INTELLIGENCE – EMOTIONAL VS. ARTIFICIAL INTELLIGENCE IN DECISION MAKING

Agata OPOLSKA-BIELAŃSKA

University of Warsaw, Faculty of Journalism, Information and Book Studies, Warsaw; ak.opolska2@uw.edu.pl,
ORCID: 0000-0001-8760-8788

Purpose: The purpose of the article is to present the impact of emotional and artificial intelligence on the decision-making process. To check whether the decision-making process, despite the dynamic development of digitalization, is also based on emotions.

Methodology: The analysis of the topic was carried out based on a literature review and original research using the CAWI method.

Findings: Artificial and emotional intelligence complement each other in the context of decision-making. The hypothesis that the decision-making process, despite the dynamic development of digitalization, is also based on emotions was justified.

Research implications: The obtained results are a starting point for further research in the analyzed area. They do not generalize to the entire group of students, but show generational trends in the process of changes in decision-making, taking into account emotions and the development of artificial intelligence. The study should be conducted on a larger sample of respondents.

Practical implications: In the face of digital tools, it is important to encourage reflection on emotions that are difficult to capture in the algorithm. Combining emotions with the possibilities offered by artificial intelligence in the era of rapid decision-making is the right direction in the study of the relationship between emotional intelligence and artificial intelligence. In future studies, it is worth examining the role of AI and changes in the level of EI among the young generation, i.e. conscious use of emotions in life, their impact on mental state and functioning.

Social implications: Awareness of one's own emotions and control over them is a key element of the decision-making process. Although the dynamic development of artificial intelligence plays a role in decision-making, the synthesis of emotions (EI) with digitization (AI) can contribute to deeper reflections and better decisions. Therefore, it is worth educating the community about the development of both EI and AI.

Originality/value: The article reflects on the relationship between emotional and artificial intelligence in the domain of human intellect within the context of the decision-making process. It highlights the emerging interference of AI in human activities. It gives hope that human emotionality, through heuristics, will be an alternative to decisions suggested by AI, which all people should be aware of.

Keywords: Emotional Intelligence, Artificial Intelligence, Decision-making.

Category of the paper: Research paper.

1. Introduction

Interest in emotions is currently experiencing a renaissance, especially in the context of artificial intelligence development. Currently, the focus on emotions is not limited to psychology or sociology but also extends to scientific disciplines such as economics, management, and biological sciences. Emotions, analyzed as a significant element of personal, professional, and social life, are a subject of interest in the context of human activity – decision-making processes, interpersonal relationships, and functioning in the digital world. The combination of two variants – emotional and digital – seems to be very important today. Psychological research proves that humans have "two minds": rational – conscious, reflective, and emotional – fast, impulsive (Kahneman, 2012). Decision-making is based on the symbiosis of emotions and rationality. The dynamic progress of digitalization, along with the developing artificial intelligence, is becoming a daily occurrence in decision-making and problem-solving. AI can increase the efficiency of performed activities and significantly streamline the decision-making process. By analyzing large amounts of data, it plays an increasingly significant role in our lives, impacting the world and human functioning (Mosbah, 2020). It dominates and directs our actions – for example, which way to drive, what to buy, what music to listen to. It becomes a "prompter" of how to live, facilitating decision-making. The essence of human functioning is the awareness of its influence on life – consciously, emotionally verifying the content "suggested" by it.

The aim of this article is to attempt to present the impact of intelligence – emotional and artificial – in the decision-making process. The assumption of the work is to verify that the decision-making process, despite the dynamic development of digitalization, is also based on the emotional sphere. The analysis was conducted based on a literature review and original quantitative research. The pilot study was conducted on a group of students from the University of Warsaw, was anonymous, and conducted using the CAWI method.

The work is divided into subsections discussing both types of intelligence and presenting, in the context of original research, their impact on the decision-making process, understood as the ability to make effective choices leading to desired results.

2. Emotional Intelligence as Emotional Awareness

Emotions accompany us at every stage of life and in every situation. They are an element conditioning our behavior, social relations, and also the decisions we make. Although they are well-known, we can name and distinguish them, they are difficult to define. Among

psychologists, there is agreement that a clear definition of emotions is difficult, complex, associated with feelings or moods, and multifaceted (Dąbrowski, 2012).

