth to cover nakedness and protect from heat and cold, etc. Some of them think that these things have the stated effects in virtue of their (intrinsic) natures and essences. Ibn Dihaq said, "There is no disagreement that whoever believes this is an unbeliever."

Others think that these things do not have the stated effects in virtue of their (intrinsic) natures, but rather by means of a power that God deposits in them, which, if removed, would render the thing causally inert. Ibn Dihaq said, "Many common believers have adopted this belief of the philosophers and there is no disagreement that whoever believes this is (at least) an innovator, but whether or not he is an unbeliever is a matter of disagreement."

*The believer with true faith is the one who attributes no causal power whatsoever to such things, neither in virtue of their (intrinsic) natures nor a power that has been deposited in them, but believes that God Almighty has - purely of His own choice - made it a customary habit to create one set of things immediately after another set, not by means of that other set.*⁵

[Assertion of metaphysical determinism: free will is an illusion]

The servant (of God) is free only apparently; in reality he is coerced. For,

³ Sanusi/Disuqi, 61-62

⁴ Sanusi/Disuqi, 343-4

⁵ Sanusi/Disuqi, 344-5



(even) his choosing is created by God. Thus, he is apparently free and actually coerced, a coerced being with the apparent form of a free one. This is in contrast to the Mu'tazila [Rationalists], who say that he has free will outwardly and inwardly, and to the Jabariyyah [Determinists], who say that he is coerced outwardly and inwardly.⁶

It may be objected that the Sunni view (of human acts) entails coercive determinism as it does not give the agent any causal power over his acts despite being accountable for them. In response, we say that the problematic coercive determinism is the physical one, according to which humans may be held accountable for actions outside of their capacity.⁷ As for metaphysical determinism, which consists in not attributing creative power to humans, it is incumbent upon all the sects, and there is no harm in it for it is the pure essence of faith itself.⁸

Thus, leading Ash'ari theologians assert the following basic principles; rejection of these are deemed as blasphemy or polytheism, expelling a person from the fold of Islam. Other Ash'aris within the same school dispute this, finding room for secondary causation. Hence, addressing these is crucial for a conversation between Islam and causal science:

- Denial of secondary causation: all that exists in nature is coincidental conjunction
- Denial of intrinsic or extrinsic causal powers
- Assertion of metaphysical determinism: free will is an illusion

6 Sanusi/Disuqi, 259

7 Such as involuntary spasms, or performing physically impossible feats.

8 Sanusi/Disuqi, 261



APPENDIX B: A mediaeval text on the soul and spirit

The following is a detailed, representative summary of traditional views on the soul and spirit, found in Suyuti's commentary on the disputed hadith, "He who knows himself, knows his Lord."⁹ The soul was often regarded as a "subtle, incorporeal body" (*jism latif*) somehow inhabiting or co-inhabiting the physical body.

Shaykh 'Izz al-Din [b. 'Abd al-Salam] said, "One of the secrets of this hadith has become apparent to me, and it must be unveiled and described clearly. It is that Allah, Glorified and Exalted, has placed this Spirit (Ruh) in a physical body as a subtle divine force in a human skeleton, as an indication of His Oneness and Lordship. There are ten ways in which this conclusion may be inferred:

1. *Since this human form needs the spirit to cause movement and manage all its matters, we know that the world must have a Prime Mover and Disposer of all Matters.*
2. *Since the disposer of the body, i.e. the spirit, is one, we know that the Prime Mover of the world must be One, having no partner in His Disposing and Decree. Further, there cannot be a partner in His Dominion. Cf. Qur'an, "If there were, in the heavens and the earth, other gods besides Allah, there would have been confusion in both!" (21:22); "Say: if there had been gods with Him - as they say - behold, they would certainly have sought out a way to the Lord of the Throne!" (17:42); "No son did Allah beget, nor is there any god along with Him: (if there were many gods) behold, each god would have taken away what he had created, and some would have lorded it over others!" (23:91).*
3. *Since the body cannot move without the will of the spirit and its causing movement, we know that Allah wills everything that happens in the universe. No mover moves in good or evil without His Decree, Will and Pre-estimation.*
4. *Since nothing moves in the body without the spirit knowing and feeling it, for none of the movements and cessations of the body are unknown to the spirit, we know that not even an atom's weight in the earth or heaven escapes Him.*
5. *No part of the body is closer to the spirit than any other part, but the spirit is*

⁹ Imam al-Suyuti, *al-Hawi li l-Fatawi* [A Collection of Fatwas], Dar al-Kutub al-'Arabi, Beirut, n.d., vol. 2 pp. 451-5.



close to every part of the body. Similarly, no part of creation is closer to Him or further away from Him than any other part, but He is near to every thing.

6. Since the spirit existed before the body, and will exist once the body has disintegrated, we know that Allah Exalted existed before His creation and will exist after His creation. He has always existed. He will always exist. He is Sanctified above ceasing to exist.

7. Since the "how-ness" of the spirit in the body is unknown, we know that He is Sanctified above "how-ness."

8. Since the "whereabouts" of the spirit in the body is unknown, we know that He is beyond "how-ness" and "where-ness", and cannot be described with "how" and "where." Just as the spirit exists throughout the body, with no part of the body being without spirit, similarly The Truth, Glorified and Exalted, exists in every place; no place is without Him. He is beyond space and time.

9. Since the spirit in the body cannot be seen with the eyes, nor represented in an image, we know that sight cannot overtake Him, nor can He be represented in images. He cannot be compared to suns and moons. "There is nothing like unto Him. He is All-Hearing, All-Seeing." (42:11)

10. Since the spirit cannot feel or touch, we know that He is beyond feeling, body, sensation and touch.

Hence, this is the meaning of the Prophet's statement, "He who knows himself, knows his Lord," so Felicity for whoever attains gnosis and acknowledges his own sins."

