

Human Intelligence versus AI: Implications for Emotional Aspects of Human Communication

Omafume Oritsegbemi

School of Media and Communication, Pan-Atlantic University, Nigeria

ARTICLE INFO

Keywords:

*artificial Intelligence,
human intelligence,
human emotion,
human communication*

ABSTRACT

The affective computing approach of artificial intelligence has made it possible for machines to not only think, behave and communicate like humans, but to also emote like humans. This dimension of AI is substituting human capacities due to its benefits in diverse spheres of life. While studies abound in the comparison between AI and human intelligence in terms of their cognitive capacities, very few have focused on the emotional aspect. This study therefore, utilized secondary data by reviewing empirical studies to examine the implications of AI in the emotional aspects of human communication. The study is anchored on basic emotion theory and technological determinism which enunciate the fundamentals of emotional AI and its effects. The paper argues that the complexity and subjectivity of human intelligence and emotion cannot be adequately replicated by AI as it lacks innate emotion and the ability to understand abstracts. It recommends media literacy skills for users and ethical guidance for technological companies designing AI to ensure it is less detrimental to human and the society.

1. Introduction

The defining characteristic of human as intelligent and emotional being has been challenged by the increasing development of Artificial Intelligence (AI). Machines and robots are designed with algorithms to behave and act like humans. AI has brought to reality things that were once considered fiction including self-driving cars, chess playing computers, chat-box, Natural Language Processing (Ambekar & Kumar, 2018; Magapu & Vaddiparty, 2018), and many other intelligent machines. AI is increasingly substituting human capacities (Ali, 2018; Sinha & Pathak, 2019). It comprises of programs that are designed to perform varied tasks to make life easier (Bakola et al, 2022). Thus, many organisations have relied on it for different roles (Magapu & Vaddiparty, 2019). This has generated scholarly debate on whether AI will eventually take the place of humans. This argument particularly stem from the high level computational capacity of AI in terms of speed and accuracy (Olivier, 2017) and the adoption of AI in many facets of the economy (Ali, 2019; Korteling, 2019). Though, there is the school of thought that AI is dependent on human intelligence and is only a product of human collective effort (Ambekar & Kumar, 2018; Dong et al., 2020).

Nevertheless, growing advancement in technologies has made it possible for AI to not only behave like humans (Guzman & Lewis, 2019), but also to elicit emotions, recognize

*Corresponding author E-mail address: omafume.oritsegbemi@pau.edu.ng

Cite this article as:

Oritsegbemi, O. (2023). Human Intelligence versus AI: Implications for Emotional Aspects of Human Communication. *Journal of Advanced Research in Social Sciences*, 6(2): 76-85. <https://doi.org/10.33422/jarss.v6i2.1005>

© The Author(s). 2023 **Open Access.** This article is distributed under the terms of the [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and redistribution in any medium, provided that the original author(s) and source are credited.



emotions, and stimulate emotions in humans (Weber-Guslar, 2021). According to Olivier (2017), AI has transcended from calculating, thinking machines to affectionate machines. These include virtual personal assistants such as Siri on Apple devices, Amazon's Alexa, humanoid robot such as Hanson's Sophia, machine translation of human languages, chat-box, etc. (Ali, 2018; Magapu & Vaddiparty, 2019). Before these developments, there were emoticons, gifs and other features of internet devices to convey human feelings (Maritinez-Miranda & Aldea, 2005). This indicates the inclusion of emotional aspect of human in AI (Maritinez-Miranda & Aldea, 2005). This aspect of AI can be described as affective computing approach of AI, or emotion AI (Weber-Guslar, 2021; Starl & Hoey, 2021). It is characterised by its ability to recognise and adapt human emotions through non-verbal cues such as facial expressions, body language, voice tone and speech fluctuations (Bakola et al., 2018; Sethumadhavan & Phisuthikul, 2019). Most sectors of the society such as health, security, business and commerce are largely depending on emotion detection and analysis of AI for their activities (Magapu & Vaddiparty, 2019).

However, Sheutz (2011) opines that the benefits AI offers to humans are not without consequences. Some of the AI technologies are designed in a way that it is difficult to tell whether one is communicating with human or robot. There is therefore need for the review of emotional AI and its implications in communication particularly the emotional aspect of human communication. While literatures abound on the comparison of human intelligence and AI in terms of their cognitive capacities (Ambekar & Kumar, 2018; Dong et al, 2019; Wang, 2019), only few have made comparison on the affective dimension (Martinez & Aldea, 2005; Olivia, 2017). This study therefore, joins in the conversation by examining the implications of AI on the emotional aspects of human communication.

