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# Intelligent machines, care work and the nature of practical reasoning

Final Draft accepted by *Nursing Ethics*

Angus Robson

*'ZOEY. Now you. Name three things you and your partner appear to have in common.*

*ROBOT. (He scans her quickly as if assessing her) Easy. Number One: the rain. You don't like it, and I am not waterproof, and I am liable to short-circuit in the rain. Number two: the past: you tend to forget yours, and I don't have one. Number Three: It appears as though we are connected to the same Wi-Fi router. Those are three commonalities.*

*ZOEY. Ha-ha! That's true.'* <sup>1(p.468)</sup>

*'Care is surely a form of labor. But it is also much more. The labor of care is already relational, and for the most part cannot be replaced by machines in the way that so much other labor can.'* <sup>2(p.36)</sup>

## Introduction

The first extract above is taken from a play performed as part of an applied theatre research project designed by Jochum et al. <sup>1</sup> to investigate audience reactions to human interaction with a care robot. The situation of the play is that a woman has suffered a brain injury which affects her short term memory, and she is given a NAO social robot to assist with day-to-day living and to provide companionship. The plotline of the simple two-character script follows the structure of Aron's <sup>3</sup> 'How to fall in love in thirty six questions'. There appears to be some dissonance between the assumptions of this dialogue and the second extract from Held <sup>2</sup>.

The development of robots in care work is contentious, and has attracted considerable academic interest<sup>4</sup>. Ethical concerns do not only involve the well-being of end users, regarding deception, objectification or loss of privacy<sup>5,6</sup>; they also include the potential erosion of caregiving as a central feature of human moral life<sup>7,8</sup>. The latter issue is the focus of this article. Specifically, I explore the idea that machines can be moral agents, in the context of care.

In order to do so, I make use of the philosophy of Alasdair MacIntyre, who offers a distinctive approach to ethics. His philosophy is practice-led, in the sense that it does not offer any general theories of ‘what to do’. Rather he offers a way of looking at practices and other social structures which enable us to answer the question, ‘What should we do?’ on the basis of practical experience of particular contexts. He is interested in social structures as enablers of (or barriers to) moral agency, and offers a richly textured understanding of the relationship between ethics and social science.

The argument of the current article proceeds in three stages. First, the basic problem is stated. I then set out a four part framework derived from some of MacIntyre’s central ideas of the way that human moral agency and practical reasoning are developed. That framework is used to examine the claim that machines might exercise some level of moral agency, including the possibility that they might do care work. I argue that certain kinds of social structure, including relationships of care, are central to moral development, that machines cannot participate in crucial aspects of these and, consequently, that machines cannot develop as moral agents. Finally, I draw some conclusions about the nature of practical reason in care and the limitations of technology. I argue further that, since machines cannot do care work, the term ‘care robot’ should be resisted. I propose some practical implications for the position of care practitioners in design and development of new technologies.

## The nature of the problem

Advances in machine intelligence have been accompanied by remarkable claims for their moral status. It is understandable that commercial developers should market their

products as ‘emotionally sensitive’ or ‘kindly’ or that journalists should report this in anthropomorphic language<sup>9,10</sup>. It is perhaps more surprising that prominent academics go much further, to claim that intelligent machines should be recognised as moral agents, and that they may have a legitimate claim to robot rights<sup>11,12</sup>.

These two discourses, one in commercial and popular media, the other in academic debate, appear to be connected. As developers produce machines whose behaviour and appearance more and more closely mimics human action and expression, the more likely it is that anthropomorphic language will be used to describe those machines and that human attributes will be assigned to them. So, in the commercial and popular sphere, talk of ‘machines which lift people’ or ‘communicate information’, bleeds over into talk of ‘care robots’ and ‘emotional response’, while in the academic sphere, ‘autonomous action’ becomes ‘agency’ and then ‘moral agency’.

