Robot-Mediated Interviews with Children: What do potential users think?

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Abstract. When police officers are conducting interviews with children, some of the disclosures can be quite shocking. This can make it difficult for an officer to maintain their composure without subtly indicating their shock to the child, which can in turn impede the information acquisition process. Using a robotic interviewer could eliminate this problem as the behaviours and expressions of the robot can be consciously controlled. To date research investigating the potential of Robot-Mediated Interviews has focused on establishing whether children will respond to robots in an interview scenario and if so how well. The results of these studies indicate that children will talk to a robot in an interview scenario in a similar way to which they talk to a human interviewer. However, in order to test if this approach would work in a real world setting, it is important to establish what the experts (e.g. specialist child interviewers) would require from the system. To determine the needs of the users we conducted a user panel with a group of potential real world users to gather their views of our current system and find out what they would require for the system to be useful to them. The user group we worked with consisted of specialist child protection police officers based in the UK. The findings from this panel suggest that a Robot-Mediated Interviewing system would need to be more flexible than our current system in order to respond to unpredictable situations and paths of investigation. This paper gives an insight into what real world users would need from a Robot-Mediated Interviewing system.

1 INTRODUCTION

The use of social robots for children has been explored by various research groups in a number of different domains for many years. One area that appears to be particularly promising is the application of social robots for children with special needs such as Autism. More recent research has investigated how robots could potentially be used in an interview scenario with both neurotypical children and children with special needs [1-5]. To date the research in the area of Robot-Mediated Interviews has focused on researchers directly working with children to test the concept and establish how children respond to a robot in an interview setting. The next logical step is to establish what real world users would require from a Robot-Mediated Interview system. If robots are to be used for this application in a real world setting, proving that it works in theory with a rigid set of questions and a technical user at the controls is not sufficient. The system needs to be used by experts who have experience and specialist training in interviewing children to establish if this is a system and approach that would genuinely be useful for child interviewers. To address this question we conducted a user panel with police officers that specialise in child protection.

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2 BACKGROUND

Research investigating the potential of social robots has covered a wide variety of concepts from robotic pets such as the AIBO dog [6], to huggable robots such as PROBO [7], to general humanoid robots such as NAO for investigating a range of HRI possibilities [8]. There has also been a vast amount of research investigating how robots such as KASPAR and Keepon can be used to help children affected by special needs with various aspects of social interaction [9-11]. One of the most recent applications being explored with robots such as KASPAR and NAO is the possibility of Robot-Mediated Interviews [1-4]. Robot-Mediated Interviews is an application area where robots are used as an interface to interview young children. Recent studies suggest that children respond to a robot in an interview scenario in a similar manner to which they do a human interviewer [1, 4]. Although the results of these studies suggest that a robot is simply equal to a robot in an interview scenario, it is thought that there may be some potential advantages to using a robot, particularly in sensitive cases, or cases involving children with special needs. Case studies indicating how children with special needs respond to robots in an interview situation have found that in some instances the children appear to be more engaged with a robotic interviewer [3].

When police officers are conducting interviews with children that have been through a stressful or traumatic ordeal, the information that a child discloses can be quite shocking and surprising. In these situations it can be difficult for the interviewer to maintain their composure without subtly and unintentionally indicating their thoughts and feelings, despite their extensive training. Children can sometimes recognise these subtle indications, and this can have a detrimental effect on their ability or willingness to recall events during an interview. Using a robotic interviewer would negate this problem because the expressions and body language of the robot can be explicitly controlled. Aside from ensuring that the child does not detect shock or surprise, it is also important that an interviewer does not appear to assume that someone is guilty and to conduct the interview in a neutral manner. Therefore it is important that the body language of the interviewer does not influence the child [12] p66. Recent research suggests that body language can play a role in misleading witnesses. The paper entitled "A nod in the wrong direction: Does nonverbal feedback affect eyewitness

