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Bridging Political, Cultural and Religious Divides:
The Role of Academies of Sciences and Humanities*

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Abstract

This paper addresses the question why science in the Muslim world, after its influential position at the end of the first and the beginning of the second millennium,has declined to a marginal position at present, and what Academies of Sciences can contribute to building, or rather rebuilding, bridges between science and higher education in the Muslim and the Western world. There is no doubt that the causes of such decline are manifold and in several ways dialogue and cooperation between Academies from the two worlds can be helpful here. In this paper it is also suggested that to quite some extent the intolerant,anti-science attitude of some leading Islamic clergy bears responsibility for the backward state of science in many Muslim countries. The rejection of the universality of science, the resistance against freedom of thought and speech,and the claim of 'otherness' of the Muslim experience leading up to the efforts to develop an Islamized science seriously hamper the development of science and technology, and bear resemblance to the harmful curtailment imposed on science by church authorities in the pre-renaissance Western world. It is defended that 'truths' in holy scriptures and 'truths' in science are of a totally different order and cannot be at variance any more than a poem can be at variance with mathematical physics.

1. Introduction

The fourth objective of the 18th Conference of the Islamic World Academy of Sciences (IAS) held in Qatar on 22-24 October 2011, as formulated in the 1st conference circular, was *'to air the views of scientists and academicians on ways to bridge the divide between the Islamic World and West….'*. Although I have tried to acquire some insight into the Islamic scientific and scholarly sphere of thought by reading some relevant literature, my views as presented in this paper may be defective since I cannot claim great expertise on Islamic academic thought.

This objective continues with *'…..and the particular role that academies of sciences can play in such an endeavour'*. Here I feel a bit more at home. During my term as President of the Royal Netherlands' Academy of Arts and Sciences (1990-1996), and especially as President of ALLEA (All European Academies), the European Federation of 53 national Academies of Sciences and Humanities from 40 countries (2000-2006), I regularly engaged

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to reflect on the core functions of (associations of) Academies, and their role in building a platform for understanding (see, for instance, various chapters in Drenth, 2006; some of these articles were translated and edited in Arabic language by the Royal Scientific Society of Jordan (2005)). I will come back to the role of Academies below.

I want to bring a third element in the text of the Conference circular to the fore: the subtitle speaks of *rebuilding* bridges through science and technology, suggesting that these bridges have existed in the past and merely have to be revitalized. For anyone who takes cognizance of the history of science, this is indeed a correct observation! Abulafia (1997) has made clear it is a fundamental error to classify medieval Europe and medieval Islam as two separate worlds. One only has to look at the powerful presence of Islam in medieval Spain and in the late medieval Balkans. And during the 600 years of the Ottoman Empire, Muslims, Jews and Christians lived together for most of the time without basic conflicts about their existence (see Majer, 1997). There was also an extensive recognition of scientists and scholars and interaction between them. The Renaissance in Europe owes much to Muslim and Arab science (see, for instance, Saliba, 2007).‡ In the flourishing times of Arab science (Abbasid times between circa 750 and 900 AD) quite a number of classical texts of the Greek scientists and philosophers (Plato, Aristotle, Ptolemy, Euclid) had been translated into Arabic, and were thus saved for later generations only through these Arabic translations, while many of these original texts got lost. Saliba (2007) argues further that a strong scientific culture (astronomy, medicine) must have existed already in Arab countries to enable them to appreciate the greatness of the Greek giants. Later on in the 11th century, Muslim scientists in al-Andalus elaborated and translated Arabic texts into Latin, thereby transmitting to Christian Europe a wealth of scientific knowledge (Cohen 2008). They also enriched science with their advanced achievements in arithmetic and mathematics. But most important was their contribution by their early calling to rely on experimental and empirical evidence, and rejecting the uncritical acceptance of 'authorities'; see, for instance, the writings of the Arab scientist Al-Haytham (Alhazen). A striking example of this attitude is depicted by Baffioni (2011), who shows how independent from Aristotle the scholars Avicenna and Fakhr al-Din al-Razi were in their explanation of the causes of earthquakes.

