

Research Article

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Love dolls and sex robots in unproven and unexplored fields of application

<https://doi.org/10.1515/pjbr-2021-0004>

received March 14, 2020; accepted August 5, 2020

Abstract: Love dolls, the successors of blow-up dolls, are widespread. They can be ordered online or bought in sex shops and can be found in brothels and households. Sex robots are also on the rise. Research, however, has been slow to address this topic thoroughly. Often, it does not differentiate between users and areas of application, remaining vague, especially in the humanities and social sciences. The present contribution deals with the idea and history of love dolls and sex robots. Against this background, it identifies areas of application that have not been investigated or have hardly been investigated at all. These include prisons, the military, monasteries and seminaries, science, art and design as well as the gamer scene. There is, at least, some relevant research about the application of these artefacts in nursing and retirement homes and as such, these will be given priority. The use of love dolls and sex robots in all these fields is outlined, special features are discussed and initial ethical, legal and pragmatic considerations are made. It becomes clear that artificial love servants can create added value, but that their use must be carefully considered and prepared. In some cases, their use may even be counterproductive.

Keywords: love dolls, sex robots, machine ethics, robo-ethics, information ethics, artificial intelligence, robotics, human-computer interaction

1 Introduction

Sex robots are robots that are used for having sex [1]. Sex dolls or love dolls with synthetic speech or simple motor skills, such as being able to turn their heads, can be considered to fall in this category. Other love dolls are

not robots, despite being ambitious in their materials and implementation. For instance, they often have high-quality skin, which is made of silicone or thermoplastic elements and stretched over gel inlays. Sex robots and love dolls are mostly of humanoid design with a strong orientation towards a cliché sexual figure, but other forms, for instance fantasy figures, are also available. Sex robots are social robots par excellence if you define these as senso-motoric machines that are made to interact with humans and have a closeness to humans. Simple love dolls are not social robots simply because they are not robots.

The present contribution investigates the fields of application in which love dolls and sex robots can be utilized, particularly those which have not or hardly been considered so far – i.e. beyond brothels and private households. A look at the history of ideas of the artificial love servant and the history of application of the blow-up doll should make the derivation of the fields of application easier. Thus, research question 1 (RQ1) is what is the history of the idea of artificial love servants, how did they develop and how are these used and applied in different narratives and situations? Research question 2 (RQ2) is against the background of the history of ideas and development and on the basis of the author's own considerations and observations, what are possible areas of application for love dolls and sex robots beyond brothels and homes and how are they used there? The article combines this historical and contemporary tour of discovery with social, moral, legal and pragmatic questions. Identification, differentiation and focus promise to be a treasure trove for an ethics that is not satisfied with generalized judgements. Research question 3 (RQ3) is, therefore, what are the social and ethical challenges in these application areas?

It must be emphasized that this article can build on solid empirical evidence on the one hand (especially with regard to the history and characteristics of the application areas themselves) but on the other hand has to leave this reliable ground repeatedly, as there are hardly any practical findings on the related robot usage. However, there seems to be no alternative to this approach (or

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variations of it), especially since the aim is not only to hypothesize which areas of application are possible in addition to the known ones but also to consider what opportunities and risks there may be. The course must be set before one is faced with psychological and physical damage that has arisen in practice through improper or excessive use. Therefore, corresponding considerations of a speculative nature must take place now. It is repeatedly emphasized that this contribution helps to structure and inspire, but that psychological, sociological and sexual science research is then needed to follow up.

2 Dealing with artificial love servants

A regular customer of the old world of artificial love servants will pay around 20 dollars for such an object – not including shipping and transport. For this, you would get, for example, an inflatable or mannequin-like sex partner, as it was known in earlier decades and centuries. If you dig deeper into your pocket, if you get out 500 to 1,500 dollars, you have arrived in the new world. For this, you can acquire a lifelike sex doll (users and experts or connoisseurs often prefer to call it a love doll) with silicone skin and a metal skeleton, with exchangeable body openings and, with a little luck, heated body parts and elements that secrete fluids. In Switzerland, prostitutes regularly share their clientele with artificial colleagues. At least some brothels offer love dolls – figures on their use are hard to find, but there are websites with a description of the slightly different employees (e.g. www.studio-sonnenschein.ch with RealDoll Valentina). In Germany, Spain, Russia and other countries, there are even establishments where love dolls are in the majority or have completely replaced humans (e.g. the BorDoll in Dortmund, www.bordoll.de).

