http://doi.org/10.23925/2179-3565.2024v15i4p155-163

RISUS - Journal on Innovation and Sustainability
volume 15, número 4 - 2024
ISSN: 2179-3565
Editor Científico: Arnoldo José de Hoyos Guevara
Editor Assistente: Vitória Catarina Dib
Avaliação: Melhores práticas editoriais da ANPAD

EMOTIONAL REACTIONS OF STUDENTS AND ETHICAL DILEMMA WHEN WORKING WITH A NEURAL NETWORK: A CASE OF STUDENTS COMPLETING CREATIVE TASKS

Reações emocionais de alunos e dilema ético ao trabalhar com uma rede neural: um caso de alunos que concluíram tarefas criativas

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ABSTRACT

The study aims to establish the range of students' emotional responses in interaction with neural networks as part of creative educational tasks. The research is focused on the responses of students solving creative tasks using neural networks and their experience of the ethical dilemma of attributing authorship. The study hypothesis is that the emotional response arising at the first stage of interaction contributes to the assimilation of the experience of cooperation with machine intelligence and the choice of further course of action in attributing authorship. The study was conducted in three stages: determining popular neural networks, discussing the variants of emotional reactions, and conducting a student survey. Empirical research was conducted based on higher journalism schools at Moscow State University (MSU), Saint Petersburg State University (SPSU), and Kazan Federal University (KFU) from October to December of 2023. The respondent sample consisted of 159 students: 89 from KFU, 50 from MSU, and 20 from SPSU. Factor analysis shows that the share of students experiencing ambivalent emotions amounted to 17%, a positive state was described by 34%, and negative emotions were reported by 18% of students. Thus, interaction with a neural network evokes an emotional response in users, which allows them to assimilate the experience of this interaction.

Keywords: Emotional intelligence, Artificial intelligence, Authorship ethical dilemma, Journalism training.

ACEITO EM: 15/12/2024
PUBLICADO: 30/12/2024

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REAÇÕES EMOCIONAIS DE ALUNOS E DILEMA ÉTICO AO TRABALHAR COM UMA REDE NEURAL: UM CASO DE ALUNOS QUE CONCLUÍRAM TAREFAS CRIATIVAS

Emotional reactions of students and ethical dilemma when working with a neural network: a case of students completing creative tasks

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RESUMO

O estudo visa estabelecer a gama de respostas emocionais dos alunos na interação com redes neurais como parte de tarefas educacionais criativas. A pesquisa é focada nas respostas dos alunos que resolvem tarefas criativas usando redes neurais e sua experiência do dilema ético de atribuir autoria. A hipótese do estudo é que a resposta emocional que surge no primeiro estágio da interação contribui para a assimilação da experiência de cooperação com a inteligência da máquina e a escolha de um curso de ação posterior na atribuição de autoria. O estudo foi conduzido em três etapas: determinação de redes neurais populares, discussão das variantes de reações emocionais e realização de uma pesquisa com alunos. A pesquisa empírica foi conduzida com base em escolas superiores de jornalismo na Universidade Estadual de Moscou (MSU), Universidade Estadual de São Petersburgo (SPSU) e Universidade Federal de Kazan (KFU) de outubro a dezembro de 2023. A amostra de entrevistados consistiu em 159 alunos: 89 da KFU, 50 da MSU e 20 da SPSU. A análise fatorial mostra que a parcela de alunos que vivenciam emoções ambivalentes chegou a 17%, um estado positivo foi descrito por 34% e emoções negativas foram relatadas por 18% dos alunos. Assim, a interação com uma rede neural evoca uma resposta emocional nos usuários, o que lhes permite assimilar a experiência dessa interação.

Palavras-chave: Inteligência emocional, Inteligência artificial, Dilema ético de autoria, Treinamento em jornalismo.

