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PHILOSOPHY AND CULTURE OF SCIENTIFIC WORK IN JAPAN: MYTHS AND REALITIES

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In the self-assessment of the achievements of modern Japanese science, there are two opposite philosophical positions – a deep respect for the Japanese national spirit and adopted in the West critical instruction, aimed at identifying one's own shortcomings. It was found that these two positions find their reconciliation in the culture of unceasing self-improvement of scientists in the direction of the culture of scientific research and the culture of interaction between scientists, state institutions and public initiatives. Science education and science communication are considered as two key concepts that characterize the way of state and public management of science in Japan and express the essence of the Japanese culture of scientific work. It was revealed that the myth of closedness of Japanese science is being overcome in scientific education in Japan, and the myth of strict state control over the development of science is being overcome in scientific communication in Japan. Also, the predominantly directive way of state management of the development of science is being replaced by a multi-paradigm culture of science management, which includes, in addition to state orders, a more active position of research scientists, as well as non-state social networks for the dissemination of scientific information and the institutionalization of scientists' promotion of their messages to society. Japanese scientists agree that *science education* in Japan should raise the academic level of popularization of science, *science communication* should weaken vertical state patronage by building additional horizontal scientific networks and encouraging the creation of public institutions to support science, and *Japanese spirit* should become the world brand of Japanese science, which requires a wider inclusion of Japanese science in English-language scientific communication. It was determined that the philosophy of non-linearity and diversity appears as a new basis of the culture of scientific work in Japan.

Keywords: culture of scientific work; modern Japanese science; multi-paradigm culture of science management; myths; philosophy of non-linearity and diversity; science communication; science education

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Introduction

The culture of scientific work introduces science into a somewhat broader context, which can be national culture, economy, politics, and religion, as well as other spheres of social life. The specificity of the Japanese culture of scientific work is that Japanese science has always been and is under the watchful and friendly supervision of the state, which is loyally perceived by the scientists themselves. Accordingly, most of the successes of Japanese science are related to successful government science policies, while most of the failures are also due to the unsuccessful policies. In Japan, all other contexts regarding science are subject to the influence of the state and cannot be adequately understood without such influence. However, one cannot exaggerate the role of such an influence, no matter how significant it may be.

The purpose of this article is to refute both excessive expectations and excessive criticism of the culture of scientific work in Japan on the basis of a philosophical comparison of assessments of this culture by Japanese and foreign researchers.

In order to form an adequate idea about the culture of scientific work in Japan, it is worth first checking some stereotypes about this issue. Thus, it is necessary to trace to what extent the following ideas about science in Japan correspond to reality and are not myths: Japanese science, like Japan itself, is quite closed to foreign influences and has its own unique “spirit”; Japanese science, as well as the Japanese economy, are under the close protection of the state; the more cohesive Japanese science is, the higher its scientific achievements will be.

Two key concepts that express the essence of the Japanese culture of scientific work are considered – science education and science communication. The first conveys the search for the inner essence of Japanese science as Japanese researchers [Kitarō 2023; Takahashi 2015; Takahashi 2020; Oda 1998; Ogawa 1998; Watanabe and Kudo 2020], as well as by foreign scientists [Graupe 2006; Huh 2023; Johnson 1982; Low 2009], the second is the task of interaction between Japanese science and Japanese society [Koso 2021; Koso and Alvarez 2018; Liu and Takahashi 2021; Zinchenko and Boichenko 2022]. The task of developing the Japanese culture of scientific work, as well as criticism of its current state, can be found in the writings of contemporary Japanese analysts [Irakashi 2023; Isozaki 2018; Isozaki 2022; Murayama 2023]. Prospects for overcoming the tradition of restricting access as a principle of organizing social order are considered based on the concept of Douglas North and his colleagues [North et al. 2009].

Science education and the myth of the unique Japanese spirit

One of the special achievements of Japanese science was considered the widespread introduction of science education in education – starting with school education “rika (the Japanese term for science education in schools)” [Isozaki 2022, 168]. The difference from Western science education lies in the lack of influence on Japanese science education from the tradition of secularism born of Christianity [Ogawa 1998], but due to the presence of a special rationalistic influence of Buddhism [Zinchenko and Boichenko 2022]. Japanese science does not break with religion, but maintains ties with its own, Japanese religion, or rather, always strives to establish a special Japanese spirit. Therefore, Japanese scientific culture is what conveys the meaning of “Japanese slogan, wakon yōsai, which describes the Japanese spirit with Western ability or learning, or Japanese traditions and Western skills” [Isozaki 2022, 169].

