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Exploring the Application of Social Robots in Understanding Bullying Perpetrators

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Abstract. This paper examines a novel approach to the problem of bullying by employing Child-Robot Interaction to attempt to understand the causes of perpetrators behaviour. A comparative study was undertaken to understand the efficacy of such an approach. Children aged 9-10 years were first identified on the basis of their bullying perpetration record and characteristics. Half the children were made to interact individually with a social robot and the other half with a human agent over the span of 3 weeks. Our results exhibit that while children opened up to both kinds of agents, interaction with the human agent led to more insightful conversations that enhanced understanding of causes for the perpetrator's behaviour. As expected, the interactions varied from child to child and are to be considered on an individual basis. This is an ongoing study and shall be later extended to employ a hybrid of a within-subject and an in-between subject approach in order to examine the experience of each child individually and holistically.

1 Introduction

Bullying culture has been a persistently prevalent problem in schools across the world with interventions generally involving teachers and counsellors. However it is usually difficult for children to develop trust and open up to such agents given the power dynamic that generally exists between elders and children. A relatable agent with child-like disposition could be an effective alternative. However, children themselves should not be involved as agents of intervention due to unpredictability of their behaviour along with ethical considerations.

Substantial efforts are being made to study and address bullying behaviour. The most recent ones explore the use of social robots. Robots are perceived as social actors, with a recent trend towards building communication robots that participate in human daily life as a peer-type partner [1]. It is acknowledged that social robots have the potential to provide support in several practical domains such as learning and behaviour change [2, 3]. Literature in Child-Robot Interaction shows the potential of using robots as intermediaries in conflict resolution as well as holding the capacity of being viewed as confidants and peers by children [8, 10]. Work has also been done to measure the effects of dehumanization primes and anthropomorphic qualities of the robot on participants' bullying behaviour

towards the robot [12]. Recent work in Child-Robot Interaction has aimed at eliciting experiences of bullying from victims [7]. However, there is an unexplored role robots could play in addressing bullying by attempting to understand and influence the bully’s behaviour. Hence, while realizing the potential role of a bullying perpetrator as a victim of circumstances [13], this paper takes a novel approach to bullying by attempting to understand the causes of perpetrators behaviour via interaction with a social robot. Our research undertook a comparative study between a human and robotic agent to understand the efficacy of such an approach.

2 Methodology

2.1 Participants and Interaction Agents

The study spanned across 3 weeks and constituted of 3 sessions with 12 children aged 9-10 years. Children were selected by combining the results of (i) semi-structured interviews conducted with class teachers to gain insights regarding bullying behavior of students and (ii) Bullying Participant Behaviour Questionnaire (BPBQ), a preexisting self-report test that is used to classify people as bullies or victims [11].

Two groups of 6 children, each, were formed, where the first involved interaction with a robot (P1-P6) and the second involved interaction with a human agent (P7-P12). To avoid ambiguity, children identified as bullies by both teachers and the BPBQ were selected. To maintain homogeneity, they were equally divided into groups based on how they varied on the bullying spectrum with both groups containing some students that were identified as extreme bullies and some that only mildly exhibited the behaviour. To standardize the procedure for comparative analysis, the activity based content was kept similar while the conversations were semi-structured. A Lego Mindstorm robot (named ‘Chotu’, meaning ‘little one’) was presented as a social robot who is new to the school and wants to make friends. Chotu was given the ability to hold a conversation (implemented via Wizard of Oz techniques) along with limited movement. The human agent (one of the research team members) interacted with the second set and was presented as a friendly young individual who is eager to interact with children and make friends. The same member also controlled the robot to eliminate any differences that could arise owing to different personnel.

2.2 Session Design

A multimodal interaction technique was adapted to sustain a long term social interaction with the robot and followed a pattern of ice breaking, trust building and exploring possible causes for their bullying behaviour [2, 5]. 3 sessions were held over the span of 3 weeks and were designed based on the findings of the literature review and further refined after a comprehensive interview with a professional psychologist. During the sessions, only the interacting agent was present in the room with the child.

Session 1 served as an icebreaker to initiate interaction between the child and the interacting agent. The interaction began with the agent greeting the child followed by an introduction. The agent told the child the apparent purpose of visit: to make friends and to interact with children. This was followed up by a conversation about how long the agent will be there, keeping in line with the ethical considerations of such psychological studies. The conversation then transitioned into a two-way exchange about friends and hobbies. This session lasted for 15 min on average.

