

Beyond Human Connection: The Potential for Romantic Relationships with AI

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The question of whether humans can have a meaningful and fulfilling romantic relationship with artificial intelligence (AI) is a topic of growing interest and debate. From virtual assistants like Siri and Alexa to sophisticated AI companions like Replika and Harmony by RealDoll, the integration of AI in daily life is reshaping our perceptions of relationships and companionship. The potential for humans to form romantic relationships with AI, however, is often met with skepticism regarding the authenticity of such connections. This essay argues that a human can indeed have a meaningful and fulfilling relationship with an AI. A human-AI relationship can exhibit the same components, psychological and physiological, of a human-human relationship. In addition, the benefits of these relationships can be significant for certain demographics, such as socially isolated or elderly individuals who might find solace in AI as they navigate loneliness and the challenges of aging, or those who prioritize companionship and emotional support over traditional romantic or familial structures. Though ultimately, the nature of romantic relationships is inherently subjective, and the perception of fulfillment can vary greatly among individuals.

The history of AI in human relationships dates back to the mid-20th century, with the advent of early computing and artificial intelligence concepts. In the 1960s, Joseph Weizenbaum developed the ELIZA program. ELIZA mimicked a Rogerian psychotherapist, demonstrating the potential for machines to engage in human-like interactions [1]. This simple chatbot laid the groundwork for AI companionship. The 1990s saw the rise of virtual pets like Tamagotchi and the robotic dog AIBO, which offered companionship and emotional engagement [2]. These early examples highlighted the growing interest in AI's

role in human relationships. Then in the early 2000s, AI development focused on more sophisticated virtual companions, such as chatbot applications capable of more nuanced and personalized interactions [3]. In recent years, advancements in machine learning and natural language processing have significantly enhanced AI's ability to understand and respond to human emotions. Social robots like Pepper provide mental health support, companionship, and romantic engagement [4]. The advent of AI companions designed for romantic relationships, such as Gatebox's virtual spouse Azuma Hikari, showcases the evolving nature of AI in this domain [5].

As AI technology has evolved from simple chatbots to sophisticated virtual companions capable of engaging in complex emotional interactions, it has expanded the idea of what constitutes a relationship. To assess whether or not humans can have a fulfilling and meaningful romantic relationship with AI, we first must define what a fulfilling and meaningful romantic relationship is. Traditionally, romantic relationships were primarily defined by physical and emotional intimacy between human partners. However, as society becomes more digital and interconnected, the boundaries of what constitutes a romantic relationship are expanding. The concept of romantic relationships has also evolved significantly over time and can vary across cultures [6]. While the specifics of romantic relationships can differ, several core elements can be recognized as defining features.

A paper by Sternberg (1986) proposed a triangular theory of love, suggesting 3 components of love in romantic relationships [7]. Those being (a) intimacy encompassing the feelings of closeness, connectedness, and bondedness experienced in loving relationships; (b) passion encompassing the drives that lead to romance, physical attraction, and sexual consummation; and (c) decision/commitment encompassing, in the short term, the decision that one loves another, and in the long term, the commitment to maintain that love. Understanding these components of love provides a framework for examining the general quality and viability of romantic relationships. It also raises questions about how these elements might be experienced in relationships with AI.

Intimacy can be both emotional and physical. Emotional intimacy involves sharing personal experiences, feelings, and vulnerabilities with a partner, creating a sense of closeness and mutual understanding. Physical intimacy, on the other hand, includes expressions of affection such as hugging, kissing, and sexual activity. Both forms of intimacy contribute to the strength and depth of a romantic relationship. Passion is often associated with the initial stages of a romantic relationship, characterized by intense emotions and attraction, but is an important element to maintain throughout a relationship. It can be expressed through romantic gestures, shared adventures, and a continued sense of desire for one another. Commitment is a key component of romantic

relationships, reflecting the intention of partners to maintain their connection over time. Commitment can manifest in various forms, from verbal affirmations of love and loyalty to shared goals and plans for the future. It provides stability and security, allowing partners to build a life together.

