



DOI: 10.18276/sip.2018.54/2-03

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PEDAGOGICAL ASPECTS OF ROBOT ANTHROPOMORPHISM IN THE LIGHT OF THE CRITICAL HISTORICAL THEORY

Abstract

During the 20th century, technology has become part of the human environment. It has an increasing impact on the human life. The aim of this study was to investigate one of the aspects of this impact, i.e. increasing machine anthropomorphism, and to answer the following question: What impact this phenomenon has on the development of the youngest technology users? The historical-critical method has been used in the study, which was proposed by N. Selwyn for research on the use of new technologies in education. The historical analysis shows that with increasing machine anthropomorphism (both anatomical and emotional) the problems may occur in the social development and the acquisition of communication competences. This in turn should have an impact on the pedagogical practice. Proper educational activity at the junction of young person-and-technology contact seems advisable, especially because of the future good of the development of the youngest members of society.

Keywords: social robotics, affective computing, anthropomorphism, pedagogy

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Introduction

The man's meeting with technology in the 20th century took on a special dimension. Technology has become a part of human life and is increasingly involved in his/her life. It is being created by man for man. As such, it must be in relation to man. Studies on the special relationship of man with technology have been undertaken for several decades. The findings of S. Turkle are of high interest. Her research being conducted for several decades has shown how the man's attitude to a robot changed but also how the researcher's attitude towards new technologies evolved (Turkle, 1984, 1995, 2012; Weizenbaum, 1976).

Technology has usually brought with it some hopes and opened to new experiences. On the other hand, there were threats that were identified only with time, and very rarely we managed to foresee them at the time of the introduction of new technologies on the market. Therefore, it is necessary to have a cooler and balanced approach to the use of new technologies in everyday life and to determine the extent of its impact on individual life. This is even more important because we are witnessing the development of the so called *Internet of Things* which will significantly increase the entanglement of human life in technology.

A large group of the users of new technologies are young people. Technological saturation of their immediate educational environment brings consequences for their life and development. They are often different than those intended by educators or technology developers. Hence, it becomes important to answer the following question: What type of developmental difficulties young people will have to deal with in the environment heavily saturated with new technologies? It seems that these consequences relate primarily to the social development and interpersonal communication.

1. Critical historical method

S. Livingstone has devoted much work to the importance of technology-saturated environment (primarily with new media). She has paid attention to the family context of technology functioning and its impact on interpersonal relations (Livingstone, 2002; Livingstone, Bovill, 2001). According to D. Nye, the man-technology relationship can not be reduced only to the technical aspects (Nye, 2007). The social aspect is much more sensitive to any changes. The issue of changes in the human

life style under the influence of robots has been dealt with by Brooks (2002, 2002a). The need for constructive pessimism towards technology has been addressed by Dienstag (2006). He believes that questions must be raised about the quality of changes being introduced by technologies. The relationships between machines and people have been pointed to by B. Johnson in her studies, who highlighted their increasing flexibility and naturalness (Johnson, 2008). This is a particular importance in the era of the Internet of Things. C. Nass has pointed out in his works to the challenges associated with the increased presence of technology in the immediate human environment (Reeves, Nass, 1996; Nass, Brave, 2005; Groom, Nass, 2008). Also S. Turkle in her long research on the relationships between technology and man has shown her growing criticism towards their consequences. She directly refers to how the machines could affect the social condition of the youngest members of society. The S. Turkle's findings encourage to draw conclusions for the pedagogical practice.

A critical and simultaneously historical approach to research on the user-technology relationship has been proposed by N. Selwyn, an Australian professor from *Monash University*. He has suggested this approach to the research on the use of technology in education. It seems, however, that any new technology that is intended for the widest possible use goes through similar developmental stages of its social importance. With regard to the use of technology in education, N. Selwyn has noted that in a number of cases, at different stages of technology development, the effects of its use seriously deviated from intentions. Therefore, there is a demand for critical assessment of the possibilities of technology and its impact on man (Selwyn, 2014, p. 163).