The concept of "emotional intelligence" (EI) invariably arouses great interest. Despite the passage of time, it appears not only in scientific literature but also in popular magazines, guides, and daily press. Its fame is due to the popular publications of Daniel Goleman "Emotional Intelligence" and "Working with Emotional Intelligence" (Goleman, 1997, 1999), although its creators are Peter Salovey and John D. Mayer (Mayer, Salovey, 1999). The popularity of these works stems from the search for non-intellectual factors conditioning success in various areas of life.

Emotional intelligence, alongside other individual predispositions, can allow us to predict human functioning. Besides, even if emotional intelligence and related socio-emotional competencies did not determine life success, understanding oneself and accurately reading one's own emotions certainly facilitate coping in difficult situations (Jaworowska, Matczak, 2005). This understanding of emotional intelligence is adopted in this paper.

Researchers agree that emotions, accompanying us from birth, serve as an alarm system for all changes occurring in the individual and their environment, shape and support thinking, directing attention to what is important, and help to better understand what is happening within us (Mayer, Salovey, 1999).

Most generally, emotional intelligence is defined as a set of abilities conditioning the use of emotions in solving problems in social situations. It is the totality of abilities conditioning the effectiveness of processing emotional information (Jaworowska, Matczak, 2001). It is often identified with a set of dispositions including, in addition to abilities, motivation and perseverance in pursuing goals despite failures, regulating mood and not succumbing to worries that impair the ability to think, empathizing with the moods of others, and looking optimistically at the future (Goleman, 1997). Thus, it facilitates coping with stress, achieving set goals, and promotes experiencing life satisfaction (Mayer, Salovey, 1999). According to Bar-On, it constitutes a series of non-cognitive competencies and skills that enable coping with externally imposed demands (Jaworowska, Matczak, 2001).

The development of EI begins with mastering the most basic skills in the perception and expression of emotions and progresses towards reflective and conscious regulation. Characteristic of Salovey and Mayer's model is the treatment of acquiring emotional skills as a continuous process – lasting throughout life. It begins with learning to recognize one's own and others' emotional states and differentiating them. Next, the abilities to understand the relationship between thinking and emotions, to tolerate various emotional states and moods within oneself, and to use emotions as stimulants of thinking are developed. The next level concerns understanding and analyzing emotions and using knowledge about emotions, the ability to experience, accept, and understand them. The last, highest level refers to the awareness and reflectivity of emotion regulation to ensure emotional and intellectual development (Maruszewski, Ścigała, 1998).

An emotionally intelligent person is more susceptible to change, does not close themselves off in the world of their own views, can delegate powers, and trust colleagues. In the report published by PricewaterhouseCoopers (PWC) "Leadership of the future. Polish leader ready for change?" (PricewaterhouseCoopers, 2016), the characteristics of the leader of the future are presented. Alongside the necessity of keeping up with digital technologies, the key competencies of leaders are emphasized: openness and flexibility, using intuition based on knowledge and experience, supporting diversity – delegating powers, attentive communication, quality management, focusing on values such as knowledge, ethics, and interpersonal relations.

The concept of emotional intelligence also appears in the ManpowerGroup report (2017) as one of the desired traits in the labor market. The upcoming changes are described as a "skills revolution in the human age." Emotional intelligence also appears as one of the key skills in the World Economic Forum's The Future of Jobs Report (World Economic Forum, 2018). The opinions contained in the cited reports seem to confirm the validity of the assumption that emotional intelligence is worth being interested in not only in the area of personal life but also in the area of professional life.

3. Artificial Intelligence – The Non-Emotional Part of the Decision-Making Process

Artificial intelligence (AI) is finding increasingly widespread application in various areas of our lives. One of the originators of this term is considered to be John McCarthy, who presented the concept of artificial intelligence as a system consciously perceiving the environment, which reacts in a way that aims to maximize its own chances of success (Makowski, 2023). It is defined as a system that bases its operation on a machine and predicts, recommends, and also makes decisions for human-designed goals, thereby influencing the real or virtual environment (Osiej, 2022). AI is a term used to describe cognitive processes, such as learning, understanding, information processing, acquired by machines. It can take various forms, including technical infrastructure (i.e., algorithms), a part of a process, or a product for the end-user. This understanding of artificial intelligence has been adopted in this paper.

It is a field of computer science that deals with the creation of systems and technologies capable of performing tasks requiring human intelligence (Ziółkowska, 2023). Machine learning is a term that refers to an area of artificial intelligence related to algorithms that automatically improve through experience (Kłoczko, 2024). It is used to teach machines how to handle data more efficiently (Hui, 2023). Deep learning is considered a subcategory of machine learning and involves generating deep neural networks (Chassagnon et al., 2020).

