Empathic interaction with synthetic characters: the importance of similarity

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ABSTRACT

Empathic interaction with synthetic characters enables users to build and maintain an emotional involvement that can result in stimulating novel interactions. Many factors impact on empathic interaction; here we focus on the role of 'similarity' in developing empathic relations. Evidence suggests that if a character is perceived as being similar to the user in appearance and behaviour, then greater empathic relations will emerge. To investigate this, 345 children aged 10-11 years interacted with FearNot (Fun with Empathic Agents to Reach Novel Outcomes in Teaching), a virtual world populated by synthetic characters involved in bullying scenarios. Children completed an Agent Evaluation Questionnaire, which enquired about perceptions of similarity and empathy with the characters. Results indicated that if children perceived that they were similar to the synthetic characters, greater empathy and liking was expressed. The implications for future design of synthetic characters are considered.

Keywords: Empathic interaction, synthetic character, similarity, children, virtual world, evaluation.

INTRODUCTION

Empathy has been defined as "An observer reacting emotionally because he perceives that another is experiencing or about to experience an emotion" (Stotland et al, 1978). Synthetic characters (computer generated semi-autonomous agents corporeally embodied using multimedia and/or robotics, see figure 1) are becoming increasingly widespread as

a way to establish empathic interaction between users and computers. For example,

Feelix, a simple humanoid LEGO robot is able to display different emotions through

facial expressions in response to physical contact. Similarly, Kismet was designed to be a

sociable robot able to engage and interact with humans using different emotions and

facial expressions. Carmen's Bright Ideas is an interactive multimedia computer program

to teach a problem-solving methodology and uses the notion of empathic interactions.

Research suggests that synthetic characters have particular relevance to domains with

flexible and emergent tasks where empathy is crucial to the goals of the system (Marsella

et al , 2003).

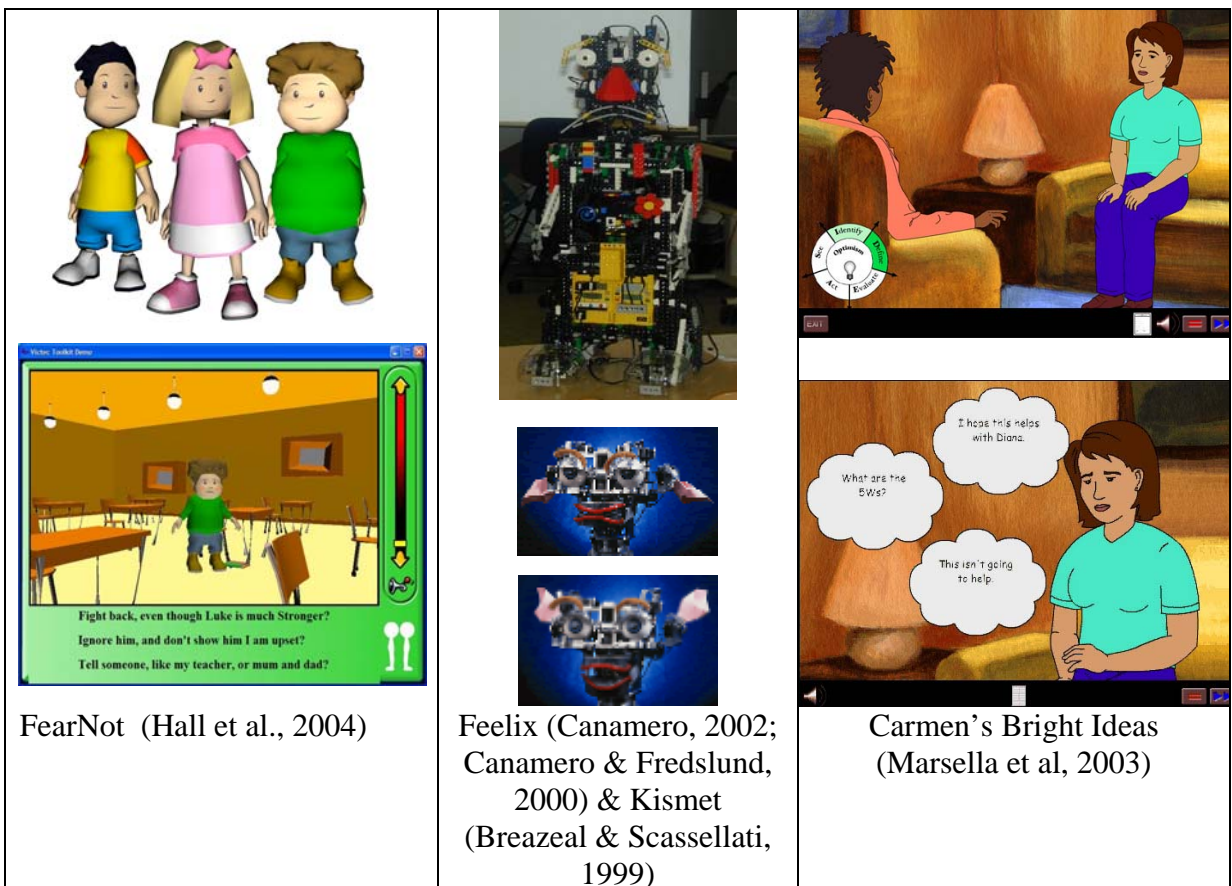| FearNot (Hall et al., 2004) | Feelix (Canamero, 2002; Canamero & Fredslund, 2000) & Kismet (Breazeal & Scassellati, 1999) | Carmen's Bright Ideas (Marsella et al, 2003) |