I must point out that the strong influence of medieval Arab and Persian scholars and thinkers on the West is not restricted to science and mathematics. The old Sanskrit and Persian literature and poetry have always attracted much attention and appreciation of western writers and artists. In a recent symposium of the Netherlands' Academy (31-05-2011), the extensive influence of the Muslim World and its creations in art and literature on my own country was illustrated. For instance, Boutens and Leopold, two of the most well-known Dutch poets at the beginning of the last century were fascinated by the classical quatrains of Omar Khayyam and translated many of them.

In the course of time, however, the influential position of Muslim science has dramatically declined (Slomp, 2004, Cohen, 2008). For a number of reasons which will be discussed below, scientific values have lost their power in the Muslim World, and today only few universities in that world are any longer centres of excellence in research; scientific achievements as measured by international quality criteria (publications in peer reviewed

‡ I know that this proposition has been challenged (e.g. by Sylvain Gougenheim, 2008) and discussed (le Monde, Oct. 2008, New York Times, 28-4-2008), but even if some reserve is assumed a substantial influence of Islamic scholars on the development of Western philosophy is beyond doubt.

international journals, citation indices and other performance indicators) are scant, despite occasional and isolated highlights. In many Muslim countries, the number of scientists and engineers who are active in research is precariously low. Still, for the Muslim world science and technology are keys for development and prosperity, as the Director General of IAS Moneef Zou'bi made convincingly clear at the conference of IAS and RSS in Amman, Jordan in December '04 (Zou'bi, 2005). Ismail Serageldin, the Director of the Alexandrian Library, appealed explicitly to the scientific community in the developing world: "We are at a cross roads. Either we reassert the importance of science and the scientific outlook, or we are going to witness our societies increasingly marginalised in the world of the information age" (Serageldin, 2002).

Fortunately, there are also positive signs. The 2010 UNDP Human Development Index, focusing on three dimensions Health, Education and Living Standards, shows five Arab countries (Oman, Saudi Arabia, Tunisia, Algeria and Morocco) as the top movers relative to the starting point in 1970. Moreover, as the UNDP report observes, the Arab region is experiencing a defining moment in its modern history, with millions of (particularly younger) women and men issuing a resounding call for change, demanding a greater say in decisions that affect their lives and a more transparent and accountable governance. This is an advantageous circumstance, since there is a clear positive correlation between the Human Development Index and the quality of democracy in a country. UNDP's strategy to support these changes includes fostering the emergence of responsive and accountable institutions and promoting inclusive growth, job creation and human development. The programme 'Global Innovation through Science and Technology' (GIST) initiated a number of interesting US-backed projects in an effort to promote science-based innovation in the Middle East, North Africa and South Asia (www.scidev.net). The Royal Society started a project 'Atlas of the Islamic World; Science and Innovation', registering the progress and needs in various Muslim countries, starting with Malaysia (http://royalsociety.org/aiwsi/). Optimism and hope were also eloquently expressed by Barack Obama, the President of the USA, in his speech at the University of Cairo, promising support and cooperation in medical, scientific and technological development in Muslim-majority countries (2009).

We conclude that there is a need for *rebuilding* bridges between Islamic and Western science. Let us focus on the question on what Academies of Sciences and Humanities can do to contribute to this process.

2. Academies of Sciences and Humanities

What do Academies of Sciences and Humanities stand for? It is clear that the world of Academies is rather heterogeneous. Some Academies confine their interests to natural and life sciences. Others include social sciences and humanities. Some Academies limit themselves to the promotion of science through scientific meetings, the exchange of information and opinions, and (international) scientific contacts. Others have, in addition, an influential evaluative and advisory function, engaging in advice on science and science policy, on the quality of research, and on ethical standards and societal consequences of developments in science and technology. Again, others actively promote research by funding and carrying the responsibility for high quality research programmes or research institutes.

In spite of their differences, two important objectives have always characterised Academies throughout history: the advancement of critical scientific thinking both in the scientific community and in society at large, and the promotion of excellence in scientific and scholarly research. And Academies have always recognised and emphasised that freedom and independence of science are *sine qua non* for the pursuit of these objectives. The importance of this freedom and independence, so adequately symbolised by the creation of the first *Akademeia* by Plato in a gymnasium outside the mainstream political bickering of ancient Athens, and so tragically misjudged by Emperor Justinian about a millennium later when he closed this academy because its views were not in line with his own, came to light again in the 16th and 17th centuries, when universities in Europe were increasingly brought under the yoke of the church and the state. Academies were founded as places where results of scientific research and philosophical issues could be discussed freely; they became safe havens for oppressed and persecuted scientists to express and debate their sometimes strongly deflecting views and ideas.