Deep learning is based on training computers, using advanced algorithms, to learn independently by recognizing patterns using processing layers (Sas, 2024). In addition to machine learning, AI domains such as natural language processing, which enables machines to understand human speech and process and generate it, have been distinguished in the literature (Jurafsky, Martin, 2023). AI domains also include image processing through image recognition and machine vision (Kurp, 2023), enabling devices to identify and classify objects by understanding the visual world. AI techniques enable the transformation of large datasets into useful insights (Nakamoto, Takasugi, 2023), which are a source of valuable information and a basis for formulating forecasts (Sagiroglu, Sinanc, 2013).

4. AI and EI in the Decision-Making Process – From Theory to Everyday Life

In 1959, John McCarthy (McCarthy, 1959) proposed the concept of a machine that would advise humans in their life affairs, guided by so-called "common sense". Today, people seek answers to all their pressing questions in internet search engines and integrated chats, confirming the fact that artificial intelligence is verifying McCarthy's assumptions. This need for dynamism, ease, and speed in acquiring information is based on the current way of life. Research in the field of decision theory or computer-aided problem-solving was already introduced by Herbert A. Simon (Simon, 2000). In 1978, he received the Nobel Prize for groundbreaking research on the decision-making process in economic organizations and the theory of bounded rationality. In his considerations on decision-making, he concluded that human rationality is limited in two ways – internally (due to the imperfections of our minds) and externally (due to the environment and social interactions). Perception, cognitive operations, and learning to make decisions were significant in his considerations. The starting point was the assumption that an individual strives to maximize many goals, does not have complete information about possible alternatives, and the decision-maker does not have sufficient computing power to make appropriate comparisons. Due to limitations, the subject does not follow the principle of optimization but satisfaction. The idea of bounded rationality took into account the limited processing capabilities of the human mind. After all, people reason and act rationally within the boundaries set by finite search and calculation abilities. These simplifications are now artificial intelligence, through available digital tools (Meyer, 2007).

The decisions made determine the paths of further action. It is essential to make choices based on drawn conclusions and refer to recognized values and facts. Decision-making processes serve to solve problems that can be well-structured or unstructured. The difference lies in their good understanding, categorization, and consequences. Structured problems can be

quantified, their solution is possible using mathematical models, and the elements of the decision-making process can form an algorithm, conditioned by a logical sequence of actions. Unstructured problems can only be presented qualitatively, in the form of a verbal description, require creative thinking, and their solution cannot be subordinated to algorithms (Łabuz, 2019).

The decision-making process itself includes a logically related group of mental operations, arranged in the appropriate order, enabling the assessment of the decision situation and the selection of the most advantageous variant. The factor triggering decision-making processes is a problem situation.

The complexity of the decision cycle and the variety of possible situations make it impossible to unambiguously present a recommended course of action. In the literature, there are discrepancies regarding the number of phases of the decision-making process, but they always constitute a logical sequence of actions leading to the selection of the most advantageous solution. Due to decision uncertainty, the decision-making process is associated with the psychological conditions of management, prompting decision-makers to consider uncertainty and risk (Byczkowska, Kuciński, Trocka, 2022).

Creating ideas for problem solutions is an extremely difficult task and possible only when the decision problem is formulated correctly and the necessary amount of reliable information is collected. The methods used in the decision-making process depend on the nature of the problem. Well-structured ones are most often solved using methods from the field of operations research. Herbert Simon defined operations research as "systematized analytical methods, often using complex mathematical apparatus in the process of making decisions related to management" (Simon, 1982). In contemporary research, the use of operations research techniques is often simply identified with conducting quantitative analyses supporting decision-making. Although the possibilities of applying these methods are very large and constantly increasing, there is no indication that they can be used to solve all issues related to decision-making. In situations where the decision concerns issues of a purely qualitative nature, the above tools prove to be unreliable (Holska, 2016).

When searching for solutions to a decision problem, especially an unstructured one, the heuristic method is used. It is a practical rule of conduct, based on experience, used in decision-making, regulating the process of evaluating or solving problems without using an algorithm. It is recognized as a mental shortcut based on associations, experience, and recollections.

