Normativity assumptions in the design and application of social robots for autistic children

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Abstract

Social robots interact with human beings and are used for a variety of therapeutic purposes, for example in interaction with children with neurodevelopmental disorders. A key ethical issue related to the application of social robots in these contexts is the idea of normativity, involved in both the design of social robots, i.e., the use of such robots to portray or mimic what is normal and to identify deviant behaviour or development. The article presents the beginnings of a framework for incorporating divergent opinions of normal social functioning, particularly neurodiversity, into the design and application of social robots.

Keywords

Social robots, neurodiversity, normativity, ethics, therapy, diagnostics, testing, Autism Spectrum Disorder, autistic

1 INTRODUCTION

Social robots are designed to interact with human beings and are increasingly used in social contexts. Such robots have different embodiments and can resemble, for example, toys, pets, or humans. These robots are useful for therapeutic purposes, for example in interventions with children with neurodevelopmental disorders, as the robot's behaviour is both predictive and repetitive, and less complex or intimidating than humans', which positively impacts the development of specific therapies and interventions, including those geared towards autistic children.

An important question is whether autistic children are open and willing to interact with social robots. As a group, autistic children are heterogeneous, meaning that just as in other populations the interest to interact with technology such as robots will vary from person to person. Therefore, usage of technology-based interventions for each individual must be monitored and tailored to fit the child's needs and preferences. Nevertheless, there are studies that report that autistic persons report higher use of technology and choose different computer-based learning forms more often than other groups [1]. Further, acceptability of, for example, usage of technological tools such as virtual reality head mounted displays seems to be broadly accepted by autistic persons [2], and acceptance rates are reported to be high among autistic children in interventions using social robots [3].

A critical ethical issue related to the application of social robots in these contexts is the idea of normativity [4, 5], which is relevant both in relation to the design of social robots and in the use of such robots to portray or mimic that which is *normal* and to identify deviant behaviour or development. Normativity in this article relates to the idea that a particular form of neurological functioning and development is normal. What is normal is again often associated with what is good or societally acceptable. We mainly refer to *neuro*normativity, which connects our endeavour to the terms neurotypicality and neurodiversity. Neurodiversity as a concept is usually associated with an objection to the deficit perspective in Autism spectrum disorder (autism from hereon). From the neurodiversity perspective it is often argued that autism is a result of natural genetic variation, and not a medical disorder or condition to be 'fixed' [6]. However, the notion of normativity also apply to a broader context, as seen for example by the notion of *heteronormativity* in feminist and queer scholarship [7].

Our main concern is not to determine what *is* normal, but to highlight how the very act of portraying something as normal involves an exercise of power. We argue that normativity permeates the design of social robots and their use in the context of autism. While we do not argue that normativity in itself is necessarily bad, policymakers, designers, researchers, and therapists, and others who work directly with autistic children should be aware of the potentially problematic issues involved in portraying some things as normal and others as deviant.

Normativity assumptions are necessarily involved in the design and application of social robots, as they manifest, demonstrate, and teach behaviour and characteristics that are perceived as both normal and desirable, either implicitly or explicitly. What constitutes 'normal', and to what degree interventions aim to 'normalise' autistic children to comply to neuronormativity, is a key focal point of heated debates within the autism intervention literature and in the autism research field as a whole [8].

The purpose of this article is to explain how and when normativity related issues become relevant for the design and application of social robots for autistic children. By highlighting these issues, we aim to make developers and designers, therapists, and policymakers better equipped to answer questions regarding when robot normativity is warranted and when it should be challenged and mitigated. The authors conducted a mapping of the potential issues related to normativity in the context of robot and autistic children based on their combined experience and expertise and have sought to highlight these challenges through a review of the literature. As one potential solution we propose a *disclosive robot ethics* approach, in line with Brey's [9] notion of disclosive computer ethics. This article presents the major considerations involved in making normativity assumptions explicit, and this will help the various actors involved in the design and application of social robots to consider divergent opinions of normal social functioning, and in particular, neurodiversity. The framework proposed in the article involves a particular form of inclusive and value sensitive design (VSD) process [10]. However, our approach is not only about design justice [11], but relates equally to the various applications of social robots.

