Why Do Children Abuse Robots?

Tatsuya Nomura,
Takayuki Uratani,
Kazutaka Matsumoto
Ryukoku University
1-5, Yokotani, Seta-ohe-cho
Otsu, Shiga 520-2194, Japan
+81-77-544-7136
nomura@rins.ryukoku.ac.jp

Takayuki Kanda
Hiroyoshi Kidokoro,
Yoshitaka Suehiro
ATR Intelligent Robotics and
Communication Laboratories
Keihanna Science City
Kyoto 619-0288, Japan
+81-774-95-1405
Kanda@atr.jp

Sachie Yamada
Tokai University
4-1-1 Kitakaname
Hiratsuka, Kanagawa 259-1292, Japan
+81-463-58-1211
s-yamada@tokai-u.jp

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1. INTRODUCTION
There are many places where social robots will operate around children, such as schools, hospitals, museums, and shops. However, robots sometimes suffer from abusive behaviors from children and young people [1, 2]. Abusive behaviors are also reported for embodied conversational agents [3]. Nevertheless, in these previous studies, it was not revealed why children bully robots.

Psychology has been dealing with children's bullying behaviors towards children and animals. It has been found that children's bullying behaviors are caused by several motives such as feelings of power or dominance over others, or wishes for affiliation with peer groups [4]. Similar motives were reported for animal abuse too [5]. We wonder whether these causes may or may not be applied to abusive behaviors against robots. Here, the question is whether children perceive robots as a kind of human-like (or at least living) entity or not.

Further, the importance of empathy is often argued in the context of children's bullying [6]. That is, children with less empathy tend to be more involved in bullying. It is also discussed that if children were well trained for empathizing with others, they would understand others' pain and discomfort, and hence bullying could be prevented. In HRI, it was reported that people empathize more with human-looking robots [7]. We wonder whether the robot bullying was related with a lack of such empathy.

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Figure 1: Children abusing a robot

To explore the above research questions, we conducted semi-structured interviews with children who bullied a robot. In the research, children's abusive behaviors toward robots were defined as follows:

> "Actions interpreted as infringements on roles robots play or human-like characteristics they pose through verbal or behavioral offences toward the robots that are frequently repeated."

In the study we observed abusive behaviors as follows:

- Persistently obstruct the locomotion of the robot.
- Use of abusive language.

Further, we observed serious abusive behaviors with physical contact such as kicking, punching, beating, folding arms, and moving (bending) the joints of robot's arm and head. Figure 1 shows typical abusing behaviors toward a robot observed in the study. In these scenes, some children frequently obstructed the robot's path regardless of the robot's utterance requesting for the children to stop the obstruction, covered up the robot's eyes with their hands, and beat the robot's head.

2. FIELD STUDY
The study was conducted in a shopping mall in Japan, using a human-sized humanoid robot. When children's aggressive behaviors escalate, we observed that they engage in aggressive actions with physical contacts with the robot. For them, we made the robot to provide explicit negative reactions that the robot recognizes their actions and want the children to stop such actions, imitating what a person would say in such a situation.

When children started to interact with the robot, the interviewer who observed the interaction judged whether they conducted serious abusive behaviors toward the robot. If the behaviors were

regarded as such serious abusive, after the children finished interaction with the robot, the interviewer identified the parents of the children and asked for the parents to allow the conduction of interview for the children. When the parents allowed, we conducted semi-structured interviews with them based on a protocol developed in advance. They were not paid for the participation. Interactions between children and the interviewer were recorded with an IC recorder. The recorded contents were transcribed for the analysis.

Observation of children in the shopping mall was conducted from June 2013 to July 2014. During some weekends and holidays in this period, the interviewers observed visitors in the mall for a few hours per day for 13 days. Children showing serious abusive behaviors toward the robot were detected in nine days of the period. A total of twenty-eight children were interviewed (male: 20, female: 3; 5 years old: 3, 6 years old: 3, 7 years old: 6, 8 years old; 6, 9 years old: 5).

3. QUANTITATIVE ANALYSIS

To extract types of children's perspectives on the robot and reasons for abusive behaviors, we employed the KJ method [15]. For a half of the responses (N = 12), we extracted sentences corresponding to: (1) whether respondents perceived the robot as human-like, and the reason why, (2) why he/she showed their abuse behaviors toward the robot, (3) whether he/she perceived the robot having a capability to perceive their abuse behavior as painful and/or stressful. Then, they made groups of responses, and established categories for each item. Then, two coders independently assigned responses from each respondents (N = 23) to one of these categories on each items. Their coding matches well. The κ-coefficients were .814, .926, and .686 for these items. The coders finally determined the category of each response based on discussion. When any of the coders decided that a response did not include any answer for the question, the response was treated as a missing data.

The majority of the respondents (N = 17) perceived the robot as human-like. Many of these participants attributed that their perceptions were due to the robot's motions and utterances. Most of them mentioned its motions and utterances. Four respondents mentioned its intelligence or smartness. In contrast, four respondents mentioned that the robot looked like a machine. Overall, the majority (74 %) of the children perceived the robot as human-like, while some children (13 %) perceived it as machine-like.

On reasons for abusive behaviors, five respondents explained their reasons for abusive behaviors toward the robot as curiosity. Eight respondents explained their reasons for carrying out abusive behaviors toward the robot as enjoyment. Four respondents mentioned that their behaviors were triggered by others who conducted abuse behaviors. Overall, although the interviewed children were those who committed various physical aggressive actions toward the robot, they explained their behavior only from their perspective, such as for curiosity (22%), for enjoyment (35%), or triggered by others (17%). Only one child mentioned that he explicitly intended to threaten the robot.

A half of respondents (N = 11) reported that the robot perceived their abuse as stressful or painful. Five respondents explicitly mentioned that the robot perceived nothing from their abuse behaviors. Overall, about a half (52 %) of children assumed that the robot had capability in perceiving their abuse behavior, while some (22 %) children did not.

4. DISCUSSION

Many of the children who displayed abusive behaviors toward the robot in the field study mentioned the reasons as curiosity, enjoyment, or triggered by others. Most of them did not explicitly mention their intention to hurt the robot. There seems considerable overlap with motivations for human/animal abuse [4, 5]. Moreover, we found that the majority of them did not regard the robot as just a machine, but a human-like entity. Thus, we consider that they would assume the robot as human-like others, yet engaged in the abuse, mentioning the reason as curiosity or enjoyment. Furthermore, we found that about half of the children believed the capability of the robot of perceiving their abusive behavior. It suggests that these children lacked empathy for the robot (i.e. they know, but did not empathize). On the other hand, some children did not acknowledge the robot's capability of perceiving abusive behaviors, meaning that these children's behavior is not necessarily sourced in the lack of empathy problem.

From this finding, we speculate that, although one might consider that human-likeness might help moderating the abuse, human-likeness is probably not that powerful way to moderate robot abuse. Instead, one possibility is to explore the way to elicit children's empathy for robots. In the case that children abuse a robot regarding it as an entity closer to a machine than a human, we face a question: whether the increase of human-likeness in a robot simply leads to the increase of children's empathy for it, or favors its abuse from children with a lack of empathy for it. In order to investigate answers for this question, we need more data to explore more factors influencing the behaviors.

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