The difference in using the problem-solving method is based on the fact that an algorithm is an exact recipe for solving a task, and a heuristic is a useful hint, not defined by a rule, based on an intuitive assessment of reality (Nosal, 2011). The development of the solution itself is subject to valuation in the decision phases, and the best option is selected. The decision-making phase is associated with the act of will of the decision-maker, which is the starting point for specific actions, outlining the path to solving the problem situation. The decision becomes

a reality only when it is implemented. And its effectiveness is the result of the effectiveness of the action that brings it into effect (Holska, 2016). Thus, the decision-making process is the recognition and definition of the essence of the decision, the separation of various possibilities, the selection of the "best" of them, and its implementation (Szarfenberg, 2002). Decision-making is a process that concerns each of us and is an integral element in private and professional life (Łabuz, 2019).

Based on the above considerations, for the purposes of this paper, an original definition of the decision-making process was adopted: The decision-making process is a way of making decisions based on understanding the problem and subjectively selecting (according to the decision-maker) the optimal way to solve it.

Based on a literature review and the definition of terminology, an original quantitative study using the CAWI method was conducted among students of the University of Warsaw. It was anonymous and consisted of 7 closed questions. Through the University Student Service System (USOS), a link to the survey was sent to students. The respondents were informed about the purpose of the study, anonymity, and collective processing of results. The study was conducted from January 6 to 31, 2025. 109 students of the University of Warsaw, studying at the Faculty of Journalism, Information, and Book Studies, participated. Respondents represented full-time and part-time studies, first (bachelor's) and second (master's) degree. Participation in the study was voluntary. Students were sent a digital survey via the University Student Service System (USOS). A limitation during the study was the low activity of students in completing the survey form.

The study was pilot in nature, allowing attention to be paid to the way students make decisions. Conducting the study among WDIiB students was important, as they are people acquiring knowledge in the field of social communication and media science, which is significant in the area of the impact of emotions and digitalization on decisions made.

As a result of the study, women constituted the majority (67%). The 18-20 age group dominated (55.7%). The overall results are presented in Figure 1.
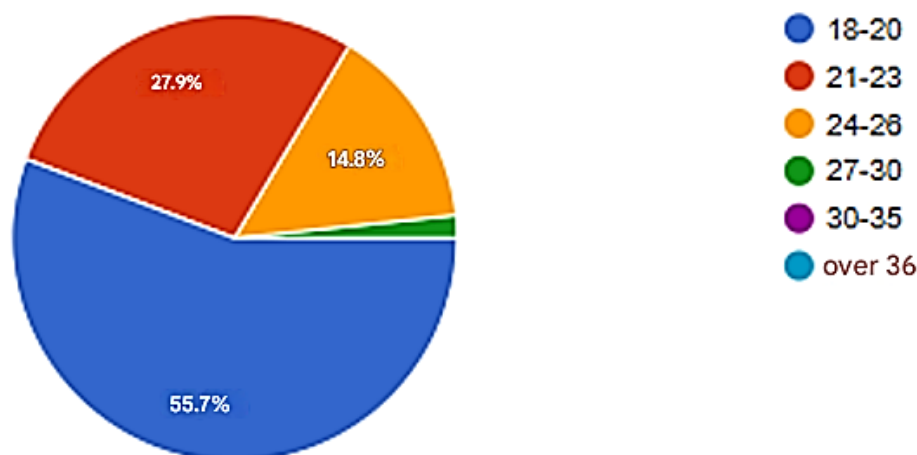

Figure 1. Age of respondents.

Source: own elaboration.

The aim of the study was to understand the respondents' attitudes towards decision-making, the significance of emotions, and rationality.

The first question, multiple-choice, concerned the respondents' subjective assessment of their decision-making. The following terms were included in the cafeteria: easy, difficult, stressful, emotional, rational, time-consuming, impulsive. The dominant term was decision-making as stressful (47.5%), followed by emotional (41%), rational and difficult (39.3%), time-consuming (31%), impulsive (21.3%), and easy (20%). From the obtained results, it can be inferred that the decision-making process is considered rather stressful and emotional, which would confirm the fact that emotional awareness is significant in this process. Thanks to it, we identify and name moods and manage emotions.

