



<https://doi.org/10.15407/scine21.03.053>

RYZHKO, L. V.¹ (<https://orcid.org/0000-0003-0967-5621>),
SHAPOVAL, A. P.² (<https://orcid.org/0009-0000-8032-351X>),
and ZHYVAHA, O. V.¹ (<http://orcid.org/0000-0002-4996-034X>)

¹ Dobrov Institute for Scientific and Technological Potential and Science History Studies of the National Academy of Science of Ukraine, 60, Taras Shevchenko Blvd., Kyiv, 01032, Ukraine, +380 44 486 9591, steps@nas.gov.ua

² Center for Humanitarian Education of the National Academy of Science of Ukraine, 4, Triochsvyatitelska St., Kyiv, 01601, Ukraine, +380 44 278 3013, cgonanu@ukr.net

EXPERTISE IN SCIENCE: COGNITIVIST AND MANAGERIALIST APPROACHES

Introduction. *The advancement of scientific knowledge has traditionally been accompanied by rigorous procedures for professional evaluation, ensuring objectivity, logical consistency, evidentiary support, and validity. These procedures serve as fundamental mechanisms for the self-organization and self-regulation of the scientific system. However, as science becomes increasingly integrated into market-driven processes, evaluation procedures have evolved into components of management technologies.*

Problem Statement. *This shift has undermined the traditional notion of science as a self-organized, self-regulating system. Simultaneously, the proliferation of open science practices and the emergence of new evaluation requirements — driven by the advancement of artificial intelligence technologies — have reshaped the principles of scientific expertise, offering grounds for cautious optimism regarding the future of scientific progress based on self-organization.*

Purpose. *This study aims to identify emerging trends in scientific expertise, focusing on the expansion of its functions, methods, and forms.*

Materials and Methods. *The study has employed comparative analysis, conceptualization and explication of key concepts, and problem-oriented analysis.*

Results. *The characteristics of managerialist and cognitivist approaches to evaluation have been clarified. New trends in scientific expertise have been identified, particularly in relation to the spread of open science practices and the integration of artificial intelligence into evaluation processes. It has been substantiated that the shift in assessment priorities from a cognitive to a managerial approach poses risks to the self-organizing capacity of science. However, open science practices and evolving assessment criteria linked to artificial intelligence technologies have created opportunities to mitigate these risks.*

Conclusions. *Contemporary trends in scientific evaluation should be grounded in the expansion of expert competencies and the cultivation of a multidimensional expert culture. This approach would facilitate polylogue, foster scholarly discussion, ensure the assessment of both actual and potential scientific outcomes, and promote an appropriate recognition of negative scientific results.*

Keywords: evaluation, expertise, peer review, cognitivist approach, managerialist approach, multidimensional expert culture, multisubjective evaluation.

Citation: Ryzhko, L. V., Shapoval, A. P., and Zhyvaha, O. V. (2025). Expertise in Science: Cognitivist and Managerialist Approaches. *Sci. innov.*, 21(3), 53–66. <https://doi.org/10.15407/scine21.03.053>

© Publisher PH “Akadempriodyka” of the NAS of Ukraine, 2025. This is an open access article under the CC BY-NC-ND license (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

The development of science has been inextricably linked with various assessment procedures, including the evaluation of new scientific knowledge, peer review of scientific texts, and expert appraisal of research projects and their outcomes. The peer-review system has been widely recognized as the foundation of self-organization and self-regulation within the scientific community. Developed for scholarly research journals, this system has ensured the verification of research reliability, facilitated the accumulation of scientific knowledge, and contributed to the effective advancement of science [1]. These processes have been grounded in the scientific ethos, particularly the norm of “organized skepticism,” which requires scientists to critically assess both their own findings and those of their peers. This somewhat idealized model effectively describes the functioning of science until the mid-20th century, when it was primarily guided by traditions of self-limitation and self-regulation within the scientific community. Two key trends in contemporary science underscore the relevance of this study. First, organized skepticism, traditionally an informal internal norm within the scientific ethos, has been increasingly supplanted by procedurally structured and institutionalized expertise, which has become an integral part of management technologies. If such managerial approaches contradict the norms of the scientific community, they may pose a threat to science as a self-organizing and self-regulating system. Second, in contrast to this trend, the ideals and practices of open science have been rapidly gaining traction. The implementation of open science encompasses open-access publications, open data, open peer review, and the emergence of new formats such as peer-reviewed preprints. These developments have created conditions for the transformation of science into a genuinely collective endeavor for understanding the natural world, incorporating multi-subjective processes for evaluating new knowledge. Furthermore, the development and application of artificial intelligence (AI) have highlighted the growing importance of expert knowledge, ne-

cessitating the expansion of knowledge bases to include not only established findings but also records of scientific errors and so-called zero results. This expansion has broadened the scope of evaluation in science, requiring a reassessment of the functions and responsibilities of experts and the role of scientific expertise.

This research aims to analyze transformations in the function of expertise within science by examining current trends in evaluation. It seeks to conceptualize the distinctions between “cognitivist” and “managerialist” approaches to scientific expertise and to identify new developments in expert activity associated with the transition to open science practices and the integration of artificial intelligence.

Methods and methodology. By using analytical and comparative methods, the authors analyze the literature concerning the problems of expertise in the scientific field. The methods of conceptualization and explanation of concepts made it possible to distinguish cognitivist and managerialist approaches to evaluation in science. It is shown that the cognitivist approach involves the determination of methodological validity, logical provenance, and the truth of scientific knowledge. It mainly concerns the cognitive component of scientific activity. The managerialist approach embraces the management context and views science as a professional activity. Historical analysis has shown the temporal priority of the cognitivist approach, as it concerns the analysis of the essential characteristics of science as a system of objectively true knowledge about the world and society. The managerialist approach is common for an institutionally formed science, which has close ties with other social institutions of society and must demonstrate the effectiveness of its activities to the state and the public. Problem-oriented analysis revealed new trends of expertise in the scientific sphere in connection with the spread of open science practices and the development and use of artificial intelligence.