Increasingly, manufacturers of love dolls are experimenting with natural language skills, cameras and sensors of all kinds. Computer chips and AI applications enhance some systems [2,3]. RealDoll Helena is also equipped with simple mimicking abilities, at a price of about 4,000 euros, available at sexpuppen-outlet.de. More advanced sex robots are now being created, such as those developed by companies like Shenzhen All Intelligent Robot Technology (www.ai-aitech.com) and Realbotix (www.realbotix.com). Realbotix's Harmony can certainly be called the flagship of the industry, with her movable head and extensive mimicking and natural language skills. That being said, it is hard to

come by reliable sales figures of these sex robots as these companies are fundamentally discreet about their data. In personal conversations with a representative of Realbotix, the author has learned that head and torso versions are sold to research institutes as well as private customers. In general, universities and institutes are among the best customers for social robots, which is not surprising, given that they have multidisciplinary applications. You can find out this, too, when you visit the websites of the institutions and come across robot laboratories. Another large market is film production companies. Otherwise, sex robots in the narrower sense are still in their infancy.

The media have been reporting on sex robots for years as if they were already part of everyday life [4]. Love dolls, which are actually a part of a daily routine for many people, also fill the headlines. Some newspapers and magazines, as well as radio stations, try to take a closer look and allow different perspectives, from users and affected persons [5]. Even petitions such as those on campaignagainstsexrobots.org and open letters from opponents of artificial love servants read as if sex robots were omnipresent. It is also suggested that a type that supports stereotypes prevails [6]. Actually there are hardly any sex robots across wider society – but when it comes to love dolls, reality is more complex. For example, in addition to the widespread Pamela Anderson replicas, fantasy characters such as anime and manga girls and elves are available. The sex robot market could develop in a similarly diverse way. Realbotix also has Henry in its program, her brother, so to speak, besides Harmony. Presumably this is aimed primarily at homosexual men, but heterosexual women could also benefit from this.

In the petitions and open letters in the media mentioned above, moral reservations and judgements become clear. These relate above all to the design of love dolls and sex robots, saying that they perpetuate stereotypes of women, objectifying them, even that they are degraded and dishonoured by these artefacts. Furthermore, as the website campaignagainstsexrobots.org shows, “normalization” – i.e. the spread and acceptance of artificial love servants – is seen as a problem. Other ethical questions, such as those concerning a good life and sexual health, are often ignored because of this. However, these other concerns are certainly taken up by communities that view artificial love servants neutrally or positively [7]. For example, the question is raised as to how paedophile tendencies can be channelled in an orderly fashion, i.e. to avoid crimes and victims [8] or to satisfy the sexual urges of people in need of care [9].

In fact, patients in need of care, the disabled, sick and elderly people and how they are treated are always a reflection of a society's technical and ethical considerations. The assumptions and conclusions are quite understandable: sexual health is a human right. If disabled, sick and old people have sexual needs, these should be satisfied in order to grant them this human right. There is some controversy as to whether love dolls and sex robots are the most effective solution [7]. Perhaps it is indispensable for human dignity to be able to choose human partners if they are available voluntarily, and perhaps only they can provide real satisfaction and sexual health for the majority. And yet, in a number of cases, artificial love servants could be a viable option. It is interesting to note that other stakeholders have so far received little attention, and other areas of application have not been discovered and conquered. There seem to be blind spots whose origin may be a lack of imagination or an excess of shame.

3 The history of ideas and development of artificial love servants

This chapter gives examples of artificial creatures in the history of ideas that can be seen as erotically or sexually oriented. It attaches no importance to completeness. Rather, it is intended to illustrate some important figures and objects that are exemplary and powerful. It is acknowledged that this is a Eurocentric view and that there may be other cultures that tell different stories. The author is not able to go deeper into the mythical and fairy-tale world of Asia or Africa although he touches on manga and anime culture in his presentation. In addition, the history of the development of early love servants will be considered. As far as love dolls of the modern kind and sex robots are concerned, detailed descriptions already exist [2,10,11]. Against the background of this chapter, possible user groups of artificial love servants are hinted at in the next one.

3.1 The myths of the ancient world and the middle ages

The golden virgins, as described by Homer, had the task of supporting their creator Hephaestus, the limping god

of forge and fire [2]. What else they did for him or with him is unknown or is not revealed by the Greek poet. If they also rendered erotic services to him, they could be considered artificial love servants of the handicapped and the disabled. His better known creation, Pandora, is an ambivalent figure [2]. By opening the box, she brought evil upon mankind but also gave it the deceptive hope. The evils in modern society are not necessarily such anymore, especially when one thinks of vice and a dissolute life. Therefore, Pandora is a source of sexual inspiration and a basis for individual freedom.

Ovid devoted unforgettable lines to the sculpture that Pygmalion created. It was modelled on Aphrodite, the unreachable goddess to whom his real longing was directed. "With his art, he's hidden art," the Roman poet wrote in his *Metamorphoses*, creating the ultimate standard for developers of humanoid robots, robotics, artists and designers [12]. After the sculpture came to life through the compassion of Aphrodite – who, by the way, was the unfaithful wife of Hephaestus – the legendary Cypriot sculptor even produced offspring with her, with the artificial woman who went down in the history of ideas as Galatea [2]. The lonely and unfulfilled are certainly a group that is just right for love dolls and sex robots.