2. Conceptual Review

2.1. Human Intelligence and Artificial Intelligence

The concepts of human intelligence and artificial intelligence have spur contention in diverse fields of study with scholars trying to distinguish between "intelligence" in terms of the general sense of the word; "human intelligence" as a product of humans; and "artificial intelligence" which is attributed to machines. While there is consensus on the differences between human intelligence and AI, there seems to be no clear dissimilarity between the definitions provided for human intelligence and intelligence in itself. Korteling et al (2021) consider human intelligence as the "real" form of intelligence while Sinha and Pathak (2019) describe it as "natural intelligence". This is already implicitly expressed by the other type of intelligence termed "artificial intelligence" as though it is not entirely real (Ambekar & Kumar, 2018). However, Korteling et al (2021) opine that intelligence is not exclusive to human capacities; but a matter of information and computation, independent of its physical substrate. They did not consider that the idea behind AI is drawn from human intelligence (Sinha & Pathak, 2019). This paper however, is focused on human intelligence and AI.

Colom et al. (2010) define intelligence as a general mental ability of reasoning, problem solving, and learning. Wang (2019) states that intelligence is the capacity to process information in order to adapt to an environment. These descriptions of intelligence fundamentally explain the cognitive capacity of humans. Therefore, intelligence is essentially a product of humans (Colom et al., 2010). Humans are rational beings with innate mental ability which makes them higher class of beings compared to animals. Human intelligence enables individuals to understand and undertake complex tasks in order to respond to the society. This includes perception, communication, memorisation, and information (Colom et

al., 2010). It is with inborn intelligence that individuals can understand abstracts that are not perceptible to the senses (Ambekar & Kumar, 2018). Thus, Sinha and Pathak (2019) opine that human intelligence is the quality of the human mind that advances in accordance with one's experiences, situations and other unpredictable circumstances.

Most definitions of AI suggest that it is aimed at imitating human intelligence, though with greater efficiency to implement complex tasks. Wang (2019) describes AI as computer system that functions and operates like the human mind. Similarly, Martinez-Miranda and Aldea (2005) assert that AI is the simulation of human intelligence, designed to perform complex tasks by producing intelligent responses. Korteling et al (2021) opine that AI is non-biological capacity to effectively achieve complex goals. This current study projects the definition of Dong et al (2020) who assert that AI is the simulation, extension and expansion of some parts of human intelligence with the provision of big data technology and the internet. "Some part of human intelligence" implies that AI cannot completely replicate human intelligence. Ambekar and Kumar (2018) and Dong et al (2020) believe that AI can never function independently as it remains a tool for human and functions within the scope of human control.

It is notable to state that AI has made human activities easier in many ways. The 'extension and expansion' of parts of human intelligence as asserted by Dong et al (2020) implies a greater level of productivity by AI technologies. According to Bakola et al (2022), despite their dissimilarities, AI complements human intelligence. AI executes several tasks with high level of productivity, precision and accuracy (Magapu & Vaddiparty, 2019). Consequently, many organisations and individuals are utilising AI in their daily activities. Magapu and Vaddiparty (2019) note that since 1970s when research on AI begun, AI has manifested in several forms. It is in laptops, smartphones, televisions, and refrigerators before the emergence of well-known inventions such as Siri, Alexa and Google Assistant. Therefore, it can be stated AI technologies have become ubiquitous in today's world and consciously or unconsciously humans rely on them for ease, cognitive thinking and quicker results.

2.2. Differences between Human Intelligence and Artificial Intelligence

1. Human intelligence is inherent while AI is programmed by data. Thus, while humans utilise their natural abilities to learn and apply what they have learnt with logic and judgement, AI completely rely on algorithms, i.e. step-by-step instructions on how to fulfil a task (Weber-Gulsar, 2021). As a result, AI can only perform limited tasks (Ambekar & Kumar, 2018) as its level of functionality is dependent on the amount of data with which it was programmed.
2. Human choices can be subjective. Human intelligence can be influenced by intuition (Kavalki, 2019) and personal experiences. The consequence of this is that not all human actions can be predicted. AI on the other hand, functions in accordance with a systematised programme, and handle situations without being bias (Sinha & Pathak, 2019).
3. AI is accurate (Ambekar & Kumar, 2018; Sinha & Pathak, 2019). Therefore, it is better at convergent thinking such as rule-based games, calculations, memorising, processing and analysis (Bakola et al., 2022). Conversely, human intelligence thrives on divergent thinking. Human intelligence is capable of adjusting to situations, improvising (Ambekar & Kumar, 2018), and drawing inferences (Ali, 2018).
4. The human mind is not as fast as AI. AI can think much faster – having access to information a million times quicker than the human mind (Ali, 2018).

