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The anthropomorphic imperative: a historical analogy

Danila Bertasio[1]

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Abstract In a cultural setting in which the imitation of nature continues to be regulated by the ambitious project to cancel the dividing line between the natural and the artificial, man continues to find space for his replicative fantasies, even at the cost of breaking cultural boundaries and taboos. On the other hand, as shown in the historical analogy, this ambition, aimed not only at a partial reproduction but a true replication, seems to exhibit developmental contours that lead to the same final results in terms of disillusionment and subsequent abandonment.

Keywords Natural · Artificial · Art · Kitsch · Replication · Anthropomorphism · Human · Robot

There was once an old man named Nahokoboni. He suffered because he had no daughters: who would protect him if he had no father-in-law? Being a wizard thus made a daughter for himself, deriving her from a plum tree.
From a fairy tale of the Indians of Guiana.

1 Introduction

The *Kunstkammer*, the ancient maps, the souvenirs of the cities of art, and many other phenomena that surround us are the clear proof that any attempt to replicate reality without an accurate knowledge of the object to be replicated, perhaps even with the addition of frills and ornaments referring to different realities, ends up generating kitsch (Bertasio 2012).[1] However, notwithstanding the failures or the replicative bias in the results, man seems undeterred and insists upon devoting himself to the replication not only of that which surrounds him, but often even of himself. Such projects inevitably require the involvement in the same space–time unit of at least two levels of observation that will play a relevant role in the present discussion: the technological and the aesthetic. The latter, which is almost always perceived as indispensable, becomes the cause of *kitsch*, conditioning and sometimes compromising the very functionality of the product or, in the case of machines, of the hardware.

However, between thrills and fears, certainties and doubts, man continues to appreciate an improvement of technological products that tend to disguise their "artificial" nature. The physical resemblance or imperceptible *matching* with the environment seems to be the categorical imperative, even if it introduces a state of ambiguity which not infrequently leads to the establishment of myths.

Man's attempt to create a replica of himself, through the unification of technological and aesthetic levels of observation, has deep roots dating back at very least to the artifices of Heron of Alexandria and his teacher Philo (Pugliara 2003); and today's anthropomorphic robotics shares the same replicative philosophy, albeit with an interesting underlying difference. Indeed, while the ancient automata had mainly recreational, imaginary or mythical

✉ Danila Bertasio
danila.bertasio@unipr.it

[1] D.U.S.I.C., Department of Humanities, Social and Cultural Industries, University of Parma, Parma, Italy

[1] In the context of this paper, the term *kitsch* has to be understood as special low level aesthetic category but not necessarily as something trivial as it prevails in the English culture.

In general terms, we define a product *kitsch* if it originated from an attempt to sum up or synthesise multiple levels of observation of an object present in nature or culture, without any coordination between them. A strictly aesthetic definition can also be that proposed by Dorfles (1990), who defines *kitsch* as a type of production that refers to uncertain rules of taste. According to Dorfles, in the production of *kitsch* it is possible to trace an opaque, sentimental and ambiguous memory of the original that inspired it.

purposes, as did those of the eighteenth and nineteenth centuries, today's anthropomorphic robot design seems to be aimed at creating a "perfect" double—an endeavour that proposes a curious continuity with others presenting themselves throughout history, such as, for example, the production of wax "doubles" in the fourteenth century. In fact, the step from wax duplicates to anthropomorphic robots is shorter than one might think, owing to the obvious similarity in the motives characterising both productions. They share the same vice—namely, an impressive rather than expressive *naïve* realism that inevitably writes their fate.