A follow-up to the previous question was to indicate the guiding factor when making decisions. Among the possible answers were: emotions, facts, both factors, and none of the above. The majority of respondents indicated facts and emotions as important for the decision-making process (82%). The overall results are presented in Figure 2.
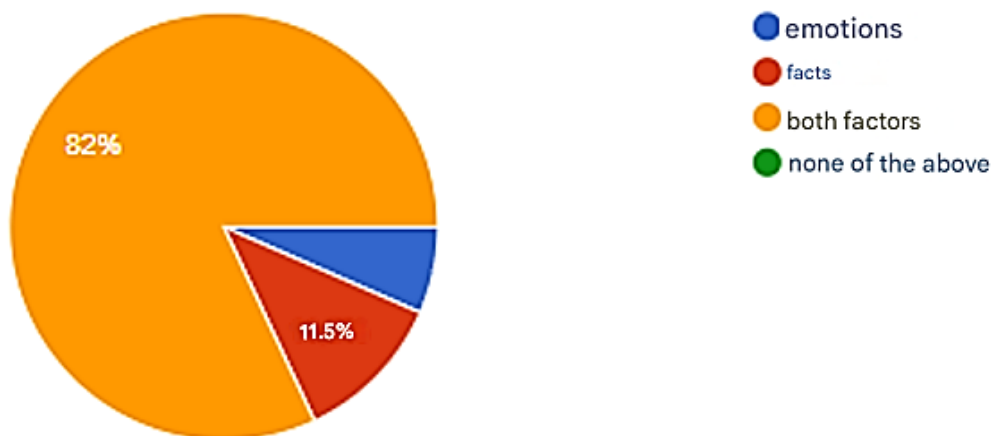

Figure 2. Factors influencing decision-making.

Source: own elaboration.

Considering decisions based on facts demonstrates human rationality, but emotions always accompany actions taken. This may prove the dual nature of the human mind (conscious and rational) as proclaimed by Kahneman.

To verify the impact of AI on the decision-making process, respondents were asked whether the development of AI has an impact on the speed of decision-making. 54.1% of respondents agreed with the affirmation. The overall results are confirmed by Figure 3.
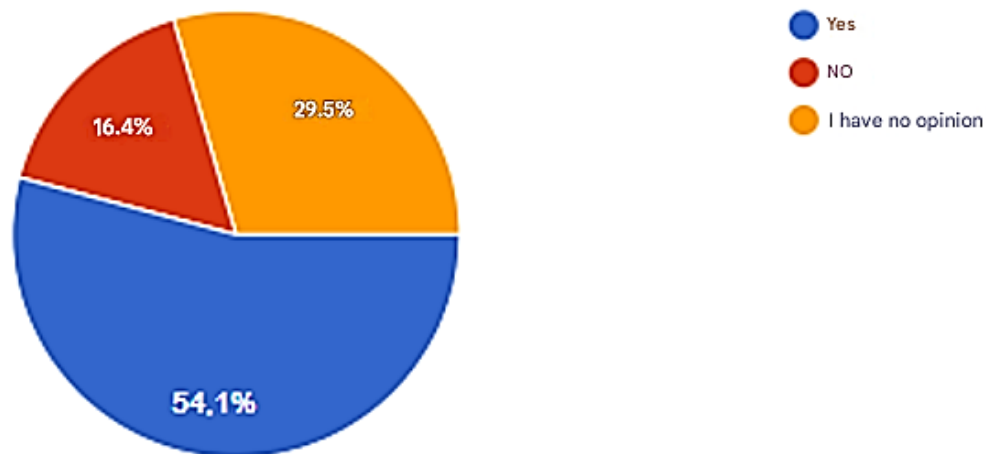
Figure 3. Impact of AI on the speed of decision-making.
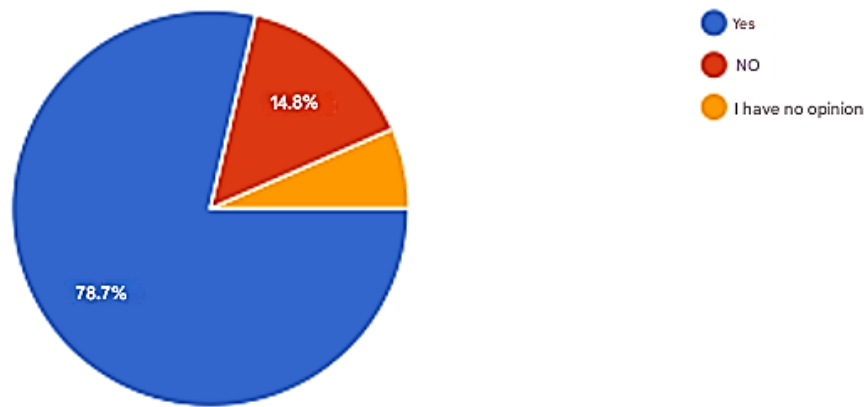
Source: own elaboration.