The classics of Japanese philosophy of the 20th century also had a clear understanding of this. Thus, Nishida Kitarō claimed in the 1930s that “every scientific judgment necessarily depends on a certain context, which in turn derives from a broader experiential domain that is beyond the scope of the judgment itself” [Graupe 2006, 70]. German economist Silja Graupe considers this as “subordination of science to culture” – in the

context that in the case of Japan it is about western science and Japanese culture. A researcher from Japan, Duim Huh, also talks about a special “Japanese spirit” as something that was cultivated in primary and secondary science education from 1831–1958 [Huh 2023]. Moreover, analyzing Kitarō’s teaching, Silja Graupe points out that, according to his understanding, scientific “knowledge is usually associated with quantification” “science’s common world of knowledge is transcendental to both the field of empirical judgments (the basho of being) and the field of the individual scientist (the basho of relative nothingness)” [Graupe 2006, 79–80]. Indeed, Kitarō states with respect to all judgments that “we cannot perceive purely abstract connections. The movement of thought takes place with the help of certain concrete mental images, without which it is impossible” [Kitarō 2023, 182]. As Graupe interprets it, science cannot be truly universal: “its universality implies incompleteness because it negates all forms of unique individual knowledge and skill” [Graupe 2006, 81]. However, these specific mental images, including “individual knowledge and skills”, can be both true and false: judgments about science can be made both on the basis of knowledge of the real social and scientific context, and on the basis of myths and prejudices. This applies both to the external view of science and to the scientists’ own self-esteem.

Among the Japanese researchers themselves, you can find a somewhat unexpected interpretation of the Japanese understanding of the essence of work in general, which obviously extends to the understanding of scientific work in particular – the interpretation of work as a value in itself: “...the essence of the Japanese-style personnel system is that (i) it is not a system that rewards work with pay, but instead rewards work with new work... On the other hand, (ii) the pay system at Japanese firms has not been designed merely for motivation; the wage curve has been designed from the perspective of guaranteeing living expenses” [Takahashi 2015, 262].

On the one hand, indeed, in science even more than in any other work, the motivation to work is formed by the possibility of carrying out new, better researches: this gives later all the other benefits of life, starting with high social respect – in the case of achieving a successful result in these researches. On the other hand, this emphasis on science itself being rewarding not only takes it beyond economic evaluation, but also over-idealizes the circumstances in which the work can be done. The employee’s enthusiasm in itself is never enough to ensure that the work is completed – experience, knowledge and qualifications are needed, which are achieved precisely by a professional, not an amateur, attitude to work. The same applies to legal requirements for normalization of scientific work – conscience cannot replace them, although it can strengthen the effect of legal norms.

It is all the more unacceptable when the appeal to “passion of work” as the embodiment of the “Japanese spirit” more or less clearly replaces not only economic or legal, but also academic criteria. And until recently, mainly only academic exchange with foreign universities forced Japanese scientists to turn to English.

“In addition to this two-way flow (albeit a trickle) of graduate students between Tokyo and Seoul, we are seeing more Japanese and South Korean universities being encouraged to teach more in English, a development that can only widen opportunities for more interaction with visiting faculty” [Low 2009, 522].

However, such an emphasis on the national uniqueness of science can be excessive, and for a certain time in Japan, the establishment of the Japanese spirit led to the preservation of the traditional culture of closure from external foreign influences – even often in Japanese science.

Japan is considered a rather closed country for foreigners, especially in relations with China: as a result of the well-known historical events of World War II, but also as a result of modern tensions in relations between these countries. However, despite this, as the researchers testify, “25.8 % of Japanese companies hiring skilled foreigners recruited or

planned to recruit foreigners graduating from overseas universities in 2019” [Liu and Takahashi 2021, 64]. However, it is one thing for foreigners to get a job in a Japanese company, and quite another to make a career in it. Thus, for Chinese applicants, Japanese researchers find a number of objective reasons that prevent them from obtaining a higher position in the company.