In the article, the terms “evaluation,” “review,” “expertise” are used as close in meaning, but the

context of their use is taken into account. In particular, evaluation is a general term; peer review is used to work with texts — books, articles, manuscripts, expertise — to evaluate scientific results, projects, etc.

In the literature, there is a large array of works on theoretical issues of expertise, in particular, the possible limitations and biases of expert opinions have been analyzed by K. A. Ericsson, N. Charness, P. J. Feltovich and R. R. Hoffman [2]. Problems of expert selection have been studied by D. C. Zhang, Y. Wang [3], J. Shanteau, R. P. Thomas, B. Friel, D. J. Weiss, J. C. Pounds [4], A. I. Kurtov, O. V. Polikashyn, and A. I. Potikhenskyi [5]. The difference between experts and beginners has been analyzed by S. Kirjavainen and S. Celik [6]. The practices of using expert evaluations in professional field have been described in A. Denysova [7], collective monographs edited by V. O. Ognevyuk [8] also by V. P. Novosad, R. H. Seliversov, and I. I. Artym [9], L. E. Montgomery and M. D. Lee [10]. The value of expert opinions in management decision-making processes has been studied by R. Oleksiyenko, A. Donets [11], N. Pedchenko, V. Strilets, N. Rudenko [12] and others.

R. Stichweh emphasizes that the expertise procedure, and therefore expert knowledge, is a multifaceted phenomenon that includes cognitive-disciplinary and interdisciplinary dimensions, time dimension is assessment of the current state, and forecast for the future. The expertise process requires compliance with the requirements of impartiality, leveling of personal preferences, and engaged emotional states. Expertise is relevant to the exercise of power. After all, experts, albeit indirectly, influence management decisions. Thus, experts' conclusions are used by financial organizations when making decisions on financing scientific projects, and reviewers of journals and publishing houses make decisions on publications. Expert decisions affect academic careers, career advancement, and obtaining academic degrees and titles [13].

Expertise is crucial for the functioning of the scientific institution. On one hand, peer review

provides an internal self-regulatory function; on the other, it serves as a primary mechanism for autonomy and equality in science, while also introducing new differentiations. Objectivity, a fundamental characteristic of scientific knowledge, ensures equal opportunities for both established and emerging scientists to acquire true knowledge. Consequently, scientific contributions are evaluated irrespective of an author's status. However, more experienced scientists predominantly engage in peer review, which, in turn, enhances their status [13]. This differentiation is functional, contingent upon the roles performed by a scientist, and facilitates status elevation based on achieved results, thereby advancing science.

As science has become integrated into modern market structures, expert activities have extended beyond peer assessments that focus on the cognitive component. They have become the purview of state institutions and form the basis for allocating funding and ensuring accountability to governments, investors, sponsors, and civil society. The methods employed for this purpose transcend the evaluation of cognitive achievements, encompassing analyses of publication activity, success in securing funding, management strategies, material and technical resources, among other aspects. These methods have been actively analyzed and critiqued in the literature. New evaluation emphases have been proposed, such as considering the societal impact of research S. Hill [14], A. Viana-Lora, M. G. Nel-lo-Andreu [15], J. Bellavista, C. Elboj-Saso, C. García Yeste, B. Villarejo-Carballido [16], ethical considerations M. Almeida, R. Ranisch, [17], and the methodological feasibility of various metrics D. Moher, L. Bouter, S. Kleinert, P. Glasziou, M. H. Sham, V. Barbour, U. Dirnagl [18], D. Hicks, P. Wouters, L. Waltman, S. de Rijcke, & I. Rafols, [19], O. Hallonsten [20], B. Malitsky [21], I. Yu. Yegorov, and I. A. Zhukovych [22], etc.

Thus, the literature presents a broad spectrum of issues related to evaluations in science. There remains a need to comprehend the distinct characteristics of the cognitivist approach, which fo-

cuses on assessing scientific knowledge, and the managerialist approach, which aims to enhance management efficiency in the scientific domain, as well as the potential for their interaction. This issue has gained prominence due to the proliferation of open science practices and the development and application of artificial intelligence. These processes present new opportunities and challenges for the scientific system, necessitating transformations in evaluation principles and expert activities.

COGNITIVIST AND MANAGERIALIST APPROACHES TO EXPERT EVALUATION IN SCIENCE

Traditionally, evaluation in science has signified the reliability, validity, and truth of scientific statements, constituting an intrinsic professional concern. Although external factors, such as religious and ideological influences, have occasionally caused distortions in assessments, the inherent logic of scientific development has eventually rejected these aberrant results. Thus, expertise has essentially contributed to the growth of scientific knowledge, focusing on cognitive problems and being limited to reviewing texts or discussing scientific reports in which researchers present their findings. This method of evaluation can be termed cognitivist.

The peculiarity of expertise in science arises from its role as a field dedicated to the pursuit of new knowledge – that is, knowledge that theoretically or empirically describes and explains previously unknown phenomena, facts, or processes in nature or social life. Therefore, the primary task of expert evaluation in science, as a domain of knowledge production, is to establish the truth and novelty of the obtained results. The problem of truth pertains to epistemology and involves significant issues addressed through fact verification, falsification of scientific positions, and related procedures. These tasks fall within the purview of professional disciplinary communities and are driven by the skepticism inherent in every scientist as a member of the scientific community.

In science, individual and collective responsibilities for producing true, novel scientific knowledge are interconnected. Science is a collective endeavor and a social institution with specific ideals, norms, and values aimed at assessing the methodological rigor and validity, logical soundness, epistemological novelty, and truth of scientific knowledge.

Various peer review practices have emerged in modern science. The tradition of peer review traces its roots to the activities of reviewers and editors of scholarly research journals, whose task is to decide whether to publish or reject articles. Notably, only peers with recognized scientific authority in the relevant field of research were previously acknowledged as experts. Due to differentiation and interdisciplinary and transdisciplinary developments, the concepts of “colleagues” and “subjects of expert evaluation” have expanded. Certain collegial rights have been assigned to interested parties, known as stakeholders.