Daedalus, the father of Icarus, this legendary inventor, is said to have a Venus figure filled with mercury [13]. He is also famous for his cowhide-covered wooden construction, in which Pasiphaë, the wife of Minos, could receive the bull fertilized by him, and she later gave birth to the Minotaur for whom Daedalus had to build a labyrinth as a prison at Minos' behest. The "iron maiden" of Nabis (207–192 before our time) was a "woman statue" or "machine" [13]. Arms, hands and breasts were studded with nails. When a man came before her who owed taxes, she would hold him in a deadly embrace. The wooden woman from the Chinese San-Tsang (sixth century after our time) was of great beauty. She walked back and forth, served and waited [13]. These are very different figures, servants and executors, sometimes connected with sexuality, sometimes with violence. They can again serve as inspiration or deterrent.

3.2 Legends and literature of modern times

The Sennentuntschi (also called "Hausäli" or "Sennpoppa" depending on taste and region) seems to be an unfortunate relative of Galatea. The puppet of wood and straw and other materials, according to the legend created by

Alpine herdsmen and dairymen from Switzerland, Austria, Italy, and Germany, is fed and comes alive – and then ridiculed and abused. Usually several men are involved, and one of them tries to stop the others from doing so [14]. If the legend was ever forgotten, a Swiss writer in the twentieth century made sure that it was remembered.

In Hansjörg Schneider’s scandalous stage play “Sennentuntschi” from 1971, which established his fame, the sexual moment is intensified [15], and sexuality and eroticism manifest themselves both physically and linguistically. In contrast to Pygmalion, the focus is not on the loving, dreaming and yearning but on the reality of herdsmen and dairymen who were regularly isolated from civilization for months on end and alone with their urges. A broad audience in Switzerland is familiar with the movie *Sennentuntschi* by Swiss film director Michael Steiner, which was released in cinemas in 2010.

In literature, E. T. A. Hoffmann stands out with *Der Sandmann (The Sandman)* [16]. The hero Nathanael falls in love with the doll Olympia. He is enraptured, even obsessed by her. Others notice a certain rigidity and “soullessness” [16]. Among mangas, *Doll*, *Eden 1* and *skydream song* can be mentioned. In the series *Doll* by Mihara Mitsukazu, there are several interesting stories. A father buys his son the Doll Ayako to comfort him over the death of his mother. A girl who has been abandoned by her fiancé wants to be as beautiful as a Doll. And the loner Satoru wants to transform his Doll Maria into the perfect human lover [17]. Here again it is the lonely, even the mourners and the confused who turn to artificial companions. It is striking that the girl measures herself against these seemingly perfect competitors.

It goes with the territory that science fiction books and films are also full of artificial creatures that can be interpreted erotically or sexually, and while there has been a great variety in origin, material and design in the history of ideas before, humanoid hardware and software robots dominate them. *Metropolis* (1927) by Fritz Lang with the artificial Maria is a milestone. Most recently, the television series *Real Humans* (2012–2014) and feature films such as *Ex Machina* (2015) have captured the imagination, with their fictional material and virtual creatures with which people form relationships. Also *Her* (2013) with Samantha, a voicebot, probably remained in the memory of the interested and open-minded public, as did *Blade Runner 2049* (2017) with its Joi, which, depending on the scene, is designed as a life-size or larger-than-life hologram. Here, in addition to loneliness, a certain affinity for technology comes into play: you create artificial love

servants because you can, or you use them because they are easily available.

3.3 Immersion into the game world

The game world also offers a variety of sexual projection screens. The information can be collected on countless websites like www.pcgamingwiki.com and through the games themselves. Lara Croft from *Tomb Raider* (since 1996) is only one of many characters that have fascinated developers and players (mostly the male ones). She changes her appearance significantly over time, depending on the zeitgeist. The slim waist widens, the giant breasts shrink. Besides avatars, which you control yourself, there is an extensive staff of female and male characters that you can look at and desire. In addition to the formerly prevailing female stereotypes, more realistic or more complex female figures are emerging. In *Horizon: Zero Dawn* from 2017, for example, the protagonist Aloy confronts giant robot creatures using only a bow and arrow, and she certainly cuts a fine figure. In *Hellblade* (2017), the story of the warrior Senua is told, focusing on her psychoses. Meanwhile many women turn to computer games, and they don’t necessarily want to meet sexualized female figures, or even female figures who are confronted with violence and humiliation. The games are taken up in films and series, for example in *Lara Croft: Tomb Raider* (2001) with Angelina Jolie and in *The Big Bang Theory*, where Bernadette catches her boyfriend Howard or his avatar making love in an online game (*World of Warcraft*) and then ends the relationship, as she considers this to be a real infidelity.

