

Robot caregivers: harbingers of expanded freedom for all?

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Abstract As we near a time when robots may serve a vital function by becoming caregivers, it is important to examine the ethical implications of this development. By applying the capabilities approach as a guide to both the design and use of robot caregivers, we hope that this will maximize opportunities to preserve or expand freedom for care recipients. We think the use of the capabilities approach will be especially valuable for improving the ability of impaired persons to interface more effectively with their physical and social environments.

Keywords Capabilities approach · Human flourishing · Robot ethics · Robot caregivers

Introduction

The ethics of personal-service robots is a growing area of study, in part because they may begin to play an increasingly important role in our lives. Lin et al note that with few exceptions, e.g., the military's use of robots, it has been customary for robots and humans to work separately

from one another.¹ Yet the cordoning off of humans from robots is becoming a thing of the past. For instance, South Korea plans to have a robot in each home by 2020.² Human-robot interactions will presumably affect several facets and stages of life, but we will focus on the interaction among robots, care recipients, and caregivers. Although we will examine the use of robots for care of impaired persons generally, our starting point will be their use in elder care. It remains debatable whether creating robot caregivers is the best allocation of resources, but interest in using robots to care for the elderly is growing. This makes it advisable to expound on the sorts of considerations that ought to take center stage when contemplating the design and use of robot caregivers.

If indeed it is appropriate to use robots as caregivers,³ it is crucial to enhance scientists' and engineers' "awareness of the values they bring to the design process".⁴ As Oosterlaken astutely recognizes, "...many different design options are generally available during the development process of a new technology or product. This means that the *details of design are morally significant*."⁵ Acknowledging that any design process is value-laden, our goal is to help shape the values influencing the robotics community's choices to include certain features and not others in the makeup of robot caregivers rather than provide a specific design template. More specifically, our aim is to influence the *values* incorporated into the "design and

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¹ Lin et al. (2008).

² Onishi (2009).

³ Which of course is a significant ethical issue but only portions of the issue will be discussed in this paper. For instance, safety concerns will not be addressed.

⁴ Wallach and Allen (2009).

⁵ Oosterlaken (2009).

implementation of the technology”⁶ in a way that will preserve and promote central human capabilities and thereby contribute to human flourishing. Though the robotics community is the primary target audience, this inquiry should be of interest to a much wider audience, given that all human beings require varying levels of care during different stages of their lives.

Following Coeckelbergh, we agree that the focus should not be on understanding how robots function in isolation; instead, the emphasis should be on how robots can improve people’s ability to interface with their environments and contribute to people’s overall sense of well-being.⁷ That is, as Coeckelbergh points out, a primary concern should be the manner in which human-robot interaction is *experienced* by people. This should help shape design decisions and antecedently address concerns about threats to the welfare of care recipients and their human caregivers. While all humans should have the opportunity to lead meaningful lives, we are particularly concerned in this paper with the flourishing of elderly individuals, particularly as they are affected by impairments that often accompany the aging process. As Nussbaum states, “an elderly ‘normal’ person may be disabled for thirty or forty years, perhaps longer...than the total life span of some people with a lifelong disability.”⁸ Alongside the elderly, our inquiry has implications for human-robot interactions among physically or cognitively impaired persons of any age.

Theoretical background

The theoretical framework underlying our discussion is the capabilities approach, which was first articulated by Amartya Sen and Martha Nussbaum. Among other things, the capabilities approach requires social institutions to be organized so that they provide a foundation for upholding central human capabilities.⁹ Its proponents sought to address considerations of justice and overcome the perceived shortcomings of frameworks, such as utilitarianism and Rawls’s view, while preserving insights from them. According to Sen, the capabilities approach “focuses directly on freedom, seen in the form of individual capabilities to do things a person has reason to value.”¹⁰ While some scholars emphasize wealth maximization or preference satisfaction, expanding personal freedom is paramount to the capabilities approach (Alkire 2005).

The capabilities approach is preferable in part because it does not emphasize the maximization of the total aggregate good at the expense of other important individual goods. It disallows this sort of tradeoff of goods that might be permissible under a utilitarian scheme. To modify one of Nussbaum’s examples, we should not be required to give up on emotional health in order to maintain a relationship with a loved one.¹¹ Caregivers should be able to fulfill their obligations without simultaneously relinquishing their own prospects for human flourishing. Hence, if the intervention of robot caregivers is pursued, it should promote the well being of care recipients and caregivers alike. In a similar vein, the capabilities approach does not prize general social well-being above that of the individual as a social contract theory might permit. An additional consideration for the present discussion is that the capabilities approach is not strained by including individuals with physical or mental impairments. Unlike Kantian approaches, the capabilities approach is not heavily reliant on the “split between the rational/reasonable person and everything else in nature.”¹²

Sen observes that “our desires and pleasure-taking abilities adjust to circumstances, especially to make life bearable in adverse situations.”¹³ This brings to light a key reason why strict allegiance to utilitarianism, according to Sen, Nussbaum, and others, is ultimately unsatisfactory and why they embrace the capabilities approach instead. Utilitarianism does not seem to account for adaptive preference, where people adjust to their destitute situation and may even claim that they are happy. A utilitarian calculus, according to Nussbaum, “gives sanctity to the distorted scale of dissatisfaction.”¹⁴ To the extent that utilitarianism relies on the testimony of individuals who inaccurately claim they are happy or not suffering, there is a problem. For example, Nussbaum recalls Sen’s account of malnourished widows in India who believe they are doing fine only because they have adjusted to their poor conditions.¹⁵ She contrasts these women with widowers—men not accustomed to being malnourished or in ill health—who assess their health status more accurately. The former group may say that they are fine when they are unwell, e.g., by medical evaluation. But a utilitarian scheme would (seemingly) allow this to be counted as “okay” as long as the aggregate good of the group is maximized. The central problem is that these women have not only adapted to their

⁶ Wallach and Allen (2009, p. 39).