There exist primary reviews of manuscripts and evaluations of grant applications conducted before publication or the commencement of project activities, as well as secondary reviews that occur after publication or project completion. Evaluation procedures can vary, involving face-to-face interactions or being executed remotely or online, and engaging subjects with diverse professional interests. Scientific experts can be internal or external to an academic institution, and their rank may be higher or lower than that of the individual they are evaluating. Depending on the level of anonymity among authors, reviewers, and editors, peer review can be single-blind, double-blind, triple-blind, collaborative, or open. Each form has its advantages and disadvantages, but in any case, peer review enhances the credibility of manuscripts and promotes adherence to academic publishing standards.

The role of science as a social institution with complex interrelationships with other societal institutions has raised the issue of assessing work productivity, operational efficiency, and development potential. Consequently, there has been a shift

in the focus of expertise from the results (scientific knowledge) to their presentation in publications, reports, or other forms that demonstrate the impact of activities. E. Forsberg, L. Geschwind, S. Levander, and W. Wermke have provided the following definition, “Peer review is a context-dependent, relational concept that is increasingly used to denote a vast number of evaluative activities engaged in by a wide variety of actors both inside and outside of academia. By peer review, we refer to peers’ assessments and valuations of the merits and performances of academics, higher education institutions, research organizations and higher education systems. Mostly, these activities are part of more encompassing social evaluation practices, such as reviews of manuscripts, grant proposals, tenure and promotion and quality evaluations of institutions and their research and educational programs” [23].

Peer review in science has been institutionalized in various forms, according to the functions it performs. Researchers and academic staff evaluate their peers’ research results, pedagogical work, and compliance with positions, among other aspects. The scientific community assesses manuscripts and publications, dissertations, and conference presentations, holds competitions, and provides awards. International, regional, and national agencies for quality assurance in higher education perform accreditation and quality assurance audits of educational programs. Funding agencies evaluate grant applications for projects and scholarships. Evaluation is related to the provision of human and financial resources and the development of future strategies as a basis for policy and priorities in science. Evaluation procedures are regularly carried out by researchers and institutions and have an interconnected and spiral nature, as the same study can be reviewed several times [24]. Thus, the process of evaluation in science is universal and comprehensive, influencing the development of science as a field of knowledge production and institutional structure [23]. With limited funding, evaluation and expertise have become factors in choosing subjects and ob-

jects of the scientific process. Thus, internal factors in the development of science (the logic of the cognitive process, the researcher’s interest, etc.) have been replaced by selection criteria that are external to science.

The above definition of expert activity in science and education encompasses a wide range of issues, which is appropriate given that fields related to the creation of new knowledge imply the presence of evaluation procedures at every stage of work.

Currently, as the scientific system has become an element of market relations, the role of evaluation in science has been undergoing a transformation. H. F. Hansen has noted that while historically expert evaluation was an opportunity for peers to exercise academic power in a professional self-regulatory system, the results of evaluation now often serve to provide management advice and accountability to institutions of power [25]. J. P. Olsen has also emphasized the decreasing relevance of peer review in the context of the functioning of scientific institutions and universities as self-governing communities of scholars. Instead, its importance as a tool for political programs has increased, influencing the development of science and education institutions embedded in competitive market structures [26]. The so-called modified forms of peer review have become increasingly common. They are carried out in a more standardized manner, using appropriate methodologies that combine quantitative measures — indicators, criteria, metrics — and qualitative expert opinions. Such methods are used to evaluate job applicants, determine the grounds for promotion, and assess research and educational institutions and grant proposals. Based on standards developed by management structures, such evaluations operate in a managerialist context and aim to generate data useful for managing the scientific system [27].

In addition, traditional assessments in science, such as peer reviews of manuscripts, publications, or project proposals conducted by peers serving on selection committees for positions or awards, have been supplemented by various metrics. However, it has been widely emphasized that the re-

levance of these metrics is controversial in many cases, especially since they were not originally designed for evaluation purposes. The Leiden Manifesto for Research Metrics explicitly states that metrics should not be used at the individual level. In this context, the function of evaluation in science shifts from solely validating objectively true knowledge to managing the development process of the scientific domain. Consequently, science, which has traditionally operated as a self-organizing and self-managing system driven by the logic of research processes, is transforming into a structured production of scientific outputs with corresponding management and administration.

Utilizing evaluation results for management decisions leads to modifications in the evaluation process. The focus shifts from assessing the scientific results obtained by individual researchers to evaluating the performance of organizations, such as groups, departments, faculties, institutes, and universities. In this scenario, the emphasis is not on the scientific knowledge presented in texts and patents but on secondary materials like research reports, activity summaries, journal rankings where results are published, effectiveness in securing financial resources, management strategies, stakeholder feedback, and the state of material support. Evaluations become more heterogeneous, as committees may include members from various scientific disciplines and stakeholders, broadening the scope and shifting the focus of assessments. The primary concern is not necessarily the quality of research but the proper functioning of the research environment and its development potential. Attention is given to conditions and processes that promote research quality and innovation, researcher training, gender balance in teams, enhancement of scientific collaboration, development of scientific networks, and communication with society. While these are important aspects of a research institution's functioning, they pertain more to the potential for achieving scientific results than to the results themselves. At the same time, the significance of evaluation is growing in terms of its impact on the future functioning of research

institutions. By accepting responsibility for ensuring research quality, universities and research institutions strive to protect their autonomy [25].

Overall, the managerialist approach to evaluation is relational, context-dependent, purpose-driven, influenced by managerial requirements and traditions, and aligned with existing job descriptions.

NEW TRENDS IN PEER REVIEW IN THE TRANSITION TO OPEN SCIENCE

The transition to the principles of open science has changed the requirements for publishing scientific results and their evaluation, which has implied modifications in the procedures for peer review of scientific texts and outcomes. Open science has primarily involved making science accessible to society, building trust in scientific endeavors, and understanding science as a global public good [28].

