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Artificial intelligence and its impact on social behavior: a scoping review

La inteligencia artificial y su impacto en el comportamiento social: una revisión de alcance

Inteligência artificial e seu impacto no comportamento social: uma revisão de escopo

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Abstract

This paper presents a documentary review of the challenges of artificial intelligence in today's world and the social challenges of coexisting with new technologies. For this purpose, a literature search was carried out in the leading open-access journals. In addition, a simple random population was surveyed using artificial intelligence and the possible impacts on social behavior. The results show that the literature aligns with the social perception that the excessive use of intelligent tools can be detrimental to people and that it is essential to be cautious with intelligent applications. In addition, it could be evidenced in the literature that social behaviors have been modified by existing psychological theories, the latter suggesting that social behavior is affected by other humans within the same society, but with the advent of AI, social behavior is affected in different ways, even when not in contact with humans, indicating that social behavior can be affected by human behaviors even if these are simulated by computer algorithms. Palabras clave: aplicaciones inteligentes, conducta social, nuevas tecnologías, sociedad.

Keywords: Intelligent applications, social behavior, new technologies, society.

Resumen

En este trabajo se presenta una revisión documental sobre los retos de la inteligencia artificial en el mundo actual y cuáles son los desafíos sociales para convivir con las nuevas tecnologías. Para ello se ha realizado una búsqueda bibliográfica en las principales revistas de acceso abierto y además se indagó en una población aleatoria simple sobre el uso de la inteligencia artificial y los posibles impactos en la conducta social. Los resultados encontrados muestran que la bibliografía es acorde con la percepción social y que el uso excesivo de herramientas inteligentes puede ser perjudicial para las personas y que resulta indispensable ser cautelosos con las aplicaciones inteligentes. Además, se podría evidenciar en la literatura que los comportamientos sociales han sido modificados por las teorías psicológicas existentes, estas últimas sugieren que el comportamiento social se ve afectado por otros humanos dentro de la misma sociedad, pero con el advenimiento de la IA, el comportamiento social se ve afectado de diferentes maneras, incluso cuando no está en contacto con humanos, lo que indica que el comportamiento social puede verse afectado por los comportamientos humanos incluso si estos son simulados por algoritmos informáticos.

Keywords: aplicaciones inteligentes, conducta social, nuevas tecnologías, sociedad.

Resumo

Este artigo apresenta uma revisão documental dos desafios da inteligência artificial no mundo atual e dos desafios sociais da convivência com as novas tecnologias. Para tanto, foi realizada uma busca bibliográfica nos principais periódicos de acesso aberto. Além disso, uma população aleatória simples foi pesquisada usando inteligência artificial e os possíveis impactos no comportamento social. Os resultados mostram que a literatura se alinha com a percepção social de que o uso excessivo de ferramentas inteligentes pode ser prejudicial às pessoas e que é essencial ter cautela com aplicações inteligentes. Além disso, pôde-se evidenciar na literatura que os comportamentos sociais têm sido modificados pelas teorias psicológicas existentes, estas últimas sugerem que o comportamento social é afetado por outros seres humanos dentro da mesma sociedade, mas com o advento da IA, o comportamento social é afetado de maneiras diferentes, mesmo quando não em contato com humanos, Isso indica que o comportamento social pode ser afetado por comportamentos humanos, mesmo que estes sejam simulados por algoritmos de computador.

Palavras-chave: Aplicações inteligentes, comportamento social, novas tecnologias, sociedade.

I. Introducción

Artificial Intelligence (AI) is a field of computer science that focuses on developing algorithms and systems that mimic human intelligence. The history of AI dates back to the 1950s when early researchers began creating computer programs capable of performing tasks that required human intelligence, such as learning, decision-making, and problem-solving. During the 1950s and 1960s, significant advances in AI research occurred, including developing the first expert systems which used human knowledge to solve specific problems. However, in the 1970s, AI progress stalled due to a lack of funding and the complexity of the issues it was trying to address.

In the 1980s, there was a renaissance of AI, driven by new machine-learning techniques and the availability of more significant computing resources. At this time, systems capable of learning from examples and recognizing patterns in data were developed, allowing significant advances in natural language processing, computer vision, and robotics. In the 1990s and 2000s, AI expanded into new fields, such as e-commerce, medicine, and security, and increasingly sophisticated and specialized systems were developed. Today, AI is present in various applications, from virtual assistants and recommender systems to autonomous vehicles and surveillance systems.