The modern-day engineer pursues the same dream as did the fourteenth-century wax-workers, unaware that doing so is related to a kind of neo-Platonism that might be even less tolerant of a copy—namely, to construct simulacra that would be expected to behave "humanly". In a cultural setting in which the imitation of nature continues to be regulated by the ambitious project to eliminate the dividing line between the natural and the artificial, even the common man continues to find space for his replicative fantasies, perhaps even at the cost of breaking cultural limits and taboos. Overcoming the disquieting effect of the wax-workers' statues, robotics once again pursues the dream to construct robots more and more like humans—ideally indistinguishable from them—and thus everything seems to begin again in the name of building a replicant very similar to its creator. In this sense, man the maker, *homo faber*, shows under an evolutionary profile that he has reached a certain oscillating yet persistent tendency to return periodically to the most ancient and utopian projects, applying the new technologies acquired over time. He is well aware of the preceding failures, but is ready to run into them again. In short, if Heron concealed from public view the mechanism that gave movement to his creatures; if the novelist deprived hers of a soul; and if the alchemist was obliged to respect the course of nature's magical laws, robotics engineers seem to adopt a replicative philosophy that leads them to abandon the exclusively ludic or fantastical ends typical of ancient automata, in the name of the demand to grasp the profound nature of existence—as, indeed, did the wax-workers of old, as we shall see below.

2 Anthropomorphism in the middle ages

The use of wax, a malleable material *par excellence*—but we also refer to substances in some way related to it, such as boiled leather or papier-mâché—was geared towards the ambitious effort to surpass the limits of representation in order to arrive or remain at the level of the most stubborn realism. All this occurred through an emphasis on the deceptive but excessive adherence to an ontological, corporeal and material origin, which has denied these kinds of production, the recognition of a noteworthy artistic status.

The *lost wax* technique involved well-defined procedures. The first consisted in obtaining a plaster cast by placing the plaster directly on the body of the deceased subject, or on parts of it. Then, once shaped and hardened, it was used as a mould into which hot wax was poured. Subsequently, this mould was removed with sufficient care to avoid damaging the wax positive. The uses of the positive thus generated were essentially two: it could serve as a model for the sculptor, or, with the addition of wig, glass eyes, and teeth and nails belonging to the deceased, it could serve as a substitute for the dead person. Often the procedure involved complete dismemberment (Sallmann 1994).[2]

Owing to the obvious connection with death, not surprisingly perceived as troublesome to the imagination, the work of the wax-modellers, also called *fallimagini* or *fallimmagini* ("image-makers"), was not considered artistic at the same qualitative level as that of sculptures or painters such as Ludovico Cardi, also called Cigoli (1559–1613). The link was metonymical rather than metaphorical.[3]

Writing in the late XIV century, Cennino d'Andrea Cennini, student of Agnolo Gaddi, recounts the canonical proceedings for obtaining a perfect double:

"Know that if you wish to follow this process into more subtle mastery, I will inform you that you may mold and cast a man in one piece, just as in ancient times. Many good figures and nudes are to be found. Therefore, if you want a whole nude man or woman, you must first have him stand upright in the bottom of a box, which you get built up to the height of the man's chin. And have this box all fit together lengthwise halfway from one side to the other. Arrange to have a thin templet [or "paten" (*piastra*)] of very thin copper from the middle of the shoulders, starting at the ears, down to the bottom of the box; and have it follow lightly over the flesh of the nude without injury, not pressing on the flesh by so much as a line. And have this templet nailed on to the edge where this box fits together. And in this way nail on four pieces of templet which will close up together as the edges of the box do. Then grease the nude; stand him up in this box:

[2] Sallmann (1994) tells of an incredible removal, which took place in 1711, of the breast of the Franciscan monk Bonaventura of Potenza. At the end of the funeral, the guardian monk appropriated, with the help of a surgeon named Giuseppe Ippolito, the left nipple of the saint.