INTRODUCTION

The issue of the influence of the digital environment on pedagogical interaction, learning, and development of students is becoming more complex and urgent. Russian students have access to neural networks able to perform all the newest functions: Shedevrium generates new images, Balabola (Yandex) composes texts analogous to the user's mental stereotypes, DeepL translates foreign text and adapts it to the task at hand, and Gerwin generates texts. This variety of generative neural networks leads students to increasingly use neural networks in the educational process, especially when completing creative tasks and projects. The results of this work are attributed by students to themselves. The ability to be creative, create a unique and original product, and conduct research is a priori considered a prerogative of man. A technical (secured by software) system capable of solving complex intellectual and creative problems breaks this stereotype, eliciting an emotional response similar to the defense of personal boundaries: anxiety, anger, and fear.

The structure of a modern neural network is unique. It duplicates the neural processes in the human brain: algorithms for accessing user experience (memory), intelligent interface (creative processes), and language code (communication skills).

The methodology of cognitive modeling for analysis and decision making in ill-defined situations has already gone through long stages of establishment and was developed by Axelrod (1976). At present, neural networks improve the apparatus of analysis and situation construction. The concerns expressed by modern specialists of industries in the information field concern the loss of leverage in the creative process of content generation, especially important in training for creative professions.

Neural networks can solve technically complex and creative tasks, e.g., to perform full production (creation) of complex video content. They are also developing in behavior management and reading consumer emotions. Emotion AI reacts to non-verbal facial signals using a webcam, Affectiva and Kairos recognize standard facial expressions in the categories of joy, sadness, anger, disdain, disgust, fear, and surprise. SORA creates highly realistic video sequences based on textual description, and DALL-E can generate video clips. For journalists, this presents a real threat of job losses and the destabilization of established learning strategies. The issue of managing AI resources, which may become uncontrollable, is raised by Barrat (2019).

The study of students' emotional response to situations of interaction with neural networks (particularly when attributing authorship and solving creative tasks) will allow setting up advanced systems of teaching creative professional competencies in university practice.

1 THEORETICAL BACKGROUND

The topic of interaction between humans and neural networks is explored in several studies. Mori (1970) in "The Uncanny Valley: Effect of Realism on the Impression of Artificial Human Faces" observes people's reactions to the artificial emotions of robots, describing them as "the uncanny valley effect". A study by Shukla and Agnihotri (2023) shows that interaction with AI affects emotional intelligence: "The use of AI-based tools and interventions may have a negative impact on emotional intelligence in some cases, particularly in the areas of emotional regulation and empathy".

The study of emotional responses to a new environmental phenomenon is impossible without investigating the phenomena of the contact situation. Narrative psychologist Crossley (2020) refers to the interaction environment as stressful, describing the user's state as "multiphrenia", which "shows a Self that is characterized by fragmentation, volatility, and context dependence". Changes in the situation prompt strong emotional reactions, which allow the person to navigate their surroundings and select an adequate adaptation strategy. In the etymology of the word "emotion" from the Latin verb ‘to move’ (moveo) lies the meaning of movement, an active response. In "Emotional Intelligence", Goleman (2024) asserts that "Emotions are none other than stimuli to action, instant algorithms to get out of a particular situation". "The transformation of the modern generation's lifestyle as a result of the intense digitalization of society is leading to changes in social relations, modes of communication, and discreteness of thinking". A growing number of researchers are turning to the study of emotional responses to changes in the environment. Of note are works by Bar-On (2006), Bisquerra-Alzina (2009), Castillo et al. (2013), and Mayer et al. (2004), which testify to the urgency of shaping and developing emotional intelligence. Notable

studies by Russian researchers include the works by Ilin (2017), Liusin (2004), and Pavlova (2014). Sandomirskii (2001) establishes the factors affecting the formation of responses in the generation of digital natives (Generation Z). These factors include technological, social, socio-economic, socio-psychological, and systemic factors. Among the systemic ones, Sandomirskii points to the emergence of "digital psychomorphosis", the need for creativity and sensation seeking. In the 1970s, research at the University of Delaware headed by Zuckerman (1979) discovered the human need for thrill-seeking, an emotional response. There are many theories of emotions and their application in psycho-correctional work. A monograph by Izard (1991) describes cognitive-behavioral therapy approach, which considers the relationships between emotional response to a situation, the cognitive framework (assessment), and action – behavioral patterns.