For example, Floridi<sup>13</sup>, in summarising what he means by ‘information ethics’, argues that information systems have both moral agency (they can act well or badly, morally) and moral patiency (they deserve moral consideration or rights), and he infers from this that they are accountable for their actions, even if they cannot be responsible for them. Others have proposed models of extended agency, such that responsibility for an event involving a machine may be distributed across a network of components including humans and non-humans<sup>14</sup>. Such debates provide some basic ontological challenges, by questioning our assumptions about the moral nature of human beings compared to machines.

A recent review of literature on the ethics of care robots in elder care recommends broadening our ethical landscape to include the moral agency of robot technology<sup>4</sup>. In this the authors explicitly follow Gunkel<sup>15</sup>. They qualify agency here as intended not in the sense of machines exercising moral reasoning, but in the sense of them influencing human moral reasoning. However, it is exactly questions of extending moral agency and patiency, in the sense of moral decision making and moral consideration, that Gunkel, Floridi and others are interested in.

To be clear, the problem is not the development and introduction of intelligent machines in the context of care. The benefits of emerging technologies in healthcare are

well established <sup>16</sup>. The problem is one of exaggeration, which may lead to poor design and use. If it is accepted that intelligent machines should be recognised as exercising some form of extended moral agency, being accountable for their actions or sharing responsibility, or if it is imagined that they are capable of providing care or companionship, then this will affect the way that they are developed, marketed and used in care settings.

In order to understand the moral limitations of technology, it is useful to first have some idea of the basis of the moral capacities of human beings. The context of care brings such issues into sharp focus. In this respect, I broadly agree with O’Brocháin <sup>8</sup>, who also makes use of MacIntyre. However, I do not share the assumption that robots in care contexts such as dementia need necessarily displace human caring. My argument is that we need to be clear about the limitations of technology in order to avoid such displacement, and I seek to position the topic of care in MacIntyre’s wider philosophy of practical reason. The section below gives a very condensed overview of the kind of structures which MacIntyre thinks are essential for human moral development – in Aristotelian terms, the development of practical reason.

## A MacIntyrean four-part scheme

MacIntyre does not seek to describe a complete system of practical reasoning. However, he does set out his ideas of the kinds of structure which we need, in order to develop as practical reasoners. Here I pick out four in particular: practices, traditions, the narrative unity of a human life and intimate relationships of care and dependency. The first three are articulated in *After Virtue* and subsequent books, and the fourth in *Dependent Rational Animals*.

### **Practices**

MacIntyre’s idea of practices has been widely discussed elsewhere, including in the context of health care and more specifically nursing <sup>17-19</sup>. Here I give only a brief indication of the concept.

‘By a ‘practice’ I am going to mean any coherent and complex form of socially established cooperative human activity through which goods

internal to that form of activity are realized in the course of trying to achieve those standards of excellence which are appropriate to, and partially definitive of, that form of activity, with the result that human powers to achieve excellence, and human conceptions of the ends and goods involved, are systematically extended.’<sup>20</sup> (p.187)

The above is perhaps the most quoted passage from MacIntyre’s writing. He illustrates the idea of a practice through the example of a child learning to play chess, a process whereby the child might be given reasons to learn how to play chess first by means of rewards, such as candy, which are extraneous to the game of chess; if the child then persists and learns to play the game moderately well, he or she may then learn to enjoy the game for its own sake. Learning to enjoy the game for its own sake involves beginning to recognise certain goods which are specific to chess, a ‘particular kind of analytic skill, strategic imagination and competitive intensity, a new set of reasons, reasons now not for winning on a particular occasion, but for trying to excel in whatever way the game of chess demands’<sup>20</sup> (p.188).

MacIntyre calls these ‘internal goods’. He extends his discussion to a range of practices, such as farming, fishing, portrait painting, medicine, physics etc., and distinguishes between the internal goods of practices which are co-operative and non-exclusive, with external goods of money, status and so on. The latter are typically objects of competition within and among organisations, in the shape of profits, salaries, outputs or league tables. His initial characterisation of virtue is then a human quality which enables one to appreciate and pursue the internal goods of practices.

