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Children's future parasocial relationships with media characters: the age of intelligent characters

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ABSTRACT

Children experience emotionally tinged parasocial relationships with their favorite media characters across a constantly changing media landscape. On the frontier of this landscape are intelligent agents: digital companions that can socially interact with and educate children. We discuss how research on parasocial relationships with media characters can influence the design of intelligent "characters" for children. We discuss the components of parasocial relationships—including attachment, character personification, and social realism—and how these may play a role in developing intelligent characters as effective educational tools. We also examine the development and dissolution of parasocial relationships, and how these factors can inform intelligent character design. Educational and social implications for these technologies as teaching tools are also discussed.

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Media characters are ubiquitous in children's lives. Not only are these characters present across multiple media environments (including television, video games, and mobile apps), they also transcend media altogether, appearing as toys, on clothing, and as marketers of food products (Calvert & Richards, 2014). Given these characters' omnipresence in children's worlds, it is unsurprising that most US children develop emotionally tinged parasocial relationships with these characters, treating them as lifelike and trusted friends (Bond & Calvert, 2014a).

Children's parasocial relationships with characters develop, in part, through children's social interactions with them (Bond & Calvert, 2014a). These parasocial interaction techniques, in which characters engage viewers in pseudo-conversations, are now used in many US children's educational television programs (Calvert & Richards, 2014). Children's parasocial relationships with media characters can facilitate learning: for example, toddlers more effectively learned a math concept taught by an on-screen character if they had previous experience interacting with a personalized plush toy of that character, especially if they also engaged in nurturing behaviors with their plush toy (Calvert, Richards, & Kent, 2014; Howard Gola, Richards, Lauricella, & Calvert, 2013). In other words, developing a child's parasocial relationship with a character can make that character a powerful educational tool for that child.

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The rapidly changing media landscape in which children grow and learn is now shifting again. Intelligent agents, or machines capable of mimicking social interaction, are a relatively new frontier in media (Franklin & Graesser, 1997). These agents, including Apple's Siri and therapy robots, can vary in form, such as a voice only to an embodied agent. Here we specifically discuss screen-based intelligent agents who are embodied; in other words, an interactive, visible screen character, which we call an intelligent character.

Because children develop robust parasocial relationships with popular media characters, we focus on the promising potential frontier of intelligent characters as credible, socially engaging, and informative agents. Our questions are as follows: With the emergence of intelligent characters, what is the future of children's traditionally one-sided emotional parasocial relationships with media characters as they increasingly mimic actual social partners? Will there be changes in the formation of parasocial relationships when characters use increasingly contingent parasocial interaction techniques? What are the best practices in designing intelligent characters? What potential do intelligent characters have as teachers?

What are parasocial relationships and how do they develop?

Parasocial relationships refer to one-sided, emotionally tinged relationships that people (in this discussion, children) develop with media characters (Calvert & Richards, 2014). Most children will experience one or more parasocial relationships with media characters during childhood, usually forming this attachment with a favorite character from television, movies, or games (Brunick, Calvert, & Richards, 2015). Because these characters often exist across multiple platforms, it is unclear if one platform primarily drives parasocial relationship development, or if these media platforms work in concert to facilitate these relationships. To capture the social nature of these experiences, we define children's parasocial relationships with media characters as a self-other relationship rather than a player–avatar relationship, wherein the character is simply a different graphical representation of the player.

Research has demonstrated that children more effectively learn concepts like early math skills from media characters with whom they share a stronger parasocial relationship (Calvert et al., 2014; Howard Gola et al., 2013). Because creating a successful educational media character hinges, in part, on children being able to form a bond with that character, it is important to understand the components and formation process of these parasocial relationships.

Describing parasocial relationships

Recent research surveying parents demonstrated that children's parasocial relationships are composed of three factors: attachment, character personification, and social realism (Bond & Calvert, 2014a; see Figure 1). We describe these factors and then apply them to the potential design of intelligent characters.

Attachment

Attachment is a fundamental part of children's earliest relationships with other people, and has been studied at length in a variety of contexts. As defined by Bond and Calvert (2014a), attachment to media characters refers specifically to feelings of comfort, safety, and being soothed that children experience with a character.