[3] It should be remembered that notwithstanding this, such a custom was in use among the Romans, who, in order to renew the memory of deceased relatives or deities, modelled figurines in white wax with coloured faces, to which they added organic parts of the dead. Such doubles were placed in special niches in the lobbies of homes from which they were removed to renew the 'physical' presence of a loved one, who, having 'passed to a better life', could not be present at an important family event.

wet up a great quantity of plaster with quite warm water; and have an assistant, so that if you fill in in front of the man the assistant will fill in in back, so as to get the box full at the same time, up to the throat: because you can do the face separately, as I have shown you. Let the plaster stand until it has hardened thoroughly. Then open and take apart the box; and insert tools and chisels between the edges of the box and the copper or iron templets which you made; and open them up, the way you would a nut, holding on each side these pieces of the box and the casting which you have made. And you extract the nude gently from it: wash him diligently with clear water, for his flesh will have turned the color of a rose. And in the same way, again, as when you filled in the face, you may cast this mold or casting in any metal you please; but I advise you, in wax. The reason: it enables you to chip the plaster without injury to the figure, because you may remove, and repair wherever the figure is defective. After this you may add the head to it; and cast everything together, including the whole person. And likewise you may cast separately, member by member, that is, an arm, a hand, a foot, a leg; a bird, a beast, and any sort of animal, fish and other such things. But they have to be dead, because they have neither the natural sense nor the rigidity to stand still and steady" [Cennini (1933), p. 127 ff.].[4]

[4] "Onde di mestiero t'è, a volere un uomo tutto ignudo o donna, prima farlo stare in piè in su'l fondo di una cassetta, la quale farai lavorare di altezza dell'uomo per infino al mento; e fa' che la detta cassa si commetta o vero si scommetta in tutto per lo mezzo dall'un de' lati, e dall'altro per lunghezza. Ordina che una piastra di rame ben sottile sia dal mezzo della spalla, cominciando all'orecchie, per insino in su'l fondo della cassa: e vada circondando leggiermente sanza lesione su per la carne dello ignudo, non accostandosi alla carne una corda. E sia chiavata la detta piastra in su l'orlo, dove si commette la detta cassa. E per questo modo cava quattro pezzi di piastra, che vegnino a conchiudere insieme, siccome faranno gli orli della cassa. Poi ugni lo'gnudo: mettilo ritto nella detta cassa: intridi del gesso abbondantemente, con acqua ben tiepida; e sia con compagnia, che se empi il dinanzi dell'uomo, che il compagno empia dirieto, acciò che a un medesimo tempo la cassa vegna piena per infino coperta la gola. Però che'l viso, siccome t'ho mostro, puoi fare di per sè. Lascia posare il detto gesso tanto, che sia bene rassodato. Poi apri e scommetti la cassa, e metti alcuni ingegni e scarpelli tra gli orli della cassa e le piastre di rame o di ferro che abbi fatto: e aprila, sì come facessi una noce, tenendo dall'un lato e dall'altro i detti pezzi della cassa e della impronta che hai fatta. E moderatamente ne trai fuori lo'gnudo: lavalo diligentemente con acqua chiara; chè sarà diventata la carne sua colorita come rosa. E a quel modo ancora, quando impronti la faccia, la predetta forma o vero impronta tu la puoi buttare di ciò che metallo tu vuoi; ma io ti consiglio di cera. La ragione: fa' pure che rompa la pasta senza lesione della figura, perchè tu puoi levare, aggiungere, e rimendare dove la figura mancasse. Appresso di questo puoi aggiugnervi la testa; e buttare ogni cosa insieme, e tutta la persona: e per lo simile di membro in membro spezzatamente puoi improntare; cioè un braccio, una mano, un piè, una gamba, un uccello, una bestia, e d'ogni condizione animale, pesci, e altri animali simili. Ma vogliono essere morti, perchè non avriano il senno naturale, nè la fermezza di star fermi e saldi." Cennino Cennini, *Il Libro dell'Arte, o Trattato della pittura di Cennino Cennini*, edited by Gaetano & Carlo Milanesi, Le Monnier, Florence (1859).

