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Child development robots

Social forces, children's perspectives

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Robotics is pushing full steam ahead, to use a 19th century metaphor, in the development of robots as monitors, entertainers, companions, and care providers for children. This timely article sounds a clarion call for ethical appraisal of the possible consequences of “exclusive or near-exclusive care of a child by a robot” (p.10). As technology endows robots with ever more sophisticated capacities in touch, conversation, face recognition, and emotion recognition, and marketers tout the myriad benefits of robot care to harried parents, the use of robots in many aspects of a child's life is likely to proliferate. Sharkey and Sharkey explore the possible perils for child well-being of expanded use of robots as safety monitors, as entertaining companions, and especially as exclusive child care providers. Robot monitoring raises issues of child privacy and autonomy, robot companionship raises issues of deception, and robot care raises issues of child psychological and emotional harm. Given these concerns, the authors urge the establishment of ethical guidelines and legal structures of accountability. International standards are needed, since robot development, distribution, and marketing – like almost all technology – are global, with the most rapid growth in Japan and South Korea.

In this commentary, I explore a number of questions raised by this important and provocative piece: (1) How does the current and anticipated proliferation of robot technology in children's development reflect the larger societal context of contemporary child-rearing in North America and Western Europe? While recognizing that child-rearing contexts are highly diverse, I address this question by examining the following trends: (a) a child-rearing focus on cognitive stimulation and acceleration, particularly in the first five years of life; (b) increasing adaptation to social pseudo-interactions with technology; and (c) increasing adaptation to mediated interactions with biological forms (humans, non-human animals, and plants). I argue that these social trends are driving the dissemination and acceptance of child-focused robot technology. If robots are inexorably moving into

children's lives, then these additional questions also become important: (2) How are children's ideas about and interactions with robots similar to and different from their engagement with other entities, such as non-human animals and other technologies? (3) Given these similarities and differences, what are the implications of robots in children's lives for their development? Finally, based on these questions, I speculate on ways that robotics might become integrated into a child's life in ways that are, if not beneficial, then neutral with respect to child-wellbeing.

1. Child development robots

In addition to the functions of child safety, entertainment, companionship, and care, robots also are likely to be increasingly marketed as child development aids. Highly educated and technologically savvy parents, likely to be first adopters of new technologies (Lee, Bartolic, & Vandewater, 2009), may be especially vulnerable to the purported appeals of 'child development robots', especially those tagged as accelerators of cognitive advancement. A powerful appeal to many parents is the claim that an entertaining robot is, at the same time, teaching their young child foundational skills – numbers, colors, shapes – more effectively than a human could. The robot can be seen as a personable computer, tirelessly cheery, available and engaged with the child in learning tasks. The expected advances that Sharkey and Sharkey describe for future robots in interactive capacities through voice, face, emotion, and language recognition may lead many parents to believe claims that a 'child development robot' is *more* not less skilled than a distracted multi-tasking parent. To the extent that the robot creates for parents the illusion of full social engagement with their child, they may believe that the robot is a more entertaining and attention grabbing context for learning than the parents themselves.

Widespread recognition of the importance of early intervention and enrichment may make many parents further vulnerable to the claims of new educational technology, particularly when adopted by key members of one's social network. In addition, parents recognize that they are preparing their child to function in a technological future likely to be quite different from the present. The desire to ensure that even very young children become technologically savvy as early as possible puts computers in toddlers' bedrooms, play cell phones and remote controls in their toy boxes, and robotic pets like Furby in their cribs. To keep their child ahead of the technology curve, parents may feel an obligation to acquire the latest robot, thought to enrich child development.

2. Adaptation to pseudo-interactions with technology

The anticipated (and feared) proliferation of robot care for children should be seen in the wider context of decreasing societal investment in face-to-face human–human interactions and relationships. In the service of economy, efficiency and convenience, many social transactions, both routine (buying and selling goods, ordering and providing services) and intimate (online dating), have shifted to online transactions and voice recognition computer exchanges. Increasingly, parents and children are accustomed to conducting pseudo-interactions with various voice-activated systems. As robotics becomes more sophisticated in mimicking human and animal responses, a robot's approximations to the 'real thing' may seem 'good enough'. The value-added component of a living being (human or non-animal) may cease to be apparent.

3. Mediated interactions

Related to adaptations to pseudo-interactions with technology is adaptation to mediated experiences with organic, biological forms. Children and parents are increasingly experiencing nature through documentaries, virtual gardens, and pictorial displays, rather than directly. For example, in interviews with eight to fourteen year olds living in rural Arizona near several U. S. national parks, 60% felt they had seen more animals on television and in movies than in the wild. A 1992 survey of U.S. fifth and sixth graders found that only 9% reported learning about the environment at home and in the wild, while the majority cited the media as their major source of information (Nabhan & Trimble, 1994). Although an estimated 75% of U. S. children are growing up with pets, children's direct exposure to other animals is severely limited and shrinking (Melson, 2001).