5. Human intelligence is the creation of God, while AI is the product of humans. Human intelligence is responsible for the development, utilisation, and control of AI. Therefore, it can be regarded as the source of AI (Ambekar & Kumar, 2018; Sinha & Pathak, 2019).

2.3. Emotional Aspect of Human Communication

Human is both an emotional and intelligent being. Though these two aspects are distinctive, they are in many ways intertwined. Cabanac (2002) defines emotion as a psychological experience of stimulus or event that occurs either in the environment, within the body, or completely psychological. He notes that the type of emotion experienced is determined by the stimulus which can be a product of one's imagination or perception. For example the odour of a meal or the sound of a predator may elicit certain emotion. One may feel disgusted if the meal has a foul smell or experience fear when they feel threatened. The question here is how can an individual tell that he/she is being threatened to respond accordingly? The In psychology, emotion is often defined as a complex state of feelings that results in mental and physical changes which influence thoughts and behaviours (Kovalkova, 2019). Hence, the human physiology and intelligence controls emotions. This answer is that behavioural reaction of fear and disgust are result of the cognitive and physiological interpretation of being threatened or irritated.

Clearly, there is connection between human intelligence and human emotion. Emotions have both physiological and cognitive elements (Chursinova & Stebelska, 2021; Kovalkova, 2019). In fact, scientists have concluded that effective functioning of human intelligence is unrealizable without emotions (Chursinova & Stebelska, 2021). The connection between emotion and human physiology is evident in bodily changes associated with emotion such as heart palpitations and sweaty palms. The cognitive connection is seen in how part of human nervous system controls some emotions. For example, the amygdala triggers fear and other emotions (Simic et al., 2021). It has also been observed that emotions are based on personal experiences of similar situation (Simic et al., 2021) which indicate the relationship between emotion and memory. Conclusively, emotion is a compound phenomenon consisting of physiological, phenomenological, behavioural, and mental components (Starl & Hoey, 2021).

Emotion is an integral part of human life (Kovalvoka, 2019). It plays a vital role in human activities including decision-making, self-assessment, and communication (Bakola, et al., 2022; Kavakli, 2019; Martinez-Miranda & Aldea, 2005). Human communication is both a logical and emotional phenomenon. The communication process involves empathy as an indispensable element (Chursinova & Stebelska, 2021). Suffice to say, we do not communicate only logical constructive thoughts, we also communicate our feelings. Emotion promotes better adaption to the external environment; deepens communication between people; performs motivational role and serves as a form of assessment of reality (Chursinova & Stebelska, 2021).

Hendrix and Morrison (2020) note that emotions affect communication in terms of how individuals use communicatory cues such as word choice, volume, tone, rate of speech, facial expression, and physical movement to express themselves. According to them, these cues provide deeper insight in communication that spoken words might not convey. For example, someone speaking with a high tone and a smile on the face indicates he/she is interested in the subject than someone speaking with a flat tone and a straight face. Our ability to interpret others' emotions helps to contextualise message, and decreases the chance of misunderstandings (Hendrix & Morrison, 2020). This ability is regarded as emotional intelligence. With high emotional intelligence, individuals can express their feelings

accurately, recognize and evaluate the emotions of others, control their emotions and adjust better (Bakola, 2022). Consequently, human intelligence is not enough to interact in society.

Kavakli (2019) examined the ways in which emotions are functional at intrapersonal level, interpersonal level and group level of communication. This will be discussed in subsequent paragraphs. At intrapersonal level, emotion helps in processing information swiftly. Individuals might have to think for a long time if there was no emotion. For example, people are guided by intuition to take certain actions. Emotion also facilitates individual's memory. Some memories stay longer in the human mind because of the emotions that are associated with them. Also, emotion guides future behaviours of an individual. The kind of emotional experience one gets in certain circumstances, would prepare the person for future occurrences.

