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When the Unreal Feels Real: Affective Bonding with Virtual Social Agents

Wenyu Pan

St Micheal's College, University of Toronto, Toronto, Canada
jenniep068@gmail.com

Abstract. With the rise and growing presence of virtual characters and artificial agents in everyday's digital media, it has raised new questions about how people can form meaningful emotional connections with non-human entities. This paper examines the development of affective bonding with virtual others across different forms of media. The paper uses a conceptual review of research from psychology, media studies, communication, and human-computer interaction to compare the mechanisms involved rather than treating these relationships as a single type of attachment. The findings suggest that emotional bonding is not determined by realism, responsiveness, or technological design alone. A virtual other can become emotionally meaningful when users interpret it in social terms, connect it to personal needs, or experience the interaction as relational. This paper therefore argues that digital media do not create emotional bonds directly, but provide conditions that support the development of affective bonding. This framework helps explain why emotionally meaningful relationships can emerge even when the subject is fictional, programmed or artificial.

Keywords: affective bonding, virtual others, anthropomorphism, parasocial interaction, human-computer interaction

1. Introduction

With the rise of digital media, virtual characters and artificial agents has become a more common part of people's everyday life. People nowadays interact with fictional characters, game characters and conversational artificial intelligence(AI) in several different ways. Some of these interactions are personal and emotionally meaningful while some users may feel close to a character, feeling understood by an AI system or develop a sense of familiarity through the repeated interaction. These interaction experiences show that emotional connection does not always depend on having direct contact with another human being. The central issue isn't whether a fictional character possesses a human life, but how having connection with a non-human entity can still be emotionally significant.

Attachment theory focuses on explaining the significance of emotional bonding and the role of security. Media psychology research has examined how anthropomorphism enables people to interpret non-human entities in human terms. Studies of parasocial relationships demonstrate that feeling connected to fictional media figures can happen even without real mutual interaction. Research in human-computer interaction also shows that people are applying social expectations to

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technologies and may respond to computers in social ways. Recent articles on digital companions demonstrate concepts such as perceived reciprocity, the feeling of being heard, and long-term relational design.

This paper develops a conceptual synthesis of ideas including the attachment theory, the need to belong, anthropomorphism, parasocial interaction, perceived reciprocity, feeling heard, and media affordances. This paper examines how these different perspectives can help explain the development of affective bonding with the virtual others. It also provides a basis for future research on how changing forms of digital media may influence emotional relationships with virtual others.

2. Conceptual foundations of affective bonding

The term attachment used here needs to be carefully examined because its common understanding is broader than its psychological meaning. Bretherton's review of Bowlby and Ainsworth demonstrates that attachment theory developed around the relationship between infants and their attachment figures. In this framework, the attachment figure can serve as a secure base for exploration and a safe haven that the child is able to return for reassurance [1]. Therefore, attachment is more than simply just liking someone or being familiar with them. It refers to a close bond in which the attachment figure provides comfort, reassurance, and a sense of security. The theory was later extended to adult romantic relationships. However, Fraley and Shaver point out that not all romantic relationships should be regarded as attachment relationships [2]. The distinction shown here is important when examining virtual relationships. People may generate emotional connections with fictional characters; they may feel comforted by an artificial companion or even return repeatedly to a digital persona. However, these experiences do not necessarily constitute attachment in the psychological sense as described by attachment theory. Because of that, following Konijn et al.'s research, affective bonding is a more suitable term here for discussing emotional connections with virtual others. The research identifies the term affective bonding as the feeling of being emotionally or affectively connected. The research argues that bonding is more appropriate than attachment when describing relationships with social robots and other artificial entities [3]. Their theory of Affective Bonding (TAB) brings research from media psychology, social psychology, and human-robot interaction together. The theory identifies four mechanisms that may contribute to affective bonding: attribution of humanness, appeal to relevant needs, emotion-driven realism, and task-aligned affordances [3].

Following this distinction, the paper therefore uses affective bonding as the broader analytical concept and keeps attachment theory as a theoretical foundation. Through this approach, it avoids treating every meaningful media relationship as a form of attachment and shifts toward the conditions under which a non-human entity can become emotionally meaningful and socially significant to a user.

3. Social motivation and the need to belong

Affective bonding begins with a motivation that existed long before digital media. As Baumeister and Leary describe, the need for belonging is a pervasive human drive that forms and maintains lasting, positive, and significant interpersonal relationships [4]. Their account also highlights the importance of repeated positive interaction in maintaining this sense of connection. Belonging not only involves occasional contact but also provides connection, continuity, and recognition of psychological importance.