⁷ Coeckelbergh (2009).

⁸ Nussbaum (2006).

⁹ Nussbaum (2006, p. 193).

¹⁰ Sen (1999, p. 56).

¹¹ Nussbaum (2006, p. 73).

¹² Nussbaum (2006, p. 138).

¹³ Sen (1999, p. 62).

¹⁴ Nussbaum (2000).

¹⁵ Nussbaum (2000, pp. 139–40); in an earlier piece, Nussbaum speaks more generally about women in developing countries who report their health and nutritional status as good even though these women are shown to be suffering physical symptoms of malnourishment (Nussbaum and Onora O’Neill 1993, p. 325).

lousy circumstances, but their beliefs have been so distorted by “lifelong habituation”, that they view themselves as being unworthy of anything better.¹⁶

Even if an individual adapts to the dynamics of a situation, the ability to perform meaningful activities should not be lost. In the present context, the capabilities approach leads us to emphasize not only the likely outcomes of the use of robot caregivers but also the process by which we determine whether and when robot caregiver intervention is best used. The capabilities approach also requires us to ensure that the use of the technology should not interfere with the ability of either care recipients or their human caregivers to manifest the central human capabilities. For example, individuals in either position should be able to maintain control over their environment by being permitted to negotiate the extent of robot caregiver intervention.

Even though the capabilities approach has been formulated with the intention of circumventing problems associated with traditional ethical frameworks, Johnstone underscores that it is not necessarily inconsistent with them.¹⁷ In fact, as she suggests, rather than viewing the capabilities approach as being in conflict with Utilitarianism and Kant’s view, it is probably better understood as a complement to them.¹⁸ Because of its flexibility and consistency with specific elements of other ethical frameworks, the capabilities approach need not be understood as a stand-alone view. Instead, it can augment other theories so that human flourishing can be more effectively and comprehensively promoted.

Like any other ethical framework or theory, the capabilities approach has its share of conceptual hurdles to overcome. For instance, Johnstone admits that the approach might not straightforwardly offer “prescriptions for action”.¹⁹ Further, Baber²⁰ and Oosterlaken²¹ concede that the proponents of the approach need to more fully articulate why certain types of capabilities are more worthy of pursuit than others. Yet, as Nussbaum mentions, an advantage of a view that “does not aim at completeness” is its flexibility and its openness to revision in contrast to “complete” theories that end up being overly restrictive in many cases.²² Admittedly still in its developmental stages, the capabilities approach would clearly require designing and using robots in a way that expands opportunities for human flourishing for all human beings, including those

whose rational faculties are limited or those whose protection by a social contract may be in question.

A core distinction made by proponents of the capabilities approach is between “functioning” and “capability”.²³ Functioning refers to being in an actual condition or performing a particular task. Capabilities refer to the “opportunities or freedoms to realize functionings.”²⁴ Fasting, windsurfing, or voting in an election are examples of functionings, whereas, being literate or in good health or having freedom of expression are capabilities. In order to promote human flourishing, there is some debate about whether the goal should be capability (i.e., having the ability to do or be different things) or functioning (exercising a specific capability), particularly where children are concerned.²⁵ Robeyns remarks that much research, including some of Sen’s initial work, focused on certain functionings instead of capabilities, perhaps because it is easier to measure the former than the latter. She claims that concentrating on both functioning and capability is a viable and valuable approach as well; this may be necessary in cases where the mere exercise of choice constitutes functioning.²⁶ For example, a person’s refusal to act in some way constitutes an important type of functioning—i.e., freely choosing to refrain from doing or being something, despite possessing the capability to do so. As Nussbaum puts it, “dignified life includes capabilities, and this includes the right not to use them.”²⁷

The capabilities approach identifies the “bare minimum of what respect for human dignity requires.”²⁸ Sen calls them “basic capabilities,”²⁹ and Nussbaum refers to them as “central human capabilities.”³⁰ Both authors are alluding to what *all* human beings need to flourish and live meaningful lives.³¹ The approach stipulates that basic capabilities are universal across human beings, while embracing pluralism.³² The specific details regarding what it would mean to live the “good life” can of course vary depending on culture, religion, economics, and many other

¹⁶ Nussbaum (2000, p. 142).

¹⁷ Johnstone (2007, pp. 84–85).

¹⁸ Johnstone (2007, pp. 84–85).

¹⁹ Johnstone (2007, p. 85).

²⁰ Baber (2009).

²¹ Oosterlaken.

²² Nussbaum (2006, p. 139).

²³ Sen (1999, p. 75).

²⁴ Robeyns (2006, p. 351).

