

Better Understanding the Research Ecosystem



By Ronald Rousseau



Ronald Rousseau. (COURTESY PHOTO)

As the UNESCO states, science is mankind's greatest collective endeavor. The public, scientists and governments are all direct or indirect participants in the scientific enterprise. Their understanding and perception of science collectively influence whether science effectively responds to societal realities.

As a participant in the scientific endeavor, the *Journal of Data and Information Science (JDIS)* focuses on the science of science from a data and quantitative perspective, aiming to enhance stakeholders' understanding of interactions within the scientific community and the dynamics between science and society.

In recent years, sustained exposure to academic misconduct worldwide has damaged the public's trust in science and reduced the confidence of researchers. For the sake of better science, the *JDIS* has initiated a series of activities to respond to and reverse this situation.

The evolution of research prestige
Historically, scientists and scientific institutions held prestige among peers and society. As scientific research evolved into a state-sponsored enterprise, the 19th-century efforts to measure scientific prestige, like Alphonse de Candolle's, who counted foreign members of scientific societies and academies, laid the groundwork.

In the 20th century, the advent of indicators such as the journal impact factor (which measures how frequently the average article in a journal has been cited in a particular year) became proxies for assessing prestige and quality. Despite early warnings against using such indicators for individual assessments, the "publish or perish" mentality took hold, impacting research topics, publication decisions and career advancement.

Although early bibliometricians such as Anthony van Raan (Leiden University, the Netherlands) warned not to use such indicators for the assessment of individuals, calling such a practice a mortal sin, past events led to the exact opposite. Recall Jorge E. Hirsch's h-index, which was introduced by Hirsch in 2005, and is calculated based on the number of papers a researcher has published and the number of times their papers have been cited. For example, if 107 of a scholar's 900 publications are cited more than 107 times, his h-index is 107.

The increased reliance on bibliometric indicators resulted in a culture of "playing the indicators," influencing scientists to prioritize quantity over quality. Research evaluations, often based solely on indicators, determined career trajectories.

The dark side: fraud and paper mills
In this environment, fraudulent practices, including data and image fabrication, became no exceptions anymore. Unscrupulous companies, known as paper mills, emerged, offering ready-made publications for sale. Some successfully infiltrated prestigious journals, leading to retractions and damaged reputations.

Retractions, while essential for maintaining scholarly integrity, pose challenges for publishers. While acknowledging that mistakes can occur, retractions due to fraudulent behavior damage the reputation of authors, editors and publishers alike.

Fraudulent practices, including the use of paper mills, have posed a significant threat to the credibility of published research.

The *JDIS* aggregates and disseminates research that uses interdisciplinary approaches and large data sets to reveal the mechanisms underlying scientific research activities, thereby helping the public understand how science drives social progress, helping scientists improve their own work, helping governments develop more beneficial policies, and ultimately contributing to promoting better science.

Combating scientific fraud and ensuring research integrity

In 2023, the *JDIS* issued a special call for papers on research integrity. The call aimed to encourage policymakers, scientometricians, publishers, institutions and researchers to delve into research strategies for countering academic misconduct.

The *JDIS's* commitment extends beyond publishing; it actively organizes symposia on crucial issues like research integrity, fostering engagement with the editorial board and the broader scientific community.

In conjunction with the publication of the Research Integrity special issue, the *JDIS*, in collaboration with Beijing Normal University at Zhuhai in

Guangdong province, south China, organized a symposium in Zhuhai in 2023 addressing "research integrity." The symposium attracted representatives from leading international publishers, including Wiley, Taylor & Francis, Springer Nature, Sage Publications, Elsevier, Frontiers, IOP Publishing, PLoS, IMR Press, and other organizations such as COPE, Crossref, China Educational Publications Import & Export Corporation, the China Hospital Research Integrity Alliance, and the Charlesworth Group.

During the event, a memorandum of understanding was signed, signaling the collaborative effort required to safeguard the integrity of scientific research.

Going forward, the *JDIS* will continue supporting policymakers and the public in understanding evolving patterns in scientific development and scientific growth. This includes promoting the prudent use of scientific evaluation tools and collaboratively creating a supportive environment for research and innovation. All of these initiatives serve our ultimate goal, that is, enabling researchers to publish the best possible scientific research to create a better life.