The divided result may stem from the unconscious use of AI in the decision-making process. Young respondents treat AI tools as the primary source of information, often without considering the consequences of their impact on decisions.

Based on the above question, the possibility of making decisions without the involvement of emotions (Figure 4), solely relying on rationality, as well as the possibility of emotionality being dominated by rationality in the decision-making process (Figure 5) were verified. The aim was to verify the respondents' awareness of structured/unstructured decisions.
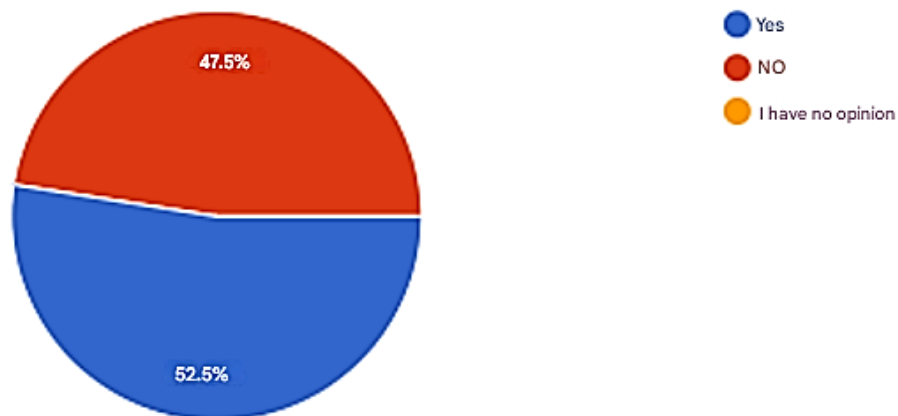
Figure 4. Making decisions without the involvement of emotions, based solely on rationality.
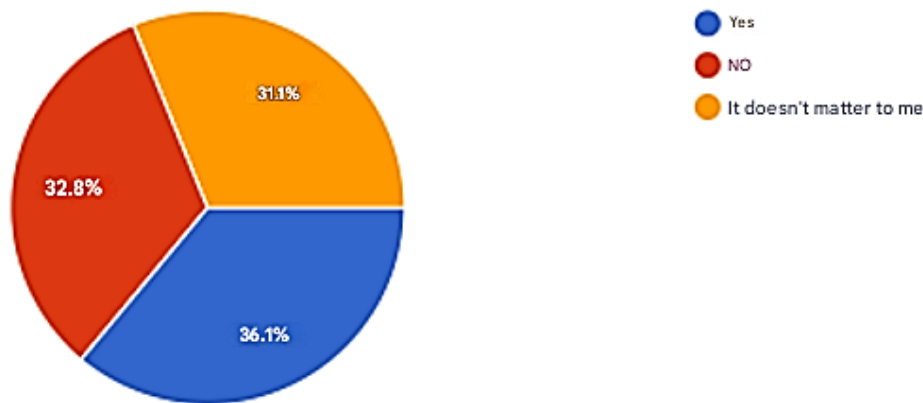
Source: own elaboration.

Figure 5. Dominance of rationality over emotionality in the decision-making process.

Source: own elaboration.

The respondents' answers indicate the dominance of rationality over emotions. This stance may result from experiencing easier and quicker actions based on AI. This is compatible with the results presented in Figure 2.

The question regarding the impact of AI-generated messages on the decision made aimed to draw attention to the content that respondents use when making decisions (its reliability and credibility).

The answers provided (Figure 6) were varied. The aspect of unconsciousness, speed in solving the problem, or self-sufficiency in decision-making processes probably had an impact.

Figure 6. Impact of AI-generated messages on the decision made.

Source: own elaboration.