### **Traditions**

The idea of practices only provides MacIntyre’s first step in exploring the basis of the way that human beings develop and exercise practical reason and the virtues on which it depends. Another element of MacIntyre’s scheme is the idea of the moral traditions in which we find ourselves. Practical reasoners are always located in moral communities of some sort. It is through our membership of and role within such communities that we develop our sense of what a good life might mean, what the virtues are for, and what our

own purposes and ends might be <sup>21, 22</sup>. Such communities may be understood at many different levels <sup>23, 24</sup>, all the way from the large social movements of national and religious cultures, through to particular ways of life in towns and workplaces, and including the traditions of particular practices.

These kinds of social structure embody shared ideas of what it means to live well and act well in particular circumstances, and through them we develop practical reasoning <sup>25</sup>. We inherit from such moral traditions our sense of right and wrong and, through our actions and words, we shape not only our own development as practical reasoners but also, in turn, the development of those same traditions. MacIntyre characterises traditions as sources not only of agreement, but also of ongoing arguments about those agreements.

### **The narrative unity of a human life**

The third key element which he introduces in *After Virtue* is the narrative unity of a human life, which gives meaning to the activities in which that life is engaged. The moral significance of any particular action depends not only on the circumstances of the act, but also on the intentions of the actor, which depend in turn on the larger story of that person's life, their history and their ultimate goals.

This is closely connected with the Aristotelian ideas of *eudaimonia* and *telos*. *Eudaimonia*, although often translated as happiness, does not equate to a transient affective state, as in, for instance, feeling happy about a new job; rather, it refers to flourishing or living well over the span of a whole life <sup>26, 27</sup>. What it is to live well depends on one's *telos*, or purpose in life. This requires a conception of the overall good at which one's life should aim, and MacIntyre regards the quest for the good as itself a foundation of the good life:

‘It is in looking for a conception of *the* good which will enable us to order other goods, for a conception of *the* good which will enable us to extend our understanding of the purpose and content of the virtues, for a conception of *the* good which will enable us to understand the place of integrity and constancy in life, that we initially define the kind of life which is a quest for the good.’ <sup>20</sup> (p.219)

These three elements of the scheme are all linked in the exercise of moral agency. The narrative quest for the good in the case of some particular person can only be understood in the light of their connection to particular communities and practices. Practices, meanwhile, generally imply moral traditions of some sort, inasmuch as they have their own histories and standards, shared between communities of practitioners. As MacIntyre <sup>20</sup> (p.216) puts it: ‘I can only answer the question “What am I to do?” if I can answer the prior question “Of what story or stories do I find myself a part?”’

### **Intimate relationships of care and dependency**

The fourth element of the scheme proposed here is taken from later in MacIntyre’s writing. In *Dependent Rational Animals* <sup>28</sup>, he begins by remarking on the importance of the work of Kittay <sup>29</sup>, Held <sup>30</sup> and other writers in feminist ethics and ethics of care, and from that point builds a Thomistic argument for the importance of virtues of acknowledged vulnerability. Here, I emphasise ethics of care, but the account remains compatible with MacIntyre’s.

Aristotelian virtue ethics is relational in the sense that it places the moral agent in the context of social relations, but ethics of care is relational in a stronger sense. Here, moral value is primarily located, not in moral agents, but in the relationships between them, specifically relationships of dependency and care. The focus is ‘on the compelling moral salience of attending to and meeting the needs of particular others for whom we take responsibility’ (Held, 2006, p.10).

Ethics of care sees close relationships of dependency and vulnerability as paradigmatic for morality. It is thus concerned, in the first instance, with the basic human need to care and be cared for by others. Most obviously this applies at those times of life where vulnerability is most marked, for instance in infancy, sickness, disability and old age, but it also applies throughout our lives, inasmuch as we continue to need others to care for us and about us <sup>31</sup>. These two ideas of caring about and caring for are basic, and both are important for good care<sup>32</sup>. Caring for implies labour, and it is central to the feminist concerns of many care ethics authors that the activities, labour and practice of care should be recognised as fundamental to human well-being <sup>29, 32</sup>.