Open science is a framework concept that combines various measures and activities aimed at making scientific knowledge publicly available and suitable for joint reuse. It has aimed to promote scientific cooperation and information exchange for the benefit of society, as well as to familiarize the general public with the processes of creating, evaluating, and disseminating scientific knowledge. Key elements of open science have included open scientific publications, open peer review, open scientific infrastructure, open data, open educational resources, open-source software, open innovation, and open dialogue with other knowledge systems. Restricted access, as noted in UNESCO's materials [29], can only be justified by concerns such as the protection of human rights and national security; confidentiality and privacy; respect for individuals and research participants; maintenance of public order; and the protection of intellectual property rights, personal information, and the sacred and secret knowledge of indigenous peoples.

The term "open peer review" is proposed by T. Ross-Hellauer [30] to refer to various peer review models used in accordance with the requirements of open science. Open peer review has in-

volved the disclosure of the names of reviewers and authors, the publication of peer review reports, and ensuring broader participation in the review process by scientists from different age groups as well as various disciplinary and professional communities [23].

The transition to open peer review has been carried out at different paces. In September 2018, a group of national research organizations from EU countries, with the support of the European Commission and the European Research Council (ERC), announced the launch of the cOAlition S initiative, which has aimed at making research publications fully and immediately open to the public while maintaining scientific excellence. A plan has been developed according to which access to scientific publications prepared through state research grants should be fully open. At the same time, the publication of preprints has been regarded as equivalent to publication [31].

One example of open peer review is the so-called social peer review (SPR). The term is proposed by C. Matt, C. Hoerndlein, and T. Hess [32] to describe the process of publishing research on social networks and subsequently having it reviewed by the entire academic community. They have noted that although Internet technologies have enabled scientists to make their results available to other researchers via social media, the traditionally closed peer-reviewed publication process has remained largely unchanged. Therefore, the authors have proposed the use of social peer review, which involves publishing work on a social network and then subjecting it to review by all readers, that is, by the entire academic community. In a survey of 1,429 scientists from different countries and disciplines, Matt, Hoerndlein, and Hess have found that the insufficient use of SPR is due to external factors rather than internal attitudes of researchers. The challenge in using SPR has been its low status among the professional community and insufficient recognition by leading scientists. However, respondents have noted that SPR can be a useful complement to the traditional expert evaluation system [32].

Despite certain difficulties, open peer review has been employed in “peer-reviewed preprint” repositories. Since open peer review is a relatively new phenomenon and its organizational principles are not yet widely understood, it is instructive to examine its application in the eLife electronic journal, which specializes in publishing articles in the life sciences and medicine. This example has allowed conclusions to be drawn regarding new trends in the use of expert opinions in science.

Since 2019, eLife has abandoned the traditional selection process for submitted articles and has instead adopted the practice of reviewing texts that have already been published as preprints. Reviewers have also been invited to write public peer reviews [33]. In an 18-month period, eLife reviewers have assessed more than 2,200 preprints in the bioRxiv repositories, providing expert evaluations of the significance of the findings and the strength of the evidence.

Upon the analysis of these results, the eLife editorial board has determined that public reviews and the evaluation of preprints are far more effective than the traditional binary decision of accepting or rejecting a manuscript. This approach has enabled a more comprehensive conveyance of the opinions of reviewers and editors, as well as a better representation of the nuanced, multidimensional, and often ambiguous nature of peer review. Thus, a new method of presenting scientific findings — a peer-reviewed preprint — has been launched.

Accordingly, the function of the publishing house is changing. eLife is no longer simply publishing a journal but is evolving into an organization that reviews and certifies articles that have already been published. In this way, the traditional “peer review, then publish” model, which was developed in the age of the printing press, is being replaced by a “publish, then peer review” model optimized for the Internet age. The eLife team has believed that it is necessary to focus its editorial and technological efforts on translating this new model into scholarly practices that benefit authors, readers, the broader research com-

munity, and the public [33]. The journal's editors have acknowledged that such fundamental changes in the publishing process cannot be immediate; in a world where publication in high-impact journals and citation counts serve as a kind of career "currency," authors who choose to present their work in an unconventional manner may be affected. Consequently, eLife publishes articles selected from peer-reviewed preprints.

The key goal of this project has been to change the criteria for assessing the quality of a scientific result – that is, to eliminate the reliance on journal status as the primary indicator of research quality. The eLife staff has maintained that peer-reviewed preprints mark the beginning of a new era in scientific publishing.

Difficulties with the transition to the new rules may be due to the position of the author, for whom this approach is unfamiliar or who, for various reasons, has been prevented from publishing research information in the form of a preprint. The publication of peer reviews has apparently not posed a problem for reviewers. Most reviewers with whom eLife staff have communicated have seen no reason to modify their reviews, since they are made publicly available. In addition, immediate public disclosure of negative reviews was not intended in the initial phase, thereby providing the author with an opportunity to prepare a response or choose an alternative journal for publication.

Other preprint platforms based on the principle of open peer review have emerged, including Society, Review Commons, Arcadia Science, PreLights, Rapid Reviews, and PREReview. Although the transformed publishing system faces challenges, it has generally become more efficient, transparent, and responsive. It is likely that moving away from the single-publication model that has dominated thus far will contribute to the development and dissemination of scientific results, as suggested by M. Avissar-Whiting, F. Belliard, S. M. Bertozzi, A. Brand, K. Brown, S. Dawson, et al. [34].

In this context, the publication of a scientific result is unlikely to be considered complete for the research process. As noted by M. B. Eisen, A. Akh-

manova, T. E. Behrens, D. M. Harper, D. Weigel, and M. Zaidi [33], there are no objective grounds for articles to be reviewed only once or solely by one organization. Peer review should be multi-subjective and continue as long as the work remains relevant and holds potential for improvement and development. The peer review process should offer every individual who can enhance the work an opportunity to contribute, rather than limiting feedback to the reviewers appointed by the journal. Moreover, the use of preprints offers the advantage of allowing edits and improvements, whereas corrections become considerably more challenging once an article is published in a journal.

At the same time, despite its advantages, the system carries potential risks that must be avoided. The evaluation of scientific results should not devolve into a competition of eloquence, populism, or mere criticism. The peer review process must remain free of bias and as fair as possible. We cannot rely solely on the "wisdom of crowds;" it is essential that communication among researchers actively contributes to the advancement of science [33]. This point is especially critical, as scientists have frequently emphasized that the advice or requirements provided by reviewers are sometimes unreasonable and biased [35]. For example, a recommendation to conduct an additional set of experiments may lead to losses in time and resources without significantly affecting the final scientific outcome.