The power of a modern Academy is rooted in its membership and the combined scientific and scholarly expertise of its members. Members are chosen purely on the basis of the quality of their scientific capacities and achievements. No other criteria such as gender, ethnic background, political preference or religious affiliation may play a role. Members are chosen for life and should have no vested interests other than the promotion of science and scholarship in their country and abroad. Thanks to an active and committed membership that an Academy can accomplish its mission.

3. The Role of Academies and their Contribution to Bridging the Divide

In at least three of the roles and remits of an Academy we should expect an important potential contribution to bridging the divide between Islam and the West.

"The laws of natural and life sciences, and also those of social sciences and humanities, are applicable everywhere, and scientists and scholars from all over the world can, in fact should, participate in the common scientific discourse."

In the first place, there is the ***forum and meeting function*** of Academies: gatherings, conferences and colloquia, international contacts and reciprocal visits, lectures, exchange of information and periodicals, and membership of international organizations such as IAP (Inter Academy Panel), ICSU (International Council for Science), UAI (Union Académique Internationale), and many other bodies express the international collaborative and meeting functions of an Academy. In these scientific contacts, different scientific views and clashes of opinions occur. However, firstly, these differences seldom coincide with divisions between continents, nations or political alliances, and, secondly, scientists that have different views are basically agreeable to reason: their weaponry consists of arguments and not instruments of force or power. The common search for the truth, the open ear for each other's arguments, and the joint effort to analyse and comprehend the complexities of the issues at hand function as important piers for the bridge between what may be initially disagreeing parties.

Of course, there are two *preconditions* for this uniting function of science and scientific organizations. In the first place, there should be an acceptance of the *universality of science.* As I argued earlier (Drenth, 2004), the laws of natural and life sciences, and also those of social sciences and humanities, are applicable everywhere, and scientists and scholars from all over the world can, in fact should, participate in the common scientific discourse. Here I do agree with Hoodbhoy (1991), Abdus Salam (1991) and Serageldin (2006) in their vigorous rejection of the claim of 'otherness' of the Muslim experience, of the alienating presumption that science is 'Western' and consequently, the efforts to develop an Islamized science. Buruma and Margalit (2004) exemplify that the anti-Western attitude – for which they use the term 'Occidentalism' – in the more fundamental Muslim range of ideas refers to more than political or scientific rivalry; it rather defies idolatry and moral decadence. But I postulate that science is not Western, and that modernization by applying the fruits of science and technology is not westernization. Nor did the early Muslims plead separateness of their scientific enterprise. They did not call for banning or burning Plato's and Aristotle's books, but they had them translated into Arabic and wrote excellent annotations about them, entirely in the tradition of the search for knowledge and truth as prescribed in the original sources of Islamic doctrine, the Quran and the Sunnah of the Prophet (Serageldin, 2006, Zewail, 2010).

A second precondition for a successful forum and meeting function of Academies is the acceptance of *scientific values:* honesty, freedom of thought, freedom of speech, critical approach, use of reason, the acceptance of fallibility and renouncing absolute truths, and tolerance with diverging views. Forms of fundamentalism are undermining these values in parts of the West. But among others, Abdolkarim Soroush (2004) and Sadik Al-Azm (2004) have shown that acceptance of scientific values also leaves unfortunately much to be desired in many parts of the present day Muslim world. Too much influence is exercised by militant Muslim fundamentalists, preventing these values to be accepted, which is, according to Serageldin (2006, p.107), in contradistinction to the real and true Muslim tradition. He argues that the values promoted by the scientific outlook are profoundly Islamic values. "Let us reclaim, as intellectuals, our right to reason, let us liberate our Muslim mind" he summons. Likewise, Zewail (2010) states: "It is these values that the Muslim world has to cultivate if it is to recover its heritage and take its place among the modern family of nations." This plea leads us to the second role of Academies.