“Chinese employees with low motivation scores derived from limited opportunities to attend company briefings held as part of the job-hunting process in Japan as well as restricted chances to communicate with employees already at the company, and the absence of a career perspective presumably revealed dissatisfaction with the day-to-day work after joining the company” [Liu and Takahashi 2021, 73].

However, among such objective reasons, we see one that looks quite respectable – “the absence of a career perspective”. It is difficult to make a career in a job where this career is not possible for a foreigner.

This situation is more reminiscent of a “limited access social order” that has a predominantly administrative basis than the inaccessibility of the “Japanese spirit” to foreigners. The disadvantages of social systems based on a “limited access social order” have been analyzed by Douglas North and colleagues [North et al. 2009]. However, neither modern Japan nor modern Japanese science is authoritarian or, even more so, totalitarian, and somewhat excessive conservatism is the drawback that the Japanese consciously fight with conservative persistence and organization. The changes in research culture that have taken place in Japan in recent decades are excellent evidence that respect for tradition can be not only an obstacle but also a motivator for innovation.

Science communication and the myth of the saving role of the state in relation to science

For a long time, the successes of the Japanese economy and the significant role of Japanese science in achieving these successes were associated with a rather strict Japanese government policy in this direction. A classic study by American professor and CIA analyst Chalmers Johnson demonstrating the benefits of this policy focuses on the leading role of the Department of International Trade and Industry [Johnson 1982]. Through numerous examples, careful analysis of statistical data, extensive comparative studies, and institutional analysis, Johnson shows how for 50 years the government ministry confidently led the economy and science in Japan to success. This demonstrated the real grounds for the creation of a myth about the unequivocal benefits of state intervention in the development of science and the need for close state protection over science. For some time, even after the Chalmers Johnson study, this trend persisted, and the myth of the state as an effective manager of science in Japan was part of the scientific culture and part of the traditional loyalty of Japanese citizens to their government, but in the 21st century the situation gradually began to change – as if under the influence of programmed institutional changes, as well as under the influence of extraordinary unexpected events.

In 1959 it was established the Council for Science and Technology and until the end of the 20th century this state institution significantly influenced the development of science, supporting and developing at the same time the culture of high loyalty of science to the state in Japan. This Council was also focused on “boosting the public understanding of science and technology (PUST)” [Watanabe and Kudo 2020, 522]. Later, in 2001 it was founded the Japanese Society for Science and Technology Studies that was aimed at “promoting public engagement with science and technology (PEST)” [Watanabe and Kudo 2020, 525]. Since 2005 “Japanese government policy for promoting PUST has shifted to PEST to some extent” [Watanabe and Kudo 2020, 526]. Also this year due to administrative reform it was formed The Ministry of Education, Culture, Sports, Science and Technology (MEXT) and as an affiliated part of it was adopted the National Institute of Science and Technology Policy (NISTEP) that was established in 1988 (from

the restructured National Institute of Resources). NISTEP mission consists of the main parts: 1) “to forecast policy issues and investigate them through autonomous research”, 2) “to carry out research in response to requests from government agencies”, 3) “to provide data that forms the basis of research and play a key cooperative and contributing role in activities with other institutions and researchers...” [NISTEP 2024]. As you can see, the Japanese government really closely guards scientific research and pursues a fairly firm state policy in the field of science and technology. By “science communication”, they seem to mean not so much the communication of scientists among themselves, but their constant communication with state officials.

However, does such a strict line of state policy and a culture of emphasized loyalty to the state create the proper conditions for the development of science?

On the one hand, this state policy clearly contributed to the popularization of science among Japanese citizens. A vivid example is the rapid spread of the network of science cafés, which in 2005 were only 20 throughout Japan, and already in 2009 there were about 1,000, and this number is stable. The success of this idea exceeded all expectations: “Science was thought of as a high-threshold topic before science cafés, but these events are now perceived as being open to all-comers thanks to the relaxed, informal environment where people enjoy talking about science over coffee” [Watanabe and Kudo 2020, 528].