2 NORMATIVITY AND THE APPLICATION OF SOCIAL ROBOTS

Social robots are designed and deployed with the purpose of both mimicking human behaviour and to engender particular forms of interaction with humans [12]. However, the lack of diversity in the groups of people designing robots is garnering increasing attention [13]. This is potentially problematic, as an homogenous group of designers might be likely to design a product from a shared background and shared biases, increasing the risks that the end product might not be as useful for all, and potentially also outright harmful for some, users [13]. One example is how robots rely on gender stereotyping, and how this generates ethical issues in the application of social robots in, for example, eldercare [14]. The broader issue we focus on in this article is how robots enact and embody a problematic normativity which might cause harms to marginalized users.

In the context of autism, the express purpose of the use of social robots is often to demonstrate, teach or encourage what is perceived to be *normal behaviour*. For example, many interventions include training in eye-contact for autistic children, as this is seen as key to productive social communication. However, many autistic people experience eye-contact as highly negative both emotionally and physiologically [15]. Other examples may relate to what is discussed within the autism literature as 'masking', which means autistic individuals develop an ability to present as non-autistic. This suppression of their own behaviours and/or traits is associated with anxiety, depression, and suicidality [16]. This type of camouflaging can also be found in childhood [17]. Here it is also worth noting that autism is a very heterogeneous condition and that what might be viewed as natural behaviours, traits, and thought patterns for one autistic individual can be very different for another [18].

We use the concept of normativity to represent how particular behaviour's, actions or traits are considered *good*, and sometimes also right and just [4, 5]. Normativity relates to moral judgements, and whenever ethical standards are promoted, they represent claims on us, as 'they command, oblige, recommend, or guide' [19]. Regardless of the creator's intentions, we argue that robots inevitably perform some form of normalcy and support certain ethical standards when they are used in social settings. They can become role models of sorts. Robot portrayal of purported normal behaviours might be problematic in two respects. Firstly, robots with behaviour modelled on normal behaviour will make those with divergent behaviour stand out from their peers. Secondly, these robots run the risk of making those same children aware that they are different.

Next, social robots are also used to teach and foster normal behaviour. This is distinct from the previous case, as this involves someone consciously using social robots to train or untrain particular behaviours that are perceived as desirable or undesirable. By doing so, social robots become the instruments of normalcy more directly, and robot makers and those employing them should be aware of the implications of such use of social robots. On the command of those behind the intervention, robots may demonstrate the difference between right and wrong in these interventions. This intervention might involve explaining what sort of behaviour is desirable, but it could also explain *why* this behaviour is desirable. The last sort of intervention's effectiveness depends on the child's age and general cognitive functioning level. It is also important to note that such interventions *could* be carried out by arguing that certain behaviours are good and correct. However, they could also be based on the approach that learning a different set of behaviours is merely useful for the child, as the child needs to learn how others perceive different situations and behaviours.

Lastly, social robots may be used to detect and monitor normalcy [20, 21]. This relates to robots that rely on gender stereotyping either in their design or in how they operate [14]. From a clinical point of view, considering the complexity and heterogeneity that is a hallmark of the autism diagnosis, it is difficult to see social robots completely substituting as opposed to supporting professionals in any near future. However, robotics has become sufficiently sophisticated to possibly tempt actors to develop software and functionalities allowing social robots to become agents of an enforcement and surveillance scheme built to identify and eliminate abnormal behaviour. Social robots have a wide range of sensors, including eye-tracking, facial recognition, and voice recognition. These capabilities can easily be coupled with software that aims to identify, for example, the emotions and the behaviour patterns of those it observes [22], and as pattern recognition

is at the core of AI, detecting normal behaviour and potential outliers is a natural part of what the software of a social robot does [23].