Ethics of care is generally (though not universally) regarded as distinct from virtue ethics<sup>33</sup>, but one key point of agreement is that emotions are vital in accounting for moral life<sup>2, 34</sup>. In ethics of care, this tends to focus on particular emotions, such as sympathy, which are indispensable for our ability to care for and about others, but it also extends to other emotions such as anger or fear. That a parent should fear for his child in appropriate circumstances, for instance, is basic to his ability to care for her.

The human experience of vulnerability and dependence and the human response to that experience in caring for others is, MacIntyre argues, the context in which moral development arises. Our development as practical reasoners is a process of emergence from the protection of carers, particularly parents, but also friends and teachers, into an increasingly independent position of decision, action and responsibility, in which we retain, nevertheless, our awareness and acknowledgement of our vulnerability and dependence on each other.

### **The scheme as a whole**

It is important to keep MacIntyre's work in view as a complex whole. Here I have identified four key structural themes, which in itself risks oversimplifying things. However, it has the merit of pointing out an important central feature of the way that MacIntyre's work has progressed, which might be characterised as a naturalist turn and to some extent a domestic one.

In his major books from the 1980s to mid 1990s<sup>21, 35, 36</sup> MacIntyre is mainly focused on social structures which are large scale and in the public sphere. There is mention of small scale examples and the domestic sphere (family life is listed as a practice), but the bulk of discussion is taken up with grand themes and historical movements: the virtues at Athens, the Rule of Benedict, the Scottish Enlightenment, Thomism, and so on.

His later books<sup>24, 28, 37</sup> show more interest in the personal and domestic. This includes the focus on the domestic sphere as discussed above, and extends to an interest in particular life narratives as exemplars of the way that individuals exercise practical rationality.

The new departure in *Dependent Rational Animals* is also notable because it is a work of Aristotelian naturalism, and thus different to the sociological and historical

emphasis of much of his earlier work<sup>38, 39</sup>. In *After Virtue*, MacIntyre famously rejected Aristotle's metaphysical biology as a starting point for an account of ethics based in human nature. In its place he proposed an account based on social practice. In *Dependent Natural Animals*, by contrast, the animal nature of human beings is front and centre. The book has the same basic purpose as Philippa Foot's<sup>40</sup>, *Natural Goodness*, albeit that its argument is differently directed. Both seek a bedrock for moral philosophy in facts of human nature, which lie beyond the mutability of human practice. For both Foot and MacIntyre at this point, human beings have an animal nature which is generic to their species, and on which rival traditions of moral enquiry are founded.

This progression becomes critical when considering the moral life of humans and machines. Questions of moral agency become not only ones of practice, culture, behaviour, language, and so on. They are also ontological questions: What basic features of the nature of human beings require and are required by moral agency? What other kinds of being have similar features?

## Machines and moral agency

If machines are to be able to exercise moral agency, they need to be able to exercise practical reasoning, and if they are to develop as practical reasoners, they need to be able to learn from experience<sup>41</sup>. The question thus arises: will machines be able to participate in the kinds of experiences which are likely to assist that development? We can position this in the light of the four part scheme outlined above.

First, what are the prospects for machines to be able to participate in practices? It is initially tempting to say that machines can win at games, but have no understanding of the internal goods of practices. To some extent this would be true. Like MacIntyre's chess playing child, machines are inclined to win by any means and this often involves subverting the game, rather than excelling in it. (For an entertaining account of this tendency, see Lehman et al.<sup>42</sup>.)

However, the experiences of human chess and Go champions are increasingly that computers have begun to play these games in innovative ways that have, in effect, extended

the goods of the practice<sup>43, 44</sup>. If we are then inclined to admit some level of involvement in some practices, but to say that these examples are suspiciously solo activities with very limited physicality, and question whether any meaningful *social* practice is evident, we should remember that robot football is a developing research field, already producing real teams of robo-footballers<sup>45</sup>.

Something like the same applies to machine participation in traditions. Certainly, machines find themselves working within traditions of scientific enquiry and they are, by their presence, contributing to the development of those traditions. MacIntyre characterises moral traditions not only as sets of assumptions which are handed down, but also as ongoing arguments about what is good or right to do. Whether machines will be able to participate in such moral traditions will largely depend on whether human beings equip them to do so, but already IBM's Project Debater is a development in this direction, as is the medical ethics programme MedEthEx<sup>46, 47</sup>.