[End of quote from Shaykh 'Izz al-Din b. 'Abd al-Salam.]



APPENDIX C: Primary Theological Objections to Evolution and Scientific Responses

It is worth restating the primary theological and scriptural objections that many Muslims, including theologians and religious scholars, have regarding the idea of human evolution, along with brief replies.¹⁰

1. Miraculous Adam: "Wasn't Adam created miraculously, so he can't have evolved?"

This objection is primarily based on the following verse of the Qur'an: *With God, Jesus is like Adam: He created him from dust, then said to him, "Be!" - and he was!* (3:59)

Answer: It may be simply argued that the above verse itself affirms a gradual, natural process for the (virgin) birth of Christ, so why not a natural process for Adam?

2. Humble origins: "Surely, the greatest men and women such as Abraham, Moses, Mary, Jesus and Muhammad (peace be upon them) could not have had common ancestors with apes?"

Answer: The Qur'an repeatedly points to our humble origins, from "despised drops of water" (*ma' mahin*)

3. The Fall: "Adam and Eve were created in Heaven (Paradise), and sent down to earth later, so they cannot have evolved on earth."

In the Qur'anic story, after Adam and Eve ate from the Forbidden Tree, they were expelled from the Garden and sent down to Earth.

Answer: The Qur'anic Jannah refers to both heavenly and earthly gardens. Some of the early commentators believed that Adam's garden was earthly, e.g. Tabari and Ibn Kathir refer to this difference of opinion.

¹⁰ Cf. presentations by Nidhal Guessoum and Usama Hasan at the *Islam and Science Workshop*, London, January 2013



4. Denying God: "The theory of evolution leads to atheism, doesn't it?"

Answer: No, it does not necessarily lead to atheism, since it is easy to accept that God could have created humans via a process of evolution. Science tells us how we were created. Revelation tells us why we were created.

Thus, the theological, scriptural, philosophical and metaphysical discussions about evolution within Muslim discourse are crucial to the addressing of this topic in Muslim societies and circles.

5. Denying Teleology: The above are all relatively superficial objections, although strongly held by some, based on scriptural literalism. Perhaps the strongest philosophical objection is that of Nasr and his colleagues: that Darwinian evolution denies any teleology. One key feature of most interpretations of evolution is that the emergence of species was not teleological – that the process was not happening to ultimately create humans. This uncertainty and openness is often difficult for religious believers to accept because it would deny the teleology of creation. It is one of the main reasons why Nasr and colleagues oppose evolution.

Responding to this objection requires advanced knowledge of evolutionary theory, including different competing interpretations aside from neo-Darwinism. Amongst the prominent contributors to this field are Stephen Jay Gould¹¹, Christian de Duve (who describes the "long and distinguished past ... [of] a teleological view of evolution" developed by Henri Bergson, Pierre Teilhard de Chardin and Lynn Margulis¹², Simon Conway Morris¹³ and Sarah Coakley.¹⁴

De Duve argues that most biologists subscribe to a version of Darwinian naturalistic evolution that is accidental and "blind." He describes several types of dissenters: he dismisses the creationists for rejecting natural selection and even the very occurrence of biological evolution. He also describes "tedious, sometimes acrimonious debates" amongst evolutionists "on such issues

11 Stephen Jay Gould, *The Structure of Evolutionary Theory*, Harvard, 2002

12 Christian de Duve, "Mysteries of Life: Is There Something Else?" in *Perspectives in Biology and Medicine*, 45:1 (Winter 2002), 1-15; reproduced with slight revisions in *Science and the Search for Meaning - Perspectives from International Scientists*, ed. Jean Staune, Templeton, 2006, pp. 38-58

13 Simon Conway Morris, *Life's Solution - Inevitable Humans in a Lonely Universe*, Cambridge, 2003

14 Sarah Coakley, *Sacrifice Regained: Evolution, Cooperation and God*, the 2012 Gifford Lectures at Aberdeen University, at <http://www.abdn.ac.uk/gifford/about/2012-giff/> (forthcoming with OUP, 2016)



as gradualism, saltation, punctuated equilibrium, genetic drift, speciation, population dynamics” and other Darwinian concepts. He describes the proponents of a teleological view of evolution, who “accept evolution but reject a purely naturalistic explanation of the process ... [To them, evolution is] directed by a special agency that somehow induced changes according to a preconceived plan.” De Chardin was a Jesuit who attempted to reconcile biology with the Catholic faith. Margulis championed so-called holistic views of biology, including Lovelock’s Gaia concept and the “autopoiesis” theory of the “Chilean biologist-cum-mystic Francisco Varela.”

The American theoretical biologist Stuart Kaufmann, an expert in computer-simulated “artificial life,” believes that classical Darwinism is incomplete since it does not include the powerful intrinsic ability of biological systems to self-organize, creating order for free. The British-Australian physicist Paul Davies is committed to naturalistic explanations but invokes a “new type of physical law” to explain life’s ability to “circumvent what is chemically and thermodynamically ‘natural’.” Michael Behe, in his *Darwin’s Black Box*, argued that “irreducible complexity” and other considerations revealed that the existence of “design” in living systems is a scientific fact. However, his arguments have come under sustained criticism. Michael Denton argued that the laws of biology reveal “purpose” in the universe.¹⁵

Gould argues that the facts of evolution favour structuralism. Denton argues that biology obeys “laws of form” that means that similar forms constantly reoccur in living systems.¹⁶ Presumably such laws of biology would arise from the nature of living systems that are subject to underlying laws of biochemistry, chemistry, physics and mathematics.