3.4 Disillusioning reality

Inflatable blow-up dolls already belong to the history of development. They are the stumpy and clumsy predecessors of today’s love dolls and sex robots. Allegedly they were to be found again and again on ships, where sailors – who were isolated and without female company for weeks and months – would gratify themselves with these dolls but in sharing them they also ended up infecting each other with STIs. They were called sailors’ brides. Even truck drivers are said to have made use of them – they were allegedly called trucker girls. Today, love dolls with silicone or thermoplastic elastomers (TPE)

skin and fixed or replaceable orifices, as already mentioned, can be found in numerous brothels in Europe and in private homes worldwide. As far as the history of the development of sex machines and sex robots is concerned, reference is made to [2,11,10].

3.5 Interim conclusion

It is striking that in the history of ideas and development, the sexually connoted figures are almost exclusively female. There are certainly several reasons for this. The stories in question were invented or retold by men. Not in all eras were women allowed to openly and publicly think up the artificial love partners they wanted and talk or write about them. Of course, one wonders why, for example, there is hardly any talk of artificial young men, even though boy love was so widespread in ancient Greece. Perhaps these stories never existed, perhaps they did, and they were later marginalized and eliminated. Perhaps there was not much interest in them either in later eras, so that they did not find their way into the non-fiction and media. All in all, what is true for Eros in art is true for the artificial love servants: it is the men who describe, sing, draw, paint and create the girls and women. It is a man's world, and at its centre is a man's ideal of a woman.

With this representation RQ1 could be answered. It became clear that the longing for artificial companions has existed for thousands of years. It turned out that the narratives are mainly from men and are likely carried and absorbed by them. Accordingly, the artificial love servants are primarily modelled on women, or rather, an ideal of women, which in turn is linked to the zeitgeist. It has become obvious where, why, when and by whom the artificial love servants are used, which is important for the next chapter. It was emphasized that the history of ideas and development portrays largely a European history.

4 Fields of application of love dolls and sex robots

Against the background of the history of ideas and development of artificial love servants, several groups with potential users of love dolls and sex robots crystallize, which partly overlap. Of course, one must keep in mind that myths and legends, for example, are

not representations of reality (besides, they often come from a completely different time). However, they do pick out basic patterns that are noteworthy. The following groups can be listed at first:

1. Lovers who see no possibility to get the object of their desire and therefore make or have a copy or a replacement made.
2. Desiring people who have chosen a new object of desire and do not see it or do not see it only as a substitute.
3. Temporarily or permanently isolated persons who have no possibility to find a partner and agree to a replacement.
4. Technologically fascinated people who have found their ideal of love in the virtual or fictional, but not or not yet in the real world, but would like to see it there.
5. Technologically savvy people who have or see the opportunity to create their ideal love servant in hardware and software.

Other groups are also conceivable. Some persons are closely connected with restrictions and prohibitions. For example, Catholic clergymen are subject to celibacy, i.e. they are not allowed to marry a woman (and certainly not a man) or start a family [18]. Catholics in general are also not allowed to have sex outside of marriage, not even self-stimulation, which is widely considered a sin in Christianity [19]. Prohibitions like this certainly exist in other religions, sometimes going further as an expression of nationalism and racism. So this group can be identified:

6. Persons who are subject to taboos and prohibitions, who are only allowed to have sexual relations to a limited extent or not at all, but who can or want to have them.

In addition, there are persons with a strong sex drive, whether it has biological or social causes [20]. The weekly or daily contact with real persons is not enough for them, so they resort to other methods and means, to a whole spectrum of possibilities. Young people can belong to this circle of active people just as much as older people who lead an unfulfilled life. So this further category can be identified:

7. People with a strong sexual drive who are not satisfied dealing with just real people and who therefore use love dolls and sex robots.

Quickly you come across another group whose members are not satisfied with the sexuality and attractiveness of their partner or potential partner. They seek the aesthetic in the artificial, while they see in the natural ugliness, the decay and the decline that time brings with it. They benefit from the fact that

most love dolls and sex robots are modelled after teenagers or tweens, after young, attractive men and women. They can be described briefly and succinctly as follows:

8. People interested in beauty and youth, who suffer from the unattractiveness of their partners or other people and for whom love dolls and sex robots fulfil the dream of eternal youth.