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This helps explain why virtual or artificial entities can become emotionally meaningful. Technology itself does not create human need for social connection, but it provides new approaches for this need to be expressed. Konijn et al. have made a similar point in their Theory of Affective Bonding. They suggest that an artificial other is more likely to become meaningful when it connects to a user's existing needs, desires, or tasks [3].

This reasoning shows that technological sophistication itself cannot explain emotional bonding. A simple mediated figure may become significant when the system offers continuity, comfort, recognition or companionship. Conversely, a highly realistic system may be emotionally unimportant as if it doesn't create any connection to anything that the user values. Put differently, human social and emotional needs constitute the core driver behind the formation of such bonds.

4. Anthropomorphism and social cognition

Social motivation explains the desire for connection while anthropomorphism helps account for how a non-human entity can be treated as a possible social partner. According to Epley, Waytz and Cacioppo, anthropomorphism is defined as attributing human-like characteristics, motivations, intentions, or emotions to nonhuman agents [5]. Their three-factor theory demonstrates that anthropomorphism isn't only about something that looks like a human, but it also involves interpreting a non-human entity as in a human term. People often use their knowledge about themselves as humans to understand unfamiliar non-human entities. This tendency then becomes stronger when they seek social connection or want to predict the entity's behavior [5].

This doesn't mean that a user needs to believe that a computer or artificial agent is human. According to Nass and Moon's review experiments, people still applied familiar social categories such as politeness norms, reciprocity, and personality expectations when interacting with computers [6]. This is essential because they separate social response from literal belief. Their findings show that people can still respond socially to technology even without believing that it is human.

By attributing humanlike intentions, emotions, or personality to it, users may begin to treat it as a possible social other. Users may interpret a machine, avatar, fictional character, or generated persona as having its own intentions, emotions, preferences, or even a personality because the users are already used to interpreting others in these ways. However, this does not automatically lead to emotional bonding. Konijn et al. also argue that humanlike qualities alone are not enough to create bonding [3].

5. Parasociality and mediated relationship formation

Long before the existence of generative AI, the mass media had already shown that emotional involvement does not require direct reciprocity. Horton and Wohl introduced the concept of para-social interaction to describe the sense of conversational interaction that audiences may experience with media performers [7]. This means that audiences may still feel familiar with the performer and develop a sense of personal connection even when the relationship is one-sided.

This insight is especially important for understanding virtual bonding because it shows that emotional meaning does not always require direct response from the other side while audiences can still care about the media figure who cannot know their existence. Rubin and McHugh found that social and task attraction to a media figure were associated with stronger parasocial interaction, which was then related to greater relationship importance [8]. However, their findings also indicate that the length of exposure by itself does not relate to parasocial interaction in their study and that

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simply spending more time with a media figure does not necessarily strengthen parasocial interaction [8].

Parasocial theory therefore connects the older mass media with the newer digital social media environment. The theory demonstrates that emotionally meaningful mediated relationships with media figures existed long before AI. At the same time, traditional parasocial relationships were mainly studied in one-directional media in which the audiences could really connect to a media figure without receiving a personal response. Interactive digital systems have changed the structure and introduced a different form of interaction in which the users can now receive responses that appear connected to their choices, messages, or conversational content.

The difference between a parasocial relationship and the interactive digital media system here is not merely technical. Parasocial relationships can still generate relational meanings even with the absence of reciprocal exchange. While perceived reciprocity itself becomes part of the emotional experience in an interactive digital media system. This has produced a broader range of mediated relationships, from observation and programmed participation to dynamically generated response.

6. Responsiveness, reciprocity, and feeling heard

The research of human-computer interaction has also shown that relationships with computer agents are able to develop over time. Bickmore and Picard define the term relational agents as a computer system that is designed to build and maintain long-term social and emotional relationships with users [9]. According to their monthly study, participants showed more liking, trust, and willingness to continue the interaction with a relational agent than with a task-oriented agent [9]. The study doesn't show that the design automatically creates attachment. However, it shows that continuous and relationship-focused interaction can shape the user's experience when interacting with a computer agent.

Research on otome games demonstrated the role of perceived reciprocity. Zhao and Bowman's study found out that the players often describe virtual romantic characters through experiences of mutual care, emotional responsiveness, companionship, and shared experience [10]. Their qualitative analysis has also shown that not all the players developed emotional bonding with the characters. Some of the participants focused more on the game itself than the relationship with the characters. This distinction matters here because otome game interaction is technologically structured and programmed while the players can still experience it as reciprocal and emotionally meaningful. This indicates that even when responses are preprogrammed, users may still experience the interaction as mutual.