confidence in interviews?" [13] found that participants who received positive nonverbal feedback whilst being interviewed were more confident with their answers than participants that received negative nonverbal feedback. In this study positive nonverbal feedback was a subtle nod of the head and negative feedback was a subtle shake of the head. Nonverbal behaviours such as facial expressions and hand gestures are often produced automatically and spontaneously [14-16]. Gurney's 2013 paper [13] concluded that "common nonverbal behaviours (head nodding and shaking) that are likely to occur in interviews can have an impact on eyewitnesses' confidence judgements.", and highlights that "By altering the confidence witnesses attribute to their testimony, police interviewers can manipulate precisely the quality that eyewitnesses are often judged upon.". In a courtroom scenario jurors often place a lot of trust in confident eyewitness [17], therefore it is important to ensure that both the questions and body language of the interviewer are not leading. Using a robot to interview a person could eliminate any of the subtle unintentional signs in body language that a human interviewer may give away as the body language of the robot can be fully and precisely controlled by the interviewer.

In addition to body language the mere perception of a person's authority can sometimes have an effect on a witness, particularly with regards to suggestibility [12] p56. The Achieving Best Evidence (ABE) document used by the police in the UK suggests that reducing the perceived difference in authority between the interviewer and witness will reduce the possibility of a witness complying with a leading question, "Paying attention to the appropriate form of address at this initial greeting phase can help send a message of equality both now and throughout the interview. This is essential as it reduces the perceived authority differential between interviewer and witness, so that witnesses are less likely to comply with leading questions. As no interview can be perfect, it is essential to build resistance against inappropriate questions, which may unwittingly be used by an interviewer later in the interview." [12] p187. Using a robot could negate this problem because the robot is clearly not an adult and may not be viewed in the same way.

3 METHODS

In order to establish if Robot-Mediated Interviews would be genuinely useful to real world users we conducted a user panel with police officers that specialise in child protection. When conducting the user panel we had 2 main research objectives:

- To gather the participants thoughts on the research conducted to date
- To gather feedback or what professional users would require in terms of the interface and operation for such a system to be useful to them.

To gather answers to these questions, it is important to involve the users in the design process, this is often referred to as UCD (User Centred Design). UCD helps to ensure that the user's needs are met by ensuring that the user, the requirements and the context of use are specified defined [18-20]. UCD is often a recursive process involving multiple iterations of feedback over the evolution of system or design. In the case of this research, this is one of the first user panels to be conducted, because this is relatively new field of research. Feedback on the specific aspects outlined, allowed us to critique the research carried out to date, and draw a set of requirements that real world users would need from a Robot-Mediated Interviewing system.

3.1 Participants

The user panel was held with a specialist joint child protection investigation team in Hertfordshire, with 11 members of the team participating. The team consisted of both police officers and social workers that specialise in working with children. The members of the team continually undergo specialist training that provides them with specific skills to interview vulnerable victims and witnesses. The types of cases that the team would deal with include, internet-based child abuse, complex abuse enquiries within a family environment, sexual abuse of children, and child homicide. In many of these cases it is necessary to interview children in order to gather evidence; therefore this is a routine activity for many of the members of this team. Since the members of this investigation team have to deal with such a wide variety of cases on a daily basis, it means that they are ideal candidates for providing feedback on whether a Robot-Mediated approach would be useful to police interviewers and if so what they would require from such a system. The participants of the panel had no knowledge of this particular area of research involving robotics, and were recruited via a contact within a local police constabulary.

3.2 Procedure

The user panel lasted approximately 90 minutes, and whilst the discussions were taking place, notes were taken to highlight any key points that were made. The sessions began by giving a brief background to the research including the previous studies that had taken place. This introduction and background also included a selection of videos illustrating work from previous studies. Immediately after this briefing the participants were asked the following questions:

- From what you have seen do you think that this is a tool that could be useful to you? If so…
- Do you think you would use a tool like this? If so…
  - How and at what stage?
  - With what children?
- Can you think of any specific scenarios where a tool like this would be particularly useful?
- How would you expect to operate this robot?
- What would be the most important features you would expect to see in an interface?