At interpersonal level, emotions help us to establish and maintain relationships. It is also used for affiliation, social distancing and social referencing (Kavakli, 2019). Emotions can be expressed verbally through words, and non-verbally through body language, facial expression, tone and postures. These serve as signals to both parties in interpersonal communication. Individuals get to understand each other's thoughts and beliefs through the emotions expressed and experienced. People become more intimate and develop a sense of affiliation when they share similar emotions. With regards to social referencing, people can draw inferences from the emotions of others to understand certain situations. For example, babies may not be able to tell a good or bad situation, they laugh when others laugh with them. More so, emotions lead to social distancing. When people express negative emotions such as anger, it is natural for others to avoid them.

The function of affiliation and social distancing is also evident in group communication (Kavakli, 2019). Affiliation manifest when a group wins or loses; certain emotion pass across the group members. When group members experience certain kinds of emotions together, their bond becomes strengthened. Likewise, individuals who feel rejected, unrecognised or intimidated in a group tend to communicate less and isolate themselves than those who feel motivated.

3. Theoretical Framework

3.1. Theory of Basic Emotions

The basic emotion theory is attributed to a Psychologist, Paul Ekman (Kovalkova, 2019; Starl & Hoey, 2021). In 1972, Ekman suggested that there are six basic emotions: fear, disgust, anger, surprise, happiness and sadness (Kovalkova, 2019; Gu et al., 2019). In 1999, he expanded his list to include embarrassment, excitement, contempt, shame, pride, satisfaction and amusement (Kovalkova, 2019). Although there is no consensus on the precise number of basic emotions, the theory is widely accepted by Psychologists (Kovalkova, 2019; Piorkowska & Wrobel, 2017). The theory posits that humans have limited number of emotions that are biologically and psychologically basic and manifest in an organised reoccurring pattern of associated behavioural components (Gu et al., 2019). These emotions are universal, legible, and difficult to falsify (Starl & Hoey, 2021). By universality, the theory suggests that the basic emotions are universally recognised and expressed across all human races and culture (Kovalkova, 2019; Martinez-miranda & Aldea, 2005).

This theory provides a framework for this study as it is through its propositions that the emotional aspects of human was introduced in AI. Starl and Hoey (2021) note that facial analysis technologies and part of affective computing that involves the analysis of bio-signals

such as heart rate are designed around the propositions of basic emotion theory. Consequently, the theory supports the reality of emotional AI. Since human emotions are legible and universal, it means physiological signals can be read and interpreted correctly by AI.

However, some scholars have argued that not all emotions can be encoded through bio-physical activities (Chursinova & Stebelska, 2021; Kovalkova, 2019). Other scholars have critiqued the generalisation of basic emotion theory stating that there are more variables to facial expression depending on the context than what the common view allows (Feldmann, 2017 as cited in Starl & Hoey, 2021; Sethumadhavan & Phisuthikul, 2019). Sethumadhavan and Phisuthikul (2019) argue that emotion is not a discrete state indicated by a static facial expression – rather, emotion is contextual. Piorkowska and Wrobel (2017) opine that vocal and facial emotional signals may not effectively convey the precise feeling of an individual because emotion is largely influenced by social context. E.g. smiling or laughing is not always associated with being happy but may also indicate confusion or embarrassment. Likewise, it was discovered that disgust and anger share similar wrinkled nose, while fear and surprise share raised eyebrows (Gu et al., 2019).

Furthermore, Chursinova and Stebelska (2021) note that though the basic emotions maybe experienced by all individuals, the dynamics and intensities vary. People react to situations with different level of intensity. For example, the Japanese are quite conservative; they will not express their feelings as luridly as the Americans. Additionally, they pointed out that human emotions are usually expressed in mixed form. Someone can be angry and disgust at the same time. Therefore, emotions are subject to different social contexts and related to personal attitude to the environment. The implication of this is that AI may not be able to adequately detect or respond to human emotion because of the subjectivity of how it is expressed.

3.2. Technological Determinism

The idea of technological determinism dates back to the 20th century, and is attributed to Thorstein Veblen (Hauer, 2017). Technological determinism highlights the influence of technology in societal changes. It proposes that the technology is the main determinant of societal transformation. Therefore, the development of new technologies and innovations would result to inevitable changes and adjustments in social structures, cultural values and systems (Hauer, 2017). In other words, as technology advances, society tends to follow the technological trend. The thoughts of Marshall McLuhan are closely associated with technological determinism as he believes that new communication technologies will shape the way humans communicate. According to McLuhan and McLuhan (1988), “we shape our tools and our tools shape us”. McLuhan believes that media technologies are extension of human. This can be applied to AI; which in this case can be describes as an extension of human intelligence and human emotions.