At the time of the emergence and dissemination of new technologies, we can not say much about the context of their emergence and social consequences. A historical perspective changes our point of view and provides in-depth analysis capabilities. N. Selwyn underlines that we can also learn from failures (Selwyn, 2017, p. 67).

There is a certain reserve when it comes to undertaking research on new technologies. Many researchers are of the opinion that they are short-lived. Perhaps that is why there is no reports on the history of the Internet as it is considered as a "too young" invention (Rosenzweig, 2004, p. 1). A kind of specific ahistoricism in this type of research certainly does not help in understanding the social consequences of new technology development.

However, it seems that the perspective of several decades (and even we can talk about more than a hundred years) of the development of new technologies is sufficient. Moreover, the intensity of these changes we could spread over several centuries in the technology development in earlier ages. Thanks to the benefits of the “perspective”, looking back to the history of technology development, we can undertake research on many problems and factors that determine the technology development. A historic approach allows us to analyse the technology in stages and capture that how some stages influenced the development of others (Selwyn, 2017, p. 46).

Technology creation and development contexts increasingly become apparent with time when the technical pressure weakens and the researcher is able to analyse the effects of the use of new technologies unemotionally.

2. Historical analysis of the development of relations between young people and machines

The Encyclopaedia Britannica, defining anthropomorphism, in the first sentence refers this phenomenon to machines and says about a computer: “the interpretation of nonhuman things or events in terms of human characteristics, as when one senses malice in a computer or hears human voices in the wind” (Guthrie, 2018). Anthropomorphism is therefore a process of attributing human traits to objects or events that are not humans (*nonhuman things*). When attributing human traits to objects that are not humans, at the same time this opens up the entire situation to a certain type of communication which in the case of human relationships is being defined as interpersonal communication. Because in this case at least one of the parties is not a person, we can talk about a “para-social” relationship. This was already observed in the case of television when a TV turned on, even not watched, gave man a sense of the presence of “someone” (Łuszczek, 2011, p. 145).

Even before the modern robots were created, long before the time of social robotics and the Internet, the human ideas about machines that can perform many “typically human” activities already were of anthropomorphic nature. A robot from the sci-fi film “Forbidden Planet” with L. Nielsen being one of the lead roles, has a head, eyes, arms, legs and torso. It mimics emotions. Its physical capabilities exceed several times the human ones, so it can perform certain tasks in place of man (*Forbidden Planet*, directed by F.M. Wilcox, USA 1956). The robot from “Forbidden

Planet” was a film director’s phantasy but soon real projects appeared that began to enter into some kind of relationship with man.

In 1966, ELIZA, a computer programme approximating a therapist, was launched. This programme did not understand anything of the conversation but was able to perform combinations on the sequence of words. Its use showed that people are willing to supplement its shortcomings and cooperate with it (Turkle, 2011, p. 24). Many users of this programme believed that it reads their answers with understanding and tries to provide them some psychoanalytical help. Such a belief was shared even by a few psychotherapists. In fact, the programme was a creation of J. Waizenbaum, a scientist from *Massachusetts Institute of Technology*. The essence of the programme was to cut apart user inputs into speech components and use them back in such a way as to hold a conversation (Campbell-Kell, 2008).

In the 1980s, robots for a wide audience showed up, which primarily were supposed to be partners for fun. Such a robot was Merlin, a sound-and-light computer toy, which, however, also had some educational values. It also helped to train memory (Turkle, 2011, p. 42).

The 1990s is the time of a real boom in electronic toys for children. In 1997, a *Tamagotchi* showed up. A virtual being, closed in a plastic egg, demands interest from a child. It “lives” and demands constant care. Children cared for their creatures. They could phone home to find out whether, for example, it fell asleep. Several buttons allowed them to perform simple caring tasks. In order to survive, a *Tamagotchi* had to be fed and entertained (Benzel, 1997). The attachment to the toy is not only proved by its great popularity in the 1990s, but also its spectacular comeback to the market in 2017, the 20th anniversary of its creation. It was a limited edition that was quickly bought out by users to (Wallach, 2017).

