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ENTERING BRAVE NEW SOCIALITY WITH SUPER INTELLIGENT, EMOTIONAL, AND WET BRAINED ROBOTS

During the last decade robotics has intensively developed several variants of humanoid robots – i.e. robots that resemble humans. Today robotics proceeds from improving motoric functionality to some new orientations of developing humanoid robots. These shifts lead to a contemporary re-examination of the questions, what it means to be human and how do we comprehend sociality.

Yet, the origins of the tendency to develop human-like robots are to be found in some ancient concepts. Humanoid robots are a significant example of convergence of the antique concepts *mimesis* and *technē*. The concept of *mimesis* (imitation) is central in Aristotle's comprehension of art comprehended as *technē*, but it is also the basis for other crafts (*technē*). Plato already understood art as a contest with nature, but Aristotle adds an impulse toward divinity.[1] Thus *mimesis* is not to be understood "as the duplication of isolated things, but as the active attempt to participate in a superior perfection." To comprehend *mimesis* in Aristotle, the concept of *technē* has to be additionally enlightened. "Arts", i.e. painting, poetry and music, were all to be considered sorts of craft, *technē*. For Aristotle, Nature is prudent and orders the generation of all things in proper gradation, whereat

1 Katharine Everett Gilbert and Helmut Kuhn, *A History of Esthetics* (Bloomington: Indiana University Press, 1954), p. 62.

Man is her noblest son. With the tool he has got, the hand, he has won a capacity to invent several crafts. Craft begins with handiness coupled with the impulse to imitate.[2] *Technē* means artfulness of mind to trick nature and turn it to man's advantage. This is the semantic origin of the terms technique and technology. For Aristotle what matters is beauty and order in the region of Nature. What has to be done is to imitate the manners and customs of Nature. *Technē* learns from Nature and this learning takes place through imitation. The process of imitation is natural to mankind and he is most imitative of them, he learns through imitation.[3] In the end, as believed by Aristotle, *technē* completes what nature has begun. It goes beyond the model only after long schooling according to the model of Nature.[4] Here lies the surplus value of *technē* and technology.

The Renaissance turned to antiquity and re-discovered visuality, as well as its concepts of mimesis and *technē* inherited from antiquity. Leonardo da Vinci claims that art must have recourse to nature. Man has no chances to win in competing with nature (in the sense of bettering it), but needs to consult nature about anything: "Whoever flatters Himself that he can retain in his memory all the effects of Nature, is deceived, for our memory is not so capacious: therefore consult Nature for everything."[5] However, the naturalistic stance which we find among Renaissance painters is not to be taken as one of mere optical duplication. For Leonardo da Vinci, depicting a human body is much more than just producing a resemblance of the visual appearance of its surface. The method he defends instead is: "Study the science first, and then follow the practice which results from that science."[6] In practice this means: in order to paint a body, a painter has to know its anatomy, composition, its parts, like the bones, joints, skeleton, muscles etc. Furthermore, a painter needs to know the body in action, its interior (the

2 Ibid.
3 *Aristotle's Poetics*, trans. Leon Golden (Tallahassee: Florida State University Press, 1981), chapter IV, p. 7.
4 Katharine Everett Gilbert and Helmut Kuhn**,** *A History of Esthetics***,** p. 62**.**
5 Leonardo da Vinci, *Treatise on Painting*, trans. John Francis Rigaud (London: George Bell & Sons, 1877), article 365, p. 156.
6 Ibid., article 27, p. 10.

muscle's exertion in certain positions), and the external appearance (what the body covered with skin finally looks like and why) in accordance with a given position and action,[7] and with a particular body constitution considering its age, whether it is a child, a fat man, etc. For Leonardo, to paint is to first conduct a study of how something works and why. Leonardo's observations of the body, which ground the mimetic principle the painter is to use in painting, are therefore scientific: "The flesh which covers the bones near and at the joints, swells or diminishes in thickness according to their bending or extension; that is, it increases at the inside of the angle formed by the bending, and grows narrow and lengthened on the outward side of the exterior angle. The middle between the convex and concave angle participates of this increase or diminution, but in a greater or less degree as the parts are nearer to, or farther from, the angles of the bending joints."[8] It is true that the visual outcome displays the visible world, but first of all it shows the invisible, that which was hidden to the naked eye of the ordinary observer of the scene or person depicted. The artist *knows* more than he can see, he grasps the inner essence, the truth. In the visualizations the painter produces, the real nature of things is revealed.