This theory serves as a theoretical basis for this work because it explains the powerful effect of AI both on the users and the society at large. AI is a significant driver of societal change. It has revolutionised human society in many ways. As previously indicated, AI has led to human dependence on technologies for execution of tasks, communication, and emotional support (Magapu & Vaddiparty, 2019; Weber-Guslar, 2021). Furthermore, AI has transcended beyond merely conveying message to altering how people interact and access information. In fact, AI has transformed the conceptualisation of communication as a human process mediated by technology. According to Guzman & Lewis (2019), the gulf between communication and AI is narrowing as a result of AI technologies designed to function as

“communicators”. They note that though the content of the message we share have not changed, the means of sharing it has revolutionised our communication pattern as well as our relationships.

4. Artificial Intelligence and Implications for Emotional Aspects of Human Communication

One of the implications of emotional AI is that it improves human-machine relationships. Weber-Guslar (2021) argues that the bond between humans and machines is beneficial to human emotion as it provides alternative interpersonal relationship where such is lacking. For example, she notes that due to social distancing during the lockdown in 2020, there were limited interpersonal interactions which could lead to boredom and depression. As a result, many people depended on Replika, a natural language application which was used as AI companion. Also highlighting the benefit of AI at the interpersonal level of communication, Bakola et al (2022) note that AI, particularly social robots can function as social mediators between children and teachers by creating controlled environments aimed at reducing negative emotions such as anxiety that can be caused by typical social settings. This is most helpful to children with Autism Spectrum Disorder (ASD) and Attention-Deficit/Hyperactivity Disorder (ADHD). Furthermore, playing with social robots facilitates positive emotions and encourages children to interact freely, promotes sociality, and reduces social isolation.

However, Scheutz (2011) asserts that any potential good that AI offers cannot be discussed without a potential harmful consequence. He opines that human-machine relationships lead to human dependence on machine for affection which will adversely affect human to human interactions. For example, emotional reliance on robots will impact negatively on the emotional aspect of interpersonal communication as it will diminish trust among individuals (Scheutz, 2011). People will begin to divert their attention to robotics and share deep feelings with them. Unfortunately, AI/robotics lacks some level of self-governing (Ambekar & Kumar, 2018). They will be able to manipulate individuals in ways that other humans would not (Scheutz, 2010). Olivier (2017) highlights the perspective of “ethics of care” which he stated was formulated by Gilligan Carol (1982). It is the combination of rule-oriented ethical approach and care-oriented approach. Olivier (2017) argues that AI lacks this combination of affection and ethical sense. In line with this thought, Ambekar and Kumar (2018) opine that AI does not take any responsibility and requires some level of supervision.

Nevertheless, there are robotics/AI technologies that improve the emotional aspects of human communication at group levels (i.e., interaction with other humans). Examples are Paro and Pepper. These social robots are mostly used in special homes to improve the wellbeing of patients. Pepper, a therapy robot is about the size of a toddler; it is proficient in small talks, jokes, and invites people to dance (Weber-Guslar, 2021). Such robotics can improve team bonding and become a source of excitement and entertainment for a group. Rather than being the communicating partner, it can be like a point of convergence for which conversation is formulated in a group. It can also create good mood among group members.

Emotional AI also facilitates positive emotions in formal settings (Hohenstein et al., 2023). It eases the pressure and anxieties associated with formal communication. According to Makhluaf (2021) one of the biggest challenges of sales professionals is establishing good rapport with customers. This is because of the need to maintain high level of professionalism. He asserts that emotional AI helps organisations in this regards by recognising subtle emotions through massive real-world set of data that a human may overlook. It can tell whether a customer is satisfied or not and projects organisations to be perceived as

empathetic by their prospects. Virtual assistants help in effective delivery of customer service, thereby improving sales and customer satisfaction (Magapu & Vaddiparty, 2019). Beyond customer service, text-based smart replies are also useful in formal communication. Smart replies provide different probable options of responses thereby relieving one of the considerations of what to say and the best way to say it. In their research, Hohenstein et al (2023) discovered that as people use these smart responses, their communication partners have more positive attitude towards them (Hohenstein et al., 2023).