Over the past decade, advances in deep learning have driven the development of increasingly complex and capable AI systems. Deep understanding relies on artificial neural networks that mimic the workings of the human brain and allow machines to learn from large amounts of unstructured data. As a result, artificial intelligence is increasingly present in our daily lives and significantly impacts people. Some ways AI affects society include virtual assistants, such as Siri, Alexa, and Google Assistant, which are AI programs used to answer questions, text, and conduct online searches.

Although virtual assistants have many benefits and are becoming increasingly popular, some disadvantages need to be considered, such as privacy and security, as virtual assistants collect and store personal and behavioral data from users, which can be a concern for many users. In addition, if the algorithms that feed virtual assistants are not adequately designed, they can perpetuate bias and discrimination, being able

to make recommendations based on age, gender, or some particular characteristic of people. Another factor that can represent a disadvantage is that artificial intelligence does not recognize some styles of natural expressions and, therefore, can misinterpret some people's queries. Another disadvantage is that the recurrent use of intelligent tools can mean greater social distancing or less human interaction. On the other hand, intelligent assistants lack emotions, making it difficult to understand people's individualities for specific consultations.

AI is also being used to automate workplace tasks, which can significantly impact jobs that require repetitive and predictable tasks. Some studies suggest that automation could replace up to 25% of jobs in the next 20 years. Another aspect where artificial intelligence has excelled is in analyzing data to process large amounts of information, which can impact the way decisions are made in various fields, from medicine to business. AI's ability to spot patterns and predict outcomes can help make more informed and accurate decisions.

In addition, AI is being used to develop autonomous vehicles that can be driven without human intervention. While this can positively impact road safety, it can also have implications for transport workers and city infrastructure. It suggests an adaptation of social environments to cope with the impact of road mobility with AI elements. Another social aspect where AI has had a significant contribution is in the field of health, where intelligent tools have favored medical assistance by helping to diagnose diseases and develop personalized treatments. According to an Accenture report, AI is expected to generate $150 billion in savings for the healthcare industry by 2026 (Accenture, 2022).

According to a Gartner report, by 2020, 85% of customer interactions in e-commerce will be managed by AI since the use of these new technologies helps to recognize user preferences and offer personalized services and products, thereby achieving a more pleasant experience for customers and more profitable for businesses. However, it is not only a contribution to online business (fios, 2017), AI is also being used to improve efficiency and productivity in agriculture. According to a McKinsey report, the use of AI in agriculture is expected to increase productivity by 70% by 2050. On the other hand, in the manufacturing industry, AI is being used to

improve efficiency and reduce production costs (20 minutos, 2023). According to an Accenture report, AI is expected to generate $500 billion in savings for the manufacturing industry by 2022. In addition, the Salesforce report states that 72% of consumers expect companies to use AI to personalize their experiences and get faster and more efficient responses. Another aspect where AI has stood out significantly is in the education sector (Accenture, 2022) (Salesforce, 2022), where AI is expected to manage to personalize education and teaching takes an individuality of learning, achieving optimal learning in students, as stated by the Technavio report, where it is noted that the AI market in education can grow at a CAGR of 47% between 2020 and 2024 (hpi, 2023).

In this paper, a documentary exploration was carried out to know the effects of artificial intelligence in modern life, and it is hypothesized that the growing presence of artificial intelligence in society can have a significant impact on people's social behavior, including changes in social interactions, communication, decision making, and individual and group identity.

II. Development

Several psychological theories have been proposed to explain how artificial intelligence can affect people's social behavior. Some of the most relevant ideas are:

Social influence theory: This theory refers to how people are influenced by the behavior of others in their social environment. Therefore, integrating intelligent tools can significantly affect people's behavior because it creates distancing or technological dependencies, preventing the development of other skills of social exchange between humans (Mercado, 2021).

Social Learning Theory. This theory focuses on how people learn through observing and imitating the behavior of others. In this sense, intelligent tools can be replicated by people or, on the contrary, avoided. What can represent a model with few social characteristics? (Aroca & Bellver, 2012).