For the interest in visuality, body, the functioning of nature and *technē* it is not surprising that the early modern automatons in Europe were to be produced in the sixteenth century. In the Renaissance the interest in automata actually increased. Yet complex mechanical devices were known in the ancient Greece, in the 8th century Muslim inventors and engineers produced recipes for artificial snakes, scorpions, and humans (Jābir ibn Hayyān, *Book of Stones*). In his *Book of ceremonies* (*De Ceremoniis*) Constantine VII Porphyrogenitus (Constantine, 913–959) mentions three automata related to the "throne of Solomon", trees with singing birds, roaring lions, and moving beasts. The western ambassador

7 It is worth noting that for Leonardo there is no such distinction between the interior and exterior of body as we have drawn here. We have done so in order to emphasize his interest in the whole nature (composition, functioning, etc.) of the body and not only in its visual appearance, because we are objecting to the comprehension of mimesis in the sense of resembling only the visual appearance of surfaces.

8 Leonardo da Vinci, *Treatise on Painting*, article 50, p. 17–18.

and chronicler Liudprand of Cremona also alluded to automata in the palace of lions and singing birds in his memoirs of his trip to Constantinople in 949. Several Byzantine chronicles give evidence for the automata at the court of the emperor Theophilos (829–842). Furthermore, Islamic world was fascinated with the fantastic devices. The Abbāsid palaces of the capital of Samarra may have had automata (Muslim accounts mention the amazement of two Byzantine ambassadors to the Abbāsid court in Baghdad in 917 at the sight of a lavish artificial tree with singing birds placed in a pond). In both cultures the contraptions were based on the same principles deviced by the engineers of late antiquity, such as the 1st century inventor Heron of Alexandria. In 1206 the Artuqid sultan Nāşir ad-Dīn Mahmūd ordered a book on automata from his engineer Al-Jazari. In the *Book of Knowledge of Ingenious Mechanical Devices* the latter sketched and described fanciful devices, such as elephant clock and a hand-washing device in the form of a servant pouring water from a pitcher, which is driven by a complex hydraulic system.[9] Around 1495 Leonardo da Vinci designed a humanoid automaton, a mechanical knight, which could independently maneuver its arms, stand, sit and raise its visor. The robotic system was operated by a series of pulleys and cables.

Automatons reveal that the body is comprehended as machinery, the principles of which (the mechanics) are to be studied and the craftsman ("artist") will have recourse to nature and use mimesis for his *technē*, with which he might be able to create a body on its own. By the eighteenth century, the interest in robots simulating humankind increases.

Today we have not lost this interest in androids. Androids are a discernible example of the Aristotelian type of mimesis as it is to be found in contemporary culture. The very form of the robot is developed with recourse to the body in mimicking its mechanical functions, such as to be found in muscle, body movements and balance. It has proven to be a particularly difficult objective

9 See: Mary-Lyon Dolezal and Maria Mavroudi, in: Theodore Hyrtakenos, *Description of the Garden of St. Anna* and the Ekphrasis of Gardens," in: Antony Littlewood, Henry Maguire, and Joachim Wolschke-Bulmahn (eds.), *Byzantine Garden Culture* (Washington, D.C.: Dumbarton Oaks, 2002), pp. 128.

to develop a robot with the balancing aptitudes to be found among humans, especially for more demanding actions, such as running, football paying and rising to one's feet.

The founding principle of another branch of robotics, bionics, is again mimesis. As a knowledge-technology that solves technical problems through the study of the functions of living beings, bionics is at present in full bloom in medicine, particularly in the development of prosthetics. Here it is occupied with the question of how to develop the ultimately functional prosthetic limb as a model, paying a crucial regard to biological models. The next generation of bionic prostheses will replace the lost limbs not only in the functional sense, but also sensorily. They will enable smooth cyborgian extensions and upgrade our biological bodies with the implementation of mechanics. We can expect to get bionic skin,[10] which will have the ability to sense temperature and touch (human nerves will be connected with carbon nano-tubes arranged along the artificial skin formed of flexible polymers – the active ends of the living nerves will enable sensual perception; the bionic skin will also be equipped with temperature and pressure sensors, and will have implemented artificial hair). Robotics is full of biomimetics, biologically inspired and mimicking technology.