The second role of Academies is ***informative and educational*** with respect to students and fellow scientists, as well as the public at large. Since their origin, Academies have taken on the educational charge: the transmission of scientific knowledge and the enrichment of the next generation with knowledge and insight. This educational imperative of Academies might even be more prominent in Muslim countries today, since universities in many of those countries suffer from the absence of freedom of inquiry and lack properly enforced quality standards (Zewail, 2010). Among the top 200 universities of the world according to the Times Higher Education Supplement ranking (2011), only three are located in a country with a majority Muslim population (two in Turkey: Bilkent University (112) and Middle East Technical University (183), and one in Egypt: Alexandria University (147)).

The teaching of biology may be a case in point. Among professional biologists, there is no doubt whatsoever that the evolutionary principles of Darwin are irrefutable. It is, according to the American National Academy of Science, the central unifying concept of biology or as

Dobshansky, the well-known expert in genetics, observes: "nothing in biology makes sense, except in the light of evolution". Of course, like in any scientific theory, there is incompleteness in the theory of evolution and there are controversies about technical details that are being debated and tested, but evolution as such is a fact. The positive evidence for this fact is truly massive; it consists of hundreds of thousands of mutually corroborating observations in palaeontology, geobiology and DNA research. Denying this fact as is done in creationistic or neo-creationistic (intelligent design) criticisms based on revelations in holy scriptures (Bible, Quran), undermines the fundamentals of science, since it seeks to recognise super-naturalistic beliefs as authentic scientific arguments (I shall come back to this point below). It is not by coincidence that a group of 67 Academies of Sciences, together with ICSU, signed a statement a few years ago (21 June, 2006), that rejected all attempts to deny or obscure the overwhelming scientific evidence about the evolution of the earth and life on this planet, and the attempts to create confusion by the introduction of theories that cannot be tested scientifically. This protest was directed against a powerful conservative-orthodox movement, notably in the USA, that is supported by authors like William Dembski and Michael Behe, but also against the high popularity of creationistic teaching in the Muslim world. The Quran is less specific than the Bible on the creation of the earth, and leaves more room for the conception of Allah as the *originator* of evolution. Yet, there is a strong popular current that rejects evolution as 'Western' and as incompatible with Muslim belief (Thompson, 2008). These attitudes are further encouraged by fundamentalist writings and inflammatory media messages (e.g. Internet-sites such as Yahya and Islamonline) that mix anti-evolutionist appeals with anti-scientific and anti-western propaganda. Quite a few Muslim students, also in Western universities, are attracted to this indoctrination. In my own university (VU University, Amsterdam) we had a case a few years ago, when a number of Muslim medical students refused to give serious answers to exam questions on evolution in the mandatory biology course, and copied all kinds of anti-scientific nonsense from the Internet. Failing the test was venomously denounced by the students, and the professor was accused of religious discrimination. Fortunately, the latter stood pat against the accusations, and the students had to resit the examination. The situation in other western countries with respect to this resistance of Muslim students is not different. Thompson reports that less than 10 percent of Muslim students in the UK accept the theory of evolution. The figures in Muslim countries themselves are even more disturbing. Thomson concludes: "In rejecting 'Darwinism' the developing world thinks it is demonstrating superiority over degenerate Western values. In fact, it is doing nothing of the sort. It is rejecting the scientific method itself and thereby condemning the future generations to material and intellectual poverty" (Thompson, 2008, p.59). It is good to know that among the 67 Academies that signed the statement on the teaching of evolution, about one quarter are based in Muslim countries in Europe, the Middle East, Africa and Asia. It is interesting that working contacts with Western scientists may have a significant influence. At the recent 7th World Conference of Science Journalists in Qatar (27-29 June, 2011), Salman Hameed reports on the basis of a survey that 80 percent of Pakistani doctors working in the USA accept the theory of evolution, including microbiological, animal and human evolution, whereas most Malaysian doctors (in Malaysia) reject this theory, especially with regard to humans (Hameed, 2011).