Figure 1: Synthetic Characters

Using empathic interaction maintains and builds user emotional involvement to create a coherent cognitive and emotional experience. This results in the development of empathic relations between the user and the synthetic character, meaning that the user perceives and models the emotion of the agent experiencing an appropriate emotion as a consequence.

BACKGROUND

A number of synthetic characters have been developed where empathy and the development of empathic relations have played a significant role, including theatre (Bates, 1994), storytelling (Machado et al 2001) and personal, social and health education (Silverman et al., 2002). Applications such as FearNot (Hall et al, 2004) and Carmen's Bright Ideas (Marsella et al., 2003) highlight the potential of synthetic characters for exploring complex social and personal issues, through evoking empathic reactions in users.

In a similar vein, robotics research has started to explore both the physical and behavioural architecture necessary to create meaningful empathic interactions with humans. This has included examining robot personality traits and models necessary for empathic relations (Fong et al, 2003) and the design of robotic facial expressions eliciting basic emotions to create empathic interactions e.g.(Canamero, 2002). Empirical evaluations have shown that humans do express empathy towards robots and have the tendency to treat robots as living entities (e.g. Sparky, a social robot, (Scheeff et al, 2002)).

The results from research into empathic interaction with synthetic characters suggest that it is possible to evoke empathic reactions from users and that this can result in stimulating

novel interactions. Further, research identifies that in empathising with characters a deeper exploration and understanding of sensitive social and personal issues is possible (Dautenhahn et al, 2002). This can lead to real-life impacts such as the development of constructive solutions, e.g. Carmen's Bright Ideas (Marsella et al, 2003).

However, it remains unclear as to how empathy can be evoked by interaction and here, we focus on the impact of similarity on evoking empathy in child users. This article reports findings obtained in the VICTEC (Virtual ICT with Empathic Characters) project (Aylett et al, in print 2005) that applied synthetic characters and emergent narrative to Personal and Health Social Education (PHSE) for children aged 8-12, in the UK, Portugal and Germany, through using 3D self-animating characters to create improvised dramas. In this project, empathic interaction was supported using FearNot (Fun with Empathic Agents to Reach Novel Outcomes in Teaching). This prototype allowed children to explore physical and relational bullying issues, and coping strategies in a virtual school populated by synthetic characters. The main issue this article addresses is whether the level of similarity perceived by a child with a character has an impact on the degree of empathy that the child feels for the character.

WHY SIMILARITY MATTERS

Similarity is the core concept of identification (Lazowick, 1955) and a major factor in the development and maintenance of social relationships (Hogg & Abrams, 1988). The perception of similarity has significant implications for forming friendships, with studies identifying that where children perceive themselves as similar to another child, that they are more likely to choose them as friends (Aboud & Mendelson, 1998). The opposite has also been shown to be true, with children disliking those who are dissimilar to them in

terms of social status and behavioural style (Nangle et al, 1996). This dislike of dissimilarity is especially evident for boys.