Imagine a scenario in which a government has mandated that all kindergartens should have a social robot equipped with new and impressive software aimed at screening and pseudo-diagnosing all children present. The robot is deployed in the kindergarten, and as children play with it – or not – it registers and monitors their behaviour and interactions. At the end of each week, the managers get a report where children with suspect behaviour are flagged and sent to a professional for proper testing.

Such use of social robots is even more problematic because it is a proactive tool for enforcing normalcy. However, it is also easy to see the pleas of the advocates of such a scheme, as there is great potential to identify more children that would potentially benefit from being diagnosed with autism to receive an intervention. Even if such benefits are both plausible and vital, normativity is deeply involved in social robots used in such a manner, and its designers and regulators will have to decide how they deal with such issues. This is particularly important because then it means that robot developers are becoming the determinant parties of what is normal and what is not, something that goes beyond democracy [24].

3 CONSIDERATIONS FOR INCORPORATING A DIVERSITY PERSPECTIVE IN THE DESIGN AND APPLICATION OF SOCIAL ROBOTS

Autism is increasingly seen as a social construct, and normativity and power theories are therefore useful for understanding the implications of social robot normativity. Approaches to issues of robot normativity and gender stereotyping are relevant to the issue at hand, and some solutions mentioned in the literature is *explanation*, *neutralization*, and *'queering'* [14]. Explanation refers to providing an explanation of why the robot is designed as it is and could be coupled with providing reasons aimed at dispelling the promotion or superiority of 'normal' features or capabilities. This approach is indeed important, and it is one to which we return below. Neutralization entails attempts at making a robot non-gendered in order to avoid stereotypes. A related approach related to autism could entail having the robot act in ways untypical of both autistic *and* other children, but this would often defy the purpose of using the robots in such settings, as the purpose will often be to demonstrate and encourage a particular set of behaviours. Finally, the analogy to the queering of robots would be to have the robots act in ways more similar to the autistic children. While this would indeed potentially solve some problems related to normativity, sceptics could plausibly argue that such robots might not be very effective at what they are currently being deployed to achieve. The problems are, we argue, too complex to be solved by adhering to just one of these approaches.

By adopting a post-structuralist stance, we might argue that the structures most commonly used to interpret both normalcy and desirability are themselves social structures open for debate [25]. This invites a fundamental humility with regards to values and the enforcement of norms, and we here argue that this humility is beneficial for anyone interested in developing and using robots in a value sensitive manner.

The neurodiversity movement is relevant for examining the design and application of social robots designed for autistic children (or for robots designed for any purpose, and that can be used in interventions with autistic children). Lewin and Akhtar [26] write about neurodiversity and how stereotyped representations of autistic people, and what they call *the deficit perspective*, is potentially problematic. Pesonen, et al. [27] also analyse the framing of autism in media and argue that how autism is portrayed shapes the public's perception of the phenomenon and will, in turn, influence both autistic people and their subsequent societal acceptance. The core of the neurodiversity movement is that the neurological characteristic of autism represents a natural variation and that there is no error, fault, or something in need of fixing [26].

With such a perspective, autistic people are not deficient but slightly different from others. While these *others* may be a majority, this does not mean that the minority is an abnormality that must be 'fixed' and turned into something resembling or pleasing the majority population. This is often referred to as ableism, and entails the uncritical assertion that doing what is normal is good, and entails a depreciation of various disabilities [28]. Hehir [28] argues that 'ableist assumptions in the education of children with disabilities not only reinforces prevailing prejudices against disability', and that this also leads to a range of problems related both to educational attainment and employment. Instead, we could argue that the majority needs to learn how to interact with and understand autistic people – quite the opposite approach of trying to teach autistic people to learn and mimic the behaviour perceived as more normal. The design and use of social robots entails making decisions with consequences for the 'distribution of benefits and burdens between various groups of people' [11], and we argue that traditional distributions of the burdens could and should be continually evaluated.

