Mixed Systems and Interplay. Norbert Wiener meets Walter Benjamin

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Norbert Wiener, the American mathematician (1894-1964), and Walter Benjamin, the German philosopher (1892-1940), never met and probably never heard of each other. However, their thoughts about the interaction between human beings and machines have a few interesting similarities. They are both concerned with the impact of technology on society[1] and they consider the second industrial revolution the turning point in the evolution of the relationship between human and machine.

However, they followed different routes and had different goals. Wiener approached technology from the perspective of control engineering theory and only after World War II started questioning it from an ethical point of view. Benjamin never studied any particular machine and only approached technology from an "anthropological" perspective, considering especially the way human beings deal with their own production, including crafts and art (*techne*). The viewpoints Wiener and Benjamin share are not many; yet they are significant for anyone wishing to work on these issues in an interdisciplinary way.

The turning point

In *The Human Use of Human Beings*, his first book about the ethical and sociological implications of cybernetics and technology, Norbert Wiener distinguishes «the older machines, and in particular the older attempts to produce automata», from the «modern automatic machines such as the controlled missile» (Wiener 1950, p. 22). The former functioned «on a closed clockwork basis» and did not have any interaction with the environment. The latter possess sense organs, which enable them to receive messages from, and interact with, the environment. If the engine is the essential element of the

[1] The social implications of cybernetics are evident also in its etymology: the term, that Wiener himself proposed, is based on the Greek word *kybernétes* (steersman, captain), which is related to the Latin word *gubernum* (government).

first industrial revolution, substituting the labor of slaves and animals with the energy of the machine, the second industrial revolution can find its icon in the photoelectric cell (*ibidem*, p. 23). A few pages further Wiener describes these new machines through two general features:

> One is that they are machines to perform some definite task or tasks, and therefore must possess effector organs (analogous to arms and legs in human beings) with which such tasks can be performed. The second point is that they must be *en rapport* with the outer world by sense organs, such as photoelectric cells and thermometers, which not only tell them what the existing circumstances are, but enable them to record the performance or nonperformance of their own tasks. This last function, as we have seen, is called *feedback*, the property of being able to adjust future conduct by past performance (*ibidem*, pp. 32-33).

The automata – the older machines – only execute what they are programmed for and they need humans to regularly adjust their functioning. On the contrary, machines provided with self-regulation systems – modern machines – are not only more efficient, but more autonomous: one can now be surprised by the performances of a machine such as a chess-player computer.

A similar distinction between a dependent and an autonomous technology can be found in Walter Benjamin's well-known essay *The Work of Art in the Age of Its Technological Reproducibility* (1936). This essay is much more than a reflection on art; Benjamin thinks anew about the way technology transforms our experience of the world. Even though human life has always been somehow technical, two kinds of technology can be recognized, according to the sort of interaction they establish with human beings: an older one based on mastery over nature, and a second one based on interplay.

> Whereas the former made the maximum possible use of human beings, the latter reduces their use to the minimum. The achievements of the first technology might be said to culminate in human sacrifice; those of the second, in the remote-controlled aircraft which needs no human crew. The results of the first technology are valid once and for all (it deals with irreparable lapse or sacrificial death, which holds good for eternity). The results of the second are wholly provisional (it operates by means of experiments and endlessly varied test procedures) (Benjamin 2008, p. 26).

The *first technology* originated in ancient times, but far from being restricted to the past, it is still present today, every time something is accomplished «once and for all». The *second technology*, on the contrary, is quite recent, because it needs receptors to function by itself, reducing the use of human beings to the minimum. Obviously, a remote-controlled aircraft is not yet completely autonomous, since it needs a ground control, but it is considered by Benjamin a first step in this direction.

It is remarkable that Wiener and Benjamin employ the same vocabulary in addressing this issue: they both are interested in the new machines not for their efficiency, but because they make a «human use of human beings» possible (Wiener 1950), which means reducing «their use to the minimum» (Benjamin 2008, p. 26). The aim of first technology is to transform nature, while the second technology aims at functioning within the world: the former tries to adapt nature to itself, the latter tries to adapt itself to the world.

The second technology operates by «endlessly varied test procedures», in an experimental way. Benjamin considers tests a distinctive feature of the way of living of our society, in sport, in acting performances, and in the work process that, «especially since it has been standardized by the assembly line, daily generates countless mechanized tests» (*ibidem*, p. 30). Test performances are based on a process similar to a feedback effect[2]: the behaviour is periodically compared with the result to be achieved, and the success or failure of this result changes the behaviour of the performer. This is why the results of second technology «are wholly provisional». According to Benjamin tests confer to any act a playful dimension. «The origin of the second technology lies at the point