A year after *Tamagotchi*, a *Furby* showed up. It was small, covered with fur and had big eyes. It was suitable for cuddling. Additionally, a *Furby* could speak, which significantly increased its interaction capabilities (Turkle, 2011, p. 28). The toy’s capabilities probably exceeded even the imagination of its creators. It happened that the toy could blurt out an entire set of curse words (Hernanado, 2014).

A qualitative leap was a dog-shaped robot, AIBO, launched into the market by Sony. Depending on how it was treated, various “characteristics” developed in it (Turkle, 2011, p. 53). A large number of suitably arranged small thrusters provided the Sony’s toy with a large range of motion capabilities, although its movements

could sometimes seem to be very unharmonious. The control programme was designed in such a way as to style the AIBO on a little playful puppy dog. The toy responded to verbal commands, and the possibility to shape its “character” allowed for distinguishing the own toy from other “AIBO breed” puppies. The AIBO’s capabilities significantly outgrew previous electronic toys, which is why its price was much higher (Pogue, 2001).

In addition to wide-spread children’s toys-robots, attempts were made to construct robots designed to help elderly people in their daily life. Several US universities cooperated within the “NurseBot” project. The idea was to create a robot that could help older people in everyday life (Matthews, 2002, p. 403). The importance of this type of research is emphasised, especially in the situation where highly developed society is rapidly ageing and the number of elderly people is increasing. It will be increasingly difficult to provide them with proper care and this will impose a heavy burden on budgets. The use of robots may prove to be an inexpensive and effective solution (Outing, 2017).

When constructing the robots designed to help seniors, it turned out that the assistance of a therapeutic nature may be equally important, e.g. in the experience of loneliness. That is how the robots which started to be used in American and Japanese nursing homes for seniors were created. The best known is *Paro* (similar to a real baby harp seal). It was created in Japan in 2001. It is called a “therapeutic robot” or an “emotional robot”. Thanks to the system of touch and light sensor, a *Paro* gives an impression that it responds to stimuli from man. Social workers call it simply “*medical device*” (Tergesen, Inada 2010).

The popularity of *Paro* points to the growing importance of social robotics. Robots are getting closer to humans, creating a special type of bond, due to the fact that they more and more convincingly simulate emotions. If they start to resemble externally humans and animals, the illusion of a living creature will become almost perfect. Humanoid robots are becoming increasingly popular in Japan and set a certain direction in the development of robotics (Piore, 2014).

Robot anthropomorphism is progressing so fast that the European Union has prepared a special resolution with guidelines on how to legislate on robots. The European Parliament’s resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)) includes indications on both

directions of technology development and issues such as safety and ethics, especially in the construction of androids with human attributes (*European Parliament, 2017*).

3. Educational consequences

“Robot anthropomorphism” can be considered as a conventional term. It is a tendency to attribute characteristics of living beings to devices. The term “robot animalisation” is rather not used in relation to projects such as, for example, the AIBO puppy dog. It goes two ways. On the one hand, we are dealing with “emotional anthropomorphism”. A robot simulates emotions of living beings by “declaring willingness” to build relationships. On the other hand, we are dealing with “anatomical anthropomorphism”; a robot externally resembles the living creature (human or animal). In the latest projects, these two tendencies are becoming more convincing, making the robot a partner in the relationship with man.

Progressive robot anthropomorphism made the simulation of their “life” more convincing. This provides the incentive, often unconscious, to enter into relationships with machines. Such relationships can supersede relationships with people. Just as we were dealing with it in the case of computers and the Internet. In a family environment, they rather contributed to the breakdown of family ties and atomisation of the family structure. Anthropomorphic robots are much more effective in sending messages that are interpersonal in nature, which is particularly dangerous in the case of children.