²⁵ Nussbaum, for example, suggests that in certain cases, e.g., compulsory education for children, functioning should be the goal (Nussbaum 2006, p. 172, 2000, pp. 89–91). In other cases, e.g., voting, she contends that people should not be forced to vote if they do not want to do so. What is crucial, according to Nussbaum, is that they should have a genuine opportunity to vote.

²⁶ Robeyns, pp. 354–55.

²⁷ Nussbaum (2006, p. 184).

²⁸ Nussbaum (2000, p. 5).

²⁹ Sen (1993).

³⁰ Nussbaum (2000, pp. 70–77).

³¹ Although there are similarities and differences between the two authors’ views, the issue will not be explored here.

³² Johnstone (2007, p. 78).

factors. But all humans need the ability to think freely, communicate, have access to education, obtain safe food and water, etc. What this requires in terms of material resources, however, differs from one person to another and may also vary depending on an individual's life stage. For example, a person with a missing leg will need either a wheelchair or a prosthetic leg in order to interface with her environment as effectively as an individual who has two functioning legs. This variation in the ability to convert resources into real opportunities or functionings means that looking solely at income distribution or the distribution of other goods, as some assessments of human well-being might, is unlikely to supply adequate information about an individual's welfare.³³

Along with Bynum and Nussbaum, we think that other species ought to be permitted to live dignified lives that are consistent with the "activities and goals that creatures of many types pursue."³⁴ However, a discussion of the flourishing of nonhumans is beyond the scope of this article. Our focus is on humans for whom opportunities tend to be diminished or cut off altogether because of the inability or unwillingness of other agents to accommodate their needs. As Nussbaum asserts, doing justice to people with impairments requires "emphasizing the importance of care as a social primary good."³⁵ In some cases, failure to assist in the amelioration of certain social problems is the result of deeply entrenched cultural beliefs and practices. Rather than beginning with a specific prerequisite for moral consideration, such as rational capacity or the ability to be a party to a social contract, the capabilities approach starts by presenting the criteria for human flourishing and requires moral agents to promote these opportunities on behalf of those whose physical or cognitive limitations may interfere with their ability to do so on their own. Its emphasis on a moral agent's obligations provides a promising starting point for ensuring that basic capabilities are secured by all.

A central goal of human-robot interaction should be to ensure that elderly and non-elderly persons with impairments possess central human capabilities. Included in Nussbaum's list of capabilities is the ability to make meaningful choices about one's life. Consequently, caregiver robots should enhance people's opportunities to interface with their environment and enjoy relationships with other human beings. Robots should not override people's desires to act in ways consistent with their values or life narratives. This includes avoiding deliberate manipulation or deception of individuals through the use of robots. Even if others happen to think (perhaps paternalistically) that it would be better for another to function in some particular

manner, preservation of the freedom to make choices is vitally linked to human flourishing. It is only once a person has lost the capacity to choose that others, including robot caregivers, should be permitted to make decisions on their behalf. However, even these decisions ought to be consistent with a care recipient's values.

Capabilities and robotic caregivers

We seek to determine how the capabilities approach may help illuminate what is appropriate or not with regard to robotic caregiving. While we believe that this strategy can contribute to the creation of socially responsible technology, we do not intend to exclude other ethical frameworks from the conversation. To reiterate, the capabilities approach is probably best seen as complementing and augmenting existing frameworks rather than replacing them.

Our focus will be on impaired persons, particularly elderly persons who have accumulated physical and cognitive impairments as part of the aging process. In doing this, we do not intend to pathologize aging, which is a normal part of human life. Quite the contrary, since some degree of impairment is part of the "normal" human life, we ought to think differently about those for whom impairments are always a part of life—e.g., those born with impairments or who suffer a debilitating injury or illness from a much earlier life stage. Because aging is often accompanied by the diminishment of certain capacities, focusing on the elderly is instructive in helping us figure out how best to use robots to minimize the impact of impairments on an individual's life. That said, the needs of elderly persons with impairments can differ significantly from those of infants, children, or young adults with impairments.

Many varieties of robotic caregivers are being developed.³⁶ Yet limits on the design and implementation of robot caregivers should be guided by the goal of preserving as many basic capabilities as possible for care recipients as well caregivers. However, the appropriateness of particular pathways toward this goal is unclear. For instance, Castelfranchi describes how forms of artificial intelligence can be designed deliberately to deceive humans,³⁷ which raises the fundamental question of whether truth-telling is always necessary for human flourishing. As in many interactions with people suffering from illnesses or living with certain types of impairments, balancing present and future autonomy will be a focal concern, and one that must be balanced against her other interests, regardless of her ability to function as an autonomous agent.

³³ Robeyns (2006); Nussbaum (2000); Sen (1999); Terzi (2005).

³⁴ Bynum (2006); *Supra*, No. 6, p. 327.

³⁵ Nussbaum (2006 p. 2).

³⁶ Some of these efforts are described in the 2006 *ETHICBOTS* report; see Datteri et al. (2006 pp. 78–81).

³⁷ Castelfranchi (2000).