Perceived similarity as a basis for liking and empathising with someone is also seen in reactions to fictional characters, where the perception of a character as similar to oneself and identifying with them will typically result in liking that character, and empathising with their situation and actions. This can be frequently seen with characters portrayed in cinema and television (Hoffner & Cantor, 1991; Tannenbaum & Gaer, 1965). Further, people are more likely to feel sorry for someone (real or a character) if they perceive that person as similar to themselves (von Feilitzen & Linne, 1975).

To investigate the impact of similarity on children's empathic reactions to the synthetic characters in FearNot, we performed a large scale study, further discussed in (Aylett et al., in print 2005). Liking someone is strongly influenced by perceived similarity and research suggests that if a child likes a character they are more likely to empathise with them. Thus, in considering the impact of similarity on the evocation of empathy we looked at perceived similarity of appearance and behaviour and their impact on the like/dislike of characters, as well as two empathic measures (feeling sorry for a character and feeling angry with a character).

THE FEARNOT STUDY

FearNot was trialed at the "Virtually Friends" event at the University of Hertfordshire, UK, in June 2004. 345 children participated in the event. 172 male (49.9%) and 173 female (50.1%). The sample age range was 8 to 11, mean age of 9.95 (SD: 0.50). The sample comprised of children from a wide range of primary schools in the South of England.

Method

Two classes from different schools participated each day in the evaluation event. All children individually interacted with FearNot on standard PCs. FearNot began with a physical bullying scenario comprised of three episodes and children had the role of an advisor to help provide the victim character with coping strategies to try and stop the bullying behaviour. After the physical scenario, children had the opportunity to interact with the relational scenario showing the drama of bullying among four girls. After the interaction children completed the Agent Evaluation Questionnaire (AEQ). This was designed in order to evaluate children's perceptions and views of FearNot, see table 1. This questionnaire is based on the Trailer Questionnaire (Woods et al, 2003) that has been used extensively with a non-interactive FearNot prototype as is reported in (Hall et al, 2004). Questions relating to choosing characters were answered by selecting character names (posters of the characters were displayed with both a graphic and the name as an aide memoire). Children's views were predominantly measured according to a 5 point Likert scale.

Aspect	Nature of Questions
Character preference	• Character liked most • Character liked least • Prime character, who they would choose to be • Character with whom child would most like to be friends
Character attributes	• realism of movement (realistic to unrealistic) • smoothness of movement (smooth to jerky) • clothes appreciation (looked good to looked strange), liking (liked to did not like) and similar to own (similar to what you wear to different to what you wear)

	• character age
Character conversations	• conversation content (believable to unbelievable) • conversation interest (interesting to boring) • content similarity to own conversations (similar to different)
Interaction impact	• victims acceptance of advice (followed to paid no attention) • helping victim (helped a lot to not at all)
Bullying Storyline	• storyline believability (believable to unbelievable) • storyline length (right length to too long)
Similarity	• character that looks most and least like you • character that behaves most and least like you
Empathy towards characters	• Feeling sorry for characters and if yes which character • Feeling angry towards the characters and if yes which character • Ideomotoric empathy based on expected behaviour