De Duve argues that evolution is subject to *channelled randomness* and *convergence*:

God plays dice because he is sure to win ... Life is a cosmic imperative ... The laws of biochemistry produce such strict constraints that chance is channelled and the appearance of life and even of conscious thought becomes an obligation in the universe and so on many occasions.”

He continues, “According to the theory I defend, it is in the very nature of life to generate intelligence everywhere (and when) the necessary conditions are met. Conscious thought belongs to the cosmological scheme, not as an epiphenomenon due to the strictly inherent randomness in our biosphere, but

¹⁵ De Duve, quoted in Staune, pp. 48-50

¹⁶ Michael Denton and Craig Marshall, *Laws of form revisited*, Nature, 410, 22 March 2001, p. 417



as a fundamental manifestation of matter."¹⁷

Simon Conway Morris argues that evolution must be reproducible, since it has the property of convergence:

"For classical Darwinians, it is highly improbable that the occupants of a planet may resemble those of another planet ... The phenomenon of evolutionary convergence indicates that, on the contrary, the number of alternatives is strictly limited ... If this thesis is correct, it suggests that if we explore how evolution 'navigates' to a particular functional solution, it could provide the basis for a more general theory of biology. Essentially this approach points to the existence of something like an 'attractor' by which evolutionary trajectories are channelled into modes of stable functionalities."

He continues, *"Mammals and monkeys (or all other biological entities) emerged through specific historical trajectories, but in these cases (and in many others), the various convergences towards mammals and monkeys that we have gathered here, indicate that while each story is necessarily unique, the complex forms we find at the end of these processes are not simply the result of local and random events. On any other planet with similar characteristics, I suggest we will find animals very close to mammals, and mammals closely related to monkeys. Not identical, but similar, perhaps surprisingly similar."*

Morris comes up with the following conclusions:

- (i) Selection does not explain the fundamental structure of living beings, but only some of their adaptations. In living beings, structure is first towards function. Adaptation is secondary: it does not produce a fundamental structure such as the plan of tetrapod vertebrates.
- (ii) Organisms have their own internal logic and sometimes seem to follow it regardless of environmental changes they are going through and the selection exerted on them.
- (iii) Randomness does not exclude inevitability. Constraints exerted on living beings can ensure that certain results will appear, even in cases where the basic process of evolution were to be based on chance.
- (iv) Evolution, seen in its entirety, has a logic which includes growth towards complexity. It does not at all correspond to the idea of a 'bushy' evolution going in all directions.

¹⁷ Christian de Duve, *Poussière de Vie*, Editions Fayard, 1996



(v) The independent emergence of identical forms (convergence) is a strong argument in favour of structuralism in evolutionary theory.

(vi) The basic elements of life that are the proteins, are like snowflakes: their three-dimensional form is written in the laws of nature.

(vii) Biological forms can therefore be of natural origin and not the result of contingent processes, and the more so as a number of these forms can be represented using mathematical formulas.

Morris finally concludes:

“My opinion is that such a search program could reveal a deeper level of biology in which Darwinian evolution remains a central concept, but where possible, functional forms are predetermined since the Big Bang.”¹⁸

¹⁸ Morris, pp. 308-310



APPENDIX D: Extract from Basil Altaie, God, Nature and the Cause, KRM publication, 2016 (in press), Chapter 6, pp. 147-160.

The Size of the Universe

In the first discussion of his *Tahāfut al-falāsifa*, al-Ghazālī discussed the problem of the temporality and the eternity of the world. His strategy was based on defying what he considered to be the strongest arguments of the philosophers in claiming that the world should be eternal, raising some challenging questions for the philosophers, discussing their views and showing that their arguments were inconsistent. In this context, al-Ghazālī presented a very deep and thoughtful discussion of space and time, defending the necessity to recognize the fact that space and time allocations should not be taken as absolute, but should always be considered in reference to a given point in space or time. This was indeed a very advanced comprehension of a topic that might well be considered a problem for the modern science of the twentieth century. Al-Ghazālī used the terms “spatial dimension” and “time dimension”. (8) He refused the notion of a space that goes beyond the world and refused the existence of time before the creation of the world. (9) And it was through this comparison between space and time that he introduced the question about the size of the world, allowing for the possibility that the world could have been created larger or smaller than it is. With his sophisticated concept of space and time, and his realization of the analogy between space and time, al-Ghazālī refuted the philosophical claim that an infinite extension of time should have existed before the creation of the world. The most important argument which was placed in this context was the notion that both space and time existed only after the creation of the world, a concept that was established only by the modern theory of cosmology

One of the arguments of al-Ghazālī concerned the size of the universe, where he posed the question of whether the universe could be larger or smaller than it is. This he posed in order to challenge the philosophers, trying to force them to admit one thing or another in their views concerning the existence of time before the creation of the universe. The philosophers used to argue that, if the universe were not eternal but had been created in time with a well-



defined beginning, then why did the Creator wait so long before creating it? Obviously, this question implicitly assumes that the Creator lives in time.

Al-Ghazālī first questioned the philosophers over whether the world could have been created by God larger than its known size: "Did it lie within God's power to create the highest heaven greater in thickness by one cubit than the one He had created?" (10) Then he commented: "If they say, 'No,' this would be [the attribution to Him of] impotence. If they say, 'Yes,' then [it follows that God could have created it] greater by two cubits, three cubits, and so on, ascending *ad infinitum*".(11)

Consequently, al-Ghazālī concluded that, if the answer was "yes", then this would imply the affirmation of a space beyond the world that has a measure and quantity, since that which is greater by two cubits does not occupy the equivalent space as the one greater by one cubit. Accordingly, he said: Then, beyond the world there is quantity, requiring thus that which is quantified -namely, either body or the void. Hence, beyond the world there is either void or filled space.(12)

By setting this argument, al-Ghazālī posited a fundamental paradox that the philosophers were required to solve. The paradox had two faces: they could have said that beyond the world there is a void into which the world could be expanded. But the existence of such a void went against the doctrines of the philosophers, who refused the existence of voids anywhere in the world. Alternatively, they could have said that beyond the world there is a matter-filled space. In this case, there would be no reason why such a filled space should not be part of the world itself, since it would then be no more than an extension of the world itself.