In general, open peer review and peer-reviewed preprints, as a scheme for publishing and expert evaluation of scientific results, have transformed the publishing process and have the potential to convert scientific research into a truly collaborative endeavor. However, many questions remain regarding intellectual property rights, the establishment of priority, and the recognition of individual achievements. There is also the danger of an infodemic – a significant increase in the volume of scientific information coupled with the risk of disseminating unverified or false information.

It should be recalled that the term "infodemic" emerged during the COVID-19 pandemic to de-

note the frenzied growth of information about the virus [36, 37]. Concurrently, there was a critical need for rapid dissemination of new data along with its thorough analysis. From the onset of the pandemic until June 2020, almost 20,000 unique texts about COVID-19 had been published, with more than 2,000 articles added weekly. This expanding body of literature has included both articles from traditional peer-reviewed journals and texts presented as preprints. Preprints have enabled the immediate availability of data to everyone, including fellow scientists, medical professionals, and the general public [38], thereby contributing to the rapid development of vaccines and treatment protocols.

Despite concerns that virtually uncontrolled dissemination of information might lead to “information noise” and the spread of unverified data, questions have been raised regarding whether this strategy is justified in the absence of emergencies. This issue has required further study and additional precautions. At the same time, considering that the traditional peer review process has exhibited certain disadvantages — such as potential bias, a lack of transparency in decision-making for authors, and inadequate communication between journals — if an article is not accepted for publication by one journal, it can be submitted and published without changes in another, as the second journal does not have access to the peer review reports from the first. This duplication has led to excessive time wastage, with almost 15 million hours spent annually on the peer review of rejected papers [39]. Although this process has allowed for the mitigation of possible prejudices or erroneous decisions by reviewers to some extent, there has never been absolute certainty that a rejected article does not deserve publication. Consequently, the question has arisen as to whether time and resources should instead be directed toward new research and the advancement of science in general.

In Ukraine, the transition to open science practices has also begun. By the Decree of the Cabinet of Ministers of Ukraine dated October 8, 2022,

No. 892-p, the National Plan for Open Science has been approved. According to this plan, a number of measures have been envisaged to improve legislation in accordance with European Union standards and norms regarding open access to scientific results and scientific and technical information obtained in the course of basic and applied research funded by the budget [40].

At the same time, the Action Plan for the Implementation of the Open Government Partnership Initiative in 2023–2025 (approved by the Cabinet of Ministers of Ukraine on November 17, 2023, No. 1049-p) has noted that actual progress has lagged behind, to the detriment of both science and society [41]. However, owing to the complexity and challenges inherent in the practical implementation of open peer review, Ukraine has had the opportunity to avoid previous mistakes by drawing on the experience of its predecessors. Moreover, significant advances have already been made; in particular, the Decree of the Ministry of Education and Science of Ukraine No. 747 of May 24, 2024, has established a working group for the introduction of open responsible peer review. This group has been tasked with developing and submitting draft methodological recommendations for implementing open responsible peer review of scientific research, as well as proposals for amending legislation on the introduction of open peer review for scientific research that does not contain information with restricted access and that has been carried out with state and local budget involvement [42]. It can be assumed that these processes will lead to changes in the scientific landscape, the principles of professional research communication, and the interaction between science and society.

Given the fact that each approach to expert review (open and closed peer review) has its own advantages and disadvantages, and considering that the scientific community has had limited experience with open peer review, the most effective strategy at present has been to create opportunities for the coexistence of both methods of scientific expertise. This approach will help to

protect science from unpredictable negative consequences, such as those that might arise from a complete transition to quantitative indicators for assessing the activities of scientists and scientific organizations.

REQUIREMENTS FOR EXPERT EVALUATION IN THE CONTEXT OF THE DEVELOPMENT AND USE OF ARTIFICIAL INTELLIGENCE

The search for ways to enhance expert activity in science has another important dimension. Experts' work should contribute to the effective development of science by recognizing the scientific cognitive process as a progression from the unknown to the known – from ignorance to knowledge. Moreover, it should be acknowledged that science may encounter dead ends and false leads; the disclosure of these unproductive paths will help prevent redundant efforts and render the scientific process more transparent, clear, and comprehensible. Consequently, experts should consider both the actual new scientific results obtained and the potentially possible, though not actualized, outcomes.

In this regard, initiatives to publish negative results are particularly noteworthy [43]. Calls to publish negative results have been made before; for example, in 1979 the American psychologist R. Rosenthal highlighted the accumulation of unpublished manuscripts, a phenomenon known as “the file drawer problem” [44]. Scientists have often refrained from attempting to publish negative results because they have been convinced that such findings would be rejected or that the process would be excessively time-consuming [45]. Although it is well established that negative results constitute valid scientific outcomes, it is understandable that researchers prefer to share successful studies and the knowledge gained rather than report false hypotheses and methodological errors. While this issue once possessed purely historical and psychological dimensions, it is now taking on new forms in today's research environment.

The issue has become increasingly pertinent with the transition to open science, as openness requires the demonstration of the entire process of knowledge production without exception. Journals specializing in the publication of “null” results have emerged. For instance, in 2020 the Journal of Trial & Error was launched. Its editor-in-chief, Sarahanna Field, emphasizes that the journal's goal is to highlight scientific failures; importantly, even methodologically sound research may yield unexpected negative results, which can serve as a source of potential breakthroughs and thus merit careful peer analysis. Another example is the Per-Fail International Workshop on Negative Results in Pervasive Computing [46], which serves as a platform for sharing ideas, experiences, and lessons learned from research in pervasive computing.