The last question concerned the influence of social relations on decision-making processes. In this regard, respondents were asked whether they rely on the opinions of others when making decisions. This was a counter-question to the previous one, regarding AI-generated content as a source of decision-making. A significant portion of respondents answered affirmatively (Figure 7), with 77%. This confirmed the importance of interpersonal relationships in the decision-making process.
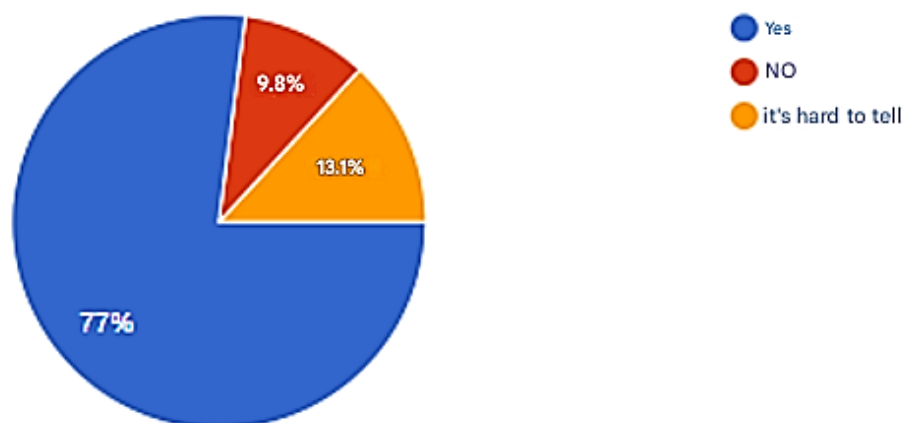
Figure 7. Opinions of others when making decisions.
Source**:** own elaboration.

The obtained results are not surprising, as a significant portion of respondents are digital natives. AI integrates into their daily activities, often automatically and unconsciously, minimizing heuristic methods. However, in accordance with the assumption adopted in the article, artificial and emotional intelligence complement each other in the context of decision-making. The hypothesis that the decision-making process, despite the dynamic development of digitalization, is also based on the emotional sphere has been justified.

The obtained results serve as a starting point for further research in the analyzed area. They do not represent a generalization for the entire group of students, but they do show generational tendencies in the process of change occurring in decision-making, taking into account emotions and the development of artificial intelligence. The study should be conducted on a larger sample of respondents.

5. Summary

Intelligence, until recently reserved exclusively for living and rational beings, now applies to digital entities and is realized in both technical and natural processes. Modern tools like GPT, Copilot, and Gemini allow the use of the potential of both human and digital intelligence. At the center of this phenomenon is the interaction of humans as emotional, rational beings with machines. The technological revolution is changing daily life, making digital tools indispensable companions of human existence. Artificial intelligence (AI) is entering the domain of content creation, challenging the traditional roles of human creators. In a time when convenience intertwines with the speed of actions, the decision-making process is undergoing changes. People give credence to machines to obtain ease of results and answers.

The aspects discussed in the article concern the changes taking place in the realm of emotions – rationality – decisions. Learning through algorithms, by recognizing patterns, increases the efficiency of AI messages. At the same time, it limits human cognitive abilities. The human mind has unlimited analytical capabilities; AI is a response to a programmed strategy. Artificial intelligence has no emotions, although it tries to learn them, but will these feelings be equivalent to human ones? Decision-making in the analyzed context is a reflection on the future of human independence from AI.

The article, which is a reflection on the relationship between emotional and artificial intelligence in the area of human intellect in the context of the decision-making process, draws attention to the emerging interference of AI in human actions. It gives hope that human emotionality, through heuristics, will be an alternative to the decisions indicated by AI.

In the face of digital tools, it is important to encourage reflection on interpersonal skills, where empathy and mutual relations are difficult to capture in an algorithm. Combining emotions with the possibilities offered by artificial intelligence in the era of rapid decision-making is the right direction in research on the relationship between emotional and artificial intelligence. In the perspective of further research, it would be necessary to focus on the issue of the place of artificial intelligence and changes in the level of emotional intelligence of the young generation, i.e., the conscious use of emotions in life, their impact on one's own state of mind and functioning.

References

1. Byczkowska, M., Kuciński, A., Trocka, M. (2022). *Risk in the decision-making process. Selected problems.* Gorzów Wielkopolski: Jakub of Paradyż Academy in Gorzów Wielkopolski.
2. Chassagnon, G., Vakalopoulou, M., Paragios, N., Revel, M.-P. (2020). Deep learning, definition and perspectives for thoracic imaging. *European Radiology, 30(4),* 2021-2030, doi: 10.1007/s00330-019-06564-3.
3. Gardner, H. (2002). *Multiple intelligences.* Poznań: Media Rodzinna.
4. Goleman, D. (1997). *Emotional intelligence.* Poznań: Media Rodzina.
5. Goleman, D. (1999). *Working with emotional intelligence.* Poznań: Media Rodzina.
6. Holska, A. (2016). Decision-making theories. In: K. Klincewicz (Ed.), *Management, organizations and organizing – review of theoretical perspectives.* Warsaw: Warsaw University Faculty of Management Scientific Publishing House.
7. Hui, Y. (2023). *Recursivity and contingency.* J. Bednarek, M. Krzykawski (Ed.). Katowice: University of Silesia Press.