The chronicles tell us that in thirteenth-century Florence, in the church of Orsanmichele, a miraculous Madonna was venerated. Her fame had spread throughout Tuscany, and the faithful came in great numbers to adore her and bring votive offerings in wax, the *boti*, which replicated bodies or parts of them. Wax, then, offered the Florentine nobility the possibility of creating life-sized replicas whose resemblance to the deceased was amplified thanks to the possibility of dressing them with the actual clothes of the deceased. The church, as a sanctuary, was soon transformed into an enormous wax museum containing doubles of all sorts. They filled its balconies and front cloister, and it is said that when, in 1447, there was no more room to put new figures, special platforms were constructed at the sides of the entrance door, and that when these, too, were full, there was no choice but to hang them on ropes from the ceiling of the church. Many years later, George Eliot, in her novel *Romola* (1863), reintroduced the concept of celebratory an eternalizing doubles, recapturing, not by chance, the example of the extraordinary crowd of the Basilica of the Most Holy Annunciation in Florence. Eliot wrote, in fact:

"And spreading high and far over the walls and ceiling there was another multitude, also pressing close against each other, that they might be nearer the potent Virgin. It was the crowd of votive waxen images, the effigies of great personages, clothed in their habit as they lived: Florentines of high name in their black silk *lucco*, as when they sat in council; popes, emperors, kings, cardinals, and famous condottieri with plumed *morion* seated on their chargers; all notable strangers who passed through Florence or had aught to do with its affairs—Mohammedans, even, in well-tolerated companionship with Christian cavaliers; some of them with faces blackened and robes tattered by the corroding breath of centuries, others fresh and bright in new red mantle or steel corselet, the exact doubles of the living. And wedged in with all these were detached arms, legs, and other members, with only here and there a gap where some image had been removed for public disgrace, or had fallen ominously[…]. It was a perfect resurrection-swarm of remote mortals and fragments of mortals, reflecting, in their varying degrees of freshness, the sombre dinginess and sprinkled brightness of the crowd below".

Much the same thing happened at the Shrine of Our Lady of Grace, which is located in Curtatone near Mantua, built by Duke Francesco Gonzaga in 1399 and enriched with doubles in coloured wax. In the seventeenth century, a scaffold was added, composed of wooden niches separated from each other by columns decorated with wax reliefs to collect replicas of breasts, hearts and hands.

Giorgio Vasari, in his *Lives*, published in 1550, expressed his amazement at the "most lifelike" aspect of the waxen bodies located in the workshop of Andrea Verrocchio, and he expressed sympathy with Luca Signorelli in his decision to make use of this technique to

"bring back to life" his prematurely dead son. The wax technique, writes Vasari, offered the artist a chance to see, as often as he wished, that which nature had given but which adverse fortune had taken away. He appreciated the hair, eyelashes and nails, and the eyes made of Venetian glass; but, at the same time, he sensed that the "atrocious" naturalism that characterised them would distance the wax-modellers' art from true art, to the point of predicting that "this art, even if it is kept alive in our time, is nevertheless rather in decline, either owing lack of devotion, or for some other reason" (Vasari 1991, 230).

The use of wax carried not only a fundamentally evocative-affective function—preferable to the presentation of the embalmed body, which over time could present problems of conservation—but also a significant ideological function of a juridico-political character. Such an affirmation, developed by the Elizabethan jurist Edmund Plowden, argued that the king possessed two distinct bodies: a *natural body*, subject to the action of time, and an eternal *body politic* that survived it; and upon this conception the French and English monarchies founded the reason for their own perpetuity. In *The King's Two Bodies: A Study in Mediaeval Political Theology*, Ernst Kantorowicz (1957) writes, in this regard, that the artificial body of the king was exhibited with all the symbols of sovereignty: on his head he wore the crown, while his artificial hands clutched the orb and sceptre: "enclosed in the coffin of lead, which itself was encased in a casket of wood, there rested the corpse of the king, his mortal and normally visible—though now made invisible—natural body; whereas his normally invisible body politic was on this occasion visibly displayed by the effigy in its pompous regalia: a *persona ficta*—the effigy—impersonating a *persona ficta*—the *Dignitas* (p. 421). There existed two lives thus two bodies. As in Christ there coexisted two bodies—the physical and the mystical—also in the king there existed the physical body, destined to die, and the ever-immortal body politic, which would be reincarnated in the future king. The single king could die, but the King, representing the sovereign justice and in turn represented by the supreme judges, did not die; he continued his jurisdiction through the action of his officials even though his natural body had expired.