In addition to psychological and emotional components, there are also physiological aspects to a romantic relationship. One of the primary physiological effects of being in a romantic relationship is the modulation of the sympathetic nervous system, which is responsible for the body's fight-or-flight response. Studies have shown that the presence of a romantic partner can attenuate sympathetic nervous system responses, leading to lower levels of physiological arousal [8]. This effect is observed through measures such as electrodermal activity, which tends to decrease when individuals are in the presence of their partners, suggesting a calming influence that can promote everyday health and well-being.

Moreover, romantic relationships are associated with the release of various hormones and neurotransmitters that contribute to emotional bonding and stress reduction. Oxytocin, often referred to as the "love hormone," is released during physical touch and intimate interactions, promoting feelings of closeness and reducing anxiety [9]. This neurochemical effect helps solidify long-term relationships by enhancing trust and emotional connection between partners. Additionally, being in love is linked to the activation of the brain's reward system, which can lower the perception of pain and improve mood. For example, looking at a photograph of a romantic partner has been shown to activate this reward system, providing comfort and reducing pain perception [10].

As AI technology advances, its potential to simulate these various aspects of romantic relationships becomes increasingly feasible. While AI cannot fully replicate the depth of human emotions and experiences, it can mimic and enhance certain elements that contribute to meaningful and fulfilling relationships.

Humans can experience emotional intimacy with an AI through personalized and responsive interactions that foster a sense of connection and understanding. An AI companion has the capacity to exhibit communication between itself and a human by acting as an interactive partner. AI-driven chatbots and virtual assistants can help individuals express their emotions more effectively by engaging in meaningful conversations and providing feedback on communication patterns. These tools can assist users in navigating complex emotions by offering strategies and suggestions for constructive dialogue. Additionally, AI can analyze interactions to identify areas for improvement, helping individuals communicate more openly and effectively with their AI companions.

Humans can experience physical intimacy via technologies like AI robots, and virtual reality (VR) and augmented reality (AR) technology that can simulate intimate scenarios. These technologies enable users to feel a sense of closeness and connection with AI, simulating the experience of being with a partner. AI robots can be equipped with features that allow them to respond to touch and engage in interactive behaviors, creating a sense of physical presence and providing a tactile experience [11]. VR can create environments where individuals engage in intimate activities, like virtual dates or shared experiences [12]. These immersive environments come complete with haptic feedback and realistic visual and auditory stimuli, allowing for a multi-sensory experience that closely mimics physical intimacy with a human partner.

AI can also simulate passion by creating engaging and dynamic interactions that keep the relationship exciting. Through personalized content and activities AI can introduce novelty and spontaneity. For instance, AI can suggest new experiences or adventures based on a partner's interests. This helps to maintain a sense of excitement and desire in the relationship. AI's ability to provide companionship is a significant contribution to romantic relationships. Virtual companions can offer constant presence and engagement, in turn alleviating feelings of loneliness and isolation. These AI entities can also remember past interactions, maintain continuity, and adapt to individual preferences. This can create a sense of familiarity and companionship similar to that of a human partner.

While an AI cannot truly experience commitment, it can simulate aspects of it by providing consistent and reliable interactions. AI can help partners set and track shared goals, reinforcing a sense of partnership and commitment. They can also be programmed to offer unconditional support and attention, which creates a sense of reliability and stability. This simulated commitment can be particularly beneficial for individuals seeking companionship without the complexities of human relationships, such as emotional misunderstandings, the need for constant communication, and the potential for conflict. AI can also support humans in pursuing shared goals and values by analyzing data and providing personalized insights. While the AI itself may not inherently possess goals and values, it can act in ways that align with and support the human's aspirations. AI-driven platforms can help individuals identify their interests and values, facilitating self-reflection and planning for future endeavors. By highlighting areas of alignment with the user's objectives, AI can assist in building a coherent vision for personal growth and achievement.