After gathering feedback to these questions the participants were then briefed on the operation of the robot. Details describing the operation of the robot were specifically avoided prior to the initial feedback in an effort to avoid constraining the thought process of the participants on how the robot should be operated. Following the current operational description of the robot, we then participants we then gathered opinions on what the participants would require from a Robot-Mediated Interview system by asking the following questions:

- What features must the interface of the robot have?
- What features would you like to have?
- Could you rank the importance of the features?

These questions completed the session and provided us with a clearly defined set of user requirements to follow when developing a new interface that could be used by a professional interviewer.

4 RESULTS AND DISCUSSION

The findings from the user panel are split into 5 sections each of which addresses an aspect relating either to the completed research or suggestions for the future direction of the work.

4.1 Thoughts on previous work

When asking for feedback on our previous work we found that the participants were not surprised that the children spoke to the robot in a similar manner as they did the human interviewer. The participants explained that children will often talk to puppets in a similar way to which they talk to a person, even if it is obvious that the puppet is being controlled by someone else. The participants also noted that the children in the previous interviews had no stress associated to the questions that they were being asked. They stated that the results might have been different if the questions would have been of a sensitive or stressful nature. This is a fact that we were aware of but for ethical reasons we are unable to conduct this type of study ourselves. A study of this nature would need to be conducted by professional interviewers with the appropriate experience and expertise in this field to carry out this type of study properly and without psychological harm to the children. Another aspect relating to our previous work was related to visible levels of stress from the child being interviewed. It was explained that in court cases some level of stress or emotional involvement is expected to be seen from the child for the case to be taken seriously by the prosecution. If a child appears to be too comfortable and not showing any signs of emotional stress, this can actually harm the prosecution, as people usually have preconceived ideas about how a child should be reacting when being questioned about sensitive issues. This is a factor that had not previously been considered but is only likely to become an issue much further in the future if evidence was being collected by a robotic interviewer for court proceedings. Currently our research is clearly focused on establishing how well children interact with a robot in an interview scenario. The participants of the panel went on to say that a disclosure from a child to a robot that could not be used as evidence in court is still better than no disclosure because if the child is in any immediate danger measures can be put in place to protect that child.

4.2 Would experts use this system and where do the main benefits lye?

When asked, the participants of the panel believed that the system would not be used as it currently stands because it is too restrictive. The group clearly stated that the system would need to be far more flexible and have the ability to respond to any question, as the nature of the interviews with children is often unpredictable. The participants stated that if the flexibility of the system were to be improved then using the system could be considered. The group believed that it was unlikely that the system would be used with typically developing children as there is less opportunity and flexibility for using aids to interview them. Therefore, efforts should be focused on working with children affected by special needs such as autism, as these are the children that professionals would be looking at using this type of approach with. In addition to this the general consensus of opinion was that this is where the main benefits of a Robot-Mediated approach may lie. There are very well documented approaches and established successful methods for interviewing typically developing children. Interviewing children with special needs is much more difficult and as a result prosecution and conviction rates for cases involving a child witness affected by a special need is much lower, despite the fact that children with special needs are much more likely to be the victim of abuse. The participants mentioned that they are given more opportunity to use interview aids with children that have special needs than typically developing children. These facts coupled with the research suggesting that children with special needs respond well to robots, presents a strong case for further investigation in this area.

4.3 Potential complications and advantages of Robot-Mediated Interviews

The participants of the panel raised a point about children slipping into a fantasy type scenario when using interview aids. One of the difficulties of using aids/props in an interview scenario is the potential for the children to view the situation as a fantasy. In a fantasy world it would be acceptable for the children to make things up and fantasise. This would obviously present a problem when a child is giving evidence. KASPAR could potentially get around this problem as it has a human like appearance, however, this would need further consideration and investigation to ensure that children do not see talking to KASPAR as a fantasy situation. Talking to KASPAR would need to be just as serious and as real as talking to a person. This point would also indicate that KASPAR may potentially be more appropriate than a robot such as NAO because it has a human type appearance and children may be less likely to slip into a fantasy type scenario as a result of the robots more human like appearance. Furthermore the results of quantitative and qualitative analysis from our three separate studies with 46 children, indicated that the children interacted with the robot in a similar manner to which they did a human interviewer in terms of the way they interacted and the information they provided [2-4].