Android science now reckons upon the findings of the cognitive sciences, particularly those concerning the interaction between humans and robots. The researchers of robotics have aimed to adapt the mechanisms underlying successful inter-human interaction in order to create robots with which people could easily communicate.

In 2006 Hiroshi Ishiguru (University of Osaka) developed the first geminoid prototype HI-1. geminoid etymologically deriving from Lat. geminus, meaning twin, and Lat. oides, meaning similarity, since the robot is grounded in the model of its creator. The visual resemblance to Ishiguru's appearance is quite good; the robot makes clumsy gestures, remains seated, and speaks several languages, which it is able to use for communication with people. The teleoperational system

10 See the project FILMskin, a common project of the Federal Laboratory at Oak Ridge and NASA, developing bionic skin for the application to patients with burns.

of the geminoid generates autonomic movement of the robot, micro-motions during the process of speech and listening (which differ in both cases), such as take shape spontaneously in human beings. The collaborators in the project propose "to use androids that behave similarly to humans for studying what it essentially means to 'be human', i.e. the mystery of human nature. Androids and geminoids are artificial humans that allow us to investigate human nature by means of psychological and cognitive tests, which we conduct during interaction with people."[11]

The Cartesian deception of the senses is actually not to be avoided, but accounted for in a positive sense: "If we could build an android that is very similar to a human, how can we distinguish a real human from an android? The answer is not trivial. While interacting with androids, we cannot see their internal mechanisms and thus we may simply believe that they are human."[12]

This quote calls to turn to Descartes and his argumentation of doubt, founded in the distrust in senses: "I look out of the window and see men crossing the square, as I just happen to have done, I normally say that I see the men themselves, just as I say that I see the wax. Yet do I see any more than hats and coats which could conceal automatons? I judge that they are men. And so something which I thought I was seeing with my eyes is in fact grasped solely by the faculty of judgment which is in my mind."[13] Thus Descartes does not trust the senses: "I had many experiences which gradually undermined all the faith I had had in the senses. Sometimes towers which had looked round from a distance appeared square from close up; and enormous statues standing on their pediments did not seem large when observed from the ground. In these and countless other such cases, I found that the judgments of the external senses were mistaken."[14]

11 ATR Intelligent Robotics and Communication Laboratories, "Geminoid HI-1," in: Gerfried Stocker and Christine Schöpf (eds.), *Human Nature. Ars Electronica 2009* (Ostfildern: Hathe Cantz, 2009), p. 221.
12 Ibid.
13 René Descartes, *Meditations on First Philosophy* (Cambridge: Cambridge University Press, 19René Descartes,
14 Ibid., p. 53.

Regardless of the method of proof that is used, Descartes is "always brought back to the fact that it is only what I clearly and distinctly perceive that completely convinces me."[15] It is mind which he trusts: "so long as I perceive something very clearly and distinctly I cannot but believe it to be true".[16]

Michel Foucault beheld a connection between the baroque's games of illusion and Descartes' critique of sensual experience. Descartes rejects resemblance as an instrument for gaining knowledge; it rather becomes an occasion for mistakes, a danger to which the observer is exposed. Sensual experience itself is deceptive. The baroque is madness of vision and visibility, innovative uses of visuality are worshipped. The position of the observer becomes important; the visible depends on the observer's position, as in the form of the cupola depicted by Andrea Pozzo for the *Apotheosis of Saint Ignatius* church in Rome (1685–1694). The baroque is at the same time a critique of vision. Vision and the visual become unreliable. However the perception tricks of visualizations that were dependent on the act of observation already appeared in the Renaissance; consider only Hans Holbein's 1533 painting *The Ambassadors*.