It was the effigy in wax, therefore, that represented the continuity of the monarchical institution. It is no mere coincidence that there were also two funeral rites: a triumphant one, in which the duplicate was lain on a richly decorated bed with the insignia of power clearly displayed, and a more discreet one for the deceased king himself, placed in a coffin adorned with black drapes that hid the symbols of power. This is what happened in France in 1422, to Charles VI, and, a century and a half later, in 1574, to Charles IX. Freedberg (1989) reports a contemporary account, already cited by Kantorowicz (Kantorowicz, 1957) in which it is clear that the king's "double" was treated as if it were the living king himself, to the point that "While the body in effigy was lying in the lounge, at lunch-times and dinner-times the forms and manners of service were respected and observed in exactly the same way as was the custom to do so in life: food had been prepared by officials, and the service was performed by *gentilshommes, servants, panetiers, chanson et écuyer tranchant, l'huissier marchant devant eux*. [Then, when the meal was ready,] the table was blessed by a cardinal or a bishop, […] all in the same form, ceremony and *essays* in which it would have been done when the Lord had been alive".

Up to the 1600 s the demand was considerable, and this allowed the creation of real industries, which remained active and flourishing especially in Tuscany and France. Aby Warburg (1901) notes that during the Renaissance the archaic memory of the cult of the dead was intertwined with the art of portraiture, pushing the latter on the one hand towards its presumed anthropologico-ritual foundation, and on the other hand towards a strong interpretation of resemblance, already oriented towards finding disquieting components—"disturbing", to use a Freudian term—within the processes of replication of the human body. However, the political and social changes that came about with the French Revolution deeply marked the art of wax-workers. It goes without saying that certain expressive forms survived with difficulty until they disappeared permanently, while others were able to adapt to the new conditions.

The recourse to the wax doubles died out at the same time as did the Ancien Régime. Denis Diderot, in *Salon* (1765), announced its end to the world: "[…] il n'y a rien de si déplaisant que le contraste du vrai mis à côté du faux, et jamais la vérité de la couleur ne répondra à la vérité de la chose; la chose, c'est la statue seule, isolée, solide, prête à se mouvoir. C'est comme le beau point d'Hongrie de Roslin sur des mains de bois, son beau satin, si vrai, sur des figures de mannequin. Creusez l'orbite des yeux à une statue et remplissez-les d'un œil d'émail ou d'une pierre colorée, et vous verrez si vous en supporterez l'effet. On voit même par la plupart de leurs bustes qu'ils ont mieux aimé laisser le globe de l'œil uni et solide que d'y tracer l'iris et que d'y marquer la prunelle, laisser imaginer un aveugle que de montrer un œil crevé; et n'en déplaise à nos modernes, les Anciens me paraissent en ce point d'un goût plus sévère qu'ils ne l'ont" (Diderot 1765).

Soon afterwards, even the gruesome doubles of the Annunciata of Florence did not keep their place in the church. In 1771, Peter Leopold of Habsburg-Lorraine, Grand Duke of Tuscany ordered the clergy that they be removed and relocated all in one place for scientific purposes. To this end,

Florence's Imperial-Royal Museum for Physics and Natural History (now the Museum of Zoology and Natural History, better known as La Specola—"The Observatory") was inaugurated on 21 February 1776. A wax-working school was also opened there. Little of the equipment used still remains, but in the archival records are listed copper containers, tools for modelling, iron wire, marble slabs for reducing the wax to thin layers, scales, baskets for the transfer of cadavers, containers of different shapes and sizes, etc. (Lanza et al. 1979).