Controversy persists about whether robots will be able to care for elderly or others in need of care partly because the meaning of “care” in this context is not always clear. Hence, exploring the meaning of “care” is vital. While discussing various notions of care, Coeckelbergh draws a useful distinction between “deep” and “shallow” care.³⁸ He suggests that robots can provide “shallow” care such as performing manual tasks though without “emotional, intimate, and personal engagement”.³⁹ While there is no good reason to think that robots will be exempt from giving “shallow” care to individuals, we share Coeckelbergh’s skepticism about the prospect of robots moving beyond “shallow” care to offer the reciprocal sort of companionship or friendship that is characteristic of “deep” care. That said, the inability of robot caregivers to provide “deep” care need not preclude human caregivers from using them to help provide “good” care—i.e., “care that respects human dignity”.⁴⁰ Consequently, robots should complement the efforts of human caregivers rather than replace them.⁴¹

Adjusting the type and amount of care to particular contexts is likely to be required, given the varying needs individuals have across their lifespan. It is difficult to know how proficiently robots will perform specific caregiving tasks. The answer is largely contingent on advances in artificial intelligence. Sparrow and Sparrow, for example, delineate types of care that robots might eventually provide, ranging from the completion of rather mundane tasks such as serving drinks and cleaning rooms to being a friend or companion.⁴² Their relevant level of sophistication could enable robots to remind a person to take medications and detect warning signs if the person might be in danger.⁴³ Further, robot companies have divergent visions of what their technologies ought to accomplish. At least one company is testing what it calls a “fully autonomous personal companion home care robot”.⁴⁴ Yet whether the robot will meet such lofty expectations remains to be seen.

When considering how robot caregivers should be programmed, it should not be assumed that caregiving is the same in each situation or stage of life. For instance, Nussbaum distinguishes between a person who has been impaired since birth and a person who becomes impaired due to aging, illness or injury. She notes that elderly

persons tend to be upset or frustrated in ways that those with lifelong impairments may not be.⁴⁵ Thus, it is often more challenging—and Nussbaum suggests, less rewarding—for caregivers to provide care for elderly who are cognizant of the diminishment of their abilities. Correspondingly, designers should be sensitive to these nuances.

Nussbaum stresses that our relative independence at various stages of our lives is a temporary condition.⁴⁶ For instance, a person’s autonomy and competence (in the medical/legal sense of the term) can diminish rapidly or gradually. Drawing from Aristotle and putting it in modern terms, Bynum claims that autonomy is often a key component of flourishing.⁴⁷ The erosion of autonomy can interfere significantly with the performance of tasks. If impaired individuals can recover some of their autonomy through the use of a robotic caregiver, this can improve their opportunity to flourish. On a related note, Oosterlaken remarks that one’s health status plays a crucial role in determining whether capabilities can be actualized.⁴⁸ To the extent that robot caregivers can mitigate further declines in an individual’s health, they will also help ensure that individuals have the choice to actualize capabilities rather than live as relative prisoners of their impairments or the needs or whims of human caregivers.

There could also be psychological benefits to having robots for the “nuts and bolts” of daily living so that interactions can continue with other persons in as normal a way as possible. Robot caregivers could unlock possibilities for impaired individuals. As Johnstone states, access to certain types of technologies (e.g., computers) “will for many people significantly alter the action choices they have and the outcomes they are capable of bringing about.”⁴⁹ Empowering elderly and other individuals in this way may contribute to improved health and lucidity. For example, a person who fails to nourish herself adequately is going to fail to function in many ways, including cognitively. And this sort of thing can become a vicious cycle: the person forgets to eat, brain power decreases, she forgets to eat again or take care of herself in other ways, and so on. A robot caregiver could function as a “cognitive prosthesis,”⁵⁰ while also helping to ameliorate the impact of physical limitations.

Roboticians suggest that the technology could expand communication potential and mobility for elderly, allowing them to have better access to needed medications,

³⁸ Coeckelbergh (2010).

³⁹ Coeckelbergh (2010, p. 3).

⁴⁰ Coeckelbergh (2010, p. 5).

⁴¹ Decker (2008).

⁴² Sparrow and Sparrow (2006, pp. 145–149).

⁴³ Faucounau et al. (2009 pp. 36–38).

⁴⁴ Grandma Interacts During GeckoSystems’ Elder Care Robot Trials. *CNNMoney.com*. December 2, 2009. <http://money.cnn.com/news/newsfeeds/articles/marketwire/0564659.htm>.

⁴⁵ Nussbaum (2006, p. 101).

⁴⁶ Nussbaum (2006, p. 101).

⁴⁷ Bynum, p. 160.

⁴⁸ Oosterlaken, p. 98.

⁴⁹ Johnstone, p. 74.

⁵⁰ Faucounau et al. p. 35.

nourishment, and timely intervention when required. According to a study by Kozima and Nakagawa, the robot *Keepon* can help children, including those with impairments, to develop communication skills.⁵¹ A study by Robins et al indicates that interactions with robots can benefit autistic children.⁵² Further, if robots can be “trained” to diagnose medical conditions like autism and recognize their severity,⁵³ a range of care possibilities opens up.