The group also brought up a potential unforeseen advantage of a robot interviewer with regards to performing interviews in a more fluid and uninterrupted manner. Currently as the UK rules stand, if a member of the investigation team thinks of a useful question to ask the child while an interview is taking place (even the technical camera person), the child must be asked that question to give them the opportunity to disclose. The participants said that this sometimes results in pieces of paper being slid under the door of the interview room by other officers that are monitoring the interview, which can be very distracting to the child and can sometimes interrupt the interview. KASPAR could negate this problem as a team of officers could control the robot remotely and would be able to offer the child a seamless interview with no such interruptions.

4.4 Aesthetics of the robot

In addition to the specific information we aimed to capture from the participants, an additional area of feedback about the aesthetics of the robot seemed to form itself during the session. Some of the feedback from the participants related to the visual

and audible aesthetics of the system. It was noted that the robot looks disproportionate and is strangely clothed. The participants stated that the KASPAR appears to have a full sized male head on a child's body and this could be interpreted as an adult trying to act like a younger person. This could present a problem because individuals that abuse children often try to present themselves in a childlike manner. The neither adult nor child look of the robot could be confusing to a child, or actively problematic if the child had been abused by an adult trying to portray the image of a child. This is an important aspect that will need further consideration when building and dressing future implementations of the robot. However, it is also important to take into account children's view of the robot. The KASPAR robot has been used with numerous children since 2006 and this has not presented a problem in the past. It is possible that the participants of this panel had some preconceptions about how children would respond to a robot with such an appearance. More recent versions of KASPAR are more proportionate, partially addressing this concern. The concerns about an adult trying to impersonate a child were also extended to include the aesthetics of KASPAR's voice. The participants commented that KASPAR's voice was not very childlike and it would be better to have a more childlike but still slightly robotic voice to help maintain the impression of the robot.

Figure 3. KASPAR interviewing child

4.5 Interface and operation of the robot

The interface of the robot was discussed in terms of how the robot should be operated. In our three studies prior to conducting this panel, pre-recorded sayings and sequences of movement were programmed into the robots java based GUI. These sayings and sequences were triggered via buttons on the GUI. The system was limited to the sayings and sequences that had been pre-programed into the system prior to use. The interviewer controlling the system was in a remote location and would monitor the situation via a monitor and headset connected to a camera in the interview room.

Currently as the interface stands it was universally agreed that the system would not be useful to expert interviewers due to the limitations and lack of flexibility of the system. The system needs to be more flexible with freedom to respond to and ask questions spontaneously. The interviews that the police have with children are often very spontaneous in nature and the direction of the interviews is often unknown and unpredictable: "no two interviews are the same, you try what you think will work and if it doesn't you will use your experience and try another approach". It was agreed that the most effective way of accomplishing this would be to have a direct link to the robot where the interviewer's voice would be converted and spoken by the robot in the remote location. The participants of the panel believed that body language is less important. It was commented that too much body language could be distracting to the child. In addition to this, research suggests that inappropriate body language can actively mislead witnesses in interviews [13]. Having a robot who's gestures you can consciously control could remove this problem all together.

5 CONCLUSIONS

5.1 Summary

The overall summary from the user panel was that the experts would only be interested in using such a system with children affected by special needs due to the rules under which they operate, as well as their belief that this is where the greatest potential for the system lays. As the system currently stands, it would not be usable to them due to the limited scripted nature of the system. Nevertheless, if the flexibility of the system were to be improved they believed that this approach may be useful in cases involving children with special needs and communication difficulties. The participants did however caution us about the legal acceptability of evidence acquired by the robot and stated that this could prove problematic in a court of law, and that this would need to be investigated in more detail before they could rely on such an approach. It is possible that one case would need to be tried first as a test case to establish whether this approach could be used to pave the way for future legal cases.