It is now possible to derive areas of application – institutions, places and situations of use – from the individual groups or their combination. If you think about 3, nursing and retirement homes come to mind again as well as vehicles on land, water and in the air. Another option is prisons, furthermore the military. Group 5, possibly in combination with 1, 2 and 8, brings the sex robot back to life in laboratories, workshops and artistically inspired factories. With 4 you almost automatically end up in the gamer scene. With 6 you can connect to church institutions, such as monasteries and seminaries. The considerations concerning nursing and retirement homes are placed at the beginning, as research is already being carried out in this area. Military, prisons and religious institutions follow, as these seem to be of particular practical relevance. In the end, the remaining areas are dealt with.

For all fields of application, it must be emphasized that the operation of artificial love servants can be quite complex and costly. In brothels, love dolls are cleaned after each use. With sex robots – whether in brothels, in prisons or at home – it would be necessary to have technicians come in from time to time. In addition, service contracts with the manufacturer would be necessary, if only for software updates and specific repairs. It will not be easy to always execute these quickly and satisfactorily, especially since the companies are mainly located in the USA and China. Even the purchase of a sex robot can cost several thousand dollars. Proper and safe operation further increases the costs. But that is not all: even with gentle treatment, the artificial love servants have a limited “lifespan.” With hard treatment – for example, when they are forced into unnatural positions – they quickly break down [1].

4.1 Nursing and retirement homes

The literature repeatedly points out that sexual health can be part of a fulfilled and satisfying life, that it is even a human right and that this also includes old, dependent and disabled persons [9]. However, it is often a taboo in

nursing and old people’s homes to talk about such topics, and it is even more a taboo to let the persons concerned make use of their right, be it through the assisted use of sex toys, be it through access to professional sex work or be it through regular visits from friends and acquaintances, in combination with the facilitation of discreet retreat.

Bendel classifies sex robots within the wider tree of surgery, therapy and care robots [21]. He sees them, for all his doubts, as a way of promoting health – in this case sexual health. Döring asks whether nursing robots should have sexual assistance functions [9], as does Bendel [22], extending and deepening certain aspects and including actual sex robots. Not only partner sexuality in the narrower sense, i.e. caressing, stimulating and penetrating, is considered but also lying next to and hugging each other, having erotic conversations, reading erotic stories and cleaning sex toys.

From an ethical point of view, some questions arise. On the one hand, those affected could be helped in their sexual needs in many ways. On the other hand, carers could be relieved of unpleasant activities, if they are able to perform them at all, such as cleaning sex toys or disposing of condoms by specialized care robots [9,22]. However, new unpleasant tasks are also created, such as cleaning love dolls. Moreover, artificial love servants could cause irritation among people in need of care, caregivers and relatives, due to their mere presence, the situations they create and the behaviours they reveal. Finally, it is possible that a battle for resources may break out that disagreement may arise about the use, the period of use and the place of use.

When it comes to sex robots with cameras and sensors, or sex robots connected to AI systems and the cloud, questions arise regarding intimacy and privacy [2]. The patient can be captured visually and vocally, what he or she shows and says can be evaluated. A profile can be created of him or her, over time, and used against him or her with the intent of blackmail and coercion. Overall, there will always be an uncertainty regarding the use and dissemination of the data. In some countries, authorized and unauthorized persons can easily gain access to the servers. It should also be considered that among the persons in care, some may be celebrities whose intimate and sexual lives are of great interest to media and public.

Legal – not only data protection related – and pragmatic aspects are also important. It is the question of whether there is a right to be provided with an artificial love servant, and it is the question of who is responsible for the loan or purchase, who is responsible for the operation

and who pays. Questions of liability are also relevant, for example when – not unlikely in the case of people in need of care and the elderly – overstraining and accidents occur. These are in turn linked to further ethical issues.

4.2 Prisons

There are numerous studies on sexuality and violence in prisons. *The Prison Community* by Clemmer [23] and *The Society of Captives* by Sykes [24] are key studies in this area. Prison inmates suffer not only from separation from their partners, if they have any, or from the limited possibility of gaining such partners, but also from sexual harassment, blackmail and the threat of rape, which has far-ranging effects on their mental and physical health [25]. Punishment by the state seems to be followed by further punishment, from fellow inmates and prison staff, and the question is whether the state is doing enough to protect those affected. Similar conditions may prevail in other controlled living situations. For example, there are repeated attacks in refugee camps [26].

Non-violent sexuality does take place in prisons. However, it is not always the desired type, in terms of sexual orientation, choice of sexual means and choice of partners. Power structures can also play a role, for example in relationships with wardens. The restriction of freedom therefore takes place in many ways. The way one may suffer then is highly contextual. Of course, it also depends on the type of penal system, whether there is free access, whether the sexes are segregated, etc. As a rule, men and women are physically separated but not everywhere or all the time; for example, a protected area for women has been set up at the Billwerder Men's Prison in Hamburg (see the authorities' website www.hamburg.de/justizbehoerde), and at the Limmattal Prison in Dietikon ZH certain prisoners of different genders eat together [27]. The most difficult situation is probably solitary confinement, where there are hardly any options for the prisoner.