Cognitive dissonance theory. It refers to people's tension when their beliefs or behaviors do not align with their previous

values or knowledge. For example, artificial intelligence can affect people's social behavior by presenting information or decisions that (Ovejero, 1993) do not align with users' beliefs or values.

Hedonic adaptation theory. This theory focuses on how people adapt to pleasurable and unpleasant experiences over time. On the other hand, the recurrent use of AI tools can create high dependence or addiction due to its high content of pleasurable experiences (Martitegui, 2022).

Personality theory and social psychology. This theory discusses how personality traits and psychological processes influence people's social behavior. In this regard, AI can affect people's social behavior by interacting with users' personality traits, such as their level of extraversion, neuroticism, or openness to experience (Cloninger, 2020).

2.1. Document review

Abstract Artificial Intelligence (AI) will be a transformative technology because it will allow old things to be done dramatically differently, whether cheaper, faster, or better. Some authors have analyzed the social impacts of computerization and natural language processing, machine translation, expert systems, and the overall effect of AI applications on employment. AI applications are likely to develop in an evolutionary sequence rather than through one or more sudden breakthroughs. However, the sum of the changes that will result from the line of these suboptimal systems will almost certainly transform a wide range of human activities (Gurstein, 1985).

Other authors claim that robotics and artificial intelligence are no longer separate from today's social life or humanity. Along with the industrial revolution, they have also brought the social revolution. Robotics is the field concerned with the connection of consciousness with action. Artificial intelligence addresses critical questions (Ashrafian, 2015), such as, for example, what knowledge is required in any part of thought, how that knowledge should be characterized, and how that knowledge should be used. Robotics challenges AI by forcing it to deal with real things in the world. The methods and representations developed for purely intellectual problems only sometimes extend to meet such a challenge.

Poola argues that artificial intelligence in today's world is progressing rapidly with advanced innovations day after day (Poola, 2017). Current computer systems are designed to perform small tasks, for example, facial recognition, driving cars, and performing other menial tasks. However, the main goal of artificial intelligence is to develop advanced and more complex systems that outperform humans in any way. It includes performing more complicated tasks such as playing chess and solving equations. Therefore, the future goal of AI is to perfect all human activities and provide better solutions to problems than humans can. The author argues that, in the long term, an automated system that performs all human functions, from automobile control to computerized commercial systems, will pose several challenges to the human species, such as avoiding the development of lethal arms that would significantly harm them once they can be used to attack them. It is also likely that developing a super AI, which undergoes self-improvement, could trigger an intelligence explosion that would leave human intellectual capacity far behind (Poola, 2017). Therefore, creating a super AI will mark the greatest invention in the history of mankind. Furthermore, designing more advanced technologies can help humanity eradicate wars significantly, provide the appropriate means to combat diseases, and develop appropriate prevention measures. Moreover, advanced technology would also be of great help in the fight against poverty.

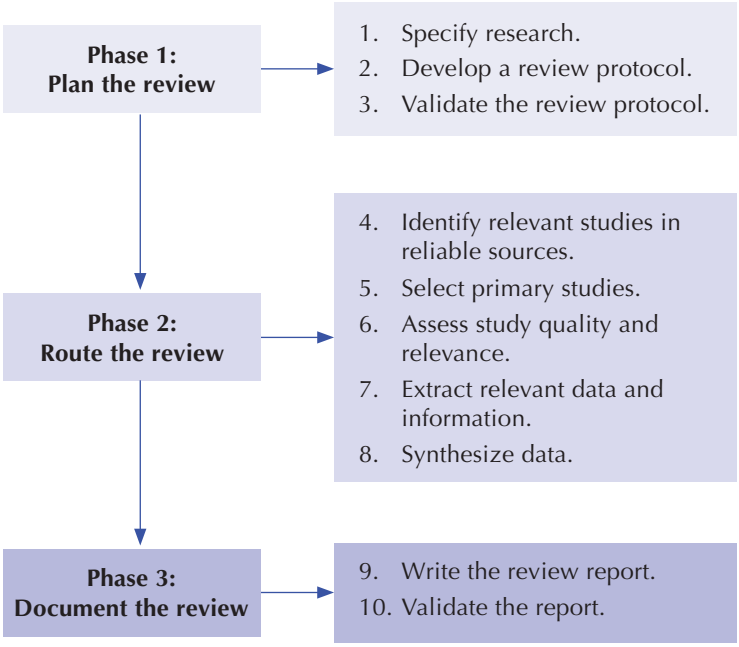
3. Methodology

In this paper, a non-in-depth literature review was carried out to know which AI tools most impact social behavior to initiate new research. Scientific articles from primary sources were evaluated, showing aspects of interest in formulating new proposals that help reinforce the benefits of using AI in everyday life and can also mitigate the possible negative impacts. Figure 1 presents the characteristics of the sources consulted, taking into account their bibliographic strength and the contributions they offer. In addition, a survey was conducted to determine the impact of AI applications on social life, which was applied to 45 randomly selected individuals.