If an impaired person relies on a robot to help with her needs, it is conceivable that the person may feel less aggravated, defensive, etc., as long as she can exercise some control over the robot that she does not have over other humans. For instance, the developers of the robot *Care-O-bot II* claim that it can assist with eating, walking, and retrieving items.⁵⁴ If true, this might allow an individual to dictate the terms of her care directly instead of through a human caregiver, just as the use of email or a telephone allows people to communicate more directly than through a human courier. Or, her needs might be met more proactively because she is neither concerned about affecting another person negatively nor fearful of a caregiver’s unpredictable, and potentially undesirable, emotional response to a request for assistance. In short, the care recipient could be liberated from some of the burdens of dependence. In turn, this is likely to promote a care recipient’s ability to “love those who love and care for us.”⁵⁵

Moreover, this may permit an individual to retain a greater degree of privacy regarding her current health status and allow her to share personal details with only certain others of her choosing. Control over information about oneself is an important component of individual autonomy; it can contribute to keeping a person’s capabilities intact. Further, an important insight that the capabilities approach makes evident is that even if two individuals are receiving the same quality of care, a fuller ability to control one’s environment (a basic human capability) is preferable since it can promote flourishing.

In addition to relieving some of the frustration, awkwardness, and sense of dependence associated with requesting assistance from other persons, the presence of certain kinds of robots may ease depression caused by loneliness. Even if robots do not provide genuine friendship, they may mitigate feelings of isolation. A study by Banks et al indicates that even minimal interaction with robot dogs can improve nursing home residents’ scores on the UCLA Loneliness Scale.⁵⁶ According to the study,

residents in the study population who were the “most lonely” experienced the greatest benefit due to the introduction of a robot dog or a real dog.⁵⁷ Interestingly, the authors reported no statistically significant difference between the subjects’ responses to a robot as compared to a real dog. In addition to the use of robots in institutional settings, such as an assisted living facility, the use of robots may delay an elderly person’s transition to such an institution or make it unnecessary. This could promote family unity or foster friendships among relatives.

Will robotic caregivers be embraced?

Beyond how well they are programmed, the effectiveness of robot caregivers in advancing flourishing is largely contingent on whether care recipients and their human caregivers accept this type of technological intervention. The well-being of care recipients will probably not be upheld if they are displeased with the care they receive. Intuitively, one might be tempted to say that care recipients would be insulted by having portions of their care delegated to a robot, but it is premature to assume that this will be the case. Human behavior is notoriously difficult to anticipate and individuals might not automatically reject (or accept) robotic caregivers.

Humans have a large capacity to bond with non-human animals, which contributes to the effectiveness of animal-assisted therapy. Further, children and adults seem to form meaningful connections with inanimate objects (e.g., dolls, blankets, automobiles) and establishing a connection with a robot may be a variation of this psychological phenomenon. Moreover, Turkle observes that the psychological inclination that humans have to nurture “relational artifacts” may facilitate bonding between humans and robots, though she emphasizes that this type of interaction will not be as meaningful and informative as those that occur with other human beings.⁵⁸ Shaw-Garlock suggests that if robots closely mimic human behavior, it might lead us to treat them like another human being.⁵⁹

Care recipients often welcome the introduction of devices that facilitate their mobility (e.g., wheelchairs) or otherwise help them to function better. However, Hansson notes that in rehabilitative medicine, devices are not always embraced.⁶⁰ He remarks that individuals with disabilities might reject technology if they fear that their opportunities to interact with other people might be reduced.⁶¹ Another

⁵¹ Kozima and Nakagawa (2006).

⁵² Robins et al. (2005).

⁵³ Scassellati. (2007).

⁵⁴ Graf et al. (2002).

⁵⁵ Nussbaum (2000, p. 79).

⁵⁶ Banks et al. (2008).

⁵⁷ Banks et al (2008, p. 176).

⁵⁸ Turkle (2006).

⁵⁹ Shaw-Garlock (2009, pp. 253–254).

⁶⁰ Hansson (2007), p. 264; see also Reidy and Crozier (1991).

⁶¹ Hansson (2007, p. 265).

decisive factor can be whether care recipients believe they have control over the technology or whether they believe the technology has control over them.⁶²

Individuals may end up feeling insulted or neglected depending on whether the robot caregiver is used by human caregivers to assist in caregiving duties or to serve as a replacement. In our view, a more suitable capability enhancing use of robots would be the former. We agree with the ETHICBOTS Project's conclusion that instead of using machines as substitutes for personal human relationships, "it would be desirable to rethink the organization of our societal and social life."⁶³ The capabilities approach is advantageous here, as it encourages us to make adjustments to social institutions rather than accepting long-standing institutions or values that leave certain categories of individuals out in the cold.

According to the results from early studies of human-robot interaction, people's reactions to robots appear to be heavily influenced by the context in which they are introduced. For example, when brought into a classroom, a group of young children were frightened by the robot, *Robovie*.⁶⁴ Yet Kozima and Nakagawa's study of the interactions between children and *Keepon* indicates that the robot "functioned as a pivot of interpersonal play with peers and sometimes with teachers."⁶⁵ Findings from a study investigating the *Roomba* suggest that humans can develop an emotional connection to it.⁶⁶ In the U.S. military, soldiers "bonded" with a robot named Scooby Doo, expressing a sense of loss when it was ultimately blown up.⁶⁷ Since the designers of the robots have conducted many of the current studies, further independent assessments are needed to establish the pervasiveness of human-robot bonding.

An additional part of the puzzle regarding whether a robot will be accepted is its physical appearance. Purportedly, if a robot or other artificial entity looks "too human", this can elicit a negative visceral response from human beings, which is typically referred to as the "uncanny valley" hypothesis.⁶⁸ Relatedly, Tapus and her colleagues are investigating how effective robots may be in assisting individuals who have suffered from a stroke, and one hypothesis they are testing is whether tailoring a robot's programming to a person's personality type may make it a more effective caregiver.⁶⁹ Taking these and

other psychological variables into account can and should continue to help inform the design process.