The narrative unity of a life appears to be more of a challenge for machines. Narrative is not in itself a barrier; machines can tell stories. However, the quest for the good is problematic and unity of life even more so. This is not only a question of embodiment, but also of the connectivity between bodies and minds. Organic life produces unique individuals with unique histories and purposes. As individual human beings, we are strictly limited to our particular lives. Machines are not so constrained. Software can be duplicated and hardware can be re-purposed. Because machines (or software systems) are not embodied in anything like the way that organic life is, it is not at all clear that machines can be individuated in anything like the way that organic beings are. Our perceptions of this can, of course, be manipulated, and it will be in the commercial interest of robot manufacturers to sell individualised robot pets, with apparently unique personalities and histories, but they will still lack the unity of life of real pets.

Perhaps the greatest challenge for claims of machine morality presented by MacIntyre's philosophy is the grounding of practical reason in intimate relationships of dependency and vulnerability. MacIntyre's position is not anthropocentric. Human beings are not automatically privileged as moral beings, and claims to practical reasoning are open to other forms of animal life. Machines, however, seem to be in some difficulties here,

since there is no sign that machines can develop relationships of care in anything like the way that humans and other animals do.

If MacIntyre and care ethicists are right, our capacities for moral life are founded in intimate relationships involving the giving and receiving of care, which are rooted in our nature as socially interdependent and vulnerable animals. Because machines cannot participate in this kind of vulnerability, whilst they can be programmed to provide a care-related service for somebody, they cannot care about others in the same way that humans can <sup>48</sup>.

It may then be tempting to say that machines can care for people, but not about them, because they can participate in care labour, even if they are incapable of the relational engagement usually implied by care. However, whilst machines certainly can and do assist in care work, it is misleading to speak of machines as caring for anyone, for two principal reasons, one conceptual and one practical.

First, it is central to the idea of care ethics, that care is relational <sup>2, 31, 49</sup>. The work of caring for someone cannot be disassociated from the relational commitment implied in caring about. This is not to say that carers cannot carry on with their care work in a reduced, instrumental way, even when they do not feel like they care about someone. It is just to say that relational commitment must be there as the context in which care work is understood.

Second, it is a practical requirement of caring for someone, that the carer should be able to understand and respond to the needs of that person <sup>50</sup>. This capability is a central feature of practical reasoning. It implies not only sensitivity to the needs of others, but also the ability to reason with regard to the flourishing of others as well as oneself. A carer needs to be able to understand what might be in someone else's best interests in some particular moment.

Consequently, two immediate limitations need to be acknowledged when considering the role of machines in contexts of care. First, machines cannot *be carers* in a relational and conceptual sense. Second, they cannot *care for* in a practical sense. Machines, in short, cannot themselves do care work. All they can do is to provide technological assistance to human carers in their care work.

## The limits of technology and the primacy of care practices

All this has consequences for how we approach the ethics of machines in a care context and how technology is designed and developed. Some authors worry, rightly, that care robots will not provide good care<sup>51,52</sup>. The argument above is, more fundamentally, that robots cannot really do care work at all, for the same reasons that they cannot develop as moral agents.

On this view, we should resist the term ‘care robot’, because it already implies that machines can do care work. Mimicry and deception are well-articulated as potential problems with regard to the use of robots in care settings<sup>5,6</sup>. My contention here is that deception is already present in the language of ‘care robots’. The phrase itself blurs lines. This is similar to the blurring implied in the phrase ‘artificial moral agency’. However, it is a key difference between usage of those two terms that ‘artificial moral agency’ is widely challenged<sup>53</sup> where ‘care robot’ generally is not. We should perhaps insist that, strictly speaking, there are no such things as care robots<sup>1</sup>.

Another key conclusion from the foregoing analysis concerns not just language, but ontology. It appears that machines (however they are spoken of, as robots, computers or artificial intelligence) are not the kind of entities which can care, develop practical rationality or exercise moral agency.

