Future of Caregiving:
Examining Empathetic Actions in Care Robots

Introduction

In a French hospital, a fifty-eight-centimetre-tall robotic caregiver named *Zora* assists nurses with providing physical, cognitive, and emotional support to patients with dementia and other health conditions that require round-the-clock treatment. From conducting exercise sessions, playing interactive games, and having intimate conversations, Zora has touched the lives of the many aged and sick patients living there (Satariano, Adam, Elian Peltier and Dmitry Kostyukov, online). Zora belongs to a class of autonomous robots called 'care robots' which are defined as machines that operate partly or completely autonomously with the aim of supporting older persons, their families, and care professionals in providing physical, cognitive, or emotional support (Gustafsson, Christine and Rose-Marie, Johansson-Pajala, online). Increasingly, care robots are being used in hospitals and nursing facilities worldwide to assist with the growing need for caregiving duties arising from demographics and ageing-related challenges.

At present, rapid advancements in Artificial Intelligence (AI) as well as care robots exhibiting more human-like characteristics (Coghlan, Simon, online) have led to care robots being more widely deployed in hospitals and nursing homes to assist nurses in their caregiving duties. This trend has been escalated by the COVID-19 pandemic, giving rise to new care robots such as *Grace* (Master, Farah, online) and *Temi* (Metteo, Rebecca, online) which are assisting nurses in hospitals and nursing facilities in providing emotional support for the aged and sick patients in Hong Kong and Singapore respectively. They are amongst the many care robots in the world today touching the lives of patients. Here, I will introduce three prominent care robots – Zora, Paro, and Pepper – which are unique in their own ways and will form the primary data set to be reviewed in this paper.

The Robotic Nurses

Zora, Paro, and Pepper are all cutting-edge and prominent care robots at the forefront of what AI has to offer for caregiving today. They are being deployed at various hospitals and nursing facilities globally to assist healthcare professionals with caregiving duties. Despite their similarity in classification, all three of them have distinct and specialised roles in supporting caregiving needs. This adds diversity to the pool of data to be examined, and makes gathering, exploring, and analysing their interactions with their human clients important and insightful. To start off, Zora has a more charming appearance and is widely used in providing care to emotionally unstable patients. There are currently more than 1000 Zora care robots being employed by nursing and health care facilities. On the other hand, more than 300 Japanese care robot Paro, which focuses on interactive care for aged and sick patients with dementia, are being used in nursing homes in Japan. Finally, Pepper, the world's first social humanoid care robot which is able to recognise faces and basic human emotions, has been employed in caring for sick children in Canada as well as in providing emotional support for autistic children in schools in England.

While many may be awed by the remarkable achievements of AI and care robots, there remains genuine concerns among others that care robots still lack the emotional capacity found in human caregivers perceived to be essential for quality caregiving for patients (Avi, Philipson, online). This is understandable because people want their feelings to be understood. They question whether care robots are necessarily the way forward for caregiving. The answer to their uncertainty will likely depend on how well care robots respond to the emotional needs of their patients. This then begs the question: how might an emotionless and non-empathetic care robot provide emotional support to humans? By delving into such a pertinent question, we can hopefully explore how even though the mind of a care robot may be very different from that of a human due to it lacking the biological components found in the latter's brain, this might not always be a hindrance to AI-driven robots having meaningful connections with humans. To explore this question, this paper argues that care robots can still be programmed to enact empathetic actions despite lacking emotions as long as they can effectively show understanding and respond to the needs and feelings of others.

How is Empathy shown?

In order to understand what empathy is, this paper will refer to Antonio Damasio's Theory on Feelings and Reasoning, while focusing mainly on Daniel Goleman's Framework on Empathy. Goleman is an American psychologist and neuroscientist who has written for the New York Times about brain and behavioural sciences for twelve years and is an award-winning author for his book titled *Emotional Intelligence*. According to Goleman, *empathy* is one of five components for emotional intelligence with the others being *self-awareness*, *self-regulation*, *motivation*, and *social skills*. He defines empathy as the ability to understand others' emotions, and at a deeper level, respond to the concerns and needs that underlie others' emotional responses and reactions. He notes that empathetic people are "superb at recognizing and meeting the needs of clients, customers, or subordinates. They seem approachable, wanting to hear what people have to say." and that true compassion "means not only feeling another's pain but also being moved to help relieve it." Goleman talks about a type of empathy known as *Compassionate Empathy*, which is the use of emotional intelligence to effectively respond to a situation based on understanding the needs and feelings of others. Through Goleman's framework, we can establish the basic criteria for empathy to be achieved: that is, through recognising feelings, responding, and taking actions to relieve the pain of another. Using Goleman's theoretical framework on Empathy, this paper will evaluate the presence and nature of empathy in the context of care robots, focusing on their ability to effectively respond to situations even without having emotions of their own. This would be key to understanding how they may provide emotional support for humans in future.