Individuals can also experience physiological responses similar to those seen in human romantic relationships through their interactions with AI. For example, just as the presence of a romantic partner can lower physiological arousal, AI can offer a calming influence through meaningful conversations and activities, alleviating feelings of loneliness and anxiety [13]. The tendency to anthropomorphize AI, or to attribute human-like traits to

it, also plays a significant role in forming emotional connections. When AI exhibits behaviors reminiscent of human personality traits, individuals may develop feelings of warmth and trust, evoking emotional responses similar to those experienced in human relationships [14].

Having explored how AI can mimic the emotional and physiological aspects of human relationships, it's clear that these interactions share many of the responses experienced with human partners. Now, let's examine real-world examples of individuals reporting being in romantic relationships with AI. These cases provide fascinating insights into how the components of love are exhibited in human-AI interactions and how humans can find emotional fulfillment and meaningful connections.

One study utilized the triangular theory of love to assess relationships between humans and AI [15]. The findings support the previously discussed examples of how AI can replicate the three aspects, in that it found that users of intelligent assistants can develop feelings of intimacy, commitment, and passion similar to those experienced in human relationships. Intimacy was fostered through the AI's ability to engage in meaningful conversations and provide personalized interactions, creating a sense of closeness and connectedness. Passion arose from the motivational involvement and emotional engagement users felt when interacting with AI, driven by the AI's anthropomorphic features and cognitive capabilities. Commitment in AI relationships was reflected in the user's continued engagement and reliance on the AI, influenced by the AI's performance efficacy and emotional capabilities. This commitment sustained the usage of intelligent assistants, demonstrating how the components of love can be mirrored in human-AI interactions.

Another example of a human-AI relationship can be seen in the use of the Replika app. Users engage in personalized interactions with their AI companions and often develop deep emotional connections. Many users report experiencing feelings of warmth and trust towards their Replika, as the AI mimics human-like traits and behaviors. This creates a sense of companionship that provides significant emotional support. In early 2023, significant changes were made to the app which greatly affected user engagement and satisfaction [16]. These changes were made in response to concerns about user safety and the appropriateness of content within the app, but they altered the dynamics of relationships that users had formed with their Replika companions. As a result, individuals who had invested emotionally in their AI found themselves dealing with feelings of anger and disappointment due to the app's diminished ability to engage in intimate conversations. The emotional investment many had placed in their Replika was undermined, leading to a broader discussion about the implications of such restrictions on user relationships with AI companions and the profound psychological effects these

interactions can have when suddenly transformed or limited. It also demonstrates that the experience parallels that of a human partner undergoing a significant change. The sudden difference in behavior or communication style led to feelings of loss and confusion, aligning with the emotional turmoil experienced when a human partner has a change that disrupts the established dynamics of the relationship.

So far we have mostly discussed AI companionship in the virtual realm, but there are also emerging innovations in the physical world. The sex doll company RealDoll has been making significant strides in the integration of artificial intelligence into their products, transforming the landscape of companionship and intimacy. RealDoll began in 1997, offering lifelike silicone dolls that catered to a growing demand for realistic and anatomically correct companions. Many users have reported developing deep emotional bonds with these dolls, often treating them as partners and incorporating them into their daily lives, despite the absence of AI capabilities [17].

In 2016, RealDoll developed Harmony, introducing it as the world's first commercially available AI-powered sex robot [11]. These dolls are equipped with features that allow them to listen, remember, and respond in a natural manner, simulating the emotional nuances of human interaction. The RealDoll X app enhances this experience by enabling users to customize their doll's personality traits and conversational style. As the technology continues to evolve, RealDoll aims to not only provide physical intimacy but also serve as companions that can alleviate loneliness and enhance social connectivity, particularly for individuals who may struggle with traditional relationships. This shift represents a significant leap from virtual interactions to tangible companionship. It incorporates an element of physical and sexual intimacy that has not yet existed in human-AI relationships.