In recent years, Russian educators have been actively researching emotional intelligence and its manifestations in learning. In a study of emotional intelligence development dynamics, a group of educators from the Tomsk Polytechnic University concluded that "digital technologies affect people's emotional abilities, transforming such features of human behavior as consciousness, purposefulness, and reflectiveness" (Limon, Plaster, 2022; Rodionova et al., 2022).

The research goal was to determine the range of students' emotional responses in their interaction with neural networks when completing creative educational tasks.

2 METHODOLOGY

Our scientific interest focused on examining students' emotional responses when interacting with neural networks to perform creative tasks and experiencing the ethical dilemma of attributing authorship. The research hypothesis is that the emotional response arising in students at the first stage of interaction in completing creative educational tasks using a neural network allows them to process the experience of cooperation with machine intelligence, assimilate it, and choose their course of action in attributing authorship. The study was conducted in several stages. First, the most commonly used neural networks were identified in the interviews, and the variants of students' emotional responses were discussed. The second stage involved a student survey and a discussion of its results with the respondents.

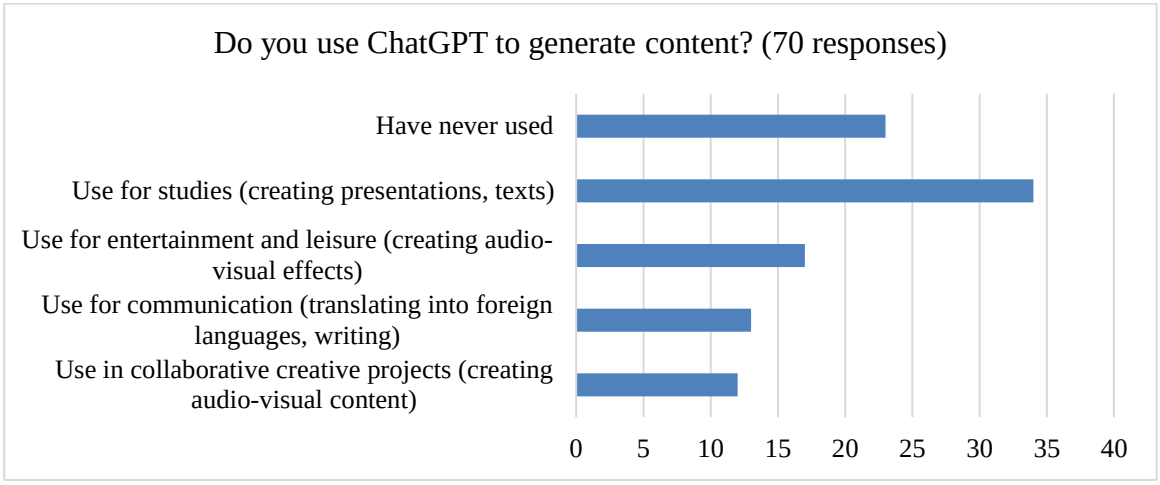
The study was conducted based on higher journalism schools of three Russian universities, Moscow State University (MSU), Saint Petersburg State University (SPSU), and Kazan Federal University (KFU) from October to November of 2023. The study involved 159 respondents: 89 KFU students, 50 MSU students, and 20 SPSU students. The frequencies and distribution of responses are illustrated in Google Forms diagrams.

Mathematical data processing was conducted using the IBM SPSS Statistics software package. The statistical criteria establishing connections between indicators include the chi-square test, the Mann-Whitney U-test, and Spearman's t-test. To analyze the subjective semantics of AI perception, we conducted factor analysis using the principal components method with varimax rotation.