A final remark on the educational role of Academies: as stated above, this function also pertains to the broader community. The scientific enlightenment of the general public can be

seen as an important instrument with which to develop and strengthen the defensibility and democratic foundation of a society. Indeed, intolerance, enmity, discrimination and xenophobia are all too often products of ignorance and misinformation. The stimulation and dissemination of accurate information and proper guidance by respected institutes like Academies may have beneficial effects. Moreover, this not only applies to the natural and life sciences. The teaching of history is another example. Nationalistic, prejudicial and selective history education has always fomented further enmity, intolerance and bigotry. Mertus (1999) shows, for instance, how myths overgrew historical facts in the Balkans, and how this contributed to the wars. Sadik Al-Azm (2004) illustrates that the Muslim countries are no exception in this respect. National Academies, therefore, also have a responsibility for offering guidance and wisdom to the nation and its leaders (as was rightly submitted by Moneef R. Zhou'bi at the conference mentioned earlier (Zhou'bi, 2005)).

The third role of an Academy that may help in bridging divides between countries and cultures concerns its ***advisory*** function. Although this advisory function is not always made explicit in the Academy's statutes or bylaws, many Academies consider it as their responsibility, on the basis of their scientific insights and mission, to convey judgements on science-related matters to governments, scientific and cultural authorities, educational and research institutes or the public at large. This advice may be delivered, formally or informally, solicited or unsolicited; sometimes, it is also explicitly prescribed by law or regulations.

As far as the content of this scientific advice is concerned, one can distinguish five categories:

- Advice based upon quality assessments;
- Advice regarding scientific policy, including foresight on trends in science;
- Science-for-policy advice: advice regarding pending policy decisions that are based on scientific research and expertise;
- Advice on ethical and social questions related to or generated by scientific research;
- Advice on research integrity.

Most of this advice-work relates to national science policy and practice. However, we see an increasing internationalisation of research and scientific collaboration, and a growing tendency to lift the discussion and decision making on scientific policy and research funding to a supra-national level. Consequently also, the consultatory and advisory role of Academies assumed more and more an international dimension. In fact, this is an important reason why ALLEA (All European Academies) was founded in the beginning of the 1990s, so as to become an active player in the European science policy arena.

Academies of Sciences and their Associations can make a significant contribution to bridging the divide between countries and cultures. Concord, mutual understanding, rapport will be achieved by developing and cherishing common values. And in their often prestigious, formal and informal advisory capacity vis-à-vis educational, political and religious leaders, Academies of Sciences and their Associations can stress these basic values of science and research integrity and thus create further dialogue and understanding.

What are the scientific values that form the pillars of these bridges? (In the previous sections we have already touched upon these values a couple of times). Here they are summarized:

- A basic commitment to solving problems through rational reasoning, a critical approach to 'established' theories, and persistence in looking for evidence through experimental or empirical facts or observations. No supernatural, untestable explanations or interpretations are allowed as scientific arguments.
- A prerequisite for this commitment is the independence and absolute freedom of mind. No political, economic, ideological or religious interest or preference can be allowed to enter or influence the scientific analytical process.
- Freedom of thought, speech and interaction are essential for critical analyses of one's theories and those of others.
- The realization that no one possesses the truth, that no one has absolute vision, and that all theories may prove fallible in the light of new discoveries or new evidence requires tolerance with respect to different views or explanations. Abdolkarim Soroush in his *Treatise on Tolerance* (2004) quotes a saying of the famous Iranian poet Hafez: "In these two expressions lies the peace in this world and the next: with friends, magnanimity, with enemies, tolerance", but he also adds: "but no tolerance with the enemies of tolerance!"
- The principles of research integrity (as for instance formulated in the European Code of Conduct for Research Integrity, developed by ESF and ALLEA (2011)) require *honesty* in presenting goals and intentions, in reporting methods and procedures, and in conveying interpretations. Research must be *reliable* and its communication fair and full. *Objectivity* requires facts capable of proof, and transparency in the handling of data. Researchers should be *independent and impartial* and communication with other researchers and with the public should be *open* and honest. All researchers have a *duty of care* for the humans, animals, the environment or any of the objects that they study. They must show *fairness* in providing references and giving credit for the work of others; and must show *responsibility for future generations* in their supervision of young scientists and scholars.