In addition, R. Brazil has drawn attention to the importance of publicizing negative scientific results in the context of developing and using artificial intelligence. Machine learning, which underpins artificial intelligence, is inherently dependent on the full spectrum of data – including both positive and negative results. Without access to a complete dataset that includes these “blank spots,” artificial intelligence cannot develop a comprehensive understanding or an equivalent of “research intuition.” In this respect, scientists have called for a change in academic culture by introducing practices to create repositories containing both positive and negative results, as well as promoting the publication and discussion of studies that have yielded negative outcomes [43]. This initiative requires not only an expansion of expert competencies but also the development of a multidimensional expert culture. Such a culture should encompass the evaluation of both actual and potentially possible scientific results, including unexpected outcomes, and foster an appropriate attitude toward negative findings. In essence, the object of expertise is primarily the methodological rigor of research, which represents a potential opportunity for scientific advancement – though it does not guarantee a particular outcome.

E. Peltonen, et al. have stated that, when properly understood, negative results should be considered as lessons that can be useful for knowledge transfer among research groups working on the same topics. In this perspective, negative results have been regarded as a potential source of new scientific ideas, since retrospective analysis of such outcomes has demonstrated what should not be done — thereby saving resources and directing scientific research more productively [47].

There is a stronger rationale for publicizing research failures. The potential for obtaining a negative result has been viewed as an indicator of the originality of the research. If a result is obvious, with no possibility of failure, then the novelty of the study is also questionable. In the best-case scenario, “win-win” research contributes only marginally to scientific knowledge rather than sparking a scientific revolution. Venturing beyond the established research paradigm has always been a risky path that can lead either to significant scientific discoveries or to negative outcomes.

Negative results should be normalized as an integral part of an active research process, and the practice of disseminating such results through scientific publications, networks, and forums should be expanded. Normalizing “failure” may even encourage researchers to take greater risks in their work, which is a pathway to new scientific achievements. This perspective is essential for transforming expertise procedures and fostering a multidimensional expert culture.

Expert activity in science is multifaceted, encompassing the review of scientific manuscripts, articles, research reports, dissertations, evaluations of scientific projects, analyses of applicants’ resumes for scientific positions and awards, as well as assessments of the activities of scientific teams and educational and research programs. Depending on the object of evaluation, the procedures, focal points, and methodologies have their own characteristics. While peer review remains the primary method for determining the quality of a scientific text and functions within an epis-

temological framework aimed at advancing true scientific knowledge, its applications have been expanding.

Despite the expansion of tasks, functions, subjects, and objects in expertise, the classic version of peer evaluation by experts has remained the principal means of obtaining objectively true knowledge, ensuring the growth of new scientific insights, involving emerging researchers in the scientific ethos, and fulfilling science’s social functions.

The transition to open science practices and the development of artificial intelligence have encouraged the expansion of expert competencies and the formation of a multidimensional expert culture that facilitates polylogue, discussion, and the evaluation of both actual and potentially possible — or unexpected — scientific results, while promoting a balanced view of negative findings.

In Ukraine, the foundation for developing open science and open peer review has been established at the legislative and methodological levels, although practical implementation still requires significant effort from the scientific community to integrate Ukrainian science into the European and global research landscape.

The modern evaluation system has become an arena for negotiations over the autonomy of science and education. Whereas evaluation was previously conducted largely under the auspices of self-governing scholarly communities, it is now performed within the context of implementing management functions in science. The expansion of evaluation criteria — from those purely internal to science that support scientific excellence to external criteria assessing societal impact — has transformed evaluation into a mediation tool among society, government, and science. Therefore, the cognitivist context of evaluation has been complemented by a managerialist one. However, when the managerialist context begins to dominate, the self-organizing capacity of science to develop an objectively true knowledge system about nature and society may be disrupted.