The walls of the churches were cleared and made ready to receive undoubtedly less disturbing artistic works, and the wax-workers' production neared its final period of popularity. Nevertheless, in the nineteenth century, several new museums were opened, such as, for example, the Musée Grévin, founded in Paris in 1882 by French journalist Arthur Meyer, and named after its first artistic director, Alfred Grévin, and Madame Tussaud's wax museum (now Madame Tussauds, without the apostrophe), founded in London in 1888 by French wax sculptor Anna Maria "Marie" Tussaud. Moreover, the somewhat morbid aesthetics of the eighteenth century could not have but remained bewitched. The Marquis de Sade, regarding the perfection of the theatres of death modelled by the abbot anatomist and wax modeller Giulio Gaetano Zumbo, is said to have thus reported his impressions: "in one of these cabinets you see a tomb full of countless corpses, in which you can observe the different degrees of decomposition of the corpse of a man just dead up to that completely devoured by worms. This bizarre work was conceived by a Sicilian named Zummo. The impression is so strong that the senses seemed to give the alarm to one another. It is natural to bring the hand to the nose without realising it, contemplating this horrible sight, which is difficult to observe without exposing to the mind the sinister ideas of destruction" (De Sade 1977).

Such museums, much appreciated in earlier times, became places to avoid as corruptors that made people bad, as maintained the French novelist Jules Fleury-Husson, better known as Champfleury. Gabriele d'Annunzio expressed the same negative judgment. In *The Secret Book* he does not hesitate to reveal all of his horror in facing the wax figure of a strangled woman. Equally critical was the English writer William M. Thackeray, who came to argue that if he had been forced to choose whether to spend a night in a wax museum or in a cage of lions, he would rather spend it in the latter. Indeed, the morbid fascination of duplications, while surviving throughout the eighteenth century, at the beginning of the new one received a strong set-back. A generalised change in aesthetics, combined with a different conception of death, becoming suddenly "pornographic", made it unpronounceable and not to be represented except in sweetened terms (de Ceglia 2005).

Degenerations in the creation of doubles were still present in the twentieth century, in decadent stories that tell of life-sized wax figures who could console desperate lovers, deluding them into thinking that the object of their love was still present in their lives. In a fascinating account of these substitutes entitled *Gogol's Wife*, Tommaso Landolfi takes the role of a fictional biographer of the writer Nikolai Vasilievich Gogol and narrates the troubled relationship that Nikolai had with his wife—a rubber doll—to which he had given the name Caracas. Landolfi, who, as Carlo Bo observed, could do with the pen what he wanted, writes: "The wife of Nikolai Vasilievich, it is soon said, was not a woman, nor any human being whatever, nor even a living being, animal or plant (as insinuated by some); it was merely a doll"—a doll for which Gogol "changed the wig and other fleeces, anointed it with ointments and retouched it in various ways so as to achieve more or less the kind of woman that suited him on that day or at that time". A passionate albeit paradoxical affair bound them, which then degenerated owing to the syphilis that had struck the writer, for which he blamed Caracas. One day, while attempting to remodel her when angry, he blew too much air into the double of Caracas, causing it to explode into a thousand pieces.

A story very similar to the one told by the writer Tommaso Landolfi has as its protagonist the painter Oskar Kokoschka and a rubber mannequin that reproduced the features of the restless Alma Mahler, widow of Gustav Mahler, with whom the artist had an intense relationship from 1912 to 1914. Kokoschka, abandoned by Alma, remained for a long time entirely absorbed by her memory, until, in 1920, to console himself for the abandonment, he commissioned the milliner Hermine Moos to assemble a mannequin of cloth and sawdust that resembled the woman. Satisfied with Moos's work, the artist treated the mannequin as if it were his beloved, exhibiting it in public. One day, however, he was cured of his obsession with Alma and freed himself from this unhappy love, dragging her double in a mad dance of death before eventually throwing it out of a window. These are two grotesque stories—stories that are born with the waxen statues and seem to end with the exasperated doubles Kokoschka and Landolfi and this brings us directly in the contemporary era. In both, indeed, overly ambiguous spaces are given to the illusion that one can bring back to life those who are no longer alive, creating doubles as legitimate substitutes, which are then discarded as soon as the painful wound left by the abandonment is healed.