Yet marvelous baroque ceilings, such as those of Pietro da Cortona, thus do not *deceive* the viewer. They instead enrich reality. If one were to claim that these are mere illusions, we would reply with Maurice Merleau-Ponty's critique of objectivity. In the case of the Müller-Lyer illusion involving two lines of equal length that we perceive as different in size, psychologists would say that we are wrong because they presume that there exists an objective word, and they thus claim that our perception is fallible. But how could we know what is real, and who is authorized to tell us what this real is? In his critique of Cartesianism, Merleau-Ponty would say that there are no two lines which are *objectively* the same, though

15 Ibid., p. 47.

16 Ibid., p. 48. Descartes, however, admits the frequency with which his mind is puzzled because he cannot fix his mental vision continually on the same thing so as to keep perceiving it clearly, thus the memory of a previously made judgment may often come back when he is no longer attending to the arguments which led him to make it.

we falsely estimate their lengths because of the directions of their arrow endings, the cause of the "optic deception." The alternative of equality and inequality is only possible in an objective world, but these lines are neither equal nor unequal. Each is perceived in its own context, as if they did not belong to the same world[17]:

> "We must not, therefore, wonder whether we really perceive a world, we must instead say: the world is what we perceive. In more general terms we must not wonder whether our self-evident truths are real truths, or whether, through some perversity inherent in our minds, that which is self-evident for us might not be illusory in relation to some truth in itself. For in so far as we talk about illusion, it is because we have identified illusions, and done so solely in the light of some perception which at the same time gave assurance of its own truth. It follows that doubt, or the fear of being mistaken, testifies as soon as it arises to our power of unmasking error, and that it could never finally tear us away from truth. We are in the realm of truth".[18]

Counting on "deception" of senses, which does not simply mean a false perception, but similarly as in the baroque world is enriching our world, contemporary humanoid robots do enter our operational world and establish person to person interaction, even though we might be aware that there is "only" a robot we are communicating with.

Androids were particularly popular in the 1980s within the enthronement of computer culture,[19] when even an ordinary computer was to be understood as a sort of android, one able to imitate human mind activities to a certain extent, though not able to move autonomously, hold or move things, listen, watch or feel. The hope to create such a device or at least a part of it has remained an inspiration

17 Maurice Merleau-Ponty, *Phenomenology of Perception* (London, New York: Routledge, 2005), p. 7.
18 Ibid., p. xviii.
19 They were also widely represented in popular culture – see for example the movie *Blade Runner* from 1982.

for numerous researchers in computers and other technical scientists.[20] Blade Runner discusses the question of a superior species in strength and agility, a robot called replicant, which is at least as intelligent as a human, but is yet not considered as living species. The significant difference between the robot and human species would lie in the incapacity of robots to have emotions. The movie discusses the issue of treating humanoid robots differently as human, in particular if it happens that they actually get all the characteristics of the human species, including emotions, thus being able to operate as humans, yet even in a superior form, but also able to communicate with humans in the same manner as human to human.

At present researchers are aiming to equip robots with a "digital memory" consisting of a digital database collected from the human mind (video recordings from the perspective of the body, taken in the best case during the period of a lifetime) and to equip the digital-mechanical systems of the robot with "wet-brains". These could be biological networks made up of nerves – such an "artificial nervous system" has proven to have the ability to learn, i.e. remember and act in accordance with these memories. Or other biological systems could be used that hold some features or qualifications which are not (yet) attainable by mere computer systems – a single-cell organism of a slime mold seems a promising artificial intelligent system as it has proven to provide intelligent, simple and effective (communication) solutions when tested in complex environments, such as labyrinths.

Some researchers (like Jürgen Schmidhuber) aim to construct the ultimate intelligent organism, a scientist that will be smarter than its (or should we say his or her?) inventor. The question worth special attention is the extent to which it is legitimate to refer to androids as "artificial humans". This is actually a question of the technique of mimesis, insofar as it is a question about how far we are able to go with imitating humans and what the status of these imitations is. What are the grounds for determining the status of these human imitations, and what politics are to be applied to them? Antonio Damasio, a neuroscientist, has acknowledged the importance of emotions in the long-run of an individual's life, especially

20 Peter Laurie, *The Joy of Computers* (London: Hutchinson, 1983).

regarding one's long-lasting relations and inclusion in the social world.[21] We might wonder how successful androids could be in this regard.

The other question is a biopolitical one. In a world that is already overpopulated with humankind, why do we need to produce another species, a new sort of "humankind"? The question about creating a robot species after the human model links up with the work of God, who created the human species after himself. Or should we put it this way: man is in the midst of creating a robot in a similar manner as man has created God: after his model, yet improved, a superior species, whereat human is making himself an obsolete, perhaps even a subordinated species.

21 Antonio Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (New York: G.P. Putnam, 1994).