A child in his/her development needs important persons, authority figures, with whom he/she enters into different relationships. In difficult situations, children are looking for support from their parents. So it is at the start of school education, when many situations are new for children. As they get older, along with increased experience, children are more resistant to difficult situations, and friendships with peers become more important. Development of emotional life is associated with relationships with people. This is them who help to name emotions and understand their context. A child learns to read emotional states of other people, firstly of the closest relatives. Living close to each other allows people to discover what they have in common. The presence becomes an opportunity for establishing relationships, as well as for the occurrence of intimacy. Certain continuity is a feature of these processes. Man can not be turned off. Parental educational activities have a particularly

large impact on the development of empathy in children. Then, it can turn out into altruistic behaviour. Parents or peers can provide here the appropriate models of behaviour.

Reducing the interaction with people for the interaction with robots may call into question the development of these behaviours in children. Children may very quickly find that something is “alive” if it moves without human assistance and shows a minimum intelligence. Toys-robots are not passive; they demand attention, and children want to take care of them. This often determines the formation of ties. Modelling largely takes place by observation. Observers are more likely to pay attention to models that are similar to them and which they deem competent. Robot anthropomorphism can redirect this process towards machines. Can a robot become a greater authority figure than parents? Potentially, this is possible, if it had the appearance of attractive man and would simulate human “wisdom”.

In the case when children consider a robot as an authority figure, the credibility of communication will increase significantly. This will allow robots to influence different aspects of child’s development. Robot anthropomorphism makes uncertainty in the relationship with a device. The programming of robots is moving into the direction to convince man that a robot is not a machine. If this succeeds, a requirement for an ethical response will be born in man.

This is used especially in therapeutic robots (like for example a *Paro* baby seal). Apart from the fact that such actions are to solve problems of social welfare system, they also fill a certain niche in relationships. What seniors can not obtain from the immediate family, they obtain from robots. Similarly, parents who do not have time for their child buy him/her an “electronic friend”. However, it will much harder demand a response from a child than an ordinary teddy bear. It will exert a kind of specific social pressure. It was F. Fröbel who already drew attention to the importance of toys and child’s immediate environment for his/her development. In the interaction with robots, people very quickly move from the feeling of closeness to a deep feeling of loneliness.

Leaving the man with a robot is often the simplest solution. The use of such relational dummies creates the artificial world of emotions with which people, at some point, are left alone. Also the temptation for trans-humanism is alive today and certainly in the near future people will have to face it. Replacing humans with robots in relationships will bring not only developmental difficulties but also deepen the

experience of loneliness. These deficits in the human presence can bring dangerous consequences in the development of children. Their normal social and emotional development requires a living person, not “something” that simulates to be alive.

4. What is next?

Human experiences with technology are not so clear like its enthusiast want to see it. Often, we have here the remnants of a kind of specific “technological romanticism” which has its roots in the 18th century and the Industrial Revolution. Any new technology was to improve human life and enhance human capabilities automatically. It became a sign of progress. Still for many, “mandatory optimism” becomes essential in technology assessment (Selwyn, 2014, p. 13). Rapid changes and emerging new technical solutions bring with them additional research difficulty. However, the social consequences come much later and are largely hard to predict (Wessels, 2010, p. 28).

At the time of the introduction of new technologies on the market, we do not know whether they will be able to succeed. A videophone, being feasible already in the 1950s, has never been successful, despite the support of telecommunications giants such as AT&T (Borth, 2018). Sometimes, the inspirations to create new technologies have a completely surprising source. A Motorola engineer, M. Cooper, being considered the inventor of a mobile phone, admits that the inspiration for his idea was the American sci-fi TV series “Star Trek”. Cooper tells himself about this in a video put on YouTube (cf. Shatner, 2005).

D. Levy predicts that in the near future we will have to deal with relationships of humans and robots. He believes that human sexual life will become more varied through intimate relationships with robots, and people will also become better friends. At the same time, a robot will not betray you, and when you get tired of it, you will be able to turn it off (Levy, 2007, p. 22).

S. Turkle sees this process of emotional dependence of modern humans on technology as a result of their loneliness. Advances in technology promise easy coping with this problem. They offer creation of a new “architecture of proximity”, where human elements will be reduced to a minimum or will be simulated. It is to be readily available and perceived as safer than natural relations (Turkle 2011, p. 1).