3 A return to anthropomorphism

The robots are not all anthropomorphic, as evidenced by their massive presence in various industrial, military, health care, services in which their appearance is that of

typical machine, without any similarity with the human being. However, the luck of the same word "robot", famously adopted by Karel Čapek in 1920, clearly indicates the appeal that this new technology has had on researchers and designers in part coming from the field of purely symbolic Artificial Intelligence. They, having understood the power of the cybernetic techniques of self-regulation in setting-up behaviours of the machine similar to those of humans, quickly tried to complete this similarity giving the machine also features of a man (Cordeschi 1989).

Research in the area of anthropomorphic robots is becoming very advanced, but even here there is no lack of perplexity which could, in the future, transform itself into a widespread gradual decision to abandon anthropomorphism in favour of the study and design of machines capable of reproducing human faculties but without respecting the imperative of matching human form, be it aesthetically, physiologically or psychological. The central point is to recognise that a robotic machine, once freed from this imperative, could open up a much wider variety of applications than that constrained to human characteristics.

For example, in the field of HRI (Human–Robot Interaction), according to some US researchers, writing in the late 1990 s, because "to date there are few artificial hands that can be used successfully for practical purposes [and hence] significant interest is emerging in more 'minimalist' projects", and it therefore "seems natural to study projects in which the hand does not try to reproduce the complex nature of the opposition of thumb and forefinger" (Ramos et al. 1999). Similarly, Guy Hoffman of Media Innovation Lab at the Herzliya Centre of Interdisciplinary Studies, Israel (2008), states that, with regard to design, it seems more and more reasonable to think of types of non-humanoid robots because, among other considerations, avoiding the imperative of duplicating human beings at all costs, "the design space opens without limits".

In fact, the new technologies dramatically expand the scope of design both in aesthetical and design terms, and this imply new possibilities for building a bridge between art and science.

Also in the design of software, anthropomorphism is at the centre of debate, because, as shown in a study on the choice between anthropomorphic and non-anthropomorphic *feedback* in the use of commercial software, it seems that the non-anthropomorphic alternative generates more effective activities (Murano 2002). With regard to music, for which one might think that anthropomorphism is fundamental, research of the Georgia Technology Center for Music Technology has demonstrated how a non-anthropomorphic machine is able to generate high expressiveness while enjoying few degrees of freedom (Hoffman and Weinberg 2010).

Needless to say, at the level of industrial and military robotics, the vast majority of devices act on the basis of projects of considerable sophistication that have nothing to do with human abilities or features.

Discussing the theme of anthropomorphism in robotics, Brian R. Duffy of Media Lab Europe, Dublin, emphasises how the ability to anthropomorphise objects of various types, be they found in nature or constructed, is part of what it is to be human. This is a consideration, as seen in the previous section, that is valid also in historical terms, as testified by the fact that the anthropomorphic propensity in robotics has very deep roots in the evolution of our species.

However, even if "people respond more positively to a device that shows characteristics similar to human ones (emotions, facial expressions)", it emerges also with regard to robotics that "humanoid robots that make excessive use of anthropomorphism, as with systems that perfectly reproduce the human likenesses while remaining unnatural copies, can generate adverse effects and even rejection" (Fink 2012). By contrast, Hiroshi Ishiguro is convinced that physical acceptability of a machine can be less culturally problematic if a robot looks like us, because it prevents us from having to accept its belonging to a constitutively different "species". In short, an anthropomorphic robot would be preferable to facing the trouble of accepting something "radically different" from us. On the other hand, both theoretically (see Masahiro Mori's well-known hypothesis of the "uncanny valley", Mori 1970)[5] and based on the results of empirical research, it seems that the risk of rejection is constantly lurking, especially beyond high thresholds of similarity (Kim et al. 2009).