3 RESULTS

The study sheds light on the features of emotional interaction between humans and neural networks, especially in the creative generation of information content. The survey participants' responses provide a detailed picture of the features of AI use and user attitudes toward AI. Figure 1 demonstrates the spheres of AI application by the participants.

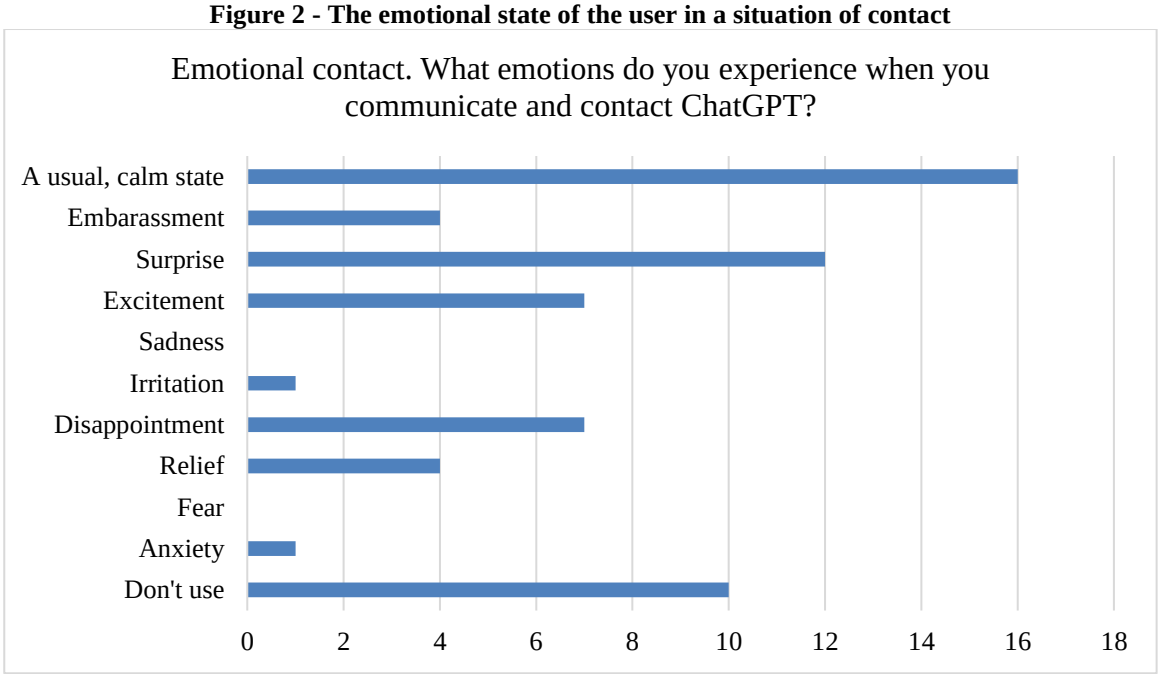
Figure 1 - AI application spheres



Source of data: compiled by authors

The survey showed that 48% of the respondents had used neural networks to solve tasks in the educational context, 24% used them for entertainment and leisure, over 17% – for creative activities, and 18% – for communication. Figure 2 demonstrates the emotions experienced by the users when working with AI.

Figure 2 - The emotional state of the user in a situation of contact



Source of data: compiled by authors

Virtually all users confessed that they experienced an unusual psycho-emotional state in this contact, describing it as positive (calm, surprise, excitement, relief, enjoyment).