Perhaps in a decade or so, children will not perceive the family and home as a “spiritual space” but, as K. Facer, J. Furlong, and R. Sutherland state, as “home is where the hardware is” (2000, p. 13–14). The place of what so far was the human domain (e.g. subjectivity of relations) has begun to be occupied by technology. People accept it quite passively.

M.T. Poe believes that our social relations will remind in time as an entry to the famous Plato’s cave. Instead of reality, only the shadows. Instead of real relationships, only their substitutes (Poe 2011, p. 202–203).

It seems that in our relationship to technology, we are just crossing the Rubicon. The next generation of people can build its relationships with their environment on completely different conditions. By replacing people with machines, we are depriving the entire generation of the opportunity of communication training. This particularly affects the youngest technology users, who are the least critical of the novelties, and so the least resistant. It is a real challenge for both the family, school and other educators (e.g. grandparents). But it can become a real “vaccine” to prevent the negative results of filling the human habitat with more and more machines.

Pretences of modern social robotics to the creation of ties simulating the human ones raises specific ethical problems. Robot enthusiasts encourage their users to build fake relationships¹. Many users may not realise what can be the consequences of such a way of life. Just as at the beginning of the 21st century, during the popularity of TV programmes of *reality show* type, many of the participants did not realise the social and emotional consequences of participation in this type of television productions. Robot meets the need for intimacy, or rather offers the promise of meeting it. It is readily available and emotionally more safe than natural relationships (Turkle, 2011, p. 1).

In one of the last scenes of sci-fi film “Prometheus” (directed by R. Scott, USA 2012), a humanoid (heavily damaged) robot David is talking with the last surviving member of the spaceship’s crew, Dr E. Shaw. It is trying to understand the motives of her behaviour, asking questions. Finally, it says: “I do not understand”, and hears her answer: “That is because I am a human being and you are a robot”.

There is still another level of conformity to human which is practically unattainable for machines – the volitional level, motives of human behaviour. To understand

¹ E.g. in the film “Mechanical Love” (directed by P. Ambo, Denmark 2007) we find delight in social robotics and an incentive for its intensive development.

the man is largely to know and try to understand these motives. The logic of human decision-making goes beyond description that can be closed within algorithms. It seems that robot anthropomorphism will progress, bringing implications for human development in the future. Therefore, all that what is human, what distinguishes man from a machine, should be emphasised to preserve the human potential in the next generations.

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PEDAGOGICZNE ASPEKTY ANTROPOMORFIZACJI ROBOTÓW W ŚWIELE TEORII KRYTYCZNO-HISTORYCZNEJ

Streszczenie

W ciągu XX wieku technologia stała się częścią środowiska człowieka. Ma ona coraz większy wpływ na ludzkie życie. Celem badań było prześledzenie jednego z aspektów tego wpływu – rosnącej antropomorfizacji maszyn – i uzyskanie odpowiedzi na pytanie: Jaki wpływ ma to zjawisko na rozwój najmłodszych użytkowników technologii? W badaniach użyto metody krytyczno-historycznej, którą do badań nad wykorzystaniem nowych technologii w edukacji zaproponował Neil Selwyn. Analiza historyczna pokazuje, że wraz ze wzrostem antropomorfizacji maszyn (zarówno anatomicznej, jak i emocjonalnej) mogą pojawić się problemy w rozwoju społecznym i nabywaniu kompetencji komunikacyjnych. To natomiast powinno wpływać na praktykę pedagogiczną. Właściwa aktywność wychowawcza na styku spotkania młodego człowieka z technologią wydaje się wskazana, szczególnie ze względu na przyszłe dobro rozwoju najmłodszych członków społeczeństwa.

Słowa kluczowe: robotyka społeczna, informatyka afektywna, antropomorfizm, pedagogika

JEL code: J17

Cytowanie

Łuszczek, K. (2018). Pedagogical aspects of robot anthropomorphism in the light of the critical historical theory. *Studia i Prace WNEIZ US*, 54/2, 37–50. DOI: 10.18276/sip.2018.54/2-03.