REFERENCES

1. Merton, R. K. (1973). *The sociology of science: Theoretical and empirical investigations*. University of Chicago Press.
2. Ericsson, K. A., Charness, N., Feltovich, P. J., Hoffman, R. R. (2006). *The Cambridge Handbook of Expertise and Expert Performance*. New York: Cambridge University Press.
3. Zhang, D. C., Wang, Y. (2021). An Empirical Approach to Identifying Subject Matter Experts for the Development of Situational Judgment Tests. *Journal of Personnel Psychology*, 20(4), 279. <https://doi.org/10.1027/1866-5888/a000279>
4. Shanteau, J., Thomas, R. P., Friel, B., Weiss, D. J., Pounds, J. C. (2001). Identifying Expertise Without a Gold Standard: Four Applications. *Conference: International Symposium on Aviation Psychology (5–8 March 2001, Columbus, USA)*. Columbus, OH Volume.
5. Kurtov, A. I., Polikashin, O. V., Potikhenskyi, A. I., Aleksandrov, V. M. (2017). Expert evaluations. The Delphi method as a management decision-making technology. *Collection of scientific works of Kharkiv Air Force University*, 1, 118–122 [in Ukrainian].
6. Kirjavainen, S., Celik, S. (2023). Environmental Considerations in Engineering: Systemic Differences between Experts and Novices. *Proceedings of the International Conference on Engineering Design (ICED23) (24–28 July 2023, Bordeaux, France)*. Cambridge University Press, 1655–1664. <https://doi.org/10.1017/pds.2023.166>
7. Denysova, A. (2019). Using the method of expert evaluations in the quality monitoring system of professional education specialists. *The image of a modern teacher*, 5(188), 39–43. [https://doi.org/10.33272/2522-9729-2019-5\(188\)-39-43](https://doi.org/10.33272/2522-9729-2019-5(188)-39-43) [in Ukrainian].
8. Ognevyuk, V. O. (Eds.). (2015). *Education: training of experts in the field of education*. Kyiv [in Ukrainian].
9. Novosad, V. P., Seliverstov, R. G., Artym, I. I. (Eds.). (2009). *Quantitative methods of expert assessment: scientific method. Development*. Kyiv [in Ukrainian].
10. Montgomery, L. E., Lee, M. D. (2021). Expert and novice sensitivity to environmental regularities in predicting NFL games. *Judgment and Decision Making*, 16(6), 1370–1391. <https://doi.org/10.1017/S1930297500008469>
11. Oleksiyenko, R., Donets, A. (2021). The place of expert assessment in management decision-making. *Economy and society*, 26. <https://doi.org/10.32782/2524-0072/2021-26-59> [in Ukrainian].
12. Pedchenko, N., Strilets, V., Rudenko, N. (2018). Method of Delphi as an innovative tool for managing asymmetric information in financial relationships of potential investors and small business entities. *Marketing and Management of Innovations*, 3, 68–80. <https://doi.org/10.21272/mmi.2018.3-06>
13. Stichweh, R. (2022). Hierarchies and Universal Inclusion in Scientific Communities. In: *Peer review in an Era of Evaluation* (Eds. Forsberg E., Geschwind L., Levander S., Wermke W.). Palgrave Macmillan, Cham, 37–52. https://doi.org/10.1007/978-3-030-75263-7_2
14. Hill, S. (2016). Assessing (for) impact: future assessment of the societal impact of research. *Palgrave Communications*, 2(1), 1–7. <https://doi.org/10.1057/palcomms.2016.73>
15. Viana-Lora, A., Nel-lo-Andreu, M. G. (2021). Approaching the Social Impact of Research Through a Literature Review. *International Journal of Qualitative Methods*, 20, 1–11. <https://doi.org/10.1177/16094069211052189>
16. Bellavista, J., Elboj-Saso, C., García Yeste, C., Villarejo-Carballido, B. (2022). Innovative Methodological Approach to Analyze Innovation and Social Impact. *International Journal of Qualitative Methods*, 21, 1–9. <https://doi.org/10.1177/16094069221083373>
17. Almeida, M., Ranisch, R. (2022). Beyond safety: mapping the ethical debate on heritable genome editing interventions. *Humanit Soc. Sci. Commun.*, 9, 139. <https://doi.org/10.1057/s41599-022-01147-y>
18. Moher, D., Bouter, L., Kleinert, S., Glasziou, P., Sham, M. H., ..., Dirnagl, U. (2020). The Hong Kong Principles for assessing researchers: Fostering research integrity. *PLoS Biol.*, 18(7), e3000737. <https://doi.org/10.1371/journal.pbio.3000737>
19. Hicks, D., Wouters, P., Waltman, L., de Rijcke, S., Rafols, I. (2015). The Leiden Manifesto for research metrics. *Nature*, 520 (22), 429–431. <https://doi.org/10.1038/520429a>
20. Hallonsten, O. (2021). Stop evaluating science: A historical-sociological argument. *Social Science Information*, 60(1), 7–26. <https://doi.org/10.1177/05390184211992204>
21. Malitsky, B. A. (2023). Problems of comprehensive assessment of scientific results. *Visnik Nacionalnoi Akademii Nauk Ukraini*, 9, 24–36. <https://doi.org/10.15407/visn2023.09.024> [in Ukrainian].
22. Egorov, I. Yu., Zhukovich, I. A. (2023). Evaluating researcher performance: emerging trends. *Science and science of science*, 2(120), 42–58. <https://doi.org/10.15407/sofs2023.02.042> [in Ukrainian].
23. Forsberg, E., Geschwind, L., Levander, S., Wermke, W. (2022). Peer Review in Academia. In: *Peer review in an Era of Evaluation* (Eds. Forsberg, E., Geschwind, L., Levander, S., Wermke, W.). Palgrave Macmillan, Cham, 3–36. https://doi.org/10.1007/978-3-030-75263-7_1