Similarly, al-Ghazālī posed the other question of whether God is able to create the world's sphere smaller by one cubit, then by two. Accordingly, if one could accept that the measure of the world is reducible in size then, according to al-Ghazālī, this would imply that the void which is left when we reduce the size of the world is measurable, while being nothing. The other side of the paradox was to challenge the philosopher about the limit of God's authority with respect to creating and sustaining the world, a challenge that Muslim philosophers certainly would not have been able to stand.

In fact, the aim behind posing these questions concerning the size of the world was tactical rather than strategic. Al-Ghazālī had no intention of showing that the universe could be expanded or contracted, he intended to show only that we must consider the temporal designations in respect of the before and the after on an equal footing with the spatial assignments of



the above and the below. That is to say the temporal assignments of events should be done with respect to a given reference rather than being absolute. Therefore, here al-Ghazālī's argument served a dual purpose: one by which he intended to show that there is no basic natural objection to having a universe larger or smaller than the existing one, and the other that such a possibility would certainly reassure the conceptual integrity of space and time. Consequently, he made an effort to use these results for refuting the claim that a temporal world necessitates the existence of a time duration before creation had taken place. For this reason, it could be said that al-Ghazālī would be quite happy with the contemporary argument put forward by Adolf Grünbaum(13), which says that the moment of creation does not qualify as a physical event, since there was no physical moment before the initial moment of the big bang. Indeed, according to al-Ghazālī, the creation of the world did not happen in time but happened with time, as he put it. For this reason, it is legitimate to argue that there is no well-defined moment of creation, since real time only started with that moment. This would indeed be quite consistent with an earlier argument of al-Ghazālī.

Similarly, if we are asked: does the world have a "before"? we answer: If by this is meant does the world's existence have a beginning, that is, a limit in which it began, then the world has a "before" in this sense, just as the world has an outside on the interpretation that this is its exposed limit and surface end. If you mean by it anything else, then the world has no "before," just as when one means by "outside the world" [something] other than its surface, then one would say: there is no exterior to the world. Should you say that a beginning of an existence that has no "before" is incomprehensible, it would then be said: A finite bodily existence that has no outside is incomprehensible: If you say that its "outside" is its surface with which it terminates, [and] nothing more, we will say that its "before" is the beginning of its existence which is its limit, [and] nothing more.(14)

So it is here that the moment of creation is considered unique, in that it has no similarity to any other subsequent moment. To confirm this, al-Ghazālī further emphasized the premise that God is timeless and, therefore, the question of what God was doing before the creation of the universe becomes meaningless, a position similar to that put forward by St. Augustine.

Ibn Rushd Responding

In his book *Tahāfut al-tahāfut* (The Incoherence of the Incoherence), Ibn Rushd tried to refute the claims of al-Ghazālī by criticizing his arguments and presenting counterarguments. As far as the question of the size of the universe is concerned, Ibn Rushd at first denied that the philosophers had said that



God could not change the size of the universe, and rejected the accusation that their position on this matter implied that God is impotent:

This is the answer to the objection of the Ash'aris that to admit that God could not have made the world bigger or smaller is to charge Him with impotence, but they have thereby compromised themselves, for impotence is not inability to do the impossible, but inability to do what can be done.(15)

Clearly, to say that impotence is not the inability to do the impossible but the inability to do what can be done is true with respect to human acts, but not to divine acts, for we are not sure whether anything is impossible for God. Ibn Rushd confirmed this attitude by saying:

This consequence is true against the theory which regards an infinite increase in the size of the world as possible, for it follows from this theory that a finite thing proceeds from God which is preceded by infinite quantitative possibilities. And if this is [an] allowed for possibility in space, it must also be allowed in regard to the possibility in time, and we should have a time limited in both directions, although it would be preceded by infinite temporal possibilities.(16)

He then concluded:

The answer is, however, that to imagine the world to be bigger or smaller does not conform to truth but is impossible. But the impossibility of this does not imply that to imagine the possibility of a world before this world is to imagine an impossibility, except in case the nature of the possible were already realized and there existed before the existence of the world only two natures, the nature of the necessary and the nature of the impossible? But it is evident that the judgment of reason concerning the being of these three natures is eternal, like its judgment concerning the necessary and the impossible.(17)

This means that it is not contingent at all for the size of the universe to be smaller or larger than it is, but is something which falls between being either necessary or impossible. With this digression, Ibn Rushd shifted the argument from the arena of metaphysics to the arena of physics. By such a designation, Ibn Rushd thought he could refute al-Ghazālī's conclusions and win the argument. From his point of view, it is impossible for the universe to be larger or smaller than its natural size, since the specified size of the universe is a necessity. Accordingly, a larger or a smaller universe would be rather impossible. As for the designation of the necessity and the impossibility, it is clear that Ibn Rushd was adopting the naturalistic dogma which assumes that whatever happens in the world has to be effected through purely natural causes and that it should take place in accordance with the laws of nature.



However, this can be validated only if we have full knowledge of the laws of nature, but, since we now know that our knowledge of the laws of nature is incomplete (see Chapter Two), it would be rather more humble to allow for the possibility for the event to happen rather than deny it. This is, in fact, the contemporary approach adopted by the modern science that we have developed through the ages, and according to which new discoveries are made.