Taken together, a parenting focus on cognitive stimulation and technological literacy, social adaptation to pseudo-interactions with technology and reliance on mediated interactions with biological forms converge to provide fertile ground for receptivity to robotics in children's lives as monitors, entertainers, educators, and caregivers. These social trends may weaken any skeptical impulses that parents and other child-rearers might bring to child development robots of various kinds.

4. Children's ideas about and interactions with social robots

Given such social trends, it is important to understand how children are thinking about and responding to the social robots currently in existence. Studies of children (preschool through adolescence) with the robotic dog AIBO (Kahn, et al., 2006;

Melson, Kahn, Beck, & Friedman, 2009; Melson, et al., 2009) suggest that in responding to and thinking about a novel social robot, children incorporate some elements of their preexisting responses to comparable objects. For example, preschool age children affirm to a similar extent the biological, mental, social and moral properties of AIBO and of a stuffed dog of similar size, color and shape. Thus, 49% of the children agreed that AIBO “could have babies” while 45% thought that the stuffed dog could, a non-significant difference (Kahn, et al., 2006). Children ages 7 to 15 appear to assimilate some ideas about living dogs, including their own pets, in talking about and responding to AIBO (Melson, et al., 2009).

While there is evidence of assimilation of the novel robot to existing mental schema, to use a Piagetian framework, there also is evidence of accommodation; that is, emergence of new ways of thinking and behaving. These new ways recognize that a social robot that emulates the form and behaviors of a living being – in this case, a dog – is both like and unlike that dog. For example, preschool children explore AIBO as an artifact – shaking, poking to determine how it ‘works’ – more frequently than they explore a stuffed dog, and they attempt to interact reciprocally much more frequently with AIBO, using hand motions, commands, questions and ball offers (Kahn, et al., 2006). Similarly, older children attribute properties of both living dogs and machines/computers to AIBO. In open-ended responses, some children grope for the language to describe this new category of objects. For example, one 8 year old, agreeing that AIBO was “alive,” explained: “He’s alive in a robot-kind of way, not a real way” (Melson, et al., 2009).

Studies of AIBO and other commercially available ‘sociable robots’ (Turtle, et al., 2006) suggest that children think about them neither as simply machines nor as equivalent to their living analogues, but as some amalgam, a new ontological category. As Turtle, et al. (2006) note, they are ‘evocative objects’ between the living and the not living.

5. Implications of child development robots for children’s lives

The cognitive, social and moral implications of social robots functioning as purported ‘aids’ to child development are unclear. Sharkey and Sharkey raise justifiable alarms about “exclusive robot care”. There are additional concerns. Will social robots displace or substitute for time spent with other living beings – family members, pets, friends, and teachers? Would social robots, however sophisticated, provide constricted and impaired quality of interaction when compared to living others? On the other hand, might such robots stimulate children to think creatively about what it means to be alive, to connect with others, and to have feelings and thoughts (Turtle, et al., 2006)?

Would children, as they think about robots as more 'alive,' begin to think about humans and animals in more mechanistic terms? Melson, et al., (2009) found that 7 to 15 year old children who reported higher involvement at home and at school with technologies, such as computers, PDAs, DVDs, and other media, were less likely than other children to recognize the psychological autonomy and moral standing of an unfamiliar living dog. Specifically, they were less likely to see the living dog as having thoughts, feelings and intentions and less likely to view the dog as having the right to just treatment and to be free from harm. By contrast, same age children who had higher attachment to their pets at home (all the children in this study had dogs as pets) ascribed *more* psychological autonomy and moral regard to the unfamiliar living dog. These findings raise the disturbing possibility that adaptation to robotic interactions may dilute the 'I-thou' relationship of humans to other living beings, particularly pets.

6. Living with child development robots

If social trends inexorably bring robots into children's lives, a parallel emphasis on 'robotic literacy' might be encouraged for parents and children alike. Such 'literacy' would help adopters of this technology understand: (1) how robots are produced, maintained and operated, emphasizing their human-produced properties; (2) what the limits and potentials are for various robotic technologies; and (3) what the distinctions are between living and 'pretend' living – stuffed animals, puppets, robots. Sociable robots also can be a springboard for discussions about aliveness, about feelings, and about relationships, particularly in the hands of skilled therapists or teachers, much as animal-assisted therapy functions.

We also might empower children in the design and use of social robots. For example, in interviews with children about future robot pet technology, children expressed the desire for robots to have fur or be soft to touch, and never to have claws or sharp teeth that could harm others (Melson, et al., 2009). In general, the ethical implications of treating machines 'as if' they were living (and the potential to treat the living 'as if' they were machine-like) should receive urgent attention in the context of children's developing moral reasoning.

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