The type of research conducted is simplified, with the fundamental purpose of evaluating the conceptual knowledge,

theories, or characteristic elements of the intelligent tools used today that can significantly affect social life. For this, the methodology proposed by Kirtchenham and Okoli, and Schabram on the documentary review was considered, which in practice is similar to the PRISMA (Preferred Reporting Items for Systematic Reviews) Meta-Anayses) review model. The proposed method consists of three phases: planning, development, and reporting of the systematic review, which are carried out following eight steps for its execution: determining the purpose of the evaluation; defining the protocol and training; conducting a literature search; screening for inclusion; quality assessment; data extraction; Synthesis of the studies and writing of the review (Tebes, Peppino, Becker, & Olsina, 2019).

Figure 1. The methodology proposed by Kirtchenham and Okoli, and Schabram. (Tebes, Peppino, Becker, & Olsina, 2019)



Phase 1: In this phase, the research questions have been defined, considering the relevance and timeliness of the subject of study; in this sense, the questions posed are:

Q1: How do intelligent apps participate in modern social life?

Q2: How do intelligent tools influence social life?

Q3: How is the consistent use of intelligent apps affect social behavior?

Phase 2: The search process involved selecting scientific papers focusing on artificial intelligence and new technological developments associated with social life. In addition, the search is limited to the most recent years, from 2013 to 2023, because it is a current topic. However, due to the historical context to which it belongs, earlier years should still be discarded, and several authors already showed concern about the social impacts of AI tools. The Scopus database was the central database, and publications from Elsevier were open-access.

A first search string was defined based on the title and central field of the subject studied; with these elements, the search chain is redefined considering the titles found, the keywords, and the referenced studies to achieve the following search strings finally:

- ARTIFICIAL INTELLIGENCE AND SOCIAL (48 documents)
- ARTIFICIAL INTELLIGENCE AND SOCIAL AND IMPACT (8 documents)
- ARTIFICIAL INTELLIGENCE AND SOCIETY (24 documents)

Table 1 presents the initial findings from various Scopus journals in 2023.

Table 1. Journals that published papers on the topic of study in the year 2023.

Journal	Number of papers
Informatic	8
Applied Science	72

The manuscripts analyzed were classified according to the following criteria: the year of publication, the journal in which they were published, the database in which they were indexed, the number of citations, the methodology used, those in which experimental research, industrial case studies, and literature reviews were given priority.

Primary research was obtained through a chain of queries from the research questions. Four criteria were applied: population, intervention, comparison, and outcome (PICO), to know the conclusions of the papers and the quality of the topics. In this sense, the people refer to published studies. The intervention relates to intelligent apps and their impact on social life. The comparison refers to carefully selected studies with artificial intelligence and the type of research. The result includes published studies on the subject and new developments in artificial intelligence; Based on PICO, five further questions were asked to ensure the quality of the extracted papers, as shown in Table 2.

Table 2. Evaluation of the quality of the documents analyzed.

Quality Control (QA)	Quality Assessment Questions	Answer
QA1	Does the paper describe the effects of artificial intelligence on society?	(+1) Yes/ (+0) No
QA2	Does the document specify the characteristics of artificial intelligence in social life?	(+1) Yes/ (+0) No
QA3	Does the paper discuss the findings around intelligence tools and their impact on society?	(+1) Yes/ (+0) No
QA4	Are the advantages and disadvantages of using artificial intelligence in everyday life considered?	(+1) Yes/ (+0) No
QA5	Are there strategies for the effective and efficient use of AI in society?	(+1) Yes/ (+0) No
QA6	Are there new developments in AI that favor social life?	(+1) Yes/ (+0) No

The inclusion and exclusion criteria aim to find important primary documents to answer the research questions; the agreement between the evaluators was resolved by applying Cohen's Kappa coefficient = 0.5 with a percentage of understanding of 87.6%, which implies a moderate agreement between the evaluators.