Ibn Rushd further embraced his denial of a possibility for the universe to be larger or smaller than its known size, trying to substantiate his views with more arguments which stemmed, perhaps, from his inability to visualize time on an equal footing with space. Thus, he was unable to accept the notion of spacetime integrity and the absence of absolute space and absolute time, such points which were very essential to the argument used by al-Ghazālī. In fact, Ibn Rushd suggested that, if the universe were allowed to expand, then there is no reason why it should not do so forever:

Therefore, he who believes in the temporal creation of the world and affirms that all body is in space, is bound to admit that before the creation of the world there was [a] space, either occupied by body, in which the production of the world could occur, or empty, for it is necessary that space should precede what is produced.(18)

Again, it is clear that Ibn Rushd had missed the point made by al-Ghazālī that space itself was non-existent before the creation of the world. This is because he thought of space and time as two independent entities. From the point of view of al-Ghazālī, the existence of an empty space into which the universe could be extended would be unnecessary, as space was born along with the creation of the universe. The same argument applies to time, since space and time are integrated and should be treated on an equal footing, at least on the conceptual level.(19)

Clearly, al-Ghazālī had allowed for two possibilities for the universe to be larger or smaller than it is. He could foresee no rational reason to prevent such a possibility. It might be true that his argument stemmed from his submission to the belief in the unlimited power of Allah to do whatever was contingent. On the other hand, Ibn Rushd had based his argument on the Aristotelian proposition that the size of the universe is fixed and no other possibility is allowed. His argument that, once the universe is "allowed" to be bigger, there would be nothing to stop it from expanding further was unacceptable, since this would lead to an infinite universe once we assume that it had no beginning, a result which would be in contradiction with the Aristotelian doctrine of a finite universe. Aristotle argued that the universe is spherical and



finite. Spherical, because that is the most perfect shape; finite, because it has a center, namely, the center of the earth, and a body with a center cannot be infinite. Therefore, based on the arguments presented by al-Ghazālī which implied that the universe could have been created larger or smaller than its known size, we conclude now that the philosophers should either have abandoned their assumption of the eternity of the world or their doctrine of a geocentric universe. It would be fascinating to see how this conclusion echoes in the modern understanding of the cosmos, a question which I leave for further research.

Scientific Assessment

By the beginning of the twentieth century, some astronomers had started a program of observations aimed at studying the motion of nearby galaxies. It was found that most of these galaxies, which are called “the local group”, are descending away from us. Through patient observations that were made during the first two decades of the last century, it was established by the works of Vesto Slipher and Edwin Hubble that the universe is in fact expanding. Hubble deduced that the further away a galaxy is from us, the faster it is descending.(20)

Using this discovery, George Gamow and collaborators suggested a scenario to explain the natural abundance of elements, that is the average percentage of each of the ninety-two natural elements found in the universe. This scenario was later called the “big bang theory”. A continuously expanding universe was already an option suggested by the theory of general relativity. This theory was proposed by Albert Einstein in 1915 and, having been confirmed by many observations, it was adopted to be the standard theory of space, time, and gravity. The theory replaced Newton’s law of gravity, which had served the astronomical calculation of the solar system for about 300 years. Almost all models of modern cosmology are based on this theory, according to which the universe is being driven to expansion by its own internal energy. Indeed, modern cosmology allows for an infinite universe as a possible solution to the Einstein field equations, although the universal model which was proposed by Einstein himself was static, finite, but unbound.

The Einstein static model was a sort of an artifact that was designed by Einstein after modifying his field equations. Einstein was driven by the prevailing belief that the universe is finite and static, a belief that might be a relic of Aristotle’s universe. The Einstein universe cannot expand nor can it collapse, for once it starts to expand it will do so forever and once it shrinks it will go on shrinking to a point. This critical behavior makes Einstein’s universe extremely unstable, like a pencil standing on its tip. It is interesting to note that



Ibn Rushd's conjecture concerning the ever-expanding universe echoes in Einstein's model. However, since the discoveries made by Hubble and others have confirmed an expanding universe, the Einstein static universe became redundant. Other dynamic models were alternatively proposed, which were deduced by solutions of the original (unmodified) Einstein field equations.

These provided us with three options: a universe which expands forever by an ever-accelerating rate, and this was called the "open universe"; a universe which expands forever but with less acceleration, to reach an ultimate terminal speed at later times, this was called the "flat universe"; the third model is a universe that expands until reaching a maximum size within a finite duration of time and then starts a collapse, at the end of which phase it returns to its original state, and this was called the "closed universe". It is this third model here that may correspond with what the Qur'an points to in verse 21:104. However, if the universe is expanding now, then this means that in the immediate past it must have been smaller in size.

Therefore, one might ask where the universe is expanding to. Is it that beyond the universe there is a void into which the universe is expanding? Modern cosmology, which is based on the theory of general relativity, assumes that the universe is four-dimensional, three dimensions are for space and the fourth dimension is time, into which the universe is expanding. Accordingly, the universe has no outside and if we have to talk about the universal volume in space then we have to accept the fact that we can only see the surface of the universe from within. This is realized in the cosmological model for the universe set forth by the theory of general relativity, by saying that the volume of three-dimensional space that we see is actually a three-dimensional surface embodied in a four-dimensional spacetime, hence time is the axis along which space is expanding.

For this reason, cosmological expansion is understood as being the growth of space in between cosmological large structures. This allows us to view the situation in analogy with the expansion of a two-dimensional balloon surface, where we see dots separated by larger and larger distances as the balloon is inflated.