Love dolls and sex robots could be a way to establish sexual health or at least diminish sexual tensions in prison, beyond the presumably predominant self-stimulation, which has an ethical dimension. These dolls or robots could be deposited in the cells themselves, or in suitable places in prison, in showers and common rooms. For their use, discretion would have to be established and the inmates' privacy preserved. Of course, shared use is also possible and – depending on the house rules – permissible. In addition to the simulation

of partner sexuality, other possible applications would include lying in bed together and hugging as well as role playing and disguise games of all kinds.

While in a nursing or retirement home the cleaning of love dolls and sex robots would be technically easy, this would not necessarily be the case in prisons, at least not in all countries, and so shared use might come at the expense of health. If it is true that sexuality and violence in prisons go hand in hand, the question arises as to how violence against love dolls and sex robots manifests itself and then possibly spreads to humans. This is an ethical question, the answer to which would also require empirical research. One can also only speculate about the inmates' (and prison staff's) acceptance of these artificial love servants. Each prison will have its own dynamic, and in men's prisons this can be different from women's prisons. The threats to intimacy and privacy posed by cameras and microphones, as described above, apply here as well.

Again, legal (not only data protection related) and pragmatic aspects are important. There is the question of whether there is a right to be provided with an artificial love servant. Shouldn't deprivation of liberty include the deprivation of physical desires? However, not every culture focuses on punishment when it comes to prisons but rather on rehabilitation – and sex can certainly help here, because it contributes to a fundamental satisfaction and equilibrium. Another question is a logistical one, who should be responsible for the loan or purchase, who should be responsible for the operation and who pays for repairs and replacements? Questions of liability are also again relevant, for example, when overuse and accidents or violence with the help of love dolls and sex robots occur. These in turn are linked to ethical issues.

4.3 Military

There are numerous studies on sexuality in the military, with the First and Second World Wars providing ample material [28,29]. There have also been modern developments [30]. The focus is on behaviour in male-dominated units, on the changes brought about by the entry and involvement of women and on prostitution in the operational areas. Slavery, rape, torture and intimidation during war were also investigated. It is known, for example, that in Japan during the Second World War, numerous Chinese prostitutes were forced to serve [29] – a circumstance that continues to cloud relations between the two countries, besides political and cultural differences.

Love dolls and sex robots could be one way to promote sexual health in a military context – particularly during weeks of barracks, long exercises and war missions. They could likewise be deposited in the sleeping quarters themselves or in suitable places in the barracks, like in showers and common rooms, even in camps or on warships. Discretion would have to be established for their use and the inmates' privacy would have to be preserved. Of course, shared use is also possible and permissible. In addition to the simulation of partner sexuality, other possible applications would include lying in bed together and hugging as well as role playing and disguise games of all kinds.

Probably the cleaning of love dolls and sex robots would be technically problem free in the military, like at nursing or retirement homes, at least in barracks and bases. The ethically relevant question is whether the artificial love servants would become the target of physical violence in everyday and extreme situations, leading military staff to become more violent towards humans. Again, empirical research is missing. One can also only speculate about the military staff's acceptance of these artificial love servants. Each barrack will also have its own dynamics, and in mixed units the response could be significantly different from the unmixed ones. Another point is the acceptance of the partners. If they find out about the artificial sex, it could endanger the relationship.

The threats to intimacy and privacy as described above also apply here. What is special is that the majority of soldiers are young people (mostly young men) who may not always be able to assess the consequences of their actions on their later lives and that the enemy may well be interested in compromising pictures and data in general. This is not only to do with ordinary soldiers but also officers. Edward Snowden has described in his book *Permanent Record* that secret service workers regard nude photos (obtained by hacking) as an informal currency that raises their standing among colleagues [31]. Here they would have a new field of activity, and the informal currency could become a formal one, so to speak.

Finally, legal and pragmatic aspects are important. Similar questions to the prison example arise, such as whether there is a right to be provided with an artificial love servant and logistically, who should be responsible for the loan or purchase, who should be responsible for the operation and who pays for repairs and replacements. In the event of war, it is important to recall that the artificial love servants must be transported and stored and that they can fall into enemy hands. Questions of liability are also relevant, for example, if there is overuse and accidents or violence occur with the help of

the love dolls and sex robots. These in turn are linked to ethical issues. Incidentally, the secret project Borghild – sex dolls for the troops in Nazi Germany – may well be an invention, and even the media that disseminated this story do so with reservations [32].