24. Langfeldt L., Kyvik, S. (2015). Intrinsic tensions and future challenges of peer review. In: *RJ Yearbook 2015/2016*. Riksbankens Jubileumsfond & Makadam Publishers.
25. Hansen, H.F. (2022). The Many Faces of Peer Review. In: *Peer review in an Era of Evaluation* (Eds. Forsberg, E., Geschwind, L., Levander, S., Wermke, W.). Palgrave Macmillan, Cham, 107–126. https://doi.org/10.1007/978-3-030-75263-7_5
26. Olsen, J. P. (2007). The institutional dynamics of the European university. In: *University dynamics and European integration* (Eds. P. Maassen, J. P. Olsen). Springer, 25–54.
27. Geschwind, L., Edström, K. (2022). Peer Advocacy: Expressions of Loyalty in Peer Review. In: *Peer review in an Era of Evaluation* (Eds. Forsberg, E., Geschwind, L., Levander, S., Wermke, W.). Palgrave Macmillan, Cham, 203–222. https://doi.org/10.1007/978-3-030-75263-7_9
28. The Contextualization Deficit: Reframing Trust in Science for Multilateral Policy. (2023). The Centre for Science Futures. Paris, 2023. <https://doi.org/10.24948/2023.10>
29. UNESCO Recommendation on Open Science. (2022). UNESCO. URL: <https://unesdoc.unesco.org/ark:/48223/pf0000379949> (Last accessed: 31.07.2024).
30. Ross-Hellauer T. (2017). What is open peer review? A systematic review [version 2; peer review: 4 approved]. *F1000Research*, 6, 588. <https://doi.org/10.12688/f1000research.11369.2>
31. Statement on peer reviewed publications. (2024). European Science Foundation. URL: [coalition-s.org](https://www.coalition-s.org). <https://www.coalition-s.org/statement-on-peer-reviewed-publications/> (Last accessed: 31.07.2024).
32. Matt, C., Hoerndlein, C., Hess, T., Matt, C., Hoerndlein, C., Hess, T. (2017). Let the crowd be my peers? How researchers assess the prospects of social peer review. *Electron Markets*, 27, 111–124. <https://doi.org/10.1007/s12525-017-0247-4>
33. Eisen, M. B., Akhmanova, A., Behrens, T. E., Harper D. M., Weigel, D., Zaidi, M. (2020). Implementing a “publish, then review” model of publishing. *eLife*, 9, e64910. <https://doi.org/10.7554/eLife.64910>
34. Avissar-Whiting, M., Belliard, F., Bertozzi, S. M., Brand, A., Brown, K., Dawson, S., ..., Williams, M. (2024). Recommendations for accelerating open preprint peer review to improve the culture of science. *PLOS Biology*, 22(2), e3002502. <https://doi.org/10.1371/journal.pbio.3002502>
35. Lee, C. J., Sugimoto, C. R., Zhang, G., Cronin, B. (2013). Bias in peer review. *Journal of the American Society for Information Science and Technology*, 64(1), 2–17. <https://doi.org/10.1002/asi.22784>
36. Rovetta, A., Bhagavathula, A. S. (2020). COVID-19-Related Web Search Behaviors and Infodemic Attitudes in Italy: Infodemiological Study. *JMIR Public Health Surveill*, May 5, 6(2), e19374. <https://doi.org/10.2196/19374>
37. Zarocostas, J. (2020). How to fight an infodemic. *The Lancet*, 395, 676. [https://doi.org/10.1016/S0140-6736\(20\)30461-X](https://doi.org/10.1016/S0140-6736(20)30461-X)
38. Vlasschaert, C., Topf, J. M., Hiremath, S. (2020). Proliferation of Papers and Preprints During the Coronavirus Disease 2019 Pandemic: Progress or Problems With Peer Review? *Adv Chronic Kidney Dis*, 27(5), 418–426. <https://doi.org/10.1053/j.ackd.2020.08.003>
39. Peer review: how we found 15 million hours of lost time. URL: <https://www.aje.com/arc/peer-review-process-15-million-hours-lost-time/> (Last accessed: 31.07.2024).
40. National plan for open science: Decree of the Cabinet of Ministers of Ukraine of 8.10.2022 No. 892-p. Official Bulletin of Ukraine. 2022, No. 83, P. 38. URL: <https://zakon.rada.gov.ua/laws/show/892-2022-p#n11> (Last accessed: 31.07.2024).
41. On the approval of the action plan for the implementation of the Open Government Partnership Initiative in 2023–2025: Decree of the Cabinet of Ministers of 17.11.2023 No. 1049. Official Bulletin of Ukraine. 2023, No. 105, P. 342. URL: <https://zakon.rada.gov.ua/laws/show/1049-2023-p#Text> (Last accessed: 31.07.2024).
42. About the formation of a working group: Order of the Ministry of Education and Science of Ukraine of 24.05.2024 No. 747. URL: <https://mon.gov.ua/npa/pro-utvorennia-roboty747> (Last accessed: 31.07.2024).
43. Brazil, R. (2024). Illuminating ‘the ugly side of science’: fresh incentives for reporting negative results. *Nature*, 08 May. <https://doi.org/10.1038/d41586-024-01389-7>
44. Rosenthal, R. (1979). The file drawer problem and tolerance for null results. *Psychological Bulletin*, 86(3), 638–641. <https://doi.org/10.1037/0033-2909.86.3.638>
45. Kozlov, M. (2024). So you got a null result. Will anyone publish it? *Nature*, 631, 728–730. <https://doi.org/10.1038/d41586-024-02383-9>
46. First International Workshop on Negative Results in Pervasive Computing. (2022). PerFail 2022. URL: perfail-workshop.github.io (Last accessed: 31.07.2024).
47. Peltonen, E., Mohan, N., Zdankin, P., Shreedhar, T., Nguyen, T., Bayhan, S. (2023). Perspectives on Negative Research Results in Pervasive Computing. *IEEE Pervasive Computing*, 22(3), 63–72. <https://doi.org/10.1109/MPRV.2023.3273718>

Received 13.09.2024

Revised 26.10.2024

Accepted 11.11.2024

Л.В. Рижко¹ (<https://orcid.org/0000-0003-0967-5621>),
А.П. Шаповал² (<https://orcid.org/0009-0000-8032-351X>),
О.В. Живага¹ (<http://orcid.org/0000-0002-4996-034X>)

¹ Державна установа «Інститут досліджень науково-технічного потенціалу та історії науки ім. Г.М. Доброва НАН України»,
бульвар Т. Шевченка, 60, Київ, 01032, Україна,
+380 44 486 9591, steps@nas.gov.ua

² Центр гуманітарної освіти Національної академії наук України,
вул. Трьохсвятительська, 4, Київ, 01601, Україна,
+380 44 278 3013, egonanu@ukr.net

ЕКСПЕРТИЗА В НАУЦІ: КОГНІТИВІСТСЬКИЙ ТА МЕНЕДЖЕРАЛІСТСЬКИЙ ПІДХОДИ

Вступ. Розвиток науки традиційно супроводжується процедурами фахового оцінювання нових наукових знань на об'єктивність, логічність, доведеність, обґрунтованість, що є основою самоорганізації та самоконтролю наукової системи. Включення науки в ринкові процеси перетворює процедури оцінювання на елементи управлінських технологій.

Проблематика. Останнє нівелює ідею науки як самоорганізованої, заснованої на самоконтролі системи. Водночас поширення практик відкритої науки та нові вимоги до оцінювання наукових знань, що виникають у зв'язку з розробленням технологій штучного інтелекту, трансформують принципи експертизи і дають підстави для помірнього оптимізму щодо подальшого наукового прогресу на основі самоорганізації.

Мета. Окреслити нові тенденції експертної діяльності в науці, пов'язані з розширенням її функцій, методів та форм.

Матеріали й методи. Застосовано компаративістські методи, методи концептуалізації та експлікації понять, проблемно-орієнтованого аналізу.

Результати. З'ясовано особливості менеджералістського та когнітивістського підходів до оцінювання. Показано нові тенденції експертизи в науковій сфері у зв'язку з поширенням практик відкритої науки та розробленням і використанням штучного інтелекту. Обґрунтовано, що зміщення пріоритетів оцінювання від когнітивістського спрямування до менеджералістського створює небезпеку порушення самоорганізаційної здатності науки. Водночас практики відкритої науки та вимоги до оцінювання, пов'язані з розвитком технологій штучного інтелекту, створюють можливість компенсувати ризики.

Висновки. Сучасні тенденції оцінювання в науці повинні ґрунтуватися на розширенні експертних компетенцій та формування багатовимірної експертної культури, яка охоплює можливість полілогу, дискусійності, оцінювання актуального і потенційно можливого наукового результату, коректне ставлення до негативних наукових результатів.

Ключові слова: оцінювання, експертиза, рецензування, когнітивістський підхід, менеджералістський підхід, багатовимірна експертна культура, полісуб'єктне оцінювання.