

COGNITIVE ASPECTS OF CROSS-CULTURAL RESEARCH: THE ROLE OF ARTIFICIAL INTELLIGENCE IN HUMAN PROFESSIONAL ACTIVITY

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Summary

The article is devoted to the analysis of cognitive aspects of the use of artificial intelligence (AI) in education, medicine, and the military domain. Based on an analysis of 22 scientific publications by American, Polish, and Ukrainian researchers (2022–2026), key cognitive risks have been identified, including the phenomenon of overreliance on automated systems (automation bias), the loss of critical thinking skills, and the problem of algorithmic opacity («black box»). Particular attention is paid to country-specific aspects, including the concept of moral injury in U.S. military medicine, the integration of European regulatory requirements and the phenomenon of «zanikanie krytycznego myślenia» in Poland, as well as the adaptation of AI to conditions of martial law, the development of the «method from the opposite», and cognitive offloading systems in Ukraine. The concept of the «cultural cognition gap» is proposed to explain differences in the perception and implementation of AI across national contexts. The need for further harmonization of research approaches among countries, taking into account their unique experience, is substantiated. The results of the study may be used for the development of national AI implementation strategies that consider cognitive risks and cross-cultural differences.

Key words: artificial intelligence, cognitive aspects, critical thinking, black box, cultural cognition gap.

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1. Introduction

The current stage of development of artificial intelligence technologies is characterized by the rapid penetration of AI into all spheres of human professional activity, from education and medicine to the military domain. However, alongside the undeniable advantages of automation and process optimization, a number of issues arise related to the impact of AI on human cognitive abilities, including the capacity for critical thinking, independent decision-making, and understanding the limits of one's own competence. These issues become particularly relevant in a cross-cultural context, as different countries demonstrate distinct approaches to the regulation, implementation, and risk assessment of AI. The aim of this study is to identify key cognitive aspects of AI application in education, medicine, and the military sector in the United States, Poland, and Ukraine, as well as to outline the concept of the «cultural cognition gap» as an analytical tool for comparing national approaches. The methodological basis of the study is a comparative analysis of 22 scientific publications by American, Polish, and Ukrainian researchers published between 2022 and 2026. The article consists of three main sections: an analysis of the cognitive risks of overreliance on AI, a review of unique cognitive aspects in each country, and a cross-cultural synthesis culminating in conclusions.

2. Cognitive Risks of Overreliance on AI

The most universal cognitive risk identified in studies across all three countries is the phenomenon of human overreliance on automated systems. American researchers (*Janumapally et al., 2025*) define this phenomenon as «automation bias» a cognitive bias in which individuals tend to place excessive trust in automated systems even when their recommendations contradict personal experience or common sense. In the context of postgraduate medical education, this bias creates a risk of loss of critical thinking skills, as medical students may uncritically accept diagnostic recommendations generated by large language models. In Polish academic discourse, a similar phenomenon is referred to as «zanikanie krytycznego myślenia» (*Więciwicz-Modrzewska, 2024*). The researcher emphasizes that students who systematically use ChatGPT to complete assignments lose their ability to analyze, synthesize, and draw independent conclusions. Of particular concern is the fact that generated responses are often plausible but not necessarily accurate, creating an illusion of competence. The author stresses the need to develop AI literacy as a form of digital criticality that enables students to distinguish reliable information from potentially biased content. Ukrainian researchers, in particular Cherevatiuk (*Cherevatiuk, 2024*), describe a similar risk as a «cognitive trap» into which students fall when they perceive persuasive but not always reliable AI-generated responses as ultimate truth. Iliichuk (*Iliichuk, 2024*) and Nikolaieva et al. (*Nikolaieva et al., 2026*) emphasize that excessive reliance on AI in the educational process leads to a decrease in independence and critical thinking, which is especially dangerous in the context of developing professional competencies in future specialists. In the military domain, this risk becomes particularly acute. The Polish researcher Zdrojewski (*Zdrojewski, 2026*) introduces the concept of «nadmierne poleganie na automatyzacji» to describe situations in which military operators blindly trust AI system recommendations even when they contradict their experience and situational awareness. A similar issue is described by Prus (*Prus, 2024*), who provides the example of the Israeli Lavender system, which automatically identifies targets with an accuracy of 90 percent, creating a risk of misidentification and unjustified civilian casualties. American researchers Leone et al. (*Leone et al., 2024*) directly link this risk to the «black box» problem and the lack of algorithmic transparency, which prevents operators from understanding the logic behind system decisions.

3. Unique Cognitive Aspects of AI Application in the United States, Poland, and Ukraine

Unique Cognitive Aspects of AI Application in the United States, Poland, and Ukraine Despite the universality of the risks described above, each of the three countries demonstrates unique cognitive aspects shaped by the specifics of national research programs as well as socio-cultural and regulatory contexts. In American scientific literature, one of the most innovative concepts is «moral injury» proposed by researchers in military medicine (*Leone et al., 2024*). This phenomenon arises when an AI system provides recommendations that contradict deeply rooted moral beliefs of a medical professional, for example suggesting that dozens of wounded individuals be classified as beyond recovery during mass casualty situations. Unlike typical cognitive bias, moral injury has not only a cognitive but also a profound emotional and ethical dimension that requires separate study. Another distinguishing feature of the American approach is the active implementation of immersive learning technologies. Krajcer (*Krajcer, 2022*) describes the use of holography for teaching anatomy, which has been shown to be more effective than traditional cadaver dissection. Holographic images allow students to examine