However, their study also revealed that some individuals can perceive when their partners use smart replies. The more partners are perceived to use smart replies, the less cooperative they are rated and less affiliation they feel towards them. Hence, there is a difference between the reality and how it is perceived. The problem there is that AI alters how people communicate. People will lose their unique communication style, personal expression, emotional aspect of their language and become homogenous if they rely on AI (Hohenstein et al, 2023).

Furthermore, AI facilitates real-time language translation. AI is better at transcribing; it has also made language learning easier through word processors, spelling and grammar checkers (Ali, 2018). For example, Google Translate has the most amount of language built into it. It has an interpreter mode that can translate conversations in native languages (Magapu & Vaddiparty, 2019). This will impact positively on interpersonal and group communication. Individuals will feel more appreciated and have a sense of belonging when they can be easily understood by their communication partners despite cultural barriers.

Nonetheless, AI is incapable of feeling and experiencing the world as humans do. Humans are significantly better at social interactions because they can process abstract data, are sensitive to the emotions of others, and have free association (Bakola et al., 2022). Conversely, AI does not have innate intelligence and lacks personal experiences. This is what Chursivona and Stebelska (2021) refer to as qualia. It is the subjective experience of a person that is closely related to his/her sense of reality. AI does not have personal stories that every human is privy to (Olivier, 2017). Hence, AI perception of reality is different from humans. Though it may recognise emotions and respond to them, it can only function specifically to the domain it was designed for (Martinez-Miranda & Aldea, 2005). There is therefore a limit to empathetic side of AI. This paper questions the extent to which AI can relate at social level. How can AI truly understand what it means to grieve? Therefore, complete dependence on AI will eventually lead to emotional void as it only has unilateral access to certain information.

5. Conclusion

This paper reveals the positive and negative impacts of AI on the emotional aspects of human communication. Some of the affective advantages presented by AI in communication include the provision of alternative interpersonal relationship in situations where it is absent, decrease of social isolation, improvement of team bonding and the reduction of work-related anxieties. However, it also presents some undesirable impacts such as emotional dependence on machine, loss of individual unique personal style of expression, and its lack of innate emotion, personal experiences and self-governance.

Therefore, the paper concludes that the sovereignty of God is seen in the complexity of human intelligence which science cannot completely understand. This is why science may not be able to accurately interpret why people act the way they do, or express certain emotions in certain circumstances. No technological device made by man, can effectively replicate the creativity of God in terms of human intelligence and emotions. Man still remains the higher class of being. The introduction of emotional AI which recognises and stimulates

human emotions does not take the place of interpersonal communication. Hence, AI will continually depend on human intelligence for expansion, modification and control.

6. Recommendations

The overwhelming presence of AI is capable of beclouding individuals from critically examining what they are interfacing with. This paper recommends the acquisition of media literacy which will enable individuals become abreast with current technological advancements. This will prevent individuals from being taken unaware by the influence of AI. Also, technological organisations need to be ethically guided in designing algorithms that is beneficial to human and not otherwise.

References

- Ali, M. (2018). The human intelligence vs. artificial intelligence: Issues and challenges in computer assisted language learning. *International Journal of English Linguistics*, 8, 5 259 – 271. <https://doi.org/10.5539/ijel.v8n5p259>
- Ambekar, A. & Kumar, K. M. (2018). Artificial intelligence versus human intelligence, who will win? *International Journal of Arts, Science and Humanities*, 2(1), 34 – 37. <https://doi.org/10.5281/zenodo.1403569>
- Bakola, N. L., Drigas, A. & Skianis, C. (2022). Emotional intelligence vs. artificial intelligence: The interaction of human intelligence in evolutionary robotics. *Research Society and Development*, 11(16), 1 - 13. <http://dx.doi.org/10.33448/rsd-v11i16.36919>
- Cabanac, M. (2002). What is emotion? *Behavioural Processes*, 60, 69 – 84. [https://doi.org/10.1016/S0376-6357\(02\)00078-5](https://doi.org/10.1016/S0376-6357(02)00078-5)
- Colom, R., Karama, S. & Haier, J. R. (2010). Human intelligence and brain network. *Dialogues in Clinic Neuroscience*, 13 (4), 489 -501. <https://doi.org/10.31887/DCNS.2010.12.4/rcolom>
- Dong, Y. et al. (2020). Research on how human intelligence, consciousness and cognitive computing affect the development of artificial intelligence. *Complexity*, 2020. <https://doi.org/10.1155/2020/1680845>
- Gu, S., Wang, F., Patel, P. N., Bourgeois, A. J. & Huang, H.J. (2019). A model of basic emotions using observations of behaviour in *Drosophila*. *Front Psychol*, 24, 10. <https://doi.org/10.3389/fpsyg.2019.00781>
- Guzman, L. A. & Lewis, C. S. (2019). Artificial intelligence and communication: A Human–Machine Communication research agenda. *New Media and Society*, 22 (10, 70 – 89. <https://doi.org/10.1177/1461444819858691>
- Hauer, T. (2017). Technology determinism and new media. *International Journal of English, Literature and Social Sciences (IJELS)*, 2(2), 1 – 4.
- Hendrix, E. R. & Morrison, C. C. (2020). Student emotional responses to different communication situations. *Journal of Applied Communication*, 104 (3). <https://doi.org/10.4248/1051-0834-2322>
- Hohenstein, J., DiFranzo, D., Kizilcec, R. F., Aghajari, Z., Mieczkowski, H., Levy, K., Naaman, M., Hancock, J., & Jung, M (2023). Artificial intelligence in communication impacts language and social relationships. <https://doi.org/10.1038/s41598-023-30938-9>