The inclusion criteria were: that the preliminary research is associated with publications in journals on the contributions of AI in society, as well as new developments that contribute to the solution of social problems, that the year of publication is recent, between the years 2013 to 2023 preferably, that the document is presented in a high impact journal, preferably in English. While the exclusion criteria were: the preliminary study is not extensive, literature review articles, and similar articles from different sources.

III.Results

Once the research has been carried out, the following results can be affirmed as a result of the content analysis carried out:

1. Many documents point to a society increasingly immersed in artificial intelligence's attractions, either for its technological development or for process improvements, system optimization, and simplification of human life. These AI tools turn out to be comfortable and captivating scenarios that become increasingly necessary for social life. Authors such as Ortega (Ortega, 2019) maintain the Japanese theory of society 5.0 as the center of technological development so that there is a balanced intelligence in people to promote new outcomes that make a better society possible. Thus, AI is seen as a positive expectation in new social spaces, in principle, as an alternative solution to various problems. Furthermore, the Japanese government raises the possibility of creating an artificial social intelligence that aims to work together with humans.

2. AI in society may reduce jobs by up to 14% in the coming years. However, this is not necessarily a problem as the community must challenge itself to find new challenges to motivate new work scenarios that promote new skills for future professional training.

3. In medicine, AI can significantly favor detecting problems that help formulate more effective diagnoses, design personalized treatments, and improve access to medical care in remote areas.

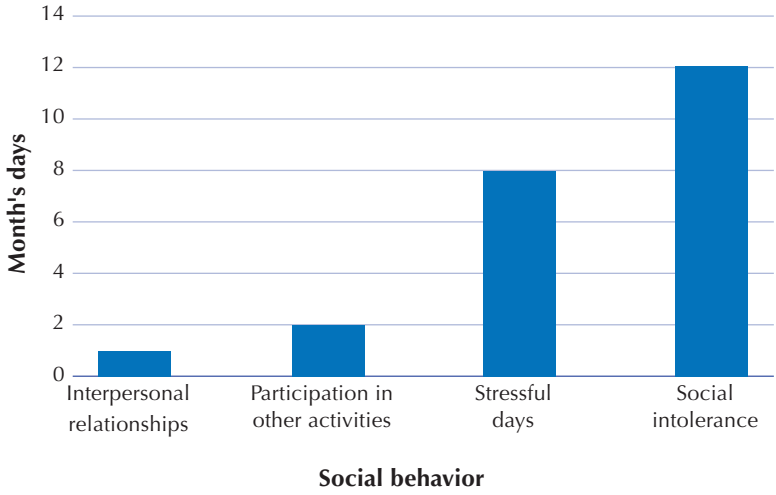
   Indiscriminate use of AI can lead to fanaticism and addictions, which damage people's social relationships and affect cognitive performance and human abilities.

A. Surveys conducted

A survey was conducted to learn about the main intelligence tools people use and how they positively or negatively affect social behavior. Recognizing that intelligent tools can significantly help daily life, as noted in the desk review, but can also affect social life unexpectedly.

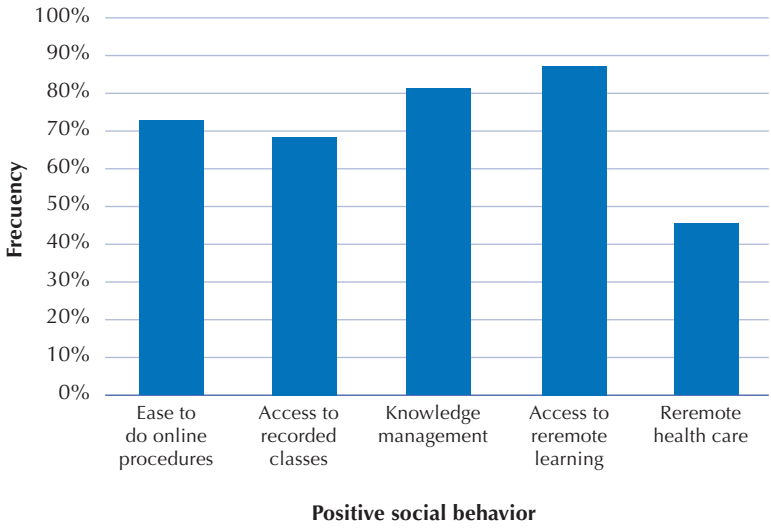
In the tests carried out on people, it was confirmed that social behavior is increasingly distant for some activities that were common some time ago. Figure 2 shows that people meet fewer days a month and present several episodes of social stress due to a lack of tolerance for differences or situations that may arise during the day. The use of intelligent tools may motivate people to interact less frequently, as well as be less patient in understanding the different characteristics that make people unique.