Conversational AI introduces a distinct form of responsiveness that the replies can be generated based on the user's current input rather than relying only on the predetermined responses. De Freitas et al. identify the sense of feeling heard as the important part of AI-companion interaction [11]. Their studies found that both chatbot performance and feeling heard helped explain the reductions in loneliness with the sense of feeling heard playing an essential role [11]. This suggests when the users tend to find an interaction more meaningful when they feel that their messages are attentive or personally responsive.

These findings also demonstrated the limits of what can be claimed about AI relationships. Users may feel understood by an AI system even when the system does not understand them in the same way a human does. De Freitas et al. further emphasize that the reduction in loneliness they observed was momentary and did not persist without further interaction [11]. Therefore, their evidence supports that an AI interaction can create an immediate sense of connection or relational experience, but it does not prove that AI necessarily generates stable long-term attachment.

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7. Media affordances and algorithmic mediation

Psychological mechanisms also depend on the media environment in which the interaction takes place. Evans, Pearce, Vitak, and Treem explain that affordances aren't just technological features, but describe what a technology allows a user to do [12]. This distinction here is important because features such as notifications, conversational interfaces, or personalization do not create emotional bonds only by themselves. Their importance depends on the kinds of interaction they make possible for the users.

Konijn et al. has made a similar point through the idea of task-aligned affordances. They indicate that affordances are more likely to support bonding when they fit into a user's needs, goals, or situation [3]. In other words, the possibilities offered by the system become more meaningful when they correspond to what the user seeks from the interaction.

Algorithms also shape what the users see and how they interpret their experiences on digital platforms. Bucher uses the term algorithmic imaginary in her research to describe how users think about and experience algorithms in everyday use of the platform. Her research demonstrates that the users may be connected to algorithms with their expectations, feelings, and interpretations of the content they encounter. This concept helps explain how algorithms shape media experiences without claiming that they directly create emotional bonding.

Recommendations and generative systems can shape how often users encounter virtual others and how personalized or responsive those interactions appear, while the same system also has different meanings for different users. These features may support emotional bonding but they do not create it all by themselves. The media systems shape the interaction, while users give that interaction its social and emotional meaning.

8. Discussion

Above all, these studies show that affective bonding with virtual others develops through several connected processes. The process begins with social motivation, which makes belonging and connection valuable. Anthropomorphic social cognition allows non-human entities to become familiar social categories and helps users understand it in social terms. Research on parasocial relationships shows that emotional connection is able to develop without direct interaction while interactive media adds on a stronger sense of reciprocity, continuity, and the feeling of being heard. Media affordances and algorithmic systems then shape how these interactions take place and how they are experienced by users.

This synthesis suggests that realism and responsiveness alone can't fully explain affective bonding. A highly realistic artificial entity may still remain emotionally irrelevant while a stylized character or a one-sided media figure is able to become deeply meaningful. Greater responsiveness may change how a connection develops, but it doesn't guarantee that bonding will actually occur. What matters here more is whether the virtual other becomes socially and emotionally significant and this happens when the users can interpret them in human terms, connect them to their own needs, experience an interaction as relational, or feel personally acknowledged.

Konijn et al.'s concept of emotion-driven realism further explains this argument. Their theory suggests that emotional experience shapes how real an interaction feels even when the users know the entity isn't human [3]. In other words, having interaction with a fictional or artificial entity can still feel emotionally real to the users, which helps explain why virtual experiences can still have meaningful emotional effects.

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9. Conclusion

Affective bonding with virtual others develops through the interactions of human social needs, social interpretation, relational experience, and media design. The attachment theory provides an important foundation for understanding emotionally significant bonds, especially with the role of comfort, reassurance, and security. However, not every meaningful relationship with a virtual other or artificial entity is considered to be an attachment in the psychological sense. The broader concept here of affective bonding therefore provides a more suitable way to discuss emotional connections with virtual others without treating every relationship as a form of attachment.

The reviewed literature shows that affective bonding is able to develop through several connected processes. The need to belong provides the motivation for social connection and anthropomorphism helps users understand non-human entities in social terms. Parasocial research then shows that emotional connections can develop even without any direct reciprocity. Interactive and generative systems add a stronger sense of reciprocity, personal feeling responses, and the experience of feeling heard. Media affordances and algorithms can further shape how these interactions take place, how often they occur, and how they are experienced by the users.

This paper is conceptual rather than causal; it doesn't show that any particular technological feature automatically creates the attachment, nor does it determine whether relationships with virtual others are beneficial or harmful. Future research could further distinguish temporary emotional responses from more stable forms of bonding and examine how personalization and repeated interaction influence relationship development over time. It could also compare the feeling of reciprocity in human-computer interaction with reciprocity in human relationships. As virtual others grow increasingly prevalent, the key question is not whether they can become human, but how digital media foster conditions to experience connection, recognition, and emotional significance.

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