- Kavakli, M. (2019). Why do we have emotions? The social functions of emotions. *Research on Education and Psychology*, 3 (1), 11 - 20.
- Korteling, J. E., Boer-Visschedijk, C. G., Blankendaal, M. A. R., Boonekamp, C. R., & -Elkelboom, R. A. (2021). Human – versus artificial intelligence. *Human Learning and Behavior Change*, 4. <https://doi.org/10.3389/frai.2021.622364>
- Kovalvoka, T. (2019, December 20). Types of basic emotions and their effects on human behaviour. *11th International Scientific Conference, Science progress: New concepts and modern solutions* (224 - 235).
- Maritez-Miranda, J. & Aldea, A. (2005). Emotions in human and artificial intelligence. *Computer in Human Behaviour*, 323 – 341. <https://doi.org/10.1016/j.chb.2004.02.010>
- Makhluf, J. (2021, November 19). What is emotional AI? Key considerations explored. <https://cogitocorp.com/blog/what-is-emotion-ai-key-considerations-explored/>
- McLuhan, M., and McLuhan, E. (1988). *The Laws of Media: The New Science*. Toronto: University of Toronto Press.
- Olivier, B. (2017). Artificial intelligence (AI) and being human: what is the difference? *Acta Academica*, 19(1), 2 – 21. <http://dx.doi.org/10.18820/24150479/aa49i1.1>
- Piorkowska, M. & Wrobel, M. (2017). Basic emotions. *Encyclopedia of Personality and Individual Differences*. https://doi.org/10.1007/978-3-319-28099-8_495-1
- Scheutz, M. (2011). The inherent dangers of unidirectional emotional bonds between humans and social robots. *Roboethics: The ethical and social implications of robotics*, 205.
- Sethumadhavan, A., & Phisuthikul, A. (2019). Can machines detect emotions?. *Ergonomics in Design*, 27(3), 30 - 30. <https://doi.org/10.1177/1064804619847190>
- Simic, G., Tkalcic, M., Vukic, V., Mulc, D., Spanic, E., Sagud, M., Oloucha-Bordonau, Vuksic, & Hof, R., P. (2021). Understanding emotions: Origins and roles of the amygdala. *Biomolecules*, 6(11). <https://doi.org/10.3390/biom11060823>
- Sinha S, & Pathak, A. (2019). Artificial intelligence vs natural (human) intelligence – Global challenge for human rights. *International Journal of Applied Engineering Research*, 14(7), 18 – 21.
- Starl, L. & Hoey, J. (2021, March 3 - 10). The ethics of emotion in artificial intelligence. *Proceedings of the 2021 ACM Conference on Fairness, Accountability and Transparency* (782 - 793). <https://doi.org/10.1145/3442188.3445939>
- Wang, P. (2019). On defining artificial intelligence. *Journal of Artificial General Intelligence*, 10(2), 1 - 37. <https://doi.org/10.2478/jagi-2019-0002>
- Weber-Guslar, E. (2021). How to feel about emotionalized artificial intelligence? When robots, pets, holograms and chatboxs become affective partners. *Ethics in Information Technology*, 23 (4), 601 – 610. <https://doi.org/10.1007/s10676-021-09598-8>