organs from different angles, overlay tissue layers, and develop spatial cognitive perception that cannot be achieved through textbooks. In addition, American researchers Kumar et al. (Kumar et al., 2024) introduce the concept of «cognitive partnership» viewing AI not as a substitute but as a partner in brainstorming that expands the cognitive capabilities of instructional designers. The Polish research school is distinguished by the most detailed development of the concept of Explainable AI (Ex AI) as a means of overcoming the problem of algorithmic opacity (Brawańska et al., 2025). Researchers emphasize that a physician cannot make a well-founded clinical decision based on a «black box» recommendation without understanding and verifying its underlying logic. The development of Ex AI methods that make algorithmic decision-making processes transparent to humans is seen as a necessary condition for the ethical and safe use of AI in medicine. Furthermore, Polish researchers actively integrate the European regulatory framework, including the AI Act and GDPR, into their studies. Patrzyk and Woźniacka (Patrzyk and Woźniacka, 2022) draw a historical parallel with Semmelweis, who demonstrated the effectiveness of handwashing but faced resistance from the medical community due to distrust of «invisible microorganisms». This analogy illustrates that even clear clinical advantages of AI may not be immediately accepted, and overcoming cognitive resistance requires not only technical solutions but also shifts in cultural attitudes. Ukrainian research is distinguished by the unique context of a full-scale war, which has become a catalyst for the accelerated implementation of AI in medicine and the military domain. Shostakovykh-Koretska (Shostakovykh-Koretska, 2025) analyzes the use of AI in clinical practice for the cognitive off-loading of physicians under conditions of limited time, resources, and personnel. Nikolaieva et al. (Nikolaieva et al., 2026) propose an original «method from the opposite» which develops students' intercultural competence through the analysis of errors and biases demonstrated by AI systems. This method not only fosters critical thinking but also prepares future professionals to work in environments where AI is not a perfect tool. Trofymenko et al. (Trofymenko et al., 2024) describe the Air-Guardian system, which monitors a pilot's eye movements to generate saliency maps for early risk detection, representing an example of direct cognitive augmentation of human capabilities. It is also worth noting the Ukrainian Griselda system for intelligence data collection (Trofymenko et al., 2024), which demonstrates the effective integration of AI with operational needs in conditions of real combat.

4. Cultural Cognition Gap: A Cross-Cultural Analysis

The conducted analysis indicates that the cognitive aspects of AI application are not universal but vary significantly depending on cultural, regulatory, and historical contexts. To describe this phenomenon, the concept of the «cultural cognition gap» is proposed, defined as a set of differences in cognitive approaches, ethical priorities, and regulatory frameworks that influence the perception, implementation, and risk assessment of AI across countries. The American approach is characterized by technological optimism and a focus on innovation, driven by active private sector involvement and significant investment in research. At the same time, the regulatory system, including FDA and HIPAA, as well as ethical frameworks such as the Executive Order on AI, attempt to balance technological progress with the protection of citizens' rights. The key cognitive risk in this context is automation bias, while a unique contribution lies in addressing the «black box» problem through XAI and conceptualizing moral injury as a specific risk in military medicine. The Polish approach, in contrast, is more cautious and regulation-oriented, shaped by Poland's membership in the European Union

and the implementation of the AI Act, GDPR, and MDR. Researchers focus on ethical issues, data protection, and accountability. Characteristic phenomena include «zanikanie krytycznego myślenia» in education and «nadmierne poleganie na automatyzacji» in the military domain. A unique contribution is the integration of European regulatory requirements directly into the research discourse and the active development of Ex AI. Moreover, Polish researchers actively study the Ukrainian experience, particularly the use of the Griselda system, indicating an effort to adapt successful practices from a neighboring country. The Ukrainian approach is shaped under the unique conditions of martial law, making it the most practice-oriented and adaptive. The primary focus is on cognitive offloading of professionals, including physicians and military personnel, and on the development of critical thinking through the «method from the opposite». Unlike the United States and Poland, where regulatory systems are relatively well developed, Ukraine is still in the process of forming national AI standards, as reflected in the Concept for the Development of Artificial Intelligence in Ukraine (2020). Ukrainian research is characterized by a high degree of interdisciplinarity and the integration of theoretical developments with concrete applied solutions such as Griselda and Air-Guardian.

5. Conclusions

The analysis of 22 scientific sources from three countries allows several generalized conclusions to be drawn. First, all three countries identify universal cognitive risks associated with AI application, including overreliance on automated systems (automation bias, nadmierne poleganie, cognitive trap), loss of critical thinking skills, and the problem of algorithmic opacity («black box»). These risks are most extensively studied in the educational domain but are equally relevant to medicine and the military sphere. Second, each country demonstrates unique cognitive aspects determined by the specifics of national research programs and sociocultural contexts. The United States is distinguished by the conceptualization of moral injury in military medicine and the development of Ex AI methods; Poland by the active integration of European regulatory requirements and a focus on «zanikanie krytycznego myślenia»; and Ukraine by adaptation to wartime conditions, the development of the «method from the opposite» and the combination of theoretical approaches with concrete applied systems. Third, the proposed concept of the cultural cognition gap provides a systematic framework for describing differences in cognitive approaches, ethical priorities, and regulatory environments in the United States, Poland, and Ukraine. This gap manifests in differing emphases: the United States on innovation and the private sector, Poland on regulation and ethics, and Ukraine on adaptability and practical solutions. Prospects for further research include a more detailed examination of mechanisms for bridging the cultural cognition gap, particularly through the exchange of successful practices between countries, for example the adaptation of Ukrainian military medical experience in NATO countries or the implementation of elements of Polish AI literacy in Ukrainian education. Another important direction is the study of the long-term impact of systematic AI use on the cognitive development of professionals in different cultural contexts.

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