For better or worse, the vulnerability of care recipients might cause bonding to occur rather readily with a robot caregiver, especially if it successfully meets the care recipients' needs. Whether care recipients or human caregivers will *trust* robot caregivers is another matter. However, previous experience with the APACHE system used to facilitate clinical decision making indicates that a lack of trust in technology is not the problem. Wallach and Allen suggest that physicians deferred too readily to machine evaluations of patients' conditions, in some cases resulting in "a closed-loop system wherein computer prediction dictate[d] clinical decisions."⁷⁰ That said, trust in robot caregivers does not have to be present in order for them to meet the needs of care recipients. Moreover, despite the tendency to anthropomorphize and subsequently bond with nonhumans, the promotion of care recipients' capabilities could occur without doing so.

Potential ramifications for caregivers

If ethically responsible designs are actualized, robots could expand capabilities not only for elderly and other impaired persons but also for their *caregivers*. In some ways, caregivers are "co-cared" because the relationship affects their welfare as well as that of the care recipient.⁷¹ Though our focus thus far has been mainly on maintaining or expanding opportunities for elderly and impaired individuals, robots have the potential to make caregiving a genuine choice—particularly about whether to be a full-time caregiver. For example, Robins et al suggest that robots may be able to ease the caregiving responsibilities of parents of autistic children.⁷² It may also lessen the chance that caregivers would be mistreated by care recipients.⁷³ However, future research is required to determine whether such benefits are likely to be realized.

Providing some relief to caregivers may expand their freedom and change the nature of discussions about elder care as well as end of life care. For instance, Hardwig

⁶² Hansson (2007, pp. 264–265).

⁶³ ETHICBOTS (D5) (2008).

⁶⁴ Tucker (2009).

⁶⁵ Kozima and Nakagawa (2007).

⁶⁶ Sung et al. (2007).

⁶⁷ Garreau (2007).

⁶⁸ Steckenfinger and Ghazanfar (2009).

⁶⁹ Tapus et al. (2008).

⁷⁰ Wallach and Allen (2009, p. 41).

⁷¹ Faucounau et al. p. 34.

⁷² Robins et al. p. 117.

⁷³ An objection might be raised here that the same problem would be repeated with robots. In other words, robots could become a mistreated class of beings. Given the difficulty robotics experts are having with their attempts to develop a robot that has the learning capacities of the average infant, robots probably will not become morally significant enough for the foreseeable future to warrant people coming to their defense or accusing people of failing to provide *them* with adequate opportunities (capabilities). However, we remain agnostic on the issue.

argues in defense of a duty to die, primarily on the grounds that no individual has the right to impose significant burdens (e.g., emotional, social, financial) on his/her family members.⁷⁴ Putting financial considerations aside, which may still be overly burdensome, the duty to die concern might diminish significantly if robots fill deficits in the caregiving department.

Nussbaum recognizes that in many contexts, women are required to care for children, elderly parents, or other impaired family members. In some cases, they may be caring for *both* children and elderly parents simultaneously. Due to social norms, women are often expected to care for others “out of love”.⁷⁵ She notes that a lot of caregiving is uncompensated or poorly compensated work that nevertheless erects barriers to the pursuit of other opportunities for professional, social, or personal enjoyment. Importantly, such obligations are frequently hoisted upon individuals rather than freely chosen by them. Succinctly stated, Nussbaum thinks we should ensure that care recipients and their caregivers both have the opportunity to experience happy lives. At a minimum, this requires that those who provide care in non-emergency contexts should have the freedom to choose the extent, type, and manner of caregiving.

Given that women usually bear the burdens of caregiving, robots could be seen as helping to empower women or improve their life options. From that point of view, the technology could help promote human well-being and social justice. On the other hand, we should be careful to avoid the enduring practice of hastily lauding new technology as being a panacea. For instance, Ruth Schwartz Cowan⁷⁶ and Freeman Dyson⁷⁷ describe how household appliances failed to liberate women as much as was envisioned in the twentieth century. Though they took some of the drudgery out of housework, completing or overseeing the work done with the appliances was still primarily a woman’s responsibility. Further, women may have spent less time doing some of the in-home tasks, but other chores such as taking care of children became more time consuming.⁷⁸ Thus, at least in the short run, many women did not experience a net gain in freedom. Without changes in attitude regarding who is responsible for domestic chores, it is hardly surprising that the emergence of household appliances did not have the dramatic effect that one would have hoped. Analogously, caregivers might gain more freedom due to the advent of robots, but we need to be prepared for unanticipated, counterbalancing shifts that

may occur. This is one area where using the capabilities approach will be especially helpful, as it requires us to continue altering our behavior and social institutions so that they consistently contribute to human flourishing. Merely providing access to technology is not the ultimate goal.