This is based on practical rather than logical premises. Whilst there may be plausibility to claims of *some* level of participation in *some* of the structures of practical reasoning as set out by MacIntyre, there is no plausible claim that machines can, or will any time soon, participate adequately across the range. They lack a locus in the kind of life experiences which enable moral development. Most obviously, they cannot experience the narrative unity of a life, and they cannot form intimate relationships of care. It also appears

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<sup>1</sup> The same is not true of some other categories of advanced and intelligent systems. For instance, ‘Lethal Autonomous Weapon Systems’ are fully capable of killing people. No misrepresentation is implied in this label or the vernacular phrase ‘killer robots’. A falling rock, a machine or a cow with a calf can all kill someone, but only the cow is capable of caring.

that these are connected. An entity which does not have a bounded and individuated life and death cannot experience intimate relationships of care and vulnerability in anything like the way that animals can.

Ontological assumptions are, of course, also cultural ones<sup>2</sup>. For instance, it appears that the assumptions of Japanese and North American cultures with regard to robots may be rather different<sup>54</sup>. It is a key part of MacIntyre's thinking on traditions that there will be such differences, often encoded in everyday language, and that critique of one's own or other cultural traditions is not only legitimate, but essential, if relativism is to be avoided. One limitation of the current article is that it engages primarily with European and North American authors, but it is important that debate is extended across cultures, particularly because Japan is currently a global leader in humanoid robots.

None of the arguments above imply that machines cannot participate in *human* moral life. Clearly, they already do so; they contribute to human decision making, they carry out tasks delegated to them by humans, and they make some tasks possible which otherwise would not be. It seems very likely that the pace of their dissemination in care work will accelerate. The question therefore arises: How can responsible design and development best be ensured? There are two central strands of MacIntyre's thoughts on practices which are directly relevant.

First, those who participate in practices are generally well placed to judge what is good and best in their practice. Practitioners cannot avoid doing moral philosophy in their day-to-day actions, and 'ethicists' have no privileged position with regard to standards in nursing, for instance, compared to nurses<sup>25</sup>. The practical implication of this in the development of technology in care work is that practitioners should lead the process of design and deployment. Practitioners, here, of course means those involved in giving *and* receiving care. Those who are cared for will be just as central to the development process as care givers, so that advocacy becomes a central concern of good design. This supports approaches to responsible design which place care workers and user groups at the centre

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<sup>2</sup> My thanks to reviewers of the draft article for reminding me of this.

of the design process<sup>55</sup>, rather than those which assume the lead position of ‘engineers and ethicists’<sup>52(p.424)</sup>, as external observers and evaluators of patient care procedures.

Second, MacIntyre emphasises that the goods and goals of practices are generally very different from the priorities of institutions, and these two sets of goals are often in tension. For instance, what an organisation commissioning or providing care services prioritises as measurable organisational targets (unit cost, number of service users, number of visits etc.), may be different from the goals of care workers in terms of the quality of human relationships. MacIntyre’s approach does not dismiss the importance of organisational goods, but it does draw attention to the difficulty of balancing the priorities of practices and institutions. In the context of new care technologies, there is a clear risk that the priorities of organisations rather than practices will drive design and deployment.

These two points indicate the need for a shift in power dynamics. Currently, developments appear to be driven partly by the organisational requirements of care purchasers and providers, and partly by the commercial prospects for tech companies to open up new markets. Care practitioners – givers and receivers of care – rather than having a largely reactive role to the introduction of new care technologies need to take a much more active role in their design and development.