Figure 2. Negative Impacts of AI on social behavior



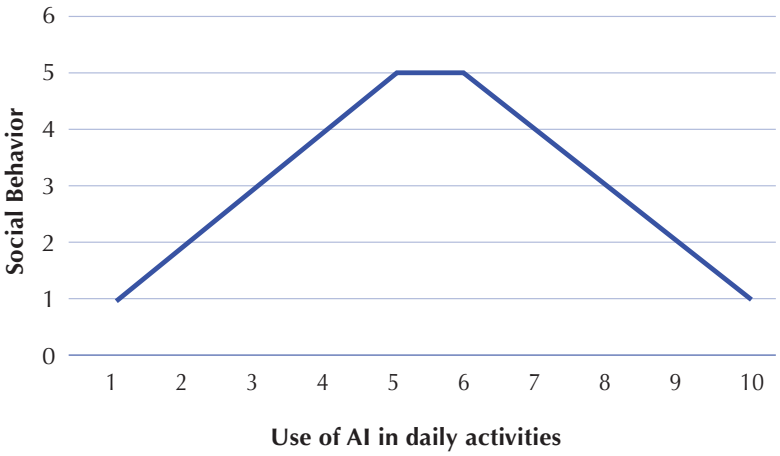
On the other hand, it was evident that social behavior is favored with intelligent applications, making people's lives more comfortable and agile in managing daily activities. Figure 3 also shows how the use of intelligent applications favors many people.

Figure 3. Positive aspects of AI in social behavior



Finally, it is essential to mention that using intelligence tools appropriately is beneficial for social life; however, excessive and inappropriate use of these tools can lead to dangerous social distancing, creating links of fanaticism with AI and harming social interaction. For example, figure 4 shows how social behavior can be affected by the excessive use of AI in daily activities; however, this social behavior can be improved with the appropriate use of AI applications.

Figure 4. Effects of AI's use on social life



Discussion on theories of human behavior compared to the use of artificial intelligence.

Considering the results obtained in the literature review, it is possible to question the different theories analyzed, based on how psychology has proposed social behaviors based on human activities, and how these behaviors are now affected by the use of intelligent digital tools.

Concerning Social Influence Theory, developed by psychologists such as Solomon Asch and Stanley Milgram, focuses on how people are influenced by the opinions and actions of others. With the advent of AI, especially in the form of recommendation algorithms and information filtering, a debate has arisen as to whether AI is altering or amplifying social influence processes. For example, recommendation algorithms can create filter bubbles, presenting people with content that reinforces their existing beliefs, which could limit exposure to different perspectives and decrease diverse social influence. In many aspects of everyday life, AI tools are influencing social preferences, through their selective degree of information, through their use of search data, tastes, and user trends. Increasingly, stores and businesses are developing Apps, where they can access user data about their preferences and, based on that, offer products tailored to each person.

Albert Bandura's social learning theory posits that individuals learn through observing others and imitating their behaviors. This theory is being challenged by the introduction of virtual agents and robots in AI, which can be modeled to exhibit social behavior and learn through machine learning algorithms. These virtual agents are capable of imparting knowledge and skills without the need for a human model, raising questions about how humans can be influenced and learn from interactions with non-human entities. Furthermore, the emergence of new AI tools with natural language processing capabilities presents a considerable appeal to humans, enabling meaningful learning experiences and thus challenging the social learning theory.