4.4 Monasteries and seminaries

In monasteries, seminaries, ecclesiastical institutions and Papal States such as the Vatican, a special challenge arises. There sexuality is not desired by the authorities and even expressly forbidden. Sexual instincts are not removed at all, in an uncontrolled sphere (self-stimulation in bed) or in a secret place. In Rome, the clergy have always been known to hire male (and sometimes female) prostitutes [33]. In addition, as has become public in recent years, there has been widespread abuse of minors (and others) by the clergy. Nuns were also not protected against sexual violence [34]. At the same time, they were perpetrators themselves from time to time [35].

Love dolls and sex robots could contribute to sexual health in religious orders and provide a therapeutic effect on negative sexual urges. However, the latter has hardly been researched in connection with paedophilia [8]. When clergymen seek closeness to children and adolescents and maintain closeness to child dolls, it is completely unclear whether their lust is weakened or strengthened and whether paedophilic crimes can be avoided. Arguments can be made for both scenarios, and how it really works is difficult to answer. Empirical research is possible but has its limits. For example, it would be irresponsible to increase desire in a subject, so to speak, which then unleashes itself in real life. Other methods, such as surveys, are unproblematic and in some cases effective.

Love dolls and sex robots in monasteries and seminaries raise many ethical questions. Those affected could find themselves in moral conflicts, depending on their own convictions and habits, and in conflicts with brothers and sisters and the church or monastery management, with the result that they lose their reputation or their place in the church. The media could take up the issue and accuse the institutions of double standards, but the mockery of citizens and critics could hurt clergymen and drive them into isolation or suicide. Numerous circles would be interested in data, not only because of the basic starting position but also because of the visibility of the people involved. Pope and puppet – that would be a sight.

Again, there are legal and pragmatic challenges. The questions of who procures the love dolls and sex robots under what circumstances, how to negotiate and remain in contact with the church leadership or church base, what communication and interaction guidelines to adopt are all important to ask. Questions of liability are also relevant, for example, if there is overuse and accidents – in some institutions the average age of users would be quite high. In some countries sex with child dolls – some clergymen might be attracted to children, as mentioned above – is limited and sanctioned in different ways; in Germany, for example the purchase is completely legal, but elsewhere this option might be limited [36]. Some aspects are again connected with ethical questions.

4.5 Science, art and design

Science is an important investor in and customer of social robots. This certainly also applies to sex robots. Realbotix, for example, makes Harmony's head model available at conferences – the author experienced this himself – and sells it (according to the person responsible at the event) to research institutions. The head model is only suitable for sexual acts to a limited extent, as the mouth area is designed differently. Overall, it cannot be assumed that sexual acts will be integrated into these robots automatically, since this is an area that is subject to clear taboos, diversity guidelines and anti-discrimination regulations [37]. However, the sex robot can certainly become a diverse object of research.

Scientists like roboticists, computer scientists and machine ethicists can also help develop sex robots, using their own experience and experiments. Bendel has made proposals for the adaptation of synthetic voices using Speech Synthesis Markup Language, which are still waiting to be implemented [38]. Artists and designers may also be involved in the process and are guided, if not consciously, by Ovid's famous *Metamorphoses*. When you look at Realbotix in San Marcos, you think less of a factory and more of an art business that produces not works of art but artificial people. Here, eyes are formed, teeth are created, hair is put on and facial skin is pulled over the robot skull to create the realistic impressions of people.

The sovereignty over the creation of apparently perfect artificial humans will in many cases lead to the creation of beauty and youth. Those who can choose one or the other will tend to choose the ideal, not the real, unless they are more attracted to the real. Of course,

commercial providers will be guided by the (possibly highly diverse) wishes of their customers, and science and art will be interested in the deviant, the unusual and not just satisfy their own needs. So, at the end, the resultant variety could lead to a model that more closely resembles reality.

Numerous ethical questions also arise here. The presence of a love doll or a sex robot in a lab could cause scientists to feel awkward. Whether empirical research may go so far as to allow test subjects to gain experience with dolls is unclear. Certainly, for student subjects this would be condemned and prevented at some universities, even at universities of applied sciences. Finally, if one assumes that the sex objects created by humans impact people, like pornography does, it must be clarified whether one is dealing with a new freedom or a new lack of freedom. As in the military context, relationships between people could suffer.

When it comes to sex robots that can collect and disseminate data, questions are brought up again about intimacy, privacy and informational autonomy. In the field of science, however, the collection of data must also be viewed differently, as an opportunity to obtain particularly interesting and meaningful data, namely, data resulting from the direct use of love dolls and sex robots. Such usage data are also of relevance to dating platforms, for example, with regard to the age of the desired partners, whereas surveys often contain distortions [39].

Again, there are legal and pragmatic challenges. The question of who procures the love dolls and sex robots and under what circumstances, more specifically what freedom is left to one by one's colleagues and the university management as well as the authorities or the state needs to be asked. In many countries there is freedom of science, freedom of teaching and research comprehensively, but there are still taboos and red lines. The production of sex robots and tests with student groups could even lead to lawsuits, from equal opportunity officers as well as from religious groups. Whether or not research projects can be carried out is not least due to the ethics committees of the universities.