Table 1: Content of the Agent Evaluation Questionnaire

Results

Gender was a significant factor in the selection of which character was most similar in physical appearance to you, with almost all of the children choosing a same gender character or none. There was a significant association for those children who felt that a same gender character looked like them and also liked a same gender character: boys ($X = 23.534$, (8, 108), $p = 0.001$) girls ($X = 24.4$, (4, 89), $p < 0.001$), meaning that boys liked male characters that looked like them, and girls liked female characters that resembled them.
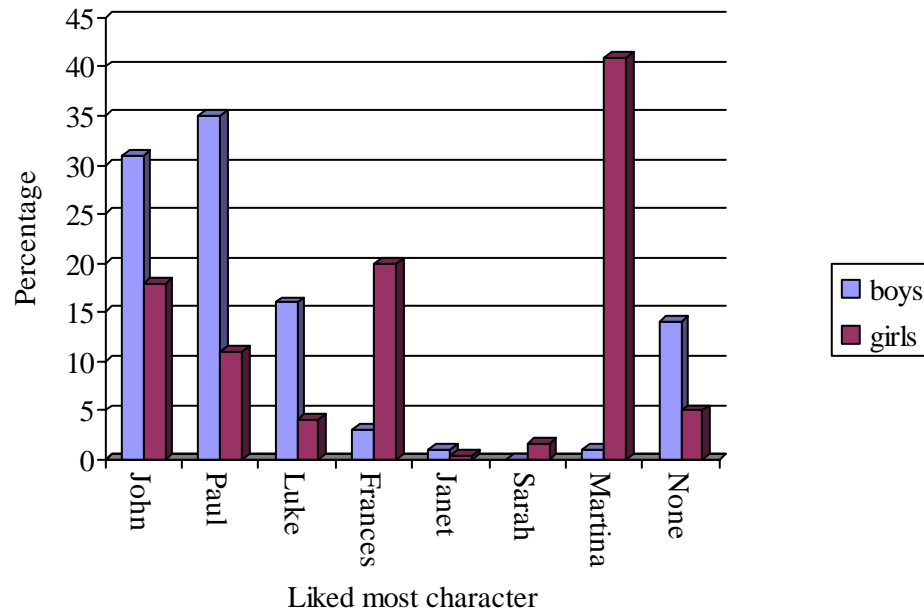
Figure 2: Liked most character

As can be seen from figure 3, children liked those characters who looked the most similar to them, if the character played a defender, neutral or victim role. However, where the character was a bully, children were not as likely to like the character that they were similar to in appearance, particularly amongst the girls. 35% of boys who looked like Luke liked him the most, although almost a third of the girls stated that they resembled a female bully character in appearance, only 4 (2.5%) liked them the most.
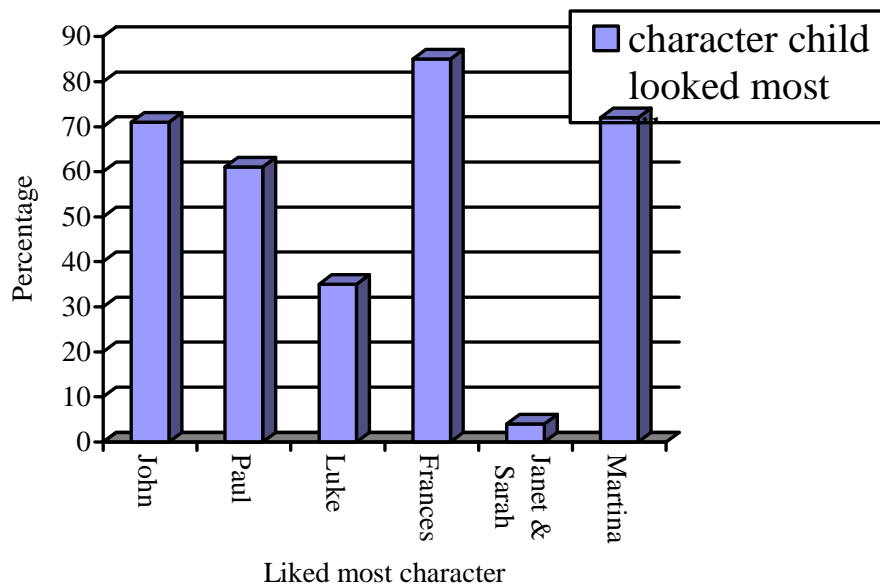
Figure 3: Character child looked most similar to in appearance and liked the most

There were no significant differences related to whom you looked like and disliking characters, with the dislike clearly being based on alternative factors to appearance. Similar to the results of (Courtney et al, 2003), children disliked the bullies (agressors) the most, followed by the victims and then the bystanders. Most children disliked Luke, the physical bullying protagonist followed by Sarah, the relational bully, then the victims. As in other results (Hall et al, 2004), children paid scant attention to the bully assistants, and only 5% of children disliked Janet the most.