Cognitive Dissonance Theory: Cognitive dissonance theory, proposed by Leon Festinger, postulates that people experience psychological distress when faced with contradictions between their beliefs and behaviors. Concerning AI, some studies have shown that people can experience cognitive dissonance when interacting with AI systems that possess human-like intelligence and abilities. This raises questions about how interactions with AI systems can challenge or disrupt traditional processes of cognitive dissonance. This type of behavior, for example, has recently been observed when feminist movements value the expressions of the GPT Chat, indicating that it uses sexist expressions.

Hedonic Treadmill or Hedonic Adaptation Theory: Hedonic adaptation theory suggests that humans have a relatively constant level of happiness over time, despite changes in circumstances. However, the AI introduction into several aspects of everyday life may pose challenges to this theory. For example, excessive use of social networks or AI-based games can lead to a constant search for novel stimulation, which could lead to a less stable hedonic adaptation. Furthermore, the creation of AI capable of simulating emotions and adapting to the preferences of individuals may also affect the experience of hedonic adaptation. It has been observed, for example, that the prolonged use of social networks can affect people's moods and can even cause depressive symptoms in some cases.

Personality Theories and Social Psychology: AI also challenges some of the theories of personality and social psychology that are based on traditional human interactions. For example, the Big Five personality factors model (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness)

might not be easily applicable to the study of interaction with AI systems. The way people relate to and are affected by non-human entities may require adaptation of existing theories.

It is important to keep in mind that the impact of AI on social behavior is still under active study and research. As technology advances, new questions and challenges to established theoretical models in the field of social psychology are being generated. In addition, new AI developments are incorporating increasingly sensitive elements for dealing with humans, which could be of high relevance shortly.

A summary table of the debates between psychological theories and AI developments and their impact on social life is presented below.

Table 3. Controversies between psychological theories and AI tools, evaluated from social impact.

Psychological theory	Description	Relationship to AI Impact on Social Behavior
Social influence theory.	It studies how people are influenced by others.	AI, through recommendation algorithms and information filtering, can create filter bubbles and limit exposure to different perspectives, which can affect diverse social influences.
Social learning theory.	Proposes that people learn by observation and imitation.	AI challenges this theory by introducing virtual agents and robots that can behave socially and learn through machine learning algorithms, raising questions about how humans can learn from non-human entities.
Cognitive dissonance theory.	Explores discomfort when cognitive contradictions are present.	Interaction with AI systems that possess human intelligence apparently and abilities can generate cognitive dissonance, questioning how traditional cognitive dissonance processes can be affected by AI.
Hedonic treadmill (Hedonic adaptation) theory.	Suggests that happiness levels remain relatively constant.	AI may influence hedonic adaptation by generating a constant search for novel stimuli and by adapting to individual preferences, affecting the stability of hedonic adaptation.
Theories of Personality and social psychology	They explore patterns of human behavior and interactions.	Interaction with AI systems poses challenges to traditional theories of personality and social psychology, as the relationship with non-human entities may require adaptation of existing theoretical models.

Conclusions

AI can improve many aspects of social life, such as healthcare, education, transportation, and public safety. For example, machine learning algorithms can improve medical diagnosis, personalize education, and optimize transportation systems.

AI's use also poses significant challenges and risks, such as algorithmic discrimination, data privacy and security, and job losses due to automation. These issues must be carefully addressed to ensure that the benefits of AI outweigh its risks and challenges.

It is important to note that AI is not a magic solution for all societal problems and that its adoption must be carefully evaluated and monitored. AI technology should be designed to improve people's quality of life and not to replace or harm them.

Industry, government, and civil society collaboration is essential for responsible and sustainable AI development. The involvement of all relevant actors in decision-making on the implementation of AI can help ensure that it is used effectively and ethically for the benefit of society at large.

Today's social life seems comfortable with intelligent applications that simplify many processes and procedures in daily life. However, people are content with the scope of AI tools and the future challenges of using AI in society. Some sectors, such as scientists and technology companies, have been able to envision a future problem using AI; however, generally, people only manage to visualize its advantages.

The study conducted allows recognition of the differences and contrasts present in psychological theories on the impact of intelligent tools on social behavior. For their part, psychological theories state that people influence the social behavior of other people, either through the way they act or the way they express themselves to them; however, AI tools have demonstrated different versions of these theories, affecting social behavior even though they are not human, but by offering behaviors, attitudes, languages and responses relatively similar to humans, they can cause similar attitudes in them, impacting in different ways to those that could be assumed in psychological theories.

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