## References

1. Jochum E, Vlachos E, Christoffersen A, et al. Using Theatre to Study Interaction with Care Robots. *International Journal of Social Robotics* 2016; 8: 457-470. journal article. DOI: 10.1007/s12369-016-0370-y.
2. Held V. *The ethics of care: Personal, political, and global*. Oxford University Press on Demand, 2006.
3. Aron A, Melinat E, Aron EN, et al. The experimental generation of interpersonal closeness: A procedure and some preliminary findings. *Personality and Social Psychology Bulletin* 1997; 23: 363-377.
4. Vandemeulebroucke T, de Casterle BD and Gastmans C. The use of care robots in aged care: A systematic review of argument-based ethics literature. *Archives of gerontology and geriatrics* 2017.
5. Sparrow R and Sparrow L. In the hands of machines? The future of aged care. *Minds and Machines* 2006; 16: 141-161. Article. DOI: 10.1007/s11023-006-9030-6.
6. Sharkey A and Sharkey N. Granny and the robots: ethical issues in robot care for the elderly. *Ethics and Information Technology* 2012; 14: 27-40.
7. Vallor S. Carebots and Caregivers: Sustaining the Ethical Ideal of Care in the Twenty-First Century. *Philosophy & Technology* 2011; 24: 251. journal article. DOI: 10.1007/s13347-011-0015-x.
8. O'Brolcháin F. Robots and people with dementia: Unintended consequences and moral hazard. *Nursing ethics* 2017: 0969733017742960.
9. Adam A. Meet Pepper - Canada's first emotionally sensitive robot for sick kids. *Global News*, <https://globalnews.ca/news/4180025/pepper-canada-robot/> (2018, accessed May 6 2018).
10. SoftBank Robotics. Who is Pepper?, <https://www.softbankrobotics.com/emea/en/robots/pepper> (2018, accessed 2 August 2018).
11. Floridi L and Sanders JW. On the Morality of Artificial Agents. *Minds and Machines* 2004; 14: 349-379. journal article. DOI: 10.1023/B:MIND.0000035461.63578.9d.
12. Gunkel DJ. A Vindication of the Rights of Machines. *Philosophy & Technology* 2014; 27: 113-132. journal article. DOI: 10.1007/s13347-013-0121-z.
13. Floridi L. Information ethics, its nature and scope. *ACM SIGCAS Computers and Society* 2005; 35: 3-3.
14. Gunkel DJ. Mind the gap: responsible robotics and the problem of responsibility. *Ethics and Information Technology* 2017. journal article. DOI: 10.1007/s10676-017-9428-2.
15. Gunkel DJ. *The machine question : critical perspectives on AI, robots, and ethics*. Cambridge, Mass.: MIT Press, 2012, p.xiv, 256 p.



16. Huston C. The impact of emerging technology on nursing care: warp speed ahead. *The Online Journal of Issues in Nursing* 2013; 18.
17. Tuckett A. Nursing practice: compassionate deception and the Good Samaritan. *Nursing ethics* 1999; 6: 383-389.
18. Beadle R. Managerial work in a practice-embodiment institution: The role of calling, the virtue of constancy. *Journal of business ethics* 2013; 113: 679-690.
19. Sellman D. Alasdair MacIntyre and the professional practice of nursing. *Nursing Philosophy* 2000; 1: 26-33.
20. MacIntyre A. *After virtue : a study in moral theory*. 2nd ed. Notre Dame, Ind.: University of Notre Dame Press, 1984, p.xi, 286 p.
21. MacIntyre A. *Whose justice? Which rationality?* Notre Dame, Ind.: University of Notre Dame Press, 1988.
22. Lutz CS. *Tradition in the ethics of Alasdair MacIntyre : relativism, Thomism, and philosophy*. Lanham, Md.: Lexington Books, 2004, p.x, 217 p.
23. Nicholas J. *Reason, tradition, and the good : MacIntyre's tradition-constituted reason and Frankfurt School critical theory*. Notre Dame, Ind.: University of Notre Dame Press, 2012, p.xiii, 250 p.
24. MacIntyre A. *Ethics in the conflicts of modernity : an essay on desire, practical reasoning, and narrative*. New York: Cambridge University Press, 2016, p.xiii, 322 pages.
25. MacIntyre A. Plain persons and moral philosophy: Rules, Virtues and Goods. *American Catholic Philosophical Quarterly* 1991; 66: 3-1.
26. Lear GR. Happiness and the Structure of Ends. *A Companion to Aristotle* 2009: 385-403.
27. Aristotle. *Nicomachean Ethics*. Cambridge: Cambridge University Press, 2000.
28. MacIntyre A. *Dependent rational animals : why human beings need the virtues*. London: Duckworth, 1999.
29. Kittay EF. *Love's labor : essays on women, equality, and dependency*. New York: Routledge, 1999, p.xvii, 238 p.
30. Held V. *Justice and care : essential readings in feminist ethics*. Boulder, Colo.: Westview Press, 1995, p.x, 234 p.
31. Noddings N. *Caring : a feminine approach to ethics & moral education*. 2nd ed. Berkeley: University of California Press, 2003, p.xvi, 220 p.
32. Tronto JC. *Moral boundaries: A political argument for an ethic of care*. Psychology Press, 1993.
33. Sander-Staudt M. The unhappy marriage of care ethics and virtue ethics. *Hypatia* 2006; 21: 21-39.
34. Blum LA. *Moral perception and particularity*. Cambridge England ; New York, NY, USA: Cambridge University Press, 1994, p.ix, 273 p.
35. MacIntyre A. *After virtue : a study in moral theory*. Notre Dame, Ind.: University of Notre Dame Press, 1981, p.ix, 252 p.
36. MacIntyre A. *Three rival versions of moral enquiry: Encyclopaedia, genealogy, and tradition*. University of Notre Dame Press, 1994.
37. MacIntyre A. *Edith Stein: a philosophical prologue, 1913-1922*. Rowman & Littlefield, 2007.
38. Knight K. Practices: the Aristotelian concept. *Analyse & Kritik* 2008; 30: 317-329.