However, it soon turned out that this success did not so much strengthen loyalty to the state, as it strengthened Japanese civil society, which began to be interested in science independently of the state. Thus, after the terrible earthquake of March 11, 2011 and the terrible accident at the nuclear power plant in Fukushima, citizens lost a high level of trust in the state as a source of scientifically proven information: “Since then people have set up their own local networks to exchange information about radiation risks” [Watanabe and Kudo 2020, 531].

State policy, which for a long time was focused on the promotion of the “public understanding” program regarding scientific research controlled by the state, received its criticism [Watanabe and Kudo 2020, 530–531]. Therefore, the significant funding of this program did not justify itself – in particular, 1 million US dollars for three leading Japanese universities (University of Tokyo, Hokkaido University and Waseda University) annually – for the five-year “formal training programs in science communication for postgraduate students” [Watanabe and Kudo 2020, 526]. An overly formalized and linear approach from the side of the state, which previously showed itself well, has turned out to be outdated in the society of social networks.

Discussion

In a 1998 publication in the journal *Nature*, Minoru Oda, a former director general of ISAS and former president of RIKEN, noted that it is necessary to reorganize state policy on the development of science and science education not “from above”, but “from below”, the key focus turns not to the popularization of science, to the support of basic science, because “basic science is a valuable cultural asset”, and therefore it is better to “listen to academics, adopting a ‘bottom-up’ approach to policy formation” [Oda 1998, 431].

After all, Japanese science in certain areas still demonstrates world-class breakthrough research – for example, in the field of computer modeling and simulation of processes and objects [Miyamoto and Ryff 2022; Takahashi 2020]. So, Japanese science itself is not the source of problems – more questions arise about the culture of its organization.

In general, even at the beginning of the 21st century, ideas in favor of some clarification of the tasks of state regulation of scientific policy began to be expressed more often in Japanese science. The result was the formation of a common position regarding the need to avoid “simple solutions” and excessive populism, but at the same time, the policy

of better feedback from science-related government agencies to the scientists themselves received general recognition.

“Simple, clear-cut categorization of science communication practice can be misleading, and it would potentially turn our attention away from visions, thoughts and broader contexts that are behind such seemingly understanding-oriented approaches to science communication” [Watanabe and Kudo 2020, 531–532].

Japanese science itself has entered a period of crisis in recent decades. Japanese researchers directly wrote that Japanese science had lost its world level [Ikarashi 2023; Murayama 2023]. Is the cause of this crisis in the development of Japanese science only a crisis of paradigmatic changes in the culture of science communication? Obviously not. However, the crisis of these paradigmatic changes undoubtedly had its impact on the crisis of the development of Japanese science.

Indeed, Japanese scientists themselves consider this negative impact to be temporary and see a more optimistic perspective of the positive impact of paradigmatic changes in the culture of science communication and the related culture of scientific work on Japanese science.

This positive lies in the widespread implementation of the principle of diversity to replace the principle of linearity [Kubalskyi 2023].

“What we need in future science communication research, therefore, should be to map out a wide variety of forms of science communication in our society – some are initiated by the government and/or scientific research institutions and others are more or less bottom-up – and to empirically investigate their meanings from the perspectives of people involved in them on the ground” [Watanabe and Kudo 2020, 532].

A vivid example of the introduction of a new philosophy of the culture of scientific work in Japan is the first Japan Scicom Forum, as a result of which an agreement was reached on the need “to foster a network of science communicators, professionalize and legitimize the field and boost English-language science communication in a country where it is still nascent” [Koso and Alvarez 2018, 1].

However, this path is still ahead of Japanese science to a greater extent. Thus, the Japanese researcher of science communication Ayumi Koso notes that today “institutionalization and professionalization, two indicators of science’s orientation to the media at the organization level, were not observed” [Koso 2021, 150]. Critically, simply “issuing press releases and using fax machines for delivery” is not enough – it is necessary to carry out a deeper integration of science into the field of media. Koso considers the creation of permanent press clubs by scientific organizations, “which is reported here for the first time in a non-Western context” [Koso 2021, 150], as one of these promising directions.