Encounters with Emotionally Unstable Patients

In many ways, care robots can demonstrate empathy for emotionally unstable patients as they can provide comfort and reassurance through their responses, thus becoming approachable figures for said patients. Let us examine the case of care robot Zora. From 2015-2017, researchers from the Utrecht University of Applied Sciences in the Netherlands monitored the performance of Zora in assisting nurses with caregiving in fourteen Dutch nursing homes (Huisman, Chantal and Helianthe Kort 31). In one observational study, old adults with an intense care demand formed the clients for Zora. Their moods were represented on a scale of -5 to +5 with -5 being 'Very bored' and +5 being 'Very enjoyable'. The old adults' moods were monitored before, during and after engaging in activities which includes dancing, playing games and singing with Zora. (Refer to Figure 1)

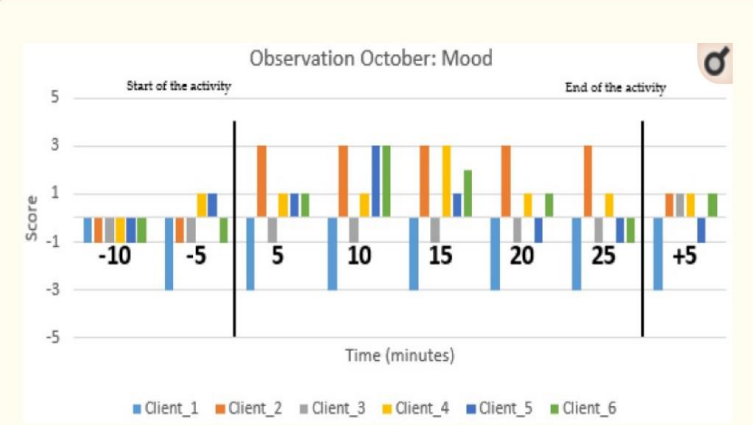

Figure 6

An observation score on mood during a group activity with the Zora robot in which six clients participated. All clients are from a psychogeriatric ward. Each colored bar represents one client. On the X-axis, the time prior to an activity (−10 and −5), the time during the activity (0–25) and after the activity (+5) are given. On the Y-axis, the mood score (−5 to +5) is given. The black vertical lines mark the start and end of the group activity with Zora.

Figure 1: Observational study of Zora's interactions with patients in the study "Two-Year Use of Care Robot Zora in Dutch Nursing Homes: An Evaluation Study"

As seen in Figure 1, it is clear that the majority of these sick adults experienced an improvement in mood after interacting with Zora as seen by the positive mood scores. This reflected Zora's ability to elicit appropriate responses in engaging sick adults to alter their mood from one of sadness and apprehension, to one of joy and laughter. Building on this, the Results section of the same study noted "Zora also had a positive effect on clients, and it is highly-valued. With some clients who were agitated or withdrawn, the use of Zora in a one-to-one situation gave positive results in the sense that a client who had not spoken for a while started to speak to Zora during an activity." As noted by Goleman earlier, "Empathetic people are superb at recognizing and meeting the needs of clients, customers, or subordinates. They seem approachable, wanting to hear what people have to say." Indeed, this was exactly what Zora was – approachable and able to respond to the needs of its distraught patients. This is so because when it came to private communication sessions with emotionally unstable patients, Zora showed that it could demonstrate appropriate responses to help mentally ill patients feel secure and open up about their problems. This runs contrary to Damasio's claim that having feelings is essential for demonstrating reasoning and various forms of intelligence, including emotional intelligence. Here, not only was Zora able to recognise the feelings of patients, but it could also respond in a way that was both reassuring and comforting, meeting the emotional needs of patients. This shows some form of Compassionate Empathy as described by Goleman.

Support for Dementia Patients

In addition, care robots have been observed to show empathy despite their lack of emotions due to them being programmed to provide empathetic responses in their interactions with patients, which have long-lasting impacts that can transform their lives. In addressing this point, I would like to introduce the terms of *Cognitive Empathy*, which refers to the ability to recognize and understand another's mental state, as well as *Affective Empathy*, which refers to the ability to share the feelings of others, without any direct emotional stimulation to oneself (Lim, Angelina and Hiroshi G. Okuno 38). These concepts help to assess the effectiveness of care robots in providing emotional support for their patients.