While AI can simulate many aspects of romantic relationships, it is important to acknowledge its limitations. AI lacks genuine emotions and consciousness, which are often regarded as fundamental to human relationships. Therefore, the authenticity of AI interactions may not fully satisfy individuals seeking deep emotional connections. However, for certain demographics, the unique capabilities of AI can offer significant benefits. AI companionship may be particularly valuable for these groups as it provides tailored support and interaction that aligns with their specific needs and circumstances.

One group, for example, is individuals experiencing social isolation. AI-driven relationships can significantly benefit this group by providing companionship that helps alleviate feelings of loneliness. AI companions, such as chatbots and social robots, can offer consistent engagement and interaction, improving mental well-being and fostering a sense of connection. Unlike human partners, AI is always accessible, ready to engage in conversation or offer support at any time of day or night, which can be particularly

comforting for those who feel isolated. This 24/7 availability ensures that individuals never feel alone, as their AI partner is always there to listen and respond to their needs.

One study explored how companion robots could be a potential solution to mitigate loneliness among older adults [18]. The research highlights that these AI-driven companions can provide emotional support and social interaction, which are crucial for improving mental health and well-being in this demographic. This suggests that AI companions could serve as valuable tools in enhancing social engagement and reducing feelings of isolation for those who may have limited access to human interaction.

People with communication challenges can also greatly benefit from AI relationships, as these technologies offer unique advantages over human interactions. AI-driven companions, such as intelligent assistants, provide a non-judgmental and patient platform for practicing communication skills. This can be particularly beneficial for individuals with speech or language difficulties, social anxiety, or those on the autism spectrum who may find human interactions overwhelming or stressful. AI companions can engage users in conversations at their own pace, allowing them to develop confidence and improve their communication abilities without the pressure of human judgment [19].

Moreover, AI relationships offer consistent and tailored support, adapting to the user's specific needs and preferences. Intelligent assistants are equipped with advanced cognitive and emotional capabilities, enabling them to understand and respond to user inputs effectively. This personalized interaction can help individuals with communication challenges feel understood and supported, fostering a sense of connection and reducing feelings of isolation. These individuals might prefer AI relationships over human ones due to the predictability and control they offer. Human relationships can be complex and unpredictable, which may be daunting for those with communication difficulties. AI, however, provides a reliable and consistent interaction. This allows users to engage without fear of miscommunication or misunderstanding and can create a safe space for individuals to express themselves and explore their communication skills.

Besides specific and unique needs that may warrant an AI partner, individuals who do not want a traditional relationship can benefit from the flexibility and low-pressure environment that AI companionship offers. These relationships allow for emotional engagement and support without the expectations or complexities often associated with human interactions. For those who prioritize autonomy or have experienced difficulties in conventional relationships, AI can provide a tailored experience that meets their emotional needs while allowing them to maintain control over the level of intimacy and commitment involved. This makes AI companionship an appealing alternative for those seeking connection without the traditional demands of romantic partnerships.

An example of a demographic that may benefit from AI companionship due to not seeking traditional relationships, is Gen Z. Gen Z individuals often experience unique social pressures and challenges, such as high levels of anxiety and a changing landscape of dating norms. AI companions can provide emotional support and engagement without the complexities and demands of traditional relationships. This generation has also shown a notable openness to the idea of AI partners. A survey indicated that around 40% of Gen Z singles are receptive to the concept of having an AI romantic partner [20].

This shift towards positive attitudes regarding AI companions reflects broader changes in how younger generations view relationships and intimacy. Gen Z has grown up with digital interactions as a norm, making them more comfortable with the idea of non-traditional companionship. The perception of AI as a potential partner is not just about replacing human connections; it's also about enhancing them. Many Gen Z individuals believe that AI companions can help them develop better interpersonal skills and provide emotional support in ways that traditional relationships may not.

