



STEVE MILLER
Turtle Eggs, 2016
 X-ray on digital UV pigment on aluminum

although some policy makers, security specialists, and scientists understand that knowledge is not discrete and that social context matters, they operate under perverse incentives, with insufficient tools, and without the benefit of appropriate expertise in social sciences.

Scientific investigation always involves choices about experimental design and approach for answering a question or addressing a hypothesis. Some designs and approaches will be riskier than others in generating information that might be exploited by others to do harm. Usually, scientists consider only technical feasibility, effectiveness, and expediency, because the research enterprise system rewards quick results with high impact and does nothing to reward risk awareness. Admittedly, identifying risk is difficult. Current research oversight policy is narrowly focused on a few specific infectious agents in order to be clear and concrete. We need a more comprehensive and generalized scheme for identifying the kinds of research results that require oversight. Certainly, the identification of risk should also consider the social

context in which the work is conducted, but, as well, the unspoken social contract between scientists and the general public that demands avoidance of unnecessary harm.

How can we influence the choices made by scientists in the workplace about the specific questions they ask and the experimental approaches they take? Evans mentions the importance of communicating and making explicit contextual information regarding, for example, threat awareness and beneficial applications. Though helpful, alone this is not enough. Unless there is an understanding of and public discussion about conflicts of interest, we will not recognize selective and biased use of this contextual information. Deliberations about H5N1 avian influenza work in 2012 by the National Science Advisory Board for Biosecurity (of which I was a member) failed to acknowledge such conflicts, nor did they adequately address the timing and real-world delivery of putative benefits.

Additional perspectives and tools should be made available. We need to instill a sense of moral and ethical responsibility among scientists and

other parties within the science research enterprise. New approaches (as yet to be described) for effective governance of scientific research are also necessary. Role models and incentives will be crucial. And none of this will work unless it is “forward-deployed”—that is, embraced by those in the “field” and by all those who stand to gain and lose by the conduct of the work about which we care so much.

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Chinese technocracy

China is well known for the technocratic character of its political structure and governance. A large number of political leaders either were trained as engineers or had extensive experience working in state-owned technical companies. Liu Yongmou’s article, “The Benefits of Technocracy in China” (*Issues*, Fall 2016), offers a good, brief, historical and cultural interpretation of this fact and argues the relevance of technocracy to contemporary Chinese politics. It also challenges the common “antidemocratic” and “dehumanizing” view of technocracy in the West and invites Western scholars to reconsider their oppositions.

Complementing Liu’s argument would be a consideration of the influence of technocracy in current Chinese politics, given the decreased percentage of current politburo members trained in applied science and engineering. One explanation for this shift might be that current leaders were mostly educated after the Cultural Revolution or during the early years of the Reform and Opening-Up, when the focus of national development shifted toward reconstructing the social and political order, which required experts from the humanities and social sciences. Over the past 30 years China has been in transition from a centrally planned economy to a socialist market economy.

The national economic system became less centralized, and more state-owned companies were either integrated with private capital or transformed into private firms. Thus, engineers had fewer opportunities to be promoted to higher leadership positions in the government through the meritocratic system, and more engineering students were interested in going to work for private firms where they could earn much higher salaries.

It is important to realize that government workers and Communist Party cadre do not earn the high salaries typical of those working in private corporations. Today, there may also be more political leaders from political

science, law, and economics because of China's increasing interest in promoting social equality and global economic and political influence.

Another complementary topic concerns the connection between technocracy and meritocracy in Chinese politics. Certainly, loyalty to the Party and strong relations with Party leaders are crucial for elite selection and promotion. However, without a certain threshold of competency, including the ability to understand technical and economic indicators for development, anyone in power can have his or her legitimacy challenged by upper-level leaders, peers, subordinates, and the public. Success

in managing economic development remains the most important factor for evaluating the performance of political leaders. The elite selection system in China today might be more appropriately called "techno-meritocracy"—that is, the most qualified political leaders are arguably still those who have passed numerous rounds of "tests" on their competency in promoting economic development driven by technological change. Officials may gain power not through a political meritocratic system, but their legitimacy can always be criticized on the basis of technological meritocratic criteria. As Liu Yongmou rightly suggests, this is one of the strengths of the current Chinese techno-meritocratic political system.

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There are few, if any, of the "benefits of technocracy in China" described by Liu Yongmou with which I would disagree. I have, in fact, insisted that scientific and technocratic movements have played a central role in increasing the production of material goods and the effective providing of public services wherever they have been employed, and I am convinced that many public decisions in today's world unavoidably depend in large part on technically competent advisory input.

Moreover, Liu is undoubtedly correct in arguing that modern technocracy in China, which began with the ascendance of Deng Xiaoping, is consistent with a long-standing Chinese tradition of government by an intellectual elite symbolized by the Confucian call to "exalt the virtuous and the capable." He is also correct in pointing out that knowledge traditionally was more important than the representation of the interests of the people, and that virtue was privileged over capability, but also that in modern China, while knowledge remains more important than expressions of the interests of the people, the traditional emphasis on virtue has been given lower



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