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METHODOLOGY FOR DEVELOPING NEUROCOGNITIVE ABILITIES BASED ON NEUROTECHNOLOGY

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Abstract

This article provides a scientific analysis of the rapid development of neurotechnologies and their profound impact on human cognition, mental processes, and personal autonomy. It explores how technologies such as brain–computer interfaces and deep brain stimulation enable direct access to or modification of complex mental functions, including perception, memory, emotion, decision-making, and motor control. While these devices have the potential to expand human capabilities and enhance cognitive performance, the study highlights that they may simultaneously pose risks to fundamental human values such as personal identity, mental privacy, and individual agency. The discussion also addresses widespread misconceptions surrounding neurotechnologies, emerging concepts like brain-to-brain communication, and the possible consequences of future advancements aimed at cognitive enhancement. The scientific, ethical, and social dimensions of neurobiological approaches designed to elevate human cognitive abilities are examined, with particular attention to invasiveness, applicability, and mechanisms for integration into daily life. The article concludes with an assessment of future development prospects and research directions, offering recommendations for evaluating the impact of neurotechnologies on human functioning.

Keywords: Neurotechnology, brain–computer interface, cognitive processes, memory, identity, mental privacy, cognitive enhancement, invasiveness, neurobiology, ethical risks.

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Introduction

NEYROTEXNOLOGIYA ASOSIDA NEYROKOGNITIV QOBILIYATLARNI RIVOJLANTIRISH METODIKASI

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Annotatsiya:
Ushbu maqolada neyrotexnologiyalarning jadal rivojlanishi inson ongiga, kognitiv jarayonlarga va shaxsiy daxlsizlikka ko‘rsatishi mumkin bo‘lgan chuqur ta’siri ilmiy jihatdan tahlil qilinadi. Miya-kompyuter interfeyslari, chuqur miya stimulyatsiyasi kabi texnologiyalar idrok, xotira, his-tuyg‘u, qaror qabul qilish va harakatlarni boshqarish kabi murakkab aqliy jarayonlarga bevosita kirish yoki ularni o‘zgartirish imkoniyatiga egaligi yoritiladi. Maqolada bunday qurilmalar inson faoliyati va tajribasini kengaytirishi bilan birga, shaxsiy identitet, aqliy maxfiylik va vakolatlilik kabi fundamental qadriyatlarga xavf tug‘dirishi mumkinligi ko‘rsatib beriladi. Shuningdek, neyrotexnologiyalar atrofidagi noto‘g‘ri tasavvurlar, kelajakda miyadan miyaga axborot uzatish kabi ilg‘or yo‘nalishlar hamda kognitiv yuksalishga qaratilgan texnikalar rivojlanishining ehtimoliy oqibatlari muhokama qilinadi. Insonning bilish qobiliyatini oshirishga qaratilgan neyrobiologik yondashuvlarning ilmiy, axloqiy va ijtimoiy jihatlari, invazivlik darajasi, qo‘llash imkoniyatlari va kundalik hayotga integratsiya mexanizmlari chuqur tahlil qilinadi. Maqola neyrotexnologiyalarning kelajakdagi rivojlanish istiqbollari, ilmiy izlanish yo‘nalishlari va ularning inson faoliyatiga ta’sirini baholash bo‘yicha tavsiyalar bilan yakunlanadi.

Kalit so‘zlar: neyrotexnologiya, miya-kompyuter interfeysi, kognitiv jarayonlar, xotira, identitet, aqliy maxfiylik, kognitiv yuksalish, invazivlik, neyrobiologiya, axloqiy xavflar.

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The continued development of neurotechnology has the potential to fundamentally transform the human experience. Devices such as brain-computer interfaces (BCIs) and deep brain stimulators (DBS) interact directly with the human brain through electrodes implanted deep in the brain, electrodes on the brain's surface, or noninvasive devices that operate through the skull. Neurotechnology allows users to control objects at a distance, prevent, mitigate, or prepare for disruptive neurological events, and monitor, influence, or regulate mood, emotion, and memory.

While neurotechnology can enhance and enhance the experiences of individuals who seek to use it, it can also inadvertently threaten features of the human experience that society cares about preserving. It is also important to consider how existing biases may influence the development of neurotechnology and how improved use of neurotechnology could fundamentally change the norms of human functioning. There are good reasons to be concerned about the development and application of neurotechnology. All mental or cognitive states, from perception to memories, imagination, emotions, decisions, and actions, arise directly from the activity of neural circuits in the central nervous system.

Technologies that provide access to these circuits, either by recording ("reading") or modifying ("writing") this activity, have the potential to record and modify the internal properties of human mentality. Therefore, fundamental human values, including biographical identity, agency, and intellectual privacy, may be in principle intelligible and directly susceptible to external influence. It is important to recognize that the threats that neurotechnology poses to our delicate feelings of human identity, agency, and privacy are not unique or exceptional.

Consider, for example, the threat to psychologically constructed personal identity through neurotechnological memory transfer. Future brain-to-brain (BBI; a specific type of BCI in which human brains are connected) devices pose a serious threat to people's sense of identity by implanting the memories of others, so that the recipient "cannot distinguish between their own real memories and the quasi-memories implanted." Spatiotemporal resolution, invasiveness, portability, energy requirements, and cost) affect their flow and the future role of human cognitive augmentation. We focus on a small subset of the tools for human

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augmentation—neuroscience technologies—and just one specific area—human cognition. The current state of neuroscience technologies for augmenting and stimulating human cognition is their greatest forecast for the next two decades. Here, in terms of cognitive augmentation, we are on par. Improving the processes of knowledge acquisition and understanding the world, such processes include attention, knowledge formation, memory, reasoning and evaluation, thinking and calculation, problem solving and decision making, as well as comprehension and language production. Unlike previous efforts, here we choose to consider applications.

Learn more about the latest techniques for enhancing brain function and futuristic applications of these technologies (below) due to cognitive function. We will study the main neuroscience technologies that are needed for human cognition to monitor and influence brain activity. We will compare and contrast such technologies with their individual characteristics. The state of the art of neurotechnologies for enhancing human cognitive power shows some of the applications that are already emerging or may emerge. Over the next two decades. Specifically, we will examine programs to enhance human intelligence in the areas of communication, cognitive enhancement, memory, decision-making, attentional control, situational awareness, social interaction, and complex problem solving. We will examine individuals whose cognitive augmentation technology (especially language) is aimed at restoring permanently disabled functions, as these technologies can enhance and advance their physical strength to the point where they are already at their peak. We will examine which part of the population today can benefit from such technologies. There are enough issues with high-tech that have raised widespread ethical concerns. Based on the lessons, it teaches us to analyze past trends and predict future trends.

Predicting the future development of neurotechnology and making recommendations for promising research directions. The development of neurotechnology recording and stimulation techniques should take into account perception, memory, attention and cognitive mechanisms. Planning and execution of actions. However, it can be used in practice regardless of these methods. Cognitive enhancement depends not only on how effectively it detects

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interpretable neural activity. Stimulating specific brain targets, but soon a number of other relevant factors are the degree of invasiveness - that is, the extent to which the technology requires the introduction of devices. This affects their ability to enhance human cognition in everyday life.

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