Duffy indicates two types of usefulness of robot anthropomorphism: "to create artificial entities capable of acting in connection with man, showing capabilities comparable to those of a human being" and to attempt to "build systems which, governed by appropriate models, may be useful for better understanding human beings themselves" (Duffy 2002). This last statement, often put forward by those who work in robotics, hides a further ambiguity, however. While, on the one hand, it is entirely reasonable to try to design artificial limbs in the medical field by adopting some natural exemplar as a model, as currently known in the scientific field (Negrotti 2012), on the other

[5] Mori's hypothesis results from an empirical research centred the relationship between a human and a robot. It argues that a moderate anthropomorphism activates a sense of familiarity. By contrast, an excessive similarity between man and robot can transform the familiarity from positive into negative. In short, a 'pathetically' human physical aspect makes the differences even more obvious and unacceptable. For this reason, Mori suggests the design of less realistic robots. It is curious that among the first to show themselves to be sensitive to his model have been the animated film authors, who, fearing inviting feelings of distress or refusal among the public, have chosen not to pursue excessive 'naturalness' in their characters.

hand, it is most improbable that, through the study of the behaviour of an anthropomorphic robot, designed and implemented on the basis on models of "human nature" that are always arbitrary, we can achieve a more accurate knowledge of the human being that inspired the models.

Finally, anthropomorphic robots, just like waxen doubles, reveal a strong but steady oscillation between two ways of understanding the technique which, however, seems to be far from finding a balanced order. On the one hand, in fact, a conception of the technique intended as a purely cognitive challenge seems to prevail. For example, it is clear that Jacques de Vaucanson, even in the midst of an era in which reproductions mainly inclined to delight and aware of the distance between natural specimens and the reproductions that he produced, often presented his machines as tools to investigate and learn about the natural world. On the other hand, the technique is constantly lived, by more or less extensive research niches, as the demiurge to be entrusted with the task of building machines mainly oriented towards duplication.

However, despite a significant difference of view, the imperative anthropomorphic no longer appears to be universally shared.

However, as the waxen doubles demonstrate to which human law and concrete experience to rely upon to ensure that man knows, at any time, how to redraw the boundaries of "naturalness" of the machine without causing rejection, thereby thwarting, in the name of too close a resemblance, applicative projects that are extraordinary in themselves.

The analogy with past events, in particular with the story of the wax-workers, poses, though, severe hypothetical restraints on the future development of anthropomorphic robots. For example, although wax offered to the Florentine nobility the possibility of creating a life-sized double, the similarity of which to the deceased was amplified thanks to the possibility of dressing it with clothes belonging to the deceased, the sentiments that these replicas awakened were strongly contradictory. Baldinucci (1693) recounts that the Cigoli, when he had to go to the church of the Santissima Annunziata—which, obviously, like that of Orsanmichele, was full of waxen doubles—preferred to make even a long detour in order not to pass in front of the workshops of the wax-workers, who, with their work, offended the true art.

The distance between the reproduction of human beings with wax and current-day robots inspired by human features is certainly great because, to give but one example, the wax-workers had no intention, nor any possibility, of giving to their reproductions almost mental capabilities of self-regulation and actuation. On the other hand, both technological sequences let us glimpse a common ambition which, if carried beyond certain limits, cannot but generate strong transfigurations of the natural exemplars of various types; and such transfigurations seem, paradoxically, more and more probable as the objective is neared.

In a game in which ambiguity and illusion weave a plot that prepares a future suspended between reality and dreams, between fable and suggestion, man has always chased the possibility of replicating himself, and many believe that, if that were to happen, also the replication of every other natural thing that surrounds us would finally be at our disposal. However, the fate of such desires seems ineluctably sealed (Bellasi 2009). In the background there is always the same constitutive limit that characterises the human condition that consists in the obstinate tendency to replicate without an accurate knowledge of the object to reproduce. The inevitable and drastic reduction of complexity that such an enterprise imposes leads invariably to *kitsch*—that is, to the coexistence, in the final product, of well-founded elements and wholly arbitrary and evocative elements, without any persuasive, let alone definitive, model that holds them together.

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