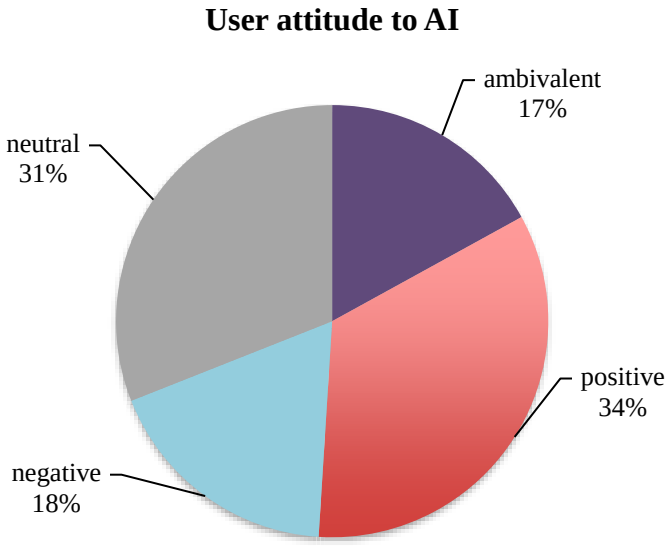
The issue of authorship is even more interesting. Since a neural network possesses the qualities of an object and not an active subject, the user tends to attribute the results of interaction with the aggregate to themselves without questioning their authorship. Over half of the respondents (67%) passed the results off as their own without shame. A third of the users experienced this ethical dilemma when generating content. The respondents reported situations where the AI demonstrated its new unique abilities: "It has more capabilities and knowledge than I could have imagined", "I learned something I was not ready for", "It supported me emotionally", "It was surprising how quickly it came up with new stuff".

Frequency analysis suggests that the users' attitudes to AI were ambivalent. Along with positive emotions (admiration, surprise, and relief), users also experienced negative feelings (disappointment, irritation, and even anxiety and fear). The number of people experiencing polarized positive and negative emotions simultaneously reached 22 (17%).

Exclusively positive emotions were reported by 43 people (34%), and exclusively negative – by 23 (18%). Thus, the users predominantly experienced either positive or negative emotions. Negative and ambivalent emotions were reported by a third of the surveyed users, which is not that small of a share.

The distribution of user attitudes is depicted in Figure 3.

Figure 3 - Emotional response to interaction with AI in completing creative educational tasks



Source of data: compiled by authors

Factor analysis enabled us to highlight the leading emotions arising in users. Table 1 presents the results of factor analysis using the method of principal components with varimax rotation (performed in the IBM SPSS Statistics software environment). The calculations point to three factors, labeled as Excitement, Disappointment, and Anxiety, considering the composition of each factor. Table 1 indicates the emotions demonstrating the strongest correlations with each factor.

Table 1 - Reverse matrix of factor analysis components

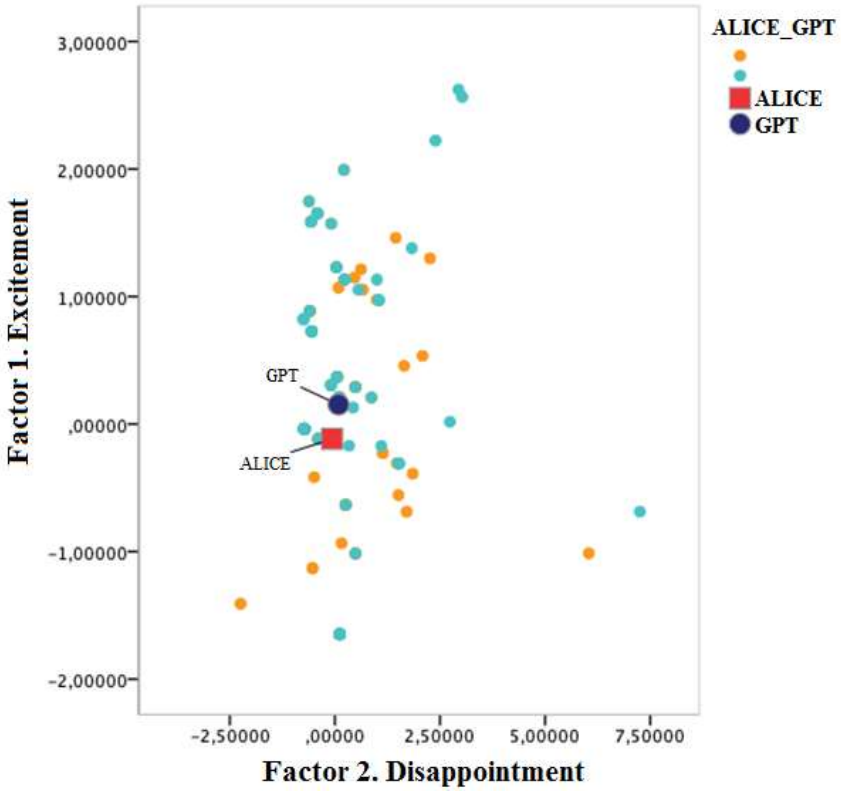
Assessed emotions	FACTORS		
	1. Excitement	2. Disappointment	3. Anxiety
calm	0.433	-0.453	0.226
embarrassment	-0.006	0.18	0.516
surprise	0.583	0.141	-0.085
excitement	0.601	0.095	-0.163
sadness	-0.081	0.632	-0.039
irritation	0.211	0.563	0.178
disappointment	0.167	0.697	0.095

