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Science and Technology and the Future Development of Societies: International Workshop Proceedings (2008)

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142 pages | 6 x 9 | PAPERBACK

ISBN 978-0-309-11927-6 | DOI 10.17226/12185

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SUGGESTED CITATION

National Research Council 2008. *Science and Technology and the Future Development of Societies: International Workshop Proceedings*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/12185>.

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The Morality of Exact Sciences

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With due respect to the sayings of the sages of old and modern times, I would like to offer my own definitions of culture and morality. In my view, the mix of the beliefs and deeds of a society constitutes the culture of that society. The consent and consensus among the members of a society to respect and practice certain forms of behavior and conduct form the moral codes of that society.

Environmental factors are among the main, if not the sole, factors shaping cultures. For instance, the Bedouin Arab and the desert-dwelling Iranian of the wind- and sand-stricken drylands have to protect themselves from the scorching sun of their habitat by covering virtually all parts of their bodies. On the other hand, the inhabitants of the wet tropics have to minimize their clothing to enhance the ventilation of the body, and the Europeans of the misty green continent find it a health requirement to expose themselves to the rare and much-sought-after sunshine wherever and whenever they happen to find it. In the course of centuries and millennia, these practices become ingrained and eventually emerge as unyielding traditions and even religious beliefs demanding strict observance. Then there comes a time when a young Muslim girl is required to remove her head scarf in a French school. She feels insulted and her religious convictions violated. Just the same, when a Western woman in Tehran's bazaar is asked to cover herself up properly, she too feels offended and deprived of her basic rights.

With the definition I have given, it is natural to expect that human societies separated from each other, either geographically or in time, have different cultures and different codes of morality. Conflicts and atrocities may arise when different cultures come together.

Until about a century ago, interactions between societies took place mainly through trade and wars. Both of these mechanisms, however, operated on a much smaller scale than they do today. There were travelers, students, Sufis, and other adventurers who moved from one place to another and helped cultural exchanges. These people were few in number and left little impact on the societies they visited. At any rate, cultural acquisitions from others were gradual and slow. Societies had ample time to adapt to whatever changes were deemed necessary or inevitable.

Modern science and its offspring, modern technology, have drastically changed the situation. A journey from Morocco to India or from Europe to China in the thirteenth century, which took Ebne Batootah and Marco Polo years to complete, now is at the reach of hundreds of thousands of air travelers and can be accomplished within hours. A caravan load of merchandise from Khatai to the coasts of Genoa, which had to be sold and resold several times along the Silk Road before reaching its destination, has in our time been replaced by businesses that are capable of moving thousands of tons of goods across the world within days. Most astonishing of all is the speed of the exchange of information. In 400 B.C., Darius the Great took pride in having created a system of communication that could deliver his order from Persepolis to his satrap in Lydia within a day. This, in the early years of the twenty-first century, has been made possible by the instantaneous transmission of information on coded electromagnetic signals in volumes of giga- and terabytes.

The plain fact that interactions between societies take place on a much larger scale and in a much shorter time frame makes societies prone to tension. Cultures don't find enough time to adjust themselves to changes dictated by modern-day science and technology. This is irrespective of whether the changes are desired and sought-after or not desired and resented. I give an example of each case.

No one disputes the values of modern hygiene and medicine. Its widespread use, however, has caused a worldwide population explosion, particularly in developing societies. As a solution to the problem, marrying at a young age is less common, and celibacy up to the ages of 30–35 has become the order of the day. This remedy, in turn, has created a new sort of problem in Muslim societies wherein sexual relations are allowed only through legal and publicly announced marriages.

As a second example, the widespread use of mass media (newspapers, radio, television, telephone, fax, the Internet) helps to inform people. However, informed minds are inquisitive creatures. They poke their noses into whatever they come across. There are numerous societies where the ruling clan, whether elected or inherited, detests interferences.

To summarize, cultures are largely influenced by environmental factors that are mainly non-human. Every culture has its own moral codes. Cultures and morals are dynamic systems and evolve in time. However, like any other dynamic

system, they have inertia, and they resist changes. Modern technology and communication systems of our time are the main factors demanding changes and imposing strains on morals.

Is there a way to cope with such strains and to prevent crises within societies and clashes between cultures? In my opinion, there is. In the course of the past two to three centuries, exact sciences have developed a way to reason out differences in opinions and bring about consensus without resorting to atrocities. Perhaps this procedure could be used effectively to settle the disputes that at first glance might look nonscientific.

By definition a science is exact if (a) it draws its principles and axioms from observations of the phenomena occurring in nature, (b) it uses mathematical logic to draw conclusions from its founding principles, and (c) it checks the validity of its conclusions by subjecting them to experiments. In this procedure there is no place for the beliefs and convictions of the scientist. A scientist, no matter how great his or her achievements, is never promoted to a state of scientific sainthood. The scientist and his or her opinions remain subject to criticism. In exact sciences, human interference is minimized. The success lies in identifying the causes of the effects. Once this identification is achieved, it takes little ingenuity to solve the problem at hand.

Let us call this scientific method *rationality* and *rational thinking*. There was a time in the history of mankind when undesirables were attributed to evil forces of nature. In the course of time man distanced himself from this notion but placed the evil in the minds of his fellow humans. The latter conviction persists. In crises that are not scientifically and rationally analyzed, people often find evil doings and inevitably resort to violence to resolve the disputes. For example, physics, chemistry, and to a certain extent biology have long become axiomatic and exact. Professionals in these disciplines don't settle their differences of opinion by accusing each other of heresy, sorcery, and so forth.

Before these disciplines became axiomatic the situation was different. Giordano Bruno was accused of sorcery and was burned. Nicolaus Copernicus could not publish his book, *De Revolutionibus Orbium Coelestium*, on the heliocentric theory of the skies in his lifetime for fear of his colleagues. Galileo, however, was wise enough to deny the motion of the Earth and save his neck. In Eastern intellectual circles, Imam Ghazali¹ pronounced Farabi, Avicenna, and Ibne Rushd (also called Averroes) as heretics because he did not agree with their perception of natural philosophy. Sohrevardi was condemned to death by his colleagues, again because of his philosophical point of view.

In our time, the science of economics and the art of managing governments, legislative and judicial systems, as well as issues of human rights and so forth, do not fall in the category of exact and axiomatic disciplines. They do not have a tension-free and rationality-based mechanism to settle disputes. It is my strong

¹Abu Hamid Muhammad ibn Muhammad Al-Ghazali (1058–1111).

conviction that mass dissemination of rational thinking through the promotion of science education in all societies is helpful in reducing global tensions and in opening doors to logical reasoning instead of presenting human beliefs as evidence of rightfulness.