It might be astonishing to know that al-Ghazālī had realized the fact that the universe has no outside. He expressed his understanding by saying: If you mean by it anything else, then the world has no "before," just as when one means by "outside the world" [something] other than its surface, then one would say, there is no exterior to the world.(21)

This sentence came in the context of describing that the world has a



beginning but no moment before that beginning, stressing the notion that space and time existed with the creation of the world but not before. Furthermore, al-Ghazālī treated space and time on an equal footing:

It is thus established that beyond the world there is neither void nor filled space, even though the estimation does not acquiesce to accepting [this]. Similarly, it will be said that just as spatial extension is a concomitant of body, temporal extension is a concomitant of motion . . . There is no difference between temporal extension that in relation [to us] divides verbally into "before" and "after" and spatial extension that in relation [to us] divides into "above" and "below". If, then, it is legitimate to affirm an "above" that has no above, it is legitimate to affirm a "before" that has no real before, except an estimative imaginary [one] as with the "above". (22)

This is surely an advanced conceptual understanding that is in agreement with the current understanding of modern cosmology and the theory of general relativity.

The Degeneration of the Sun

The Sun, which is the brightest object in the sky with all its influence on terrestrial life on Earth, has attracted the attention of man since the very early times of his existence. Some nations worshiped the Sun and on many occasions the Sun was taken to symbolize power and life.

According to al-Ghazālī, the Greek philosopher Galen proposed that the Sun is an eternal heavenly body that should not corrupt or diminish. The fact that heavenly bodies were believed to be non-corruptible is one basic doctrine of the philosophy of Aristotle and his followers. (23) The Sun, the planets, and all the stars were believed to be formed of a fifth element called "ether". It was the sub-lunar world only, the air and the Earth, which was believed to be corruptible

In the second discussion of the *Tahāfut al-falāsifa*, al-Ghazālī tried to refute the proposition put forward by the Greek philosophers that the world, space, and time are eternal. Post-eternity of the world was the main issue in this discussion and for this reason he considered the example of the fate of the Sun and he first discussed whether the corruption of the Sun could only take place through withering. The argument put forward by the philosophers (which al-Ghazālī attributes to Galen) said that, should the Sun diminish, it would suffer from withering, something which has not been seen despite the longtime of observing the Sun. Al-Ghazālī tried to refute this implicit pre-condition on the corruption of the Sun by suggesting that such a pre-condition is unnecessary: "But we do not concede that a thing is corrupted



only by way of withering. Rather, withering is but one way of [a thing's] corruption." (24)

Then al-Ghazālī argued that, even if the argument of withering is conceded for, how then would one know about withering except through astronomical observations? But, since astronomical observations are not so reliable, we cannot detect a small diminishing in the size of the Sun. Al-Ghazālī stated that, as the Sun is a very large object, a loss of a small part of it might go unnoticed:

Should the Sun, which is said to be a hundred and seventy times larger than the Earth, or close to this, be diminished by the size of mountains, for example, this would not be apparent to the senses . . . The senses, however, would have been unable to apprehend this because estimating [such an amount] is known in the science of optics only by approximation. (25)

He then made an analogy of the assimilation of a ruby, where it loses a very small amount of its mass over a long period of time:

This is similar to the case of rubies and gold that, according to [the philosophers], are composed of elements and are subject to corruption. If then a ruby is placed [somewhere] for a hundred years, what diminished of it would be imperceptible. Perhaps the ratio of what diminishes from the sun during the period of the history of astronomical observations is the same as what diminishes of the ruby in a hundred years, this being something imperceptible. (26)

So, as we see here, al-Ghazālī not only believed in a corruptible Sun, but had conjectured that the Sun might actually be diminishing at a very slow rate that would go unnoticed by the optical techniques available at his time, even by observations extending over a large period of time. This is what our current knowledge would certainly endorse

Ibn Rushd Defending Galen's View

Ibn Rushd tried to defend Galen's view, claiming that "Galen's statement is only of dialectical value". Then he argued that if the heavens were to suffer such a major change as celestial objects becoming corrupt, then such a corruption would produce a sixth element:

Should heaven, however, lose its form and receive another, there would exist a sixth element opposed to all the others, being neither heaven, nor earth, nor water, nor air, nor fire. And all this is impossible.

This he said because the fifth, heavenly, element (ether) is supposed to



be non-corruptible according to Greek philosophy so, if it were to suffer corruption, then the element of which it is composed would have to change. As no such element had been identified in the composition of the world, thus for him such an element did not exist. Ibn Rushd then questioned further the possibility of the decay of the Sun by wondering about the secondary effects produced by the decay, which, he thought, would affect the sub-lunar world: If the Sun had decayed and the parts of it which had disintegrated during the period of its observation were imperceptible because of the size of its body, still the effect of its decay on bodies in the sublunary world would be perceptible in a definite degree.

This was a reasonable expectation, since a decaying object would certainly produce some output that could be traced in the world through their secondary effects. The reason why such secondary effects are expected to happen is because:

For everything that decays does so only through the corruption and disintegration of its parts, and those parts which disconnect themselves from the decaying mass must necessarily remain in the world in their totality or change into other parts, and in either case an appreciable change must occur in the world, either in the number or in the character of its parts. In this statement, Ibn Rushd is expressing the law of conservation of matter (27), a notion which is so clear and bold here that it does make one admire his genius. However, for him such an effect had not been observed and this therefore supported the proposition that the Sun does not corrupt. Furthermore, Ibn Rushd concluded his response to al-Ghazālī by resorting to a metaphysical argument:

To imagine, therefore, a dissipation of the heavenly bodies is to admit disarrangement in the divine order which, according to the philosopher, prevails in this world.

This was not much of an argument, since we cannot see how the divine order would become disarranged unless we believe that the metaphysical order requires the heavens to be immune of corruption or change. This was what Ibn Rushd believed, that literally any change could cause such a disarrangement and may cause a change to the divine order.