relief	0.454	0.006	-0.171
fear	-0.095	-0.151	0.574
anxiety	-0.091	0.108	0.769
do_not_use	-0.745	0.057	-0.374

Source of data: compiled by authors

Next, we compared emotional attitudes to the voice assistant and ChatGPT separately. ChatGPT evoked a more positive attitude. Mean scores on the Excitement factor were significantly higher for ChatGPT than for voice assistants. The differences are illustrated in Figure 4, which provides the users' scores in the framework of the factors of Excitement and Disappointment. Blue dots represent scores for ChatGPT and orange ones – for voice assistants. As demonstrated in Figure 4, the cloud of blue dots is situated higher than the orange cloud. This result is backed by mean scores calculated based on the users' assessments and marked on the graph with different symbols: an orange square for the mean score of voice assistants and a blue circle for the mean score of ChatGPT. This shift on the Excitement scale is statistically significant according to the Mann-Whitney U-test. Thus, generative AI was more interesting to the users than voice assistants

Figure 4 - Factor analysis of students' emotional response when interacting with neural networks



Source of data: compiled by authors

This finding can only be explained by the fact that the respondents perceived work with ChatGPT as co-creation more often compared to voice assistants. Another notable fact is that those users who used ChatGPT for creative and entertainment purposes had a more positive attitude toward AI (the chi-square test is significant at $p<0.05$) than those who described other goals. Thus, co-creation may give rise to a positive and humanized attitude toward AI.

CONCLUSION

The experiment demonstrated that users have an ambivalent emotional response to interaction with different neural networks in creative educational tasks.

Regrettably, we did not discern whether students' emotional response arises when testing the neural network's capabilities or attributing authorship as a result of creative activity.

The study confirmed the hypothesis that the emotional response evoked at the first stage of students' interaction with a neural network in completing creative educational tasks allows them to establish contact with machine intelligence.

Our data is insufficient for an in-depth understanding of the nature of the interaction between humans and neural networks, particularly when identifying and describing specific strategies allowing one to make choices, for example, on the ethics of attributing authorship. However, even documentation of the emotional response to interaction with a neural network allows concluding on the non-standard and challenging nature of the situation, which requires some means of psychological adaptation. Humanity is entering a new era of professional identity development and a new stage of communication, creativity, and socialization. Even our pilot study gives reason to conclude that the rapid AI development evokes an ambivalent and strong emotional response and affects human emotional intelligence.

ACKNOWLEDGMENTS

The publication was by a subsidy allocated to Kazan Federal University for the implementation of project № FZSM-2023-0022 "Digital socialization and digital competence of young people in the context of global systemic changes: regulatory technologies, risks, scenarios" as part of a state task.

REFERENCES

Axelrod, R. *The Structure of Decision*: Cognitive Maps of Political Elites. Princeton: Princeton University Press, 1976.