Promoting these scientific values shared by scientists all over the world forms the basis for the challenging task of Academies to exert their influence in building bridges. As indicated before, some Muslim scholars or scientists may remonstrate by insisting that these values are the product of the European enlightenment, as postulated by philosophers like Spinoza, Locke and Kant, and are therefore 'western' values. I propound to refute this objection. Spinoza, Locke and Kant were not just addressing the West, but the entire intellectual world. The enlightenment — while in many ways a reflection of its time — also bore fruit for universal science, not just for Western science. And again, as shown by authoritative Muslim authors, these central thoughts of enlightenment and core values of science are not at all at variance with classical Muslim values and traditions. Also Chaney (2008) concludes after careful analysis of conditions of Islamic science throughout history, that the use of medieval scientific achievements as justification for a return to Islamic orthodoxy is unjustified. The opposite is true. Evidence suggests the importance of tolerance and personal freedom.

4. Science and Religion

In this last section, a few words on a controversy that seems to determine extensively our subject of discussion, namely the relationship between science and religion. Throughout history, the relationship between autonomous reason and divine revelations has been a recurrent source of conflict. In many faiths, and particularly in their more orthodox streams, science and religion have been at daggers drawn. An interesting question is: can these sources of knowledge and understanding somehow be reconciled or is their relation necessarily strained?

History of science shows that in many cases actions of religious leaders in the conflicts between science and religion were fierce and merciless. Discussion on 'heretical' science findings were forbidden, books and manuscripts were burned, scientists themselves silenced, isolated, imprisoned, or put to death. Obviously, scientific truths, based on facts and proof of observation, can come in basic conflict with 'truths' as revealed in holy scriptures and as interpreted by religious leaders. The latter often accept miracles, propagate myths and legends, and advocate magic and scholastic reason. The former only accept logic and empirical or experimental observation. How could these two different worlds ever be reconciled?

Before we offer an attempt to do that let us realise two important solicitudes:

1. The altercation between religion and science certainly does not run parallel to the divide between Islam and Christendom. Both religious worlds have had their share of this contention. In the West, churches have been fighting the ideas of Galileo, Spinoza, Voltaire and Thomas More. The Vatican always resisted scientism, rationalism and naturalism (see, for instance, the 1864 syllabus of Pope Pius IX). Even today, orthodox movements in the West use religious arguments to stand up against evolutionism and the biological basis of moral judgements (see Dawkins 2006). In Muslim history, we have seen the early attacks of the influential Al-Ghazali (see Al-Azm, 2007) and Abu Ala al-Maari (see Chaney, 2008) on the rational and tolerant views of the philosophers Al-Kindi and Ibn-Sina (Avicenna), calling some thoughts of the latter heretical, and others even apostatical (kufr). Later in the flowering period of the Islamic science in Spain we see again resistance of for instance Ibn Rushd (Averroes) against the orthodox repression of science. Orthodox Muslim theology has always tried to dominate, rather than to inspire science, as Bürgel concludes in his extended study (1991). And as far as the present time is concerned, we have already seen the charges of concerned Muslim scientists like Serageldin, Pervez Amirali Hoodbhoy and Abdus Salam against the attempts to base (an Islamised) science on the Quran, Sunna and ancient Muslim authorities.
2. There is little doubt that the intolerant, anti-science attitude of some Islamic clergy bears some responsibility for the backward state of science in many Muslim countries. But this is not the sole determining factor. As has been demonstrated already some time ago, other factors holding back scientific development include demographics, insufficient mastery of English as the main language of scientific communication, poor learning objectives and practice (rote learning as a legacy in many Qur'anic madrasas), lack of research capabilities and experience, state-owned corporations that have grossly neglected research and development, lack of funding and resources, powerless

professional societies, and authoritarian regimes that deny freedom of inquiry or dissent (see, for example, Segal 1996). In the same strain, Adnan Badran points out the damaging indifference of Arab countries towards science and technology activities as not being a priority condition for economic development (2005).

Back to our basic question: Are scientific rationality and religion-based convictions implacable or is there a way to reconcile these two?

"What we call 'God' is to be conceived as the symbol for ultimate justice, honesty, care and love, based on the realization that there is more to life than the mere gratification of biological needs and that life transcends the simple physical existence."

Let us, in an attempt to address this issue constructively, introduce the distinction that I made earlier (Drenth,1999), namely that between science *stricto sensu* as the methodical-analytical study of natural or social phenomena employing experimental or empirical methods, and science as the *process of knowledge accumulation,* which is embedded in pre-scientific choices and a socio-political context.