5.2 Supporting information on suggested target group

In addition to the participants view that the system should be targeted at children with special needs and communication difficulties, there is also research that suggests children with a disability are more likely to be a victim of abuse than a child without a disability. A systematic review of 17 papers and concluded that children with a disability are up to four times more likely to be a victim of abuse than children without disabilities [21], however, the number of cases that result in prosecution is relatively low [22, 23]. Interviewing children with special needs can be very difficult, particularly when talking about a sensitive or emotionally provocative topic or event, because children who cannot communicate well often will not be believed [24]. The ABE suggests that when interviewing children with special needs or communication difficulties, the interviewer(s) should seek advice from a specialist who is familiar with the specific procedures for working with children affected by a disability or communication difficulties [12] p172. Because children affected by disabilities can have difficulties communicating, sometimes props and intermediaries are used to help facilitate communication [12] p89. Props may be used for a number of reasons including, the assessment of a child's language or understanding, to keep a child calm or settled, to support the recall of events, or to enable a child to give an account of events. Using props must be approached with caution

as there are risks and pitfalls associated to using props [15] p89. The risks associated with using props include: potential legal challenges, distortions or inaccuracies (mostly associated with dolls), the potential to stimulate play or fantasy (associated with teddies or animals), and the risk of upset to the carer or child from explicit use of dolls or drawings. Nevertheless, when used appropriately props can be useful tools for interviewing when common techniques are proving ineffective. The research on Robot-Mediated Interviews is working on the basis that KASPAR could effectively be used as a prop similar to the other props mentioned in the ABE.

5.3 Requirements for a Robot-Mediated Interviewing system

From the user panel we established that a Robot-Mediated approach would be considered by experts, provided that the system would allow sufficient flexibility. The primary requirements of a Robot-Mediated Interviewing system for use by expert interviewers are:

- A direct speech interface that converts the voice of the interviewer
- A small selection of gestures that can be activated by a visual GUI
- An automated blinking behaviour so the interviewer can focus on the interviewing the child rather than operating the robot

6 LIMITATIONS AND FUTURE WORK

Although there were individuals from different disciplines in this panel, the participants all worked in the same area and the same geographical location which is a limitation. In order to build a more complete specification of what real world users may want from a Robot-Mediated Interviewing system we aim to conduct 2 more user panels with different potential user groups to establish if they have any other requirements for such a system. It is important to develop a system that will appeal to multiple user groups to ensure that the system is sufficiently flexible, and can be used in various situations where there is a need to interview a child. Upon defining a more detailed set of requirements, we plan to implement those requirements and arrange for an expert interviewer to evaluate whether this is an approach they consider would be beneficial to expert interviewers in general. Testing the system with potential users is a crucial step in establishing if this is an approach that will work in a real world situation and genuinely benefit professional interviewers.

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REFERENCES

[1] C. L. Bethel, M. R. Stevenson, and B. Scassellati, "Secret-sharing: Interactions between a child, robot, and adult." pp. 2489-2494.

[2] L. J. Wood, K. Dautenhahn, H. Lehmann, B. Robins, A. Rainer, and D. S. Syrdal, "Robot-Mediated Interviews: Does a robotic interviewer impact question difficulty and information recovery?," in 12th European AAATE Conference, Vilamoura, Portugal, 2013.

[3] L. J. Wood, K. Dautenhahn, H. Lehmann, B. Robins, A. Rainer, and D. S. Syrdal, "Robot-Mediated Interviews: Do robots possess advantages over human interviewers when talking to children with special needs?," in International Conference on Social Robotics, Bristol, UK, 2013.

[4] L. J. Wood, K. Dautenhahn, A. Rainer, B. Robins, H. Lehmann, and D. S. Syrdal, "Robot-Mediated Interviews-How Effective Is a Humanoid Robot as a Tool for Interviewing Young Children?," *PLOS ONE,* vol. 8, no. 3, pp. e59448, 2013.

[5] C. L. Bethel, D. K. Eakin, S. Anreddy, J. K. Stuart, and D. Carruth, "Eyewitnesses are misled by human but not robot interviewers." pp. 25-32.