Session 2 aimed at building trust and a rapport with the child while invoking the child's empathy towards the agent, making it more relatable [10]. The agent greeted the child by name and referred to things mentioned by the child in the previous session to exhibit memory retention. Next, the agent told the child that it had had a fight with a friend and required help. The agent engaged in conversation with the child about the fight and possible solutions and then asked the child to write a letter addressed to the friend to help resolve the conflict.

Session 3 aimed at understanding the child's attitude towards and reasons for bullying, with an increased depth of conversation. Findings show that narratives can be a useful tool to explore children's past experiences with bullying behaviour [6]. In the beginning, the agent let the child know that it was the last session. While proceeding with filler small talk, it was noted whether the child brought up the letter from the previous session. If not, the agent brought the topic up and told the child that his/her help had been invaluable. The conversation then transitioned towards discussing cartoons in general after which the agent asked the child to watch a video cartoon clip showing a child being bullied. Simultaneously, the agent discussed with the child what was happening in the video. Following this, the agent steered the conversation towards their perception of why the child was being bullied in the video, following up with questions like 'have you ever seen this happen?'. Once the child appeared comfortable in the conversation, the agent asked the child if they had ever done something similar. The robot related its own example of bullying and creating mischief so that the child opened up and responded more freely.

3 Results and Discussion

Children expressed a novelty effect with the robot in the first two sessions and associated a whole slew of emotions with the robot. They wanted to help Chotu when it had had a fight, which encouraged them to empathize with the robot and come up with a solution. When told the next day that their solution was helpful, they felt joyed and some believed that they could open up about their own issues. However, as we progressed with the sessions and started to shift towards longer conversations, the children started to become disinterested and tended to steer away from the conversation. Overall, we were able to get some interesting information from children. When children like P1 and P4 talked about their friends, we understood the type of social setting they were in. P5 showed he might have an underlying cause for his bullying since he mentioned that 'we

all have problems at home' and that the victim had probably done something to deserve the beating. On the other hand, P6, P3 and P2 seem disinterested to connect emotionally and paid less attention to what Chotu was saying.

The sessions with the researcher were more successful in that nearly all of the kids opened up about themselves. Some narrated personal incidents that allowed for inferences regarding behavioural tendencies. The kids engaged in conversation with the researcher and most of them were quite expressive, listened with attention and responded well to all questions asked. When the kids were showed the video regarding bullying, they were initially reluctant to admit that they had engaged in such behaviour but after a little probing, admitted to the mischief they had committed. This opening up flowed into a conversation regarding their personal lives and provided very interesting insights. After seeing the video, P7 opened up about her tendency to get annoyed and bother those who refused to sit with her. She also talked about being irritated by her younger brother and the extra attention he received by their mother. P8 mentioned that when he gets upset with his parents, he does not speak to them till they get him something of his liking. He annoys the teachers he does not like and those that are strict. When showed the video, he spoke about how he often got involved in fights with his neighbourhood kids. P11 talked about how she and her friends enjoyed bothering new teachers and how it was a tradition to annoy new teachers before befriending them. P12 said that sometimes he and his friends threw water on each other and bothered the girls but stopped when someone got too annoyed. Inferring from the sessions, among the six kids, P7 and P8 could be categorized as troublemakers while P11 and P12 were infrequent mischief creators. P9 and P10 seemed relatively well mannered and seemed to have been misidentified.

While in both cases the children wanted to open up to the agent, conversations with the human agent were more meaningful as children expressed a lot more of their emotions and problems. Whereas with the robot, this process was a lot more damped. This could be attributed to the decreasing effect of novelty with passing sessions and lack of responsiveness of the robot [4, 9]. The most substantial of them being the limited movement of the robot and the lack of facial and voice expressions. While conversing, the human agent can express a simple nod that expresses a sign of agreement and indicates to the child that the agent is listening and acknowledging and that he can continue talking. These interactions are absent in a robot as a child cannot properly gauge how the robot was responding to their conversations. This can be a reason for why interactions did not last very long with the robot.

Although limited by its number of participants, the study provides some interesting insights and observations regarding children's interaction with human and robotic agents alike and the nature of the relationship formed with both under a comparative framework. The work could be extended to further explore the potential use of robots in mediating classroom relations and bullying behaviour. Since the robot in this study was limited in its movement and expressions, it could be interesting to explore how varying such factors (e.g. by using other robots like NAO) could enhance their application for such a use case.

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