The author is the Co-Editor-in-Chief of the JDIS.

I see the JDIS as boosting the transition of China from playing a minor role in the information science field 20 years ago to being a major contributor today.

Twenty years ago, in Western information science journals there seemed to be few articles written by Chinese scholars based in China. After this, there was an increase in submissions to Western journals from China-based scholars but these tended to be very quantitative-focused and methods-focused with a lack of theory, so the findings were not very useful or impactful.

Today, there are many important research groups and scholars in China in the field of information science that are looked up to in the West. I think this has oc-

curred due to efforts like the JDIS, which has bridged and facilitated academic dialogue between China and the world. It has also served as a flagship to promote the idea of disseminating Chinese scholarships outside of China.

I am hoping that the future will see China introduce new approaches and topics in the field of information science, leading the world in what is researched and how it is researched in the field. This is perhaps the next stage and the JDIS would be the perfect venue to host this transformation.

— Mike Thelwall

Professor at the Information School, University of Sheffield, the UK.

Policy

Ethical Guideline for Brain-Computer Interface Released

By ZHONG Jianli

China's Ministry of Science and Technology has recently released a document to guide the development of brain-computer interface (BCI) technology and prevent ethical risks in the process of BCI research and application.

The BCI creates information channels between the brain and external devices, allowing for direct information interaction. Its application mainly includes medical health, communication and entertainment, particularly in improving motor, communication and perceptual functions for patients with neurological disabilities.

The guideline emphasizes the need to ensure that BCI research should primarily focus on restorative BCI technology, and serve to meet the public's health needs. For non-medical purposes such as attention, sleep or memory regulation and other augmentative BCI, exploration and development are encouraged to a certain extent under strict standards and clear benefits.

The guideline also outlines general requirements for BCI research, including compliance with relevant laws and regulations in China, and internationally recognized ethical guidelines, profes-

sional consensus and technical standards. It prohibits dissemination of false advertising information on the effects of BCI.

Regarding clinical trials of innovative BCI products for rare diseases with no other effective treatment methods, the guideline says the trials can be conducted under strict compliance with relevant national regulations on medical devices and clinical research, with full informed consent.

Safety risk prevention and control mechanisms, including strict operational procedures, correction mechanisms, emergency plans and suspension procedures, are required to ensure the safety of trial subjects.

In particular, the document proposes the ethical considerations for augmentative BCI, emphasizing the need for a thorough assessment of risks and benefits, and minimization of negative impacts on individuals. It also warns against the potential for addiction and interference with normal human thinking and behavior.

It is recommended to avoid BCIs that replace or weaken human judgment and decision-making abilities until they are proven to be superior to human levels and are widely recognized.



A visitor experiences the brain-computer interface during the China International Technology Fair in Shanghai in June 2023. (PHOTO: VCG)

STB Model Boosts Agricultural Modernization

By CHEN Chunyou & MA Aiping

"Whenever I look back on the work and life at the science and technology backyard (STB), the memory of operating on the farmland is fresh in my mind. The STB is a vivid example of making research out of practice and putting research results into practice again," Han Saizheng, a postgraduate student at Northwest A&F University's Ningxia Tanyang STB, told *Science and Technology Daily*.

For the first time, the STB has been written into the No. 1 Central Document. The 2024 version, released in early February, stresses promoting the STB model and encouraging experts from research institutes and universities to serve agriculture and rural areas.

The basic configuration of an STB is a backyard with a few cottages where students work and then do research. The China Agricultural University (CAU) established the first STB, the Baizhai STB in Quzhou county, Hebei province, in 2009.

In 2022, the Ministry of Education, the Ministry of Agriculture and Rural Affairs, and the China Association for Science and Technology jointly issued a notice on popularizing the STB talent cultivation model among postgraduate students in rural areas, and a second one on supporting the construction of a batch of STB. These two documents reinforced support for STBs and provided targeted services for agriculture and rural areas by expanding the scale of talent cultivation and strengthening standardized management.

Zhang Fusuo, founder of the STB model and a professor at CAU, told *Science and Technology Daily* that the original intention of establishing the STBs was to send agricultural postgraduate students to the frontline of agricultural

production. These students are expected to provide farmers with technological training and services, and help solve practical problems in agriculture and rural affairs.