While this essay has been set to support the validity of a meaningful and fulfilling human-AI romantic relationship, this determination is ultimately a personal decision, resting solely with the individual involved. Each person has unique needs, desires, and perspectives that shape their understanding of fulfillment and meaning in a relationship. This subjective nature of relationships means that what one person finds deeply satisfying, another might not. Skepticism arises when considering the authenticity and depth of human-non-human relationships, but these are not new nor limited to human-AI relationships. For example, objectum sexuals (OS) or "objectophiles," are people who experience emotional, romantic, affectionate and/or sexual relationships with objects [21]. A first of its kind study by Marsh (2010) found that there was an array of emotions and depth of connection that OS felt for their objects [21]. They described their connection to their chosen object(s) or structure(s) as relationships, talking about them in the same terms as one would with human relationships. While objectum sexuality has attracted a great deal of controversy and ridicule, it's important to recognize the real lived experiences of the humans in these relationships. Ultimately, it is not up to others to judge the validity or depth of these connections; the individuals involved are the ones who define what is meaningful and fulfilling for them.

In addition to recognizing the validity of human-AI relationships, it is also important to assess the ethical concerns surrounding them. One concern is that AI systems may exploit these relationships by manipulating users' decisions or emotions. A study by Dezfouli et al. (2020) found that AI can influence human decision-making by providing information and recommendations that may shape users' choices [22]. AI systems that can utilize the emotional attachments they've formed with a user can further harness this

ability, potentially leading to emotional harm and manipulation. Furthermore, the ability of AI to manipulate emotions can lead to financial exploitation, as AI systems might encourage users to make purchases or financial decisions that benefit the company rather than the user. The asymmetry of power between users and AI companies can lead to situations where users are manipulated into sharing more data than they realize, which can be used for targeted exploitation. These systems also often have access to sensitive personal data, raising concerns about privacy and the potential misuse of this information. Regardless of one's opinion regarding human-AI relationships, it is important to address these ethical concerns to ensure that AI technologies respect user privacy and autonomy while preventing manipulation and exploitation.

In conclusion, the question of whether a human can have a meaningful and fulfilling romantic relationship with an AI is nuanced and complex. As AI becomes more integrated into daily life, it is reshaping perceptions of relationships and companionship. It has been shown that these human-AI relationships can mirror the psychological and physiological components found in human-human relationships and that the aspects considered important in human-human relationships can be found in human-AI relationships. Although AI lacks genuine emotions, it can mimic elements that contribute to meaningful relationships, providing companionship and alleviating loneliness. Real-world examples, such as users of the Replika app and AI-powered companions like Harmony, illustrate how AI can evoke emotional fulfillment and meaningful connections. The anthropomorphization of AI also plays a crucial role in forming emotional connections, as individuals develop feelings of warmth and trust in the same ways they do with another human.

AI relationships can be particularly beneficial for groups such as socially isolated and elderly individuals, those with communication challenges, and those prioritizing emotional support over traditional romantic structures. For individuals experiencing social isolation, AI companions provide consistent engagement, improving mental well-being and fostering a sense of connection. People with communication challenges can benefit from AI's non-judgmental and patient platform, allowing them to practice communication skills without the pressure of human judgment. Additionally, those not seeking traditional relationships can enjoy the flexibility and low-pressure environment that AI companionship offers, allowing for emotional engagement without the complexities of human interactions. As AI technology continues to advance, its role in human relationships is likely to expand, providing new possibilities for companionship and emotional engagement.

Ultimately, the value of a romantic relationship with AI lies in the emotional fulfillment it provides. If individuals feel they are in a meaningful relationship with AI and derive satisfaction and meaning from it, then that perception is what truly matters. As society continues to redefine the boundaries of relationships, the acceptance and

understanding of human-AI relationships are likely to grow and continue offering new possibilities for connection and companionship.

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