Take the case of care robot Paro, which specialises in caring for patients with dementia. In a documentary produced by the Financial Times newspaper (Financial Times, online), an elderly patient with dementia living in a nursing home in western Tokyo, where Paro is used to facilitate caregiving, was asked for her views on Paro. She remarked, "When you grow old, you can't speak very well so it's nice to have a robot to speak with. The more I talk, I think it's good for my brain too." This suggests there are dementia patients who find difficulty in speaking and remembering who are able to find comfort and pleasure in engaging in conversations with Paro. Clearly, Paro's physical and verbal responses – as brought out in these conversations – were well-received by dementia patients. Many continue having more of such interactions because they realise that they benefit from it and are motivated to overcome their day-to-day struggles with dementia. From this, not only has Paro shown that it can recognise the feelings of dementia patients and respond appropriately in conversations with dementia patients, but its overall response has also lifted the spirits of dementia patients and left an enduring sense of motivation and optimism on the dementia patients, exceeding the standard of caregiving demanded of it. This corresponds to the kind of Compassionate Empathy talked about by Goleman. The analysis of Paro and Zora, thus far, suggests that these care robots have also exhibited Cognitive Empathy in showing that they can recognise the emotional state of their patients. However, at this point, there is not much evidence of Affective Empathy, since the care robots have been observed to be able to recognise and act on human emotions, but there has not been an apt way to show that it is genuinely understanding another, as opposed to simulating understanding through its programmed empathetic responses.

It may be tempting to claim that a care robot that may only respond appropriately to scenarios but is unable to go beyond and actively initiate activities may have trouble showing empathy as it cannot actively act on empathetic grounds. That would be the last thing that patients and healthcare providers seek – a passive care robot that cannot actively show affection. Fortunately, this is not always the case. There are many instances where care robots take ownership of their caregiving duties, and actively seek to improve the lives of their patients as part of their interactions with patients. In the same documentary by Financial Times, Paro was seen actively

initiating interactive group activities and games for bored and unmotivated dementia patients, sparking their interests in various meaningful rehabilitative activities, and encouraging participation in them. Without being explicitly told, Paro managed to actively conduct and follow through with bonding games, bringing quiet elderly patients closer together. Of the result, one care worker remarked that "By using a robot that encourages participation, we have seen improvements in dementia symptoms". This is notable of Paro's ability to actively initiate and conduct activities that not only encouraged bored and unmotivated dementia patients, but also brought visible improvements to their health. This analysis shows that care robots can be effective caregivers despite their lack of emotions because on top of responding in empathetic ways, they have been shown to be able to take the initiative and bring positive results, which further contributes to their role in providing emotional support.

Putting a Smile on Ill Children

Along with care robots' interactions with the elderly, equally important is their interactions with sick children. Young and playful, children look out for different things and care robots that seek to provide quality care for them must also respond differently and appropriately. The care robot Pepper, which resides in Humber River Hospital in Toronto, Canada, is one that does just that. It is programmed to provide emotional support for sick children by talking, reading stories, dancing, playing, and even accompanying sick children in operating rooms as they undergo treatment. These actions by Pepper help the sick children feel more at ease. In an interview with Global News, a child patient excitedly lauded Pepper, "When I'm sick, when he dances it makes me laugh and it's good." His mother then chipped in insisting, "It really helped my son. He started laughing and dancing, he really liked it…When they're sick, they're sad and feel a bit isolated. This helps boost their morale." (Adam, Aalia, online). In this scenario, Pepper was able to appropriately recognise how the sick child was feeling based on its facial sensors and convey responses that made him laugh and feel happy when he was feeling down. These responses helped to meet the emotional needs of the child and relieve the pain and hospitalisation anxieties. From this, Pepper sufficiently fulfilled the criteria of compassion as described by Goleman in that it recognised the child's pain and took action to meet their emotional needs, thus contributing to its ability to have empathy despite its lack of emotions. Moreover, Pepper has also been employed at the Mendip School in England, where it supported children with autism (UWE Bristol, online). On Pepper, a child with autism praises, "It's good, calms you down. Actually does." The Assistant Headteacher of Mendip School shared, "We've been seeing increasing numbers of groups around Pepper, so children that wouldn't normally socially interact with each other are now interacting with each other." Although slightly awkward initially, the children with autism slowly became comfortable around Pepper after being receptive to its candour and jokes. Through its abilities to recognise the worries of socially withdrawn autistic children, Pepper was able to provide appropriate responses through dances and cracking jokes, which made these children feel comfortable around it and each other and gradually open up and talk about their problems. This shows that even special needs children can have their needs met by care robots despite the difference in social interaction or support they might require, further emphasising the extent that care robots can go to provide emotional support.

As a reliable source of company and reassurance for sick children, Pepper, through its responses in situations that called for emotional support, added vibrancy to their lives and inspired them to feel better about their ill conditions. Its ability to recognise feelings, respond appropriately and take action to provide relief to the pain of sick children shows that it fulfils the earlier criteria set out for empathy. It joins Zora and Paro in demonstrating forms of Compassionate Empathy and Cognitive Empathy in patient interactions.

A New Beginning for Care Robots

While care robots have no emotions, they can be programmed to exhibit actions or provide responses that would qualify as being 'empathetic', which can change the lives of people in need of healthcare and emotional support. Although it is unlikely that a single care robot may possess all the desirable, emotionally responsive features of various specialised care robots such as those cited in this paper, it seems promising to leverage on their potential for empathetic actions in interactions with humans. If care robots were trusted with more opportunities to show that they can make a positive difference to the lives of humans through their empathetic actions, it would bring us one step closer to providing better caregiving in future.

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