Although the STBs are small in scale, they play a huge role in serving agriculture and revitalizing rural areas. "The model moves research from laboratories to farmers' fields, forming a pattern of collaborative innovation with universities and research institutes," said Lin Wanlong, vice president of CAU.

To date, more than 30 agricultural universities have established about 300 STBs, covering nearly 20 provinces and provincial-level regions.

The STBs have become an engine for the modernization of agriculture and rural areas. "In the future, this model should not only target small-scale farmers and the upgrading of traditional production technologies, but should also connect with modern industries and enterprises," Lin said.

The STB model has also been promoted in Laos and eight African countries. "It has evolved from the initial stage 1.0 to the current stage 3.0," Zhang said. "In the 1.0 stage, the main focus was to assist small-scale farmers, providing them with technical services, and motivating more small-scale farmers to engage in this model through technological demonstrations in households and large farms. In the 2.0 stage, it aimed to promote the upgrading of rural industries, increase farmers' income and rid them of poverty. The 3.0 stage is to empower rural revitalization with strong technology and talent support."

"Seeing that the STB has entered a new stage, we hope to bring more changes to the countryside with the joint efforts of the STB faculty and students nationwide," Zhang said.

Case Study

LED 'Little Giant' Assists Rural Revitalization

By Yu Haoyuan

Starting and succeeding in business is not easy and requires unwavering faith and dogged determination, says Ge Ailin, CEO of Jiangsu Zhaolv Metal Products Co., Ltd (Zhaolv).

It is because of this that the industrious entrepreneur is always cognizant of never forgetting the place where he was raised. "Assisting with rural revitalization is one of the best ways to give back to society," he says.



At the beginning of 2024, Zhaolv implemented a fully automated H-type automobile headlamp heat sink production line. (COURTESY PHOTO)

Fifteen years ago, Ge took a big gamble on developing the LED industry. He gave up his regular job and set up Zhaolv, which specializes in producing heat sinks for LED lighting fixtures in his hometown of Jilin village, Taizhou. The company was initially started with 15 people in a 600 m² workshop.

For most rural startups, limited technological prowess and a shortage of skilled workers restrict their growth, Zhaolv was no exception.

In response to these challenges, a

strategic emphasis has been placed on technological innovation. The company began to ramp up its investment, continually purchase state-of-the-art production equipment and assemble a highly skilled R&D team to bolster its competitive edge in the market.

With a commitment exceeding 60 million RMB towards technological advancements, Zhaolv has been successfully recognized as a "Little Giant" firm by the Chinese government. The name refers to those innovation-driven small- and medium-sized enterprises, which own core technologies in a niche market and show admirable growth potential.

Zhaolv has thrived in the entrepreneurial landscape for over a decade, boasting an impressive portfolio of 48 utility patents. This year, it has further strengthened its intellectual property arsenal by applying for three new invention patents, focusing on those with elevated technological sophistication.

It is therefore no surprise that the company holds a prominent position in the industry, with a share of 20 percent in China's LED lighting aluminum market.

Zhaolv has experienced substantial growth over the years. Currently, it has 130 employees with a 2000 m² factory. It has not only participated in key municipal projects, but also developed partnerships

with international brands such as BMW, Mercedes, Honda, Toyota and Volkswagen.

Ge attributes company success to its innovation strategy.

"Through continuous technical innovation investment and material formula improvement, Zhaolv has improved its machining and cutting performance," said Ge, adding, "We customized machinery and shortened three processing operations to one, greatly saving the processing cost."

As for the future, Zhaolv will invest more in further developing technologies and bringing equipment up to date. At the beginning of this year, the company had already implemented a fully automated H-type automobile headlamp heat sink production line.

Success hasn't made Ge forget his roots. Over the past 15 years, the company has taken part in rural revitalization. It has upgraded the idle assets of the village, optimized the local young technical talent pool and increased their employment. The company also focuses on anti-poverty initiatives, and has subsidized 10 local poor students and families.

"Choosing my hometown to start a business was an instinctive reaction. As a local enterprise, it is my duty to serve the people and relieve the villagers of their worries," said Ge.