Realizing such a shift may be difficult without health policies based on a thorough understanding of the societal ramifications of user-centred approaches. We understand that many children on the spectrum have difficulties to such a degree that labelling them just another kind of normal makes little sense. Many autistic children need both intervention and substantial assistance in both kindergarten, school, and life in general. In this case, an inclusive and value-sensitive approach that takes neurodiversity into account in the design and use of social robots seem to be an appropriate avenue for action. If social robots continue to be used in an interventional setting, efforts should be made to analyse and account for the normativity implications and effects these have on autistic people.

The approach we label *disclosive design* could be beneficial for ensuring that a diversity perspective is both considered in the design process, and that it is possible to evaluate products on the basis of normativity implications. This would also enable designers to provide specific explanations of why the robots are designed and operate the way they do, and such explanations are potentially of great importance for enabling therapists, parents, and some children with autism to consider and understand the why

the robots are and operate the way they do. The term disclosive design is based on Brey's [9] notion of a disclosive computer *ethics,* and disclosive *design* would entail a) systematically considering and b) disclosing in written documentation the finding from the designer's analysis and their intentions with regards to the product's embedded values and norms. This is also compatible with design justice [11], which emphasises community-involvement and participation in design, with a particular emphasis on awareness of the *matrix of domination* and the 'the equitable distribution of design's benefits and burdens'.

An initiative not entirely unlike the one here proposed is Value Sensitive Design (VSD), which promotes reflection on the consequences of technological research and development (R&D) outcomes and incorporating them into the research process [10]. While important, this article suggests that taking this a step further and actually disclosing the processes related to values explicitly *and* implicitly embedded in products are important.

In this context, the European Union pushed for the notion of responsible research and innovation (RRI) to establish an overarching process capturing essential steps researchers must take to ensure that science, research, and innovation have positive, socially acceptable, and desirable outcomes [29]. RRI is a science policy framework aimed at inclusive and sustainable technology, through which the European Research Council sought to align technological innovation with societal values, and to provide ways to deal with the uncertainty that various actors encounter in innovation processes [30].

We argue that adopting the principle of disclosive design might both improve the products and their use *and* the lives of those with perspectives that are often omitted from both research and design on social robots and the use of such robots with autistic children. The obvious consequences of such an approach might be that the robots are made available in a range of colours and that they won't necessarily display the *normal* features of human beings (with two arms, legs, etc.). Of more interest, however, are the prospects of building machines with more varied behaviors that take into account the heterogeneity of autistic persons. This might be one facet of a regular robot, and such functionality could, for example, be used to teach other children how to effectively interact with autistic children. Turning the table, so to speak, or at least working on mutual understanding instead of just trying to 'fix' the autistic child. Robots could also be designed to be more responsive to the behaviour of autistic children, and thus make their interactions with the robots more effective while not highlighting the fact they interact socially in a different manner from most.

4 CONCLUSION

In this discussion, we have focused on how social robots are not exempt from portraying and reinforcing social constructs, as they manifest a certain normativity. We have analysed them in relation to their use in the context of intervention with autistic children. Social robot-assisted interventions may indeed be effective in some instances, but it is nevertheless necessary to take a step back and analyse the conceptions of normalcy implemented in a) the design and b) the application of social robots.

This discussion has suggested a diversity perspective in designing and deploying social robots. The realisation of this requires legislators, designers, and those who employ social robots to apply a precautionary principle with respect to diversity and the inclusivity of their creations and use of social robots. The processes described entails that autistic people or their representatives should be included in discussions regarding how social behaviour is modelled and represented in social robots, how social robots are used in interventions, and in particular if social robots should be equipped with the ability to identify and potentially perform parts of the diagnosis of autism. This aligns with the call of Bertilsdotter Rosqvist, et al. [6] to include the voice of autistic people in research endeavours in general. However, others have pointed out user centred and participatory design is no silver bullet, and that such processes might also lead to stereotyped and problematic representations of the target groups [31].

Regardless of the choice of design process, then, we argue that it should be accompanied by the approach of disclosive design, which entails that the creators and users of social robots make explicit and disclose the processes carried out in advance of production and deployment and their justifications for their choices.

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