A significant association was found between the character children felt looked the most like them and feeling sorry for characters in the drama. Looking like any of the female characters (e.g. being female) is more likely to result in feeling sorry for the victims, with over 80% of those who felt that they looked like any of the female characters feeling sorry for the victims. If children (mainly boys) felt that Luke (62%) looked the most like

them, they expressed the least amount of empathy towards the characters in the dramas, however, only 67% of those who felt that they looked like John felt sorry for the victims, as compared to 87% of those (all female) who felt they looked like Frances.

A significant association was found between the character children felt looked most like them and feeling anger towards characters in the dramas. Again this result is related to gender, with significantly more girls than boys feeling anger towards the characters. However, the results still indicate that appearance similarity could have an impact on the evocation of anger. Boys who stated that Luke looked the most similar to them felt the least amount of anger towards characters (46%), followed by John (61%) and Paul (78%). For the girls, those who felt they looked most like Sarah the bully were most likely to be angry (95.5%) compared to 71% of those who looked most similar to Frances (the victim), suggesting that girls were more likely to be angry if the bully was similar to them, whereas boys were less likely to be angry if the bully was similar to them. For those children who stated that none of the characters looked like them, 66% identified that they felt angry, reflecting the higher number of boys than girls in this group.

DISCUSSION

The results indicate that greater levels of empathy are evoked in children if they perceive that they are similar to the characters. This would suggest that when developers seek to evoke empathic interaction that they should attempt to create synthetic characters that are similar to the intended users. Interestingly, our results also highlighted that whilst looking like a character may result in you being more inclined to like them, if they exhibit morals, ethics and behaviour that are socially unacceptable, such as bullying; this can have a significant impact on your like of that character. This reflects real world behaviour, with

all reported studies of children's reactions to aggressive behaviour / bullying supporting the view that children are more likely to dislike aggressors the most, followed by victims and then bystanders (Courtney et al., 2003). Our results supported this view.

Trusting and believing in synthetic characters and possible impact on real-life behaviour appears to be linked to perceived similarity. However, although perceived similarity may be a major factor in engagement with synthetic characters, there is also considerable evidence from the performing arts that engagement can readily occur with characters very dissimilar to oneself.

FUTURE TRENDS

This study has highlighted the potential for similarity and empathic interaction; however, further research is needed in this area. Future research directions include the impact of greater physical similarity on empathic interaction, with research in virtual humanoids considering more realistic and similar features and expressions (Fabri et al, 2004). The importance of cultural similarity is also being investigated (Hayes-Roth et al, 2002) with results suggesting the need for high cultural homogeneity between characters and their users. Whilst similarity may be of benefit, there remains the spectre of the 'Uncanny Valley' (Woods et al, 2004), for example, a recent study examining children's perceptions of robot images revealed that 'pure' human-like robots are viewed negatively compared to machine-human like robots. Research is needed into determining what aspects of similarity need to be provided to enable higher levels of empathic interaction with synthetic characters, considering different modalities, senses and interaction approaches.

CONCLUSION

This article has briefly considered empathic interaction with synthetic characters. The main focus of this article was on the impact of similarity on evoking empathic interaction with child users. Results suggest that if children perceive that they are similar to a synthetic character in appearance and/or behaviour, that they are more likely to like and empathise with the character. Future research is needed to gain greater understanding of the level and nature of similarity required to evoke an empathic interaction.

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TERMS AND DEFINITIONS

Empathy: "An observer reacting emotionally because he perceived that another is experiencing or about to experience an emotion."

Synthetic Character: Computer generated semi-autonomous agent corporally embodied using multimedia and/or robotics.

Virtual Learning Environment: A set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process.

Uncanny Valley: Feelings of unease, fear, or revulsion created by a robot or robotic device that appears to be, but is not quite, human-like

Emergent Narrative: Aims at solving and/or providing an answer to the narrative paradox observed in graphically represented virtual worlds. Involves participating users in a highly flexible real-time environment where authorial activities are minimised and the distinction between authoring–time and presentation-time is substantially removed.

Autonomous robot: A robot that is capable of existing independently from human control

Empathic Agent: a synthetic character that evokes an empathic reaction in the user