Bar-On, R. The Bar-On model of emotional-social intelligence (ESI). *Psicothema*, 18, pp. 13-25, 2006.

Barrat, J. *Poslednee izobretenie chelovechestva: Iskusstvennyi intellekt i konets ery Homo sapiens* [Our Final Invention: Artificial Intelligence and the End of the Human Era]. Moscow: Alpina non-fiction, 2019.

Bisquerra-Alzina, R. *Psicopedagogía de las emociones*. Madrid: Editorial Síntesis, 2009.

Castillo, R., Salguero, J. M., Fernández, P., Balluerka, N. Effects of an emotional intelligence intervention on aggression and empathy among adolescents. *Journal Adolesc*., 36, pp. 883-892, 2013. https://doi.org/10.1016/j.adolescence.2013.07.001

Crossley, M.L. *Narrativnaia psikhologiia.* Samost, psikhologicheskaia travma i konstruirovanie smyslov [Introducing narrative psychology: Self, trauma and the construction of meaning]. Kharkiv: "Humanitarian Center", 2020.

Goleman, D. *Emotsionalnyi intellekt.* Pochemu on mozhet znachit bolshe, chem IQ [Emotional Intelligence: Why It Can Matter More Than IQ]. Moscow: MIF, 2024.

Ilin, E.P. *Emotsii i chuvstva* [Emotions and feelings]. St. Petersburg: Piter, 2017.

Izard, C.E. The *Psychology of Emotio*ns. New York: Plenum, 1991.

Limon, D., Plaster, B. Can AI Teach Us How to Become More Emotionally Intelligent? *Harvard Business Review*, 2022. Retrieved from: https://hbr.org/2022/01/can-ai-teach-us-how-to-become-more-emotionally-intelligent

Liusin, D.V. *Sovremennye predstavleniia ob emotsionalnom intellekte* [Current views on emotional intelligence], In: Sotsialnyi intellekt: Teoriia, izmerenie, issledovaniia. Moscow: Institute of Psychology, Russian Academy of Sciences, 2004.

Mayer, J., Salovey, P., Caruso, D. Emotional Intelligence: Theory, findings and implication. *Psychological Inquiry*, 15(3), pp. 197-215, 2004.

Mori, M. Bukimi no tani [the uncanny valley]. *Energy*, 7(4), pp. 33-35, 1970.

Pavlova, E.M. Emotsionalnyi intellekt: ot ierarkhicheskikh modelei k predstavleniiu o edinoi kognitivnoi sposobnosti [Emotional intelligence: from hierarchic models to the notion of a single cognitive ability]. *Psychological Studies: electronic scientific journal*, 7(37), 2014. Retrieved from: http://psystudy.ru/index.php/num/2014v7n37/1038-pavlova37.html

Rodionova, E.V., Koniukhova, T.V., Lukianova, N.A., Koniukhova, E.T. *Emotsionalnyi intellekt studentov tsifrovogo pokoleniia*: opyt inzhenernogo vuza [Emotional intelligence of digital generation students: experience of engineering university]. Education and Self Development, 17(4), pp. 126-138, 2022. https://doi.org/10.26907/esd.17.4.10

Sandomirskii, M.E. *Pokolenie Z:* te, kto budet posle [Generation Z: those who will come after], In: Blog about small group social psychology, behavioral economics, manipulation, and disruptive behavior. "Sotsialnaia psikhologiia v deistvii" ["Social psychology in action!"], 2001. Retrieved from: http://www.felicidad.ru/2011/07/z.html

Shukla, A., Agnihotri, A. Exploring the Impact of Artificial Intelligence on Emotional Intelligence and Job Performance: A Study of Employees in The Service Sector. *Seybold Report*, 18(3), p. 1691, 2023. https://doi.org/10.17605/OSF.IO/XCRFJ

Zuckerman, M. *Sensation Seeking:* Beyond the Optimal Level of Arousal. New York: L. Erlbaum Associates, 1979.