Novelty

Japanese culture of scientific work seeks to master all institutional borrowings from the West and not only fill it with its own national content, but also bring it as close as possible in form to Japanese cultural traditions. This task is somewhat more difficult than the formal reception of Western institutions, but the results of its successful implementation promise to be much more impressive and useful for Japanese and world science.

The popularization of science in science education should be strengthened by the professional approach of the scientists themselves, the dense hierarchical state patronage in science communication should be weakened due to the construction of horizontal scientific networks, and the excessive and irrational accentuation of the uniqueness of the Japanese spirit should be balanced by international communication and the full inclusion of Japanese science in the English-speaking science communication.

The moment of truth is not only that science in Japan has somewhat lost its halo of “success as a result of wise state policy” – rather, we are not even observing a paradigm shift, but a transition to multi-paradigm culture of scientific work in Japan: in addition to

the state, science can, and therefore has the full right to develop as private institutions, and also, all citizens as representatives of the public sphere of Japanese society have the right to influence the culture of scientific work.

It is obvious that the culture of scientific work in Japan is more conservative than in South Korea with its ideology of “two cultures” [Kubalskyi and Boichenko 2024] – loyalty to the state remains a priority in Japanese science. However, within the framework of this loyalty, Japanese culture shows an increasing readiness for the development of cultural and organizational diversity and more active acquisition of the best foreign scientific experience.

Conclusion

Modern Japanese science is relatively closed – just as Japanese culture and society are relatively closed, which are traditionally quite conservative. However, if previously the culture of scientific work in Japan was aimed at strengthening this closedness and the cultivation of the “Japanese spirit”, then the modern culture of scientific work in Japan is oriented to a greater extent to a deeper mastery of the achievements of Western scientific work – the professionalization of communication between scientists and society, the creation of advanced scientific social networks, the balancing of a consistent state policy in the field of science by involving in it a variety of initiatives “from below”, from the scientists themselves, by shifting the focus of attention to the cultivation of fundamental science, and not to the unconditional nurturing of national traditions as a priority. At the same time, the new orientations for the culture of scientific work in Japan to a greater extent are currently defined theoretically, and not widely implemented in existing scientific practices. Perhaps this is one of the reasons for some loss of pace of development of Japanese science. In any case, Japanese scientists themselves have high hopes that a paradigm shift in the culture of scientific work, namely a rethinking of the value foundations of science education and science communication, will provide the necessary new impetus for the better development of Japanese science.

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Філософія і культура наукової роботи в Японії: міфи та реалії

У самооцінці досягнень сучасної японської науки зустрічаються дві протилежні філософські позиції – глибоке шанування національного японського духу і перейнята в Заході критична настанова, спрямована на виявлення власних недоліків. З’ясовано, що ці дві позиції знаходять своє примирення в культурі невинного самовдосконалення науковців у напрямі культури наукових досліджень та культури взаємодії науковців, державних інституцій та громадських ініціатив. Наукову освіту й наукову комунікацію розглянуто як два ключових поняття, які характеризують спосіб державного та суспільного управління наукою в Японії і виражають суть японської культури наукової роботи. Виявлено, що в науковій освіті в Японії долається міф про закритість японської науки, а в науковій комунікації в Японії долається міф про жорсткий державний контроль над розвитком науки. Також на зміну переважно директивному способу державного управління розвитком науки приходять

мультипарадигмальна культура управління наукою, яка включає в себе, окрім державного замовлення, більш активну позицію науковців-дослідників, а також недержавні соціальні мережі поширення наукової інформації та інституалізацію просування науковцями своїх послань суспільству. Японські науковці доходять згоди, що *science education* у Японії має підвищити академічний рівень популяризації науки, *science communication* має ослабити вертикальну державну опіку за рахунок побудови додаткових горизонтальних наукових мереж і заохочення створення громадських інституцій підтримки науки, а *Japanese spirit* має стати не перешкодою до міжнародної комунікації, а світовим брендом японської науки, що потребує ширшого включення японської науки в англомовну наукову комунікацію. Визначено, що філософія нелінійності і розмаїття постає як нова основа культури наукової роботи в Японії.

Ключові слова: багатопарадигмальна культура управління наукою; культура наукової роботи; міфи; наукова комунікація; наукова освіта; сучасна японська наука; філософія нелінійності та різноманітності

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