Addressing key objections

Thus far, we have examined how robots might contribute to the goal of improving the well-being of both care recipients and human caregivers. Though an exhaustive exploration of all corresponding ethical reservations about robotic caregivers cannot be accomplished here, we will address a few key issues. To begin, will a robot’s programming be sophisticated enough to handle the challenges associated with caregiving? Javier Movellan astutely recognizes that “to sustain interaction with people, you can’t possibly have everything preprogrammed.”⁷⁹ Speaking more generally, Selmer Bringsjord claims that even the best robots are no match for thinking abilities of “a moderately sharp toddler.”⁸⁰ What robots are expected to do must not only correspond to advances in artificial intelligence and other related realms, they should also be limited to performing tasks that promote human flourishing. Even if AI advances significantly enough that it would be feasible to defer to them for additional types of tasks, whether particular actions should be delegated to a robot should not be determined solely by its ability to complete those tasks. For example, it is problematic to allow efficiency to become the primary goal of robot caregiver intervention.

Robots will probably not possess the same arbitrariness that human beings do, which might be beneficial to care recipients. Different humans behave differently in similar situations, and the same individual may act in different ways across similar scenarios. For instance, we might not hold a door for another person based on what others around are doing, our emotional state, whether we are in a hurry, etc., and even the type of music we hear might influence our inclination to help another person.⁸¹ This is not to say that consistency is the only important, or most important, value or that robots perform each caregiving task as effectively as a human being. Yet increased consistency in responding to their needs could alleviate much frustration for care recipients. Presumably, robots would not be programmed to lash out, curse, or express anger toward people.

⁷⁴ Hardwig (1997).

⁷⁵ Nussbaum (2006, p. 102).

⁷⁶ Cowan (1983).

⁷⁷ Dyson (1998).

⁷⁸ Dyson, pp. 132–134.

⁷⁹ Tucker, p. 62.

⁸⁰ Bringsjord (2008).

⁸¹ North et al. (2004).

Conversely, Sparrow and Sparrow state that the “demands that our friends—or even pets—make on us are unpredictable, sometimes unexpected and often inconvenient. This is an essential part of what makes relationships with other people, or animals, interesting, involving and rewarding.”⁸² Then again, these features can also make human interaction burdensome, leading to some level of mutual resentment, despite the presence of an exceptionally devoted and compassionate caregiver. Since care recipients are likely to be ill-equipped to shoulder additional responsibilities, using robot caregivers may be desirable.

As Coeckelbergh, Sparrow, and others point out, robots will likely fail to offer needed emotional support. Though a legitimate and serious worry, the extent to which it is a problem is largely contingent upon the kind of care being delegated to a robot and a care recipient’s needs and expectations. For instance, if a person has severe impairments, it is probably unwise and likely unethical to leave that person’s care solely to a robot. Moreover, a common complaint about robotic caregivers is that their use might deceive individuals about the care that they are receiving, especially in cases where a person suffers from severe dementia.⁸³ On the other hand, a robot might meet that person’s needs in surprising ways (e.g. by reducing loneliness) if it complements the efforts of human caregivers. Further, a study by Ezer et al indicates that subjects were receptive to the idea that robots could help with day-to-day tasks and the subjects did not necessarily see the need for having higher level interactions such as conversations with a robot.⁸⁴ It is also important to remember that human caregivers can fail to fulfill their obligations, including to individuals who suffer from dementia.⁸⁵ In other words, merely because a human is assigned the task of providing care, an emotional bond does not necessarily form. As Coeckelbergh acknowledges, many care recipients do not currently receive “deep” care from their human caregivers.⁸⁶

Another major objection to robot caregivers is that their use in providing care to patients with severe dementia might constitute “disrespectful deceit”.⁸⁷ Whether the presence of robots will exacerbate the tendency of demented people to be confused regarding the identity,

roles, and abilities of those with whom they come into contact is not yet known. As with the introduction of any new element to a demented person’s environment, it is important to ensure that we do so in a way that minimizes anxiety or confusion for the patient. However, it is not clear that the consistent presence of a robot caregiver will generate any more anxiety or confusion than the intermittent presence of other caregivers or visitors. If other variables in the patient’s environment remain stable, adding a robot caregiver might not exacerbate already existing problems with caring for people with severe dementia. This issue is complex, because even though behavioral cues can tell us, e.g., that a demented person thinks her son is her lawyer, doctor, or husband and not her son, direct access to the precise content of another person’s beliefs regarding the robot caregiver in their midst will be lacking.

Granted, a demented person might mistakenly believe that the robot is an empathic being, but as long as it does not replace human caregivers and is used as a facilitator of care and other types of human-human interaction, the introduction of the technology would not necessarily constitute being dismissive of that person’s well-being. The presence of robot caregivers may offer comfort to dementia patients even if the reasons for this remain opaque to their human caregivers and other outsiders. In short, as long as there is no intention to deliberately deceive or neglect dementia patients through the use of a robot, the fact that some patients may form erroneous beliefs about a robot caregiver—a process over which other agents may have little control—does not necessarily amount to being disrespectful to a care recipient.

Along related lines, Sparrow and Sparrow predict that robot-human will replace human-human interaction instead of augmenting or altering existing human relationships. Admittedly, the frequency and type of human contact that may be gained or lost due to the use of robot caregivers and the corresponding effects this can have on flourishing are difficult to foresee. Moreover, a typical motive for introducing robots into an environment has been to maximize profits by replacing human workers. Yet bringing robot caregivers onto the scene could also be motivated by the obligation to meet core human needs. This is a key advantage of the capabilities approach, since it should inform the design and use of robot caregivers in such a way that the “human” in human-robot interaction is maintained.