The former, which the Swiss philosopher Bochenski at the 1990 Engelberg Forum on Science and Technology referred to as *Wissenschaftals Inhalt (science as content),* has no room for norms other than the logical-analytical norm. Objectivity has to be maintained against any pressure from external sources, including religion. Science should be allowed to analyse and interpret the facts and findings without any religious or ideological interference, and should be, in this sense, value-free. This is the science that has an independent and universal character, and that is the backbone of innovations that drive economic and intellectual progress. This is also the science that Muslim scientists like Serageldin, Hoodbhoy and Abdus Salam so vigorously stand up for and this they see as the only way for Muslim countries to climb out of the trough.

What if the scientific truths are at odds with the 'truths' as revealed in the holy scriptures? The answer is: they cannot be. The Bible, the Torah and the Quran are not historical, geological or biological textbooks. They do not intend to give a scientific explanation of physical or social phenomena. They are imaginative texts that attempt to help people to understand the meaning of life, to guide and inspire them, to provide hope and consolation. True, religion has been and is appallingly misused by men. But what we call 'God' is to be conceived as the symbol for ultimate justice, honesty, care and love, based on the realization that there is more to life than the mere gratification of biological needs and that life transcends the simple physical existence. And the holy scriptures can support and inspire people with this realization. Science, on the other hand, is the world of falsifiable knowledge, of logical consistency and of verification and validation. These two worlds cannot be at variance any more than a poem can be at variance with experimental physics. Gould (1999) suggested something similar when he described the worlds of religion and science as two Non-Overlapping Magisteria (NOMA).

This independence also means that both worlds should not hamper each other. Religious authorities should not interfere with the scientific analysis and interpretation, and should not try to impose supernatural causes or explanations upon the scientist. On the other hand, the 'scientific' endeavours to try to prove that religion is nonsense and that God does not ex-

ist (Dawkins, 2006, Hitchens, 2007, Stenger, 2007) are meaningless. Aspirations, hope and trust, which are essential in religion, are excluded from such argumentations, because they are not based upon a demonstrable or falsifiable existence of something or someone. The question whether God or Allah exists cannot be a scientific question, and can therefore not be answered scientifically.

However, we come upon a quite different picture if we consider science as a process of *knowledge accumulation,* called by Bochenski as *Wissenschaft als Tätigkeit (science as practice).* Here we see science as a societal process, enfolded in a non-scientific context of often religion-based convictions and ethical choices. These pre- or meta-scientific conditions relate to:

- the philosophical assumptions that underlie the deployed theories and paradigmata;
- the choice of subjects and hypotheses to be researched, with no-go or slow-go decisions in the pursuit of scientific questions (for example: is stem cell research allowed, can the scientist engage in anthrax or napalm research? and many others);
- the manner in which experiments are conducted (appropriate care for animals, patients, the environment) and data is gathered (respecting informed consent, privacy issues), and
- the always pressing question of what is being done with the research results and by whom. Can the scientist be held responsible for misinterpretation, selective use or abuse? And how is one to repair or to prevent this?

In this sense science, as a human and social activity, as practice, is anything but value-free, and the scientist is faced with a variety of moral and normative dilemmas and questions, for the answering of which non-scientific considerations of ethical and normative nature are required. Here religion and normative traditions do have an important and legitimate role to play. The discussion of ethical and social dimensions of research is therefore a crucial terrain for discussions among Academies of Sciences and Humanities from countries with different cultural and religious traditions.

"Through the promotion of free and clear communication and open debate between different schools of thought and between science and society, Academies can really contribute to understanding, in concordance with and in agreement within and between societies and cultures."

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5. Conclusion

It has become clear that through the promotion of free and clear communication and open debate between different schools of thought and between science and society, Academies can really contribute to understanding, in concordance with and in agreement within and between societies and cultures. It is a question of communication with the national intellectual

and student population, and also with the international science community. Conferences are extremely useful in this regard. I hope that in the future a more frequent and more intensive dialogue between Muslim and Western scientists and scholars, and especially between Muslim and Western (Associations of) Academies of Sciences and Humanities will take place. I certainly will recommend our own organisation (ALLEA) to take up this challenge.

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