[6] B. Barlett, V. Estivill-Castro, and S. Seymon, "Dogs or robots—Why do children see them as robotic pets rather than canine machines?," in 5th Australasian User Interface Conference (AUIC2004), Dunedin, 2004.

[7] J. Saldien, K. Goris, S. Yilmazyildiz, W. Verhelst, and D. Lefeber, "On the design of the huggable robot probo," *Journal of Physical Agents,* vol. 2, no. 2, pp. 3-12, 2008.

[8] I. Kruijff-Korbayová, G. Athanasopoulos, A. Beck, P. Cosi, H. Cuayáhuitl, T. Dekens, V. Enescu, A. Hiolle, B. Kiefer, and H. Sahli, "An event-based conversational system for the Nao robot." pp. 125-132.

[9] B. Robins, K. Dautenhahn, and P. Dickerson, "From isolation to communication: A case study evaluation of robot assisted play for children with autism with a minimally expressive humanoid robot." pp. 205 – 211.

[10] J. Wainer, K. Dautenhahn, B. Robins, and F. Amirabdollahian, "A pilot study with a novel setup for collaborative play of the humanoid robot KASPAR with children with autism," *International Journal of Social Robotics,* vol. 6, no. 1, pp. 45-65, 2014.

[11] H. Kozima, M. Michalowski, and C. Nakagawa, "Keepon: A Playful Robot for Research, Therapy, and Entertainment," *International Journal of Social Robotics,* vol. 1, no. 1, pp. 3-18, January, 2009.

[12] UK Government, "Achieving Best Evidence in Criminal Proceedings: Guidance on Interviewing Victims and Witnesses, and Using Special Measures," Home Office Criminal Justice System, 2011.

[13] D. J. Gurney, K. N. Vekaria, and N. Howlett, "A Nod in the Wrong Direction: Does Non-verbal Feedback Affect Eyewitness Confidence in Interviews? 1," *Psychiatry, Psychology and Law,* no. ahead-of-print, pp. 1-10, 2013.

[14] P. Ekman, "Darwin, deception, and facial expression," *Annals of the New York Academy of Sciences,* vol. 1000, no. 1, pp. 205-221, 2003.

[15] R. M. Krauss, "Why do we gesture when we speak?," *Current Directions in Psychological Science,* vol. 7, no. 2, pp. 54-60, 1998.

[16] D. McNeill, *Hand and mind: What gestures reveal about thought*: University of Chicago Press, 1992.

[17] A. L. Bradfield, and G. L. Wells, "The perceived validity of eyewitness identification testimony: A test of the five Biggers criteria," *Law and Human Behavior,* vol. 24, no. 5, pp. 581-594, 2000.

[18] D. A. Norman, and S. W. Draper, *User Centered System Design; New Perspectives on Human-Computer Interaction*: L. Erlbaum Associates Inc., 1986.

[19] ISO, "13407: Human-centred design processes for interactive systems," *Geneva: ISO,* 1999.

[20] M. Scaife, Y. Rogers, F. Aldrich, and M. Davies, "Designing for or designing with? Informant design for interactive learning environments." pp. 343-350.

[21] L. Jones, M. A. Bellis, S. Wood, K. Hughes, E. McCoy, L. Eckley, G. Bates, C. Mikton, T. Shakespeare, and A. Officer, "Prevalence and risk of violence against children with disabilities: a systematic review and meta-analysis of observational studies," *The Lancet*, 2012.
[22] V. Turk, and H. Brown, "The sexual abuse of adults with learning disabilites: results of a two year incidence survey," *Mental Handicap Research*, vol. 6, no. 3, pp. 193-216, 1993.
[23] M. McCarthy, and D. Thompson, "A prevalence study of sexual abuse of adults with intellectual disabilities referred for sex education," *Journal of Applied Research in Intellectual Disabilities*, vol. 10, no. 2, pp. 105-124, 1997.
[24] Mencap, "Submission to the Sex Offences Review," 1999.