Scientific Assessment

Modern astrophysics has shown that the Sun, and indeed all other stars in the universe, generates a tremendous amount of energy through the process of



nuclear fusion. This happens when four protons (hydrogen nuclei) fuse at a high temperature and pressure, producing one helium nuclei. Consequently, a large amount of energy is released from the core of the Sun in the form of heat, light, and other radiation. According to the law of mass-energy equivalence, which was discovered by Albert Einstein, the amount of energy radiated by the Sun in every second, in the form of heat, light, and other radiations, is equivalent to 4.2 million tons of mass. But this amount of radiation is only a small portion of the Sun's immense mass. At this rate, the Sun loses only about 0.001% of its mass every 150 million years. The Sun is believed to have a sufficient amount of hydrogen to sustain its energy production for the next five billion years or so, by which time the useful percentage of the hydrogen will have been exhausted and the Sun will then undergo a series of changes that will develop by fusing helium nuclei into carbon and oxygen, meanwhile releasing a huge amount of energy during this explosive fusion and causing the Sun to expand tremendously, increasing its size by 100 and changing it into a "red giant". This late phase constitutes only a relatively short part of the Sun's life and the Sun will end up collapsing into its final fate as a little "white dwarf" that can hardly be seen from Earth.

This happens as the red giant cools and the generation of heat and pressure ceases. Consequently, the Sun cannot sustain itself against the gravitational pull of its parts, causing it to collapse in a colossal event to become a white dwarf with a size smaller than that of Earth and to glow with only a faint light. All stars that have approximately the same mass as the Sun will undergo a similar fate. Other stars, which are more massive than the Sun, will develop into neutron stars, objects mainly composed of a neutron core and with the size of only about 10 km. Stars which are more than 3.4 solar mass will continue the course of their collapse and become black holes, objects with such a strong gravity that even light cannot escape it.

Accordingly, it is reasonable to conclude that the view of al-Ghazālī was more realistic than the one expressed by Ibn Rushd, despite the very interesting objections that the latter had raised against al-Ghazālī's arguments.

Al-Ghazālī's Position on Science and Religion

On many occasions, we read that al-Ghazālī was against science and scientific thinking and recently two well-known physicists (28) claimed that al-Ghazālī was one of the main reasons for the decline in science and scientific thinking in the Islamic world. Here, I will present excerpts from his introduction to *Tahāfut al-falāsifa*, which show that al-Ghazālī actually stood by the exact sciences and proper scientific thinking while opposing philosophers and the



atheistic view of the world. There are several other places where al-Ghazālī expressed his respect for the exact sciences, but these can be reported on another occasion.

Al-Ghazālī introduced his book *Tahāfut al-falāsifa* with a prologue in three parts. In the first part, he wrote about the main addressees of his book, who were mainly Aristotle and Plato:

Let us then restrict ourselves to showing the contradictions in the views of their leader, who is the philosopher par excellence and “the first teacher.” For he has, as they claim, organized and refined their sciences, removed the redundant in their views and selected what is closest to the principles of their capricious beliefs, namely, Aristotle.(29)

In the second part, al-Ghazālī differentiated between those subjects of philosophy that he was targeting and those he was not:

One into the refutation of which we shall not plunge, since this would serve no purpose. Whoever thinks that to engage in a disputation for refuting such a theory is a religious duty harms religion and weakens it. For these matters rest on demonstrations, geometrical and arithmetical, that leaves no room for doubt.(30)

At this point, al-Ghazālī went even further to discuss some of the dogmatic suspicions among Muslims about scientific achievements and the possible claims that they might be in contradiction with the stipulations of the Qur’an and the teachings of the Prophet:

When one studies these demonstrations and ascertains their proofs, deriving thereby information about the time of the two eclipses [and] their extent and duration, is told that this is contrary to religion, [such an individual] will not suspect this [science], only religion. The harm inflicted on religion by those who defend it not by its proper way is greater than [the harm caused by] those who attack it in the way proper to it. (31)

Al-Ghazālī dwells further on this topic, refuting claims of conflicting views on this matter from religious teachings and proposing that the proper understanding of those teachings did not to contradict scientific methodologies and results:

If it is said that God’s messenger (God’s prayers and peace be upon him) said, “The sun and moon are two of God’s signs that are eclipsed neither for the death nor the life of anyone; should you witness such [events], then hasten to the remembrance of God and prayer.” How, then, does this agree with



what [the philosophers] state? We say: there is nothing in this that contradicts what they have stated since there is nothing in it except the denial of the occurrence of the eclipse for the death or life of anyone and the command to pray when it occurs. Why should it be so remote for the religious law that commands prayer at noon and sunset to command as recommendable prayer at the occurrence of an eclipse? (32)

Clearly, the above examples, which we have presented here at length, reflect al-Ghazālī's positive impression of exact scientific methods and calculations that are not and should never be in conflict with the proper understanding of religious teachings. I hope this will partly refute the infamous claims spread in the West that al-Ghazālī was against science and that he was one important reason for the decline of scientific pursuit in the Islamic world.

Summary Conclusions

In this chapter, I have highlighted the opinions of al-Ghazālī and Ibn Rushd on two problems of the physical sciences: one was the question of the size of the universe and whether it was possible to have been created larger or smaller than it is; the other was the question of whether the Sun might become corrupted over long periods of time. Al-Ghazālī presented arguments which may be summarized by saying that there is no reason why it should not be possible for the universe to have been created smaller or larger in size. It is true that al-Ghazālī brought this question under the auspices of God's ability; however, his main intention was not to question God's ability, but to question the status of the space beyond the world, if any. He actually intended to confuse the philosophers on this question, as they claimed that their approach satisfied the omnipotence of God. For this reason, we find that Ibn Rushd confirmed the philosophers' belief, from the perspective of God's ability to do whatever he wishes within the canonical framework of creation.