4.6 Gamer scene

Gamers and cosplayers have a close relationship with their characters and often identify with them [40]. They play with them in various ways and dress up like their favourite characters for conventions and for photo shoots, the results of which are published on platforms.

They may get excited by biceps and six-packs, overly pronounced and oversized breasts and firm buttocks, or take pleasure in submissive or explicit behaviour. However, they may still have an affection for real, complex or problematic figures. In online games, the basis of the attraction is the belief that behind the avatar of the player there is a real person.

Not all gamers and cosplayers will be interested in experiencing the characters of the real world as well as the virtual. Many will further consider the game world as the real one, especially those who have succumbed to the strong pull of the computer and spend extensive periods playing a game. Nevertheless, there seems to be a need, according to the owner of the BorDoll in Dortmund, who provides some fantasy figures. She explained to the author that there is demand for them among younger men. In an interview, she told that there is a room in her establishment where customers can change the dresses of the dolls [41].

Probably most of these players would not normally go to a brothel, so it is conceivable that the love dolls and sex robots could play a role at conventions and parties. The community is well connected, and platforms could be used to show the love servants and buy them. A Realbotix employee told the author at a conference in Potsdam in 2019 that older men simply want to make use of a sex robot while younger men want to earn the sex. They are used to games and gamification and want to reach different levels with love dolls and sex robots: experience a gaming element with a sex robot.

From an ethical point of view, the main issue is whether all characters would be appropriate as artificial love servants, which are measured against both public and individual morality. Surrounding this are questions of what fascinates users about sex with fantasy figures and what this sex can affect in users. Here again, research is lacking. Perhaps there is a “Daisy Duck” limit to rendering Bendel: while pointed ears (of elves) and oversized eyes (of manga girls) are widely attractive, the desire for comic ducks is likely to be the niche at best [1,3]. This could be due to the comic-like nature of the characters, the fact that they are too far away from human beings, but also the fact that they are childhood figures who seem untouchable.

Again, there are legal and pragmatic challenges. In some places, sex with child dolls – several manga girls and anime characters like Yuki seem very young – is limited and sanctioned in different ways, as has already been mentioned. There is also a question as to whether greater deviations from the human could lead to legal grey areas. In some countries, one could argue that this

could lead to a disturbance of public order or a depraving of society, even if the sex objects are only present in semi-public areas.

4.7 Interim conclusion

In this chapter, RQ2 and RQ3 could be answered. On the one hand, the history of ideas and development of artificial love servants could be evaluated and the author’s own considerations and observations could be added to these. This resulted in types of users, from which in turn possible areas of application were derived. The answer to RQ2 is that there are at least six relevant areas of application besides brothels and private homes: nursing and retirement homes, prisons, the military, monasteries and seminaries, science and the arts and the gaming scene. The use of artificial love servants in these contexts is possible but not always easy. The answer to RQ3 is that from a social and from an ethical point of view their use is not prohibited and that it has a balance of opportunities and risks. Love dolls and sex robots can contribute to a good life, depending on the user group and area of application, but they can also violate human dignity and endanger the existing or future relationships [42].

5 Summary and outlook

In this article, a short definition of love dolls and sex robots was given and the background of this phenomenon explained. After that, the author briefly presented the history of ideas and development of artificial creatures with sexual and erotic connotations. He identified artificial manifestations of the ideal woman over several thousand years (answer to RQ1), which were first fictional and then real. Against the background of the history of ideas and development and on the basis of the author’s considerations and observations, six previously mostly neglected areas were identified and suggested where love dolls and sex robots could be made use of (answer to RQ2).

These are all sensitive areas where differing ethical and legal challenges arise and where customs and traditions can be violated and people’s self-image and perception of themselves could be damaged [43]. On the other hand, use in brothels and at home seems to be a matter of course and unproblematic, although this is not necessarily true either, since ways of behaviour and

thinking can vary greatly from household to household, from country to country, which is, so far, not covered by empirical research (answer to RQ3).

However, the perception that sex robots are somehow inappropriate or depraved is by no means fixed [44]. The aim of the present contribution was precisely to overcome the limits of thinking guided by taboo and to discuss new possibilities without prejudice that could ultimately improve many people's quality of life. Ultimately, the circumstances under which love dolls and sex robots can contribute to a fulfilled sex life or to painful assaults need to be considered objectively. To answer this question, empirical research has often been lacking, as must be emphasized again. A look at digital ethnography or e-research could be helpful to investigate this field. The increased interest of scientists in turn may also meet with scepticism. However, it must not be the case that shame, religious feelings and individual reservations hinder research in such an important area and it is significant that further empirical research is undertaken.

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