Along related lines, Sparrow and Sparrow dismiss the idea that freeing people from “mundane aspects of aged care” will allow them to “devote more of their energies to the more important task of providing companionship and emotional support for each other.”⁸⁸ Though the current level of human contact that care recipients receive in many

⁸² Sparrow and Sparrow, p. 149.

⁸³ It should be noted that if an individual suffers from severe dementia, she could not only be “deceived” by being taken care of by a robot, but presumably she could also mistake relatives for health care staff for example.

⁸⁴ The study did however have a relatively small sample size ($N = 177$); see Ezer et al. (2009).

⁸⁵ Cooper et al. (2009).

⁸⁶ Coeckelbergh (2010, p. 183).

⁸⁷ Thank you to the anonymous reviewer who raised this objection.

⁸⁸ Sparrow and Sparrow, p. 152.

U.S. nursing homes, for example, is probably preferable to none, that contact is not always terribly meaningful. While it could be a forlorn hope, the use of robot caregivers could allow people to interact in more purposeful and consequential ways than, say, discussing the weather with someone while cleaning the floor in their room. In principle, there is nothing wrong with such interaction, but this is quite different from sitting down to talk with someone over a pot of tea. The framework of the capabilities approach makes enabling human communication a primary goal, particularly for those for whom it is more difficult.

Critics are probably right that at least some care recipients may feel neglected by their family, friends, or others. Using the technology could erode the relationship between at least some care recipients and human caregivers.⁸⁹ For instance, Sparrow and Sparrow fear that human contact for the elderly may be reduced. They claim the introduction of robots might lead nursing homes to downsize, making each employee responsible for a larger number of residents.⁹⁰ Discounting this possibility is hard to do. But it is difficult to support the notion that current caregiving conditions ought to be preserved. Nursing home residents are too frequently the victims of abuse and theft,⁹¹ illustrating that care is sub-par for many. A further problem with this line of criticism is that it does not distinguish between freely choosing the company of certain other persons and requiring the presence of others due to the diminishment of one's ability to function more independently. Though the arrival of a robotic caregiver might be perceived as a sign that a care recipient has been "put out to pasture," it may also be viewed as helping that individual to recover a desired level of independence.

There is little justification for assuming that current caregiving conditions are optimal or that their removal or radical alteration would be a bad thing. Family members have as much opportunity to undermine an individual's capabilities as they do to promote their flourishing.⁹² Those caring for elderly or impaired individuals by default may not be best suited for the task. While family members might agree about appropriate goals, worldviews, priorities, and other things, they can also reasonably disagree about many things, including how one's "golden years" ought to be spent. Moreover, even when family members' views converge, this may be the result of adaptive preference and not the product of an individual's free deliberation and choosing.

Underlying the aforementioned issues is the motive behind the development of robot caregivers. Charitably

speaking, the drive stems partly from inadequate resources being dedicated to solving relevant social problems. In countries like Japan and Germany, robots might be tasked to care for populations whose average age continues to rise.⁹³ Further, elderly and others in dire need of care experience neglect or worse. Critics worry that if we rely on the "technological fix" in this case, it might lessen incentives to improve human behavior and to some degree their apprehension is understandable. There are many possible causes for our relevant social problems (e.g., frustration, lack of resources, resentment, low pay). Robots could be a valuable piece of the puzzle in this regard by serving not as a "fix" but a valuable technological "assist" that mitigates problems such as lack of genuine choice and elder abuse.

Moreover, Wallach and Allen ask, "if there is no evidence that people and communities are willing to direct the time and resources necessary to respond to the needs of the elderly and disabled *for human contact*, are social robots better than nothing?"⁹⁴ While it would be preferable to modify certain assumptions about the circumstances of acceptable human interaction so that simply going to visit or talk with another person without desiring to achieve some other goal, such as feeding, cleaning, or moving an elderly person or attending to his or her environment, would be valued equally. As it is, people are often reluctant to interact with others unless there is a tangible outcome from the interaction. This phenomenon is consistent with Nussbaum's observation that the pervasive view of the citizen is that of "productive augments of social well being"⁹⁵ and Western societies' tendency to be "dominated by economic motives and considerations of efficiency".⁹⁶

Conclusion

The relative flexibility of the capabilities approach can promote the goal of human flourishing through empowering individuals and expanding their opportunities. Along with the insights from other views on ethics, it can provide designers and users of robots with a proactive framework within which to assess the potential ethical impact of using robots as caregivers. In addition to expanding opportunities and improving the quality of life for care recipients, the capabilities approach also focuses on the well-being of caregivers. Ultimately, using the approach as a guide to robot intervention in caregiving activities may expand

⁸⁹ Sparrow and Sparrow, p. 153.

⁹⁰ Sparrow and Sparrow, p. 150.

⁹¹ Pear (2008).

⁹² Nussbaum (2000).

⁹³ Decker (2000, pp. 321–322).

⁹⁴ Wallach and Allen, p. 45.

⁹⁵ Nussbaum (2006, p. 128).

⁹⁶ Nussbaum (2006, p. 157).

freedom and contribute to human flourishing for individuals at different life stages despite existing impairments. This has the potential to alter positively our perceptions of caregiving as well as our attitudes and behavior toward care recipients.

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