39. Toner C. Sorts of naturalism: requirements for a successful theory. *Metaphilosophy* 2008; 39: 220-250.
40. Foot P. *Natural goodness*. Oxford: Clarendon, 2001.
41. Wallach W and Allen C. *Moral machines : teaching robots right from wrong*. Oxford ; New York: Oxford University Press, 2009, p.xi, 275 p.
42. Lehman J, Clune J, Misevic D, et al. The surprising creativity of digital evolution: A collection of anecdotes from the evolutionary computation and artificial life research communities. *arXiv preprint arXiv:180303453* 2018.
43. Kasparov G. *Deep thinking*. Hodder & Stoughton, 2018.
44. Chan D. The AI that has nothing to learn from humans. *The Atlantic*. 2017.
45. Barrett S and Stone P. Cooperating with Unknown Teammates in Complex Domains: A Robot Soccer Case Study of Ad Hoc Teamwork. In: *AAAI 2015*, pp.2010-2016.
46. Fleetwood J, Vaught W, Feldman D, et al. MedEthEx Online: a computer-based learning program in medical ethics and communication skills. *Teaching and Learning in Medicine* 2000; 12: 96-104.
47. Simonite T. IBM's newest AI can probably argue better than you. *Wired*, 19 June 2018 2018.
48. Parks JA. Lifting the Burden of Women's Care Work: Should Robots Replace the "Human Touch"? *Hypatia* 2010; 25: 100-120.
49. Ruddick S. Care as labor and relationship. *Norms and values: Essays on the work of Virginia Held* 1998: 3-25.
50. Lütznén K, Dahlqvist V, Eriksson S, et al. Developing the concept of moral sensitivity in health care practice. *Nursing ethics* 2006; 13: 187-196.
51. Coeckelbergh M. Artificial agents, good care, and modernity. *Theoretical Medicine and Bioethics* 2015; 36: 265-277. journal article. DOI: 10.1007/s11017-015-9331-y.
52. Van Wynsberghe A. Designing robots for care: Care centered value-sensitive design. *Science and engineering ethics* 2013; 19: 407-433.
53. Johnson DG and Miller KW. Un-making artificial moral agents. *Ethics and Information Technology* 2008; 10: 123-133. journal article. DOI: 10.1007/s10676-008-9174-6.
54. Robertson J. Robo sapiens janicus: Humanoid robots and the posthuman family. *Critical Asian Studies* 2007; 39: 369-398.
55. Compagna D and Kohlbacher F. The limits of participatory technology development: the case of service robots in care facilities for older people. *Technological forecasting and social change* 2015; 93: 19-31.