8. Jaworowska, A., Matczak, A. (2001). *Emotional Intelligence Questionnaire INTE. Manual.* Warsaw: Psychological Test Laboratory of the Polish Psychological Association.

9. Jurafsky, D., Martin, J.H. (2023). *Speech and language processing.* Prentice Hall.

10. Kłoczko, A. (2024). The use of artificial intelligence in organization management as a potential for cost reduction. *Scientific Papers of Częstochowa University of Technology, No. 55,* doi: 10.17512/znpcz.2024.3.05.

11. Kurp, F. (2023). *Artificial intelligence from scratch.* Gliwice: Helion.

12. Łabuz, A. (2019). Decision-making process on the example of purchasing new computer equipment. *Studies and Works of WNEiZ US, No. 56*, doi:10.18276/sip.2019.56-10.

13. Makowski, Ł. (2023). Artificial intelligence – a new tool in the strategy of corporate social responsibility. *Scientific Papers of the WSB University in Poznań, 102(3).* doi: 10.58683/dnswsb.1942.

14. Maruszewski, T. (2003). Autobiographical memory as a basis for creating individual experience. In: J. Strelau (Ed.), *Academic textbook. Psychology.* Gdańsk: Gdańsk Psychological Publishing House.

15. Maruszewski, T., Ścigała, E. (1998). *Emotions-alexithymia-cognition.* Poznań: Humaniora Foundation Publishing House.

16. Matczak, A., Piekarska, J., Studniarek, E. (2005). *Emotional Intelligence Scale-Faces.* SIE-T. Manual. Warsaw: Psychological Test Laboratory of the Polish Psychological Association.

17. Mayer, J.D., Salovey, P. (1999). What is emotional intelligence? In: P. Salovey, D.J. Sluyter (Eds.), *Emotional development and emotional intelligence.* Poznań: Rebis Publishing House.

18. McCarthy, J. (1959). Programs with Common Sense. *Journal Proceedings of the Symposiun ont Mechanization of Thought Processes.* Retrieved from: http://jmc.stanford.edu/articles/mcc59/mcc59.pdf, 06.03.2024.

19. Meyer, M. (2007). Herbert Simon and his idea of solving rationality. *Decision Journal.* Lublin: Publisher Leon Koźmiński Academy, edition 7.

20. Mosbah, M. (2020). *The role of the knowledge-based economy in the development of artificial intelligence AI and the impact of business process automation on the competitiveness of organizations, Knowledge-based economy: selected problems.* Lublin: Maria Curie-Skłodowska University, Faculty of Economics.

21. Nakamoto, K., Takasugi, K. (2023). Special issue on application of artificial intelligence techniques in production engineering. *International Journal of Automation Technology, 17(2),* doi: 10.20965/ijat.2023.p009.

22. Nosal, Cz. (2011). Interaction of intelligence and intuition: a new theory of mind functioning. *Psychological Journal, 17(2).*

23. Osiej, Z. (2022). *Artificial intelligence – how law tries to keep up with technology*. Retrieved from: https://gdpr.pl/sztuczna-inteligencja-jak-prawo-probuje-nadazyc-za-technologia, 6.03.2024.

24. Sagiroglu, S., Sinanc, D. (2013). *Big Data: A review*. International Conference on Collaboration Technologies and Systems (CTS) doi: 10.1109/CTS.2013.6567202.

25. SAS (2024). *Deep learning, Theory and practice*. Retrieved from: https://www.sas.com/pl_pl/insights/analytics/ deep-learning.html, 6.03.2024.

26. Simon, H.A., Thompson, V.A., Smithburgh, D.W. (2000). *Public Administration*. New Brunswick/London: Transaction Publisher.

27. Szarfenberg, R. (2002). *Rationality of decisions in social policy*. Paper presented at the WDiPN conference. Retrieved from: http://rszarf.ips.uw.edu.pl/pdf/refwdinp.pdf, 16.03.2019.

28. Ziółkowska, E. (2023). The impact of artificial intelligence on the financial market in the process of making economic decisions – opportunities, challenges and recommendations. *Studies and Works of the College of Management and Finance*, *192*, pp. 89-108. doi: 10.33119/SIP.2023.192.5.