Cultural history holds back Chinese research

Confucius and Zhuang have produced a culture in China that values isolation and inhibits curiosity. Neither is good for science, says **Peng Gong**.

Indian Prime Minister Manmohan Singh recently lamented that, when it comes to scientific research, China is now ahead of India. "India's relative position in the world of science has been declining," he said. "And we have been overtaken by countries like China." But although China is now second only to the United States in the number of scientific papers produced, many say that the quality of its research needs to improve. Misconduct is a common problem, but there are other, cultural, reasons for China's poor performance, too.

Two cultural genes have passed through generations of Chinese intellectuals for more than 2,000 years. The first is the thoughts of Confucius, who proposed that intellectuals should become loyal administrators. The second is the writings of Zhuang Zhou, who said that a harmonious society would come from isolating families so as to avoid exchange and conflict, and by shunning technology to avoid greed. Together, these cultures have encouraged small-scale and self-sufficient practices in Chinese society, but discouraged curiosity, commercialization and technology. They helped to produce a scientific void in Chinese society that persisted for millennia. And they continue to be relevant today.

One consequence is that every member of the academic community in China wants to do leading research, with few willing to play assisting roles. Not everyone, however, is qualified to lead, so this results in wasteful repetition and redundancy. Investigators use all kind of excuses to purchase similar types of equipment and do similar types of data processing.

We see this problem even at the largest scale. In any Chinese collaboration, universities, research institutions and separate government agencies all want to be the lead organization, which makes it extremely hard for the participating scientists to share data with each other. For example, the China Meteorological Administration has some 2,000 weather stations, from which it gathers the information used to issue weather forecasts, among other things. In addition, the Bureau of Hydrology operates some 20,000 gauge stations, which also collect weather data and could be used to substantially improve the spatial precision of the Meteorological Administration's forecasts, yet it does not make them available.

A related problem is the lack of division of work. Research administrators tend to value, and therefore reward, only those who claim to be doing original research, which forces people away from (useful) supporting roles. It also explains why, libraries and instrument retail companies aside, there are few specialized research services inside China. That leaves research labs with no choice but to do everything themselves, even routine work such as sample analysis and database development. With no sensible allocation of duties to people and organizations with different talents, delays in research are inevitable.

➲ NATURE.COM
Discuss this article online at:
go.nature.com/rckaa2

What can be done about these cultural obstacles? First, the scientific spirit must be established early in the education system. China has already improved its universities, using successful models copied from the Western world. It must now do the same in its schools. China's schoolteachers must do more to encourage curiosity in children, and science education should begin in the earliest years. This would require significant reforms to school curricula, as well as investment in teacher training.

The importance of collaborative research should be formally recognized and encouraged, by individual scientists as well as research administrators. Financial incentives in the form of grants, merit increases or promotion should be given to those involved in successful collaborations, with the intellectual contribution of each collaborator clearly identified.

China should also begin to divide its research work and assign jobs to personnel with the appropriate specializations. Positions must be created for chemical analysts, computer engineers, experimentalists, instrumentation staff and specialized data providers.

Finally, it must make more effort to help its scientists participate in international projects, and to entice outstanding foreign scientists to China. We need international evaluations for proposal review and strategic planning. For major research projects, it would be helpful to invite critique at the design and completion stages. The same should be done at universities to help them become internationally influential. China must learn from the European Union and provide financial support to international collaborators. For example, when the Chinese government funded a 46-million-renminbi (US$7-million) global land-cover mapping project in 2009, it ruled that none of the money could be paid to collaborators in foreign countries. A global project, of course, needs samples to be collected from all over the world, yet it is impossible for Chinese scientists to do this in many foreign countries. China must realize that isolation and self-sufficiency is no recipe for success in modern science. It will be a difficult change, but the price is affordable. And the result will be a strong China and the peaceful world that Chinese people have dreamed of for generations. ■

CHINA SHOULD BEGIN TO DIVIDE ITS RESEARCH WORK AND ASSIGN JOBS TO PERSONNEL WITH THE APPROPRIATE SPECIALIZATIONS.

Peng Gong *is in the Center for Earth System Science at Tsinghua University, China, and the Department of Environmental Science, Policy and Management, University of California, Berkeley, USA.*
e-mail: penggong@berkeley.edu