Al-Ghazālī, it seemed, was aware of such an attitude and for this reason he took the question further to puzzle the philosophers on the question of the designations of the after and the before. Obviously, al-Ghazālī had no knowledge about the expansion of the universe, nor had he conjectured such an expansion, and for this reason the question that followed in connection with this argument was related to the recognition of a temporal succession of events marking a beginning for time, a point with which al-Ghazālī wanted to refute the eternity of the world claimed by the philosophers. As far as I know, this problem and the argumentation presented by al-Ghazālī have not yet been studied, and, as is shown in the related arguments and the concluded views here, it does have a sound value in modern cosmology even though al-Ghazālī might not have intended to claim such a target.



The second problem was the question concerning the post-eternity of the world, for which al-Ghazālī took the example of the post-eternity of the Sun. He posed the question of whether the Sun suffers any corruption over time, a point which was pivotal in Greek philosophy. This question was directly related to the classification of the world into corruptible and non-corruptible parts, since it was known that Aristotle had classified the heavenly bodies as being non-corruptible, therefore raising this point was of high importance for al-Ghazālī in order to demolish that classification. In fact, some Muslim theologians and well-known mutakallimūn have always suggested that the heavenly bodies are of a different composition from Earth.

Al-Bāqillānī, one of the prominent Ash'aris and the grand mentor of al-Ghazālī, clearly rejected the notion of ethereal celestial bodies:

As for those saying that celestial bodies are of a fifth nature, not fire nor earth, air nor water, [I would say that] this is flawed and has no proof.(33)

Moreover, we see that al-Bāqillānī, who rejected the notion of the four basic elements and their intrinsic natures, also rejected astrology on a rational basis and denied any effect of the celestial bodies on Earth and its constituents. We find him in his Kitāb tamhīd al-aw'il saying:

If someone were to say, 'why do you deny that the maker of this world and His performer, ruler . . . could have been the seven spheres that are the Sun, Moon, Saturn, Mars, Jupiter, Venus and Mercury?', we would say: 'we deny that because we know that these stars are created and they are following the course of other objects in the world since it has similar constraints of limits, finiteness, composition, motion, rest and change from one state into another which applies to all other bodies of the world. Thus if it were to be eternal all other objects should be eternal too'.(34)

In other places in his discussion of the effects of celestial bodies, al-Bāqillānī tried to refute any claim for astrological effects emerging as a generative effect on the basis that all celestial bodies are of the same quality:

If it would be acceptable for these effects to be generated then the Sun should generate the same effects as those generated by the Moon and solid rocks should generate the same effects as generated by those celestial spheres, since they are all of the same quality. (35)

Here, again, we find that mutakallimūn have presented an advanced view of the world, making the point that the world is one and the same in respect of the basic constituents and in respect of the laws that are in action. The reason why the mutakallimūn refused to attribute actions to inanimate matter is the requirement that such actions can only be generated by the presence of a will



and reason. They denied that inanimate matter could have any kind of will or reason.

Ibn Rushd discussed the arguments put forward by al-Ghazālī regarding the size of the universe and the corruption of the Sun and tried to show that these arguments were faulty. Obviously, Ibn Rushd relied completely on Aristotelian views and syllogism. He tried in vain, as far as I can see, to convince the readers that the arguments of al-Ghazālī were not valid, since his thinking went outside of the existing framework. This might be true and might have convinced a limited circle of thinkers, but not those outside it, and surely not the contemporary scientists and philosophers. The views presented by Ibn Rushd concerning these two problems would have been acceptable within the context of pre-Galilean physics, but certainly not in current astrophysics and modern cosmology.

References

8. Considering time as a dimension on equal footing with space is a fundamental concept that was introduced, in modern times, by Albert Einstein through his theory of relativity. The three known spatial dimensions were integrated with the time dimension to form the spacetime continuum.
9. No doubt, the notion that time only existed along with the creation of the world was part of the propositions of St. Augustine in his Confessions.
10. I-Ghazālī, *Incoherence of the Philosophers*, 37. Clearly in his question al-Ghazālī is talking here about God's absolute power, arguing for the possibility of having a universe larger or smaller than its known size. The argument is equally the same if he had said it would have been possible that the universe was created larger or smaller by one or more cubits. The allowance of such a possibility confirms that he was convinced by such a possibility, though he did not provide a natural reason for it.
11. Ibid.
12. Ibid., 38.
13. Grünbaum, "Creation as a Pseudo-Explanation".
14. Al-Ghazālī, *Incoherence of the Philosophers*, 35.
15. Averroes, *Tahafut al-Tahafut*.
16. Averroes, *Tahafut al-Tahafut*, 65.
17. Ibid.
18. Ibid., 66.
19. See Chapter Five in this volume on space, time, and kalām.
20. See Erwin Hubble, *American Scientist* 43, no. 2 (1943).
21. Al-Ghazālī, *Incoherence of the Philosophers*, 35.
22. Ibid., p.33
23. I could not find a clear citation for Galen regarding this, but surely the general idea is known to be part of the Greek philosophical doctrines? See, for example, S. Marc Cohen, Patricia Curd, Charles David, and Chanel Reeve, eds., *Readings in Ancient Greek Philosophy: From Thales to Aristotle*, 3rd ed. (Indianapolis, IN: Hackett, 2005).
24. Al-Ghazālī, *Incoherence of the Philosophers*, 49.



25. Ibid.
26. Ibid, 49.
27. Although it is not so for the conservation of energy, as the concept of energy was unknown at the time.
28. See Weinberg, "Without God".
29. Al-Ghazālī, Incoherence of the Philosophers.
30. Ibid, 4.
31. Ibid., 6.
32. Ibid.
33. Al-Baqillānī, Kitāb al-tamhīd, 64.
34. Ibid., 66.
35. Ibid., 75.





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