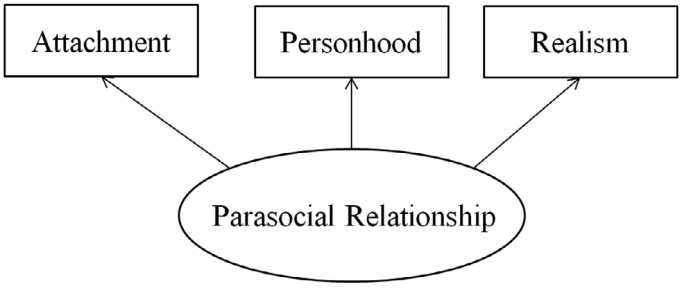

Figure 1. Dimensions of parents' perceptions of young children's parasocial relationships (Bond & Calvert, 2014a).

Designing a character that fosters child feelings of safety and comfort relies heavily on certain perceptual components, particularly visual cues. One major perceptual concern is the uncanny valley. Roboticist Masahiro Mori postulated that as computer-generated beings approach humanoid form too closely, human viewers tend to have strongly negative, visceral reactions to them (1970; Mori, MacDorman, & Kageki, 2012). The uncanny valley affects children: for example, three-year-olds were fearful of and avoided an android with realistic human features (Ishiguro, 2007). Similarly, many viewers had negative reactions to the computer-animated characters in the 2004 film *The Polar Express* because of their uncanny appearance (Noë, 2012). By contrast, characters that possess a less realistic, more cartoon-like appearance (oversized eyes, neotenous features, etc.), who generally populate children's media spaces, are often beloved by young children (Brunick et al., 2015).

The uncanny valley is an important consideration when designing an intelligent agent, as character attachment is predicated on feelings of comfort and safety. Fearful reactions to uncanny valley characters likely mean that children will feel uncomfortable or unsafe with those characters, thereby disrupting parasocial relationship development. By using popular media characters in their designs, software developers could circumvent this problem by capitalizing on the existing attachments children already have to existing media characters. If designers were creating a new character for use as an intelligent agent, they would need to be mindful of the uncanny valley's effects on children's perceptions and attachment behaviors, favoring cartoon-like representations over realistic human features.

Contact comfort is another means by which children form attachment bonds, not only with other humans (Bowlby, 1969), but also with plush toys of media characters (Calvert et al., 2014) and intelligent robots (Weiss, Wurhofer, & Tscheligi, 2009). Creating supplemental plush characters for use alongside intelligent characters may facilitate the development of parasocial relationships.

Character personification

Children need to feel that a character is person-like in order for a parasocial relationship to form (Bond & Calvert, 2014a). Introducing human-like emotional capabilities into the design of an intelligent character is one way to facilitate character personification. For example, affect mirroring (reflecting facial emotions of another person) begins in infancy and is a foundation for social interaction to develop (Gergely & Watson, 1996). Some computers can already detect and mimic emotional states displayed by human social partners (Rani, Liu, Sarkar, & Vanman, 2006), so programming these capabilities into an intelligent character may soon be possible.

Trust is another critical element of character personification. In particular, children as early as kindergarten begin self-disclosure to peers, an important predicator of trust in relationships (Bernath & Feshbach, 1995). Responding contingently and sensitively to children's self-disclosures are important considerations for intelligent agent design. Some intelligent agents are already partially capable of these attributes: intelligent agent apps like SpeakaZoo, developed by ToyTalk, have sensitive responses to children's self-disclosures of fearful emotions. Because self-disclosures can contain privileged information, designers of intelligent characters must also plan for ethical considerations.

Finally, characters are personified by having needs and wants similar to those of real people (for example, needing to eat and sleep). Children will nurture plush versions of interactive characters by attempting to respond to these perceived needs during play (Calvert et al., 2014). Intelligent characters that require nurturance could help children personify those agents. This approach already occurs in toys like Zoomer and Tomagachi, which require children to pet, feed, or play with them to ensure the toy's "happiness." These approaches have implications for teaching empathy and emotional regulation in very young children.

Social realism

Young children often have trouble discriminating between fantasy and reality (Taylor & Howell, 1972), and young children learn better from media when they can connect media to real-world experiences (Troseth, Saylor, & Archer, 2006). Connecting an intelligent character to both the child and the child's surroundings through joint interaction may foster children's sense of social realism. For example, if an intelligent character and a child were able to jointly attend to something in the child's tangible world, like the child's pet or favorite toy, the child would likely perceive the agent as more realistic. This perception of realism and real-world relevance could help children connect learning experiences across media-based and real-world platforms. However, intelligent character designers would need to remain mindful of children's difficulty in distinguishing fantasy and reality, as blurring this line can have potential detrimental effects for young children, including increased anxiety (Zisenwine, Kaplan, Kushnir, & Sadeh, 2013).

Developing parasocial relationships

Another model constructed by Bond and Calvert (2014a; see Figure 2) illustrates the factors that influence the development of parasocial relationships. First, interacting with media characters (parasocial interactions) fosters the development of these relationships. Second,

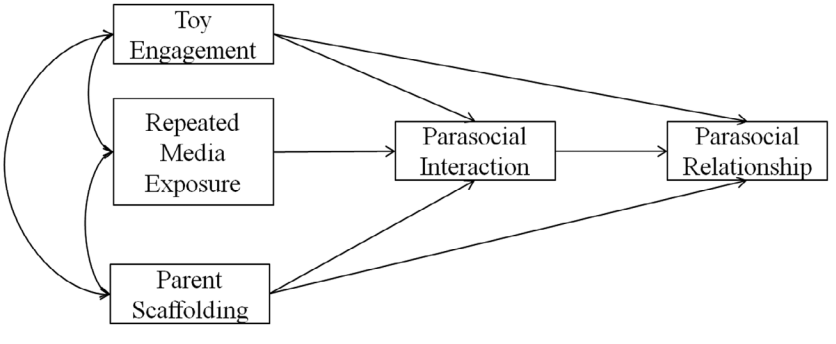

Figure 2. Model of parents' perceptions of children's parasocial relationships (Bond & Calvert, 2014a).

interaction with characters outside the media environment in the form of toy play is an important factor. Third, parents play an important role in this relationship between child and character. Finally, mere exposure to media characters is itself not enough to foster a parasocial relationship; instead, media exposure must be moderated by parasocial interaction. Taken together, these points can inform the design of intelligent agents.

Parasocial interactions

The ability of intelligent characters to have parasocial interactions with children is pivotal. Interactions between children and intelligent characters can be much more contingent than parasocial interactions through traditional media like television. Contingency refers to properties of social interactions—like conversational timing and response personalization—that are important for learning in young audiences. As young as 2 months, infants will respond differentially to stimuli that are contingent or non-contingent on their behavior, which may underlie early understandings of agency and self (Rochat, 2001).

Because it emerges early, and seems to be important for learning across domains, contingency is an extremely important consideration when creating an artificial social agent. An ideal contingent intelligent character should be capable of responding immediately with appropriate conversational timing, processing information provided by the user, and responding in a way that advances the interaction meaningfully. For example, if a four-year-old tells an intelligent character her age, the agent might reply promptly with a question about whether their most recent birthday cake had four candles on it, displaying comprehension of the child's statement, timely responsiveness, and advancement of the interaction.

Toys

Intelligent agents who take the form of already-popular media characters have a distinct advantage: these characters will likely already exist in toy form. Because toy play fosters parasocial bonding between a child and a favored character, children will likely bond with and learn from an intelligent agent if they also have access to that character in traditional toy form, potentially facilitating attachment (Howard Gola et al., 2013). Interactive toys can also foster parasocial interactions, further developing the child's parasocial relationship with an intelligent character (Calvert et al., 2014). For the creation of novel intelligent characters, introducing complementary toy versions of that character could facilitate the development of parasocial relationships with the intelligent character (Calvert et al., 2014).

Parent encouragement

Parents play an important role in their child's developing relationships with media characters, so an ideal character should be attractive to both children and their parents. Parents facilitate their children's learning across a number of domains, particularly through scaffolding and joint attention (Hustedt & Raver, 2002). In particular, joint attention to media (known as coviewing) is influential in determining the amount and quality of children's media consumption (St. Peters, Fitch, Huston, Wright, & Eakins, 1991). Active mediation (in which parents engage together interactively when viewing media) predicts preschoolers' comprehension of media content and expressive vocabulary (Strouse, O'Doherty, & Troseth, 2013), as well as positive social outcomes in older children and adolescents (Nathanson, 1999; Nathanson, Wilson, McGee, & Sebastian, 2002). As such, parents who actively participate in (or, alternatively,

withhold) their children's media exposure will affect the characters and content their children consume, and affect the subsequent parasocial bonds their children form.

Further research is needed to determine exactly what parents find appealing in characters for their children, and these characteristics could be incorporated with child preferences in the design of an intelligent character. Parent participation in interactions between their child and an intelligent character may also share the benefits of active mediation.

Repeated media exposure

Repeated exposure to a character across media platforms is not enough to begin the development of a parasocial relationship unless the exposure fosters children's parasocial interactions with the character (Bond & Calvert, 2014a). This mediated relationship lends itself well to the introduction of intelligent characters into the media landscape, as intelligent characters can readily use contingent, parasocial interaction techniques with children, thereby enhancing the possibility of parasocial relationship development. Characters who are already present and popular in the media landscape can be accessible via both traditional media (like television) as well as in the form of an intelligent character. Once again, toys and plush replicas play an important role in creating additional exposures to characters, which in turn help develop parasocial relationships (Calvert et al., 2014; Howard Gola et al., 2013).

Encouraging children to develop parasocial relationships with characters can increase the chance that the character can serve as an educational resource, especially in an extremely contingent, customizable form like an intelligent character. The longer this parasocial relationship lasts, the longer the potential for the character's use as an educational tool. Examining why parasocial relationships end, a process known as parasocial breakup, can be useful in determining ways to potentially increase the educational utility of parasocial relationships.

Why do parasocial relationships end?

Bond and Calvert (2014b) also surveyed parents on their child's previous favorite characters. These parents described multiple reasons why their child lost interest in a previous favorite, including outgrowing the character, becoming bored with the character's program, or the influence of another child. A follow-up survey (Brunick et al., 2015) found that the most common reason that children lost interest in a previous favorite character was that children outgrow the character, with children often selecting a new favorite character that was older in age than their previous favorite. Because animated media characters do not age, but their child audiences do, popular educational media characters like Dora the Explorer and Elmo lose educational traction as children increasingly feel that the character is "for babies." While live action characters in children's media do age with the show's audience (e.g., the children in Disney Channel's *Good Luck, Charlie*), retaining actors can be problematic, as some actors outgrow the role.

Intelligent agents offer the opportunity for media characters to age gradually with children rather than remaining static or aging too quickly. Intelligent characters could be programmed to gradually age physically, and also change educational trajectories consistent with a child's age and developmental stage. The average length of early parasocial relationships is 2.2 years (Brunick et al., 2015), but this timeframe could potentially be extended by intelligent characters who can develop alongside children.

Implications for intelligent characters as teachers

Intelligent characters as teachers may have both positive and negative outcomes for young learners. We consider both here and link them to areas for future research.

Positive outcomes

Increasing value is placed on children becoming digitally literate in the classroom (Collins & Halverson, 2009). The introduction of favorite intelligent media characters could provide children with technology-based, hands-on, and interactive stimulation in the classroom, lending itself to numerous opportunities for future research. In large classrooms with a diverse spectrum of learning styles, each child could interact with their own tablet-based intelligent character. Teachers could customize how the character teaches concepts to individual students. For example, the intelligent character could pace the lessons to each student's current ability, understanding, and learning style. Intelligent characters could provide meaningful feedback to individual students when needed and advance at an ideal rate, minimizing the chance that students are "left behind" or bored in the classroom. This practice could reduce classroom pressures on teachers, allowing them to provide one-on-one attention to struggling students without compromising more advanced students, as well as allow teachers to work directly with advanced students while children who need more practice are tutored by the intelligent character (Gallagher, Harradine, & Coleman, 1997).

Research demonstrates the need for at-home reinforcement of in-school learning, and technology may be an important tool to bridge this gap (Sefton-Green, 2004). Intelligent characters are an ideal link between home and school environments since children already perceive media characters as enjoyable companions during their free time. Intelligent characters could be developed for use at school and subsequent home use, allowing access to the learning tool across contexts and as a way to reinforce in-home learning (see McCarthey, 2000). At-risk children with considerable residential mobility would also have some stability in the form of a digital "companion," linking their changing or unstable home environment to their school and learning environment.

Future research could examine how personalizing the physical features and the specific capabilities of intelligent characters could reinforce learning for particular groups of children. In particular, media are increasingly being used to foster inclusion (for example, Goldie Blox, the female engineer character from mobile apps), and intelligent characters could further this agenda. Female and minority children, groups who are particularly underrepresented in science and technology fields (MacCorquodale, 1984), may benefit from intelligent characters that are both programmed to look like them (same gender and ethnicity) and that can effectively teach STEM concepts. The self-similarity between the child and the STEM-expert intelligent character could offset these children's beliefs that they "don't belong" in STEM fields.

Another venue for research involves children who are on the autism spectrum who often experience greater social comfort and competency with a non-human social partner, particularly in social domains (Dautenhahn & Werry, 2004). This area is one where intelligent characters may hold an advantage over human social partners. Intelligent characters could subtly modulate social cues, including affect mirroring, joint attention, and eye contact, thereby scaffolding and encouraging social behaviors that are deficient for children with autism. Because human social partners have very little control over these subtle, unconscious

processes (called microbehaviors), they are almost impossible to manipulate for the benefit of a social partner (Dautenhahn & Werry, 2004). However, microbehaviors of intelligent character partners could be customized in a variety of ways.

Potential limitations

Some argue that media use isolates children from real-world interactions, so intelligent characters should be designed to encourage interaction with adults and peers. In classrooms, an overly personalized intelligent character could weaken a child's ability to learn from less individualized forms of instruction in a typical classroom. For this reason, teachers may choose to use the character only as a supplement, and agent designers may choose to incorporate direct references to the teacher and classroom environment to reinforce learning in that domain.

Another potential line of research involves ensuring that intelligent characters keep children's attention and interest. Learning from novel technology in classroom settings is strongly correlated with children's continued interest in the technology (Kanda, Hirano, Eaton, & Ishiguro, 2004). Using agents who take the form of children's favorite media characters could solve this problem, but parasocial breakup with those characters could subsequently cease the effectiveness of those agents. Thus, increasing the longevity of the relationship with a specific character, such as having the character grow up with a child, is an important direction of research, as is understanding who the next favored intelligent character will be for a developing child.

Finally, developing effective intelligent characters will likely be a costly process, as the development of associated technologies (voice recognition, affect mirroring, language production, and customizable characters) requires considerable investment. Despite an up-front cost, the payout of these intelligent characters could be considerable in terms of their impact on educational outcomes. Nevertheless, the efficacy of this investment requires empirical query on the educational effectiveness of different kinds of agent interfaces.

Conclusion

Addressing the social components of parasocial relationships in designing intelligent characters begs the question of how one "designs" a social interaction that isn't truly social. Our current understanding of parasocial relationships and parasocial interactions are derived almost entirely from studies on traditional media like television. Given that intelligent agents can offer a new and unprecedented level of interactivity, we may see changes in how children's parasocial interactions take place with these agents and how parasocial relationships form with a much more sophisticated, personalized, and responsive partner. Already-popular media characters can provide a springboard for the design of intelligent agents by capitalizing on children's investment in these characters to study the best practices of intelligent agent design. Designers would then be able to create new intelligent characters that maximize the ability for parasocial relationships to form, potentially making the agents more powerful learning tools. Intelligent characters, then, represent a new and unexplored frontier of children's digital media with the potential to revolutionize children's relationships with media and media characters, thereby potentially creating a new cadre of effective twenty-first century educators for our children.

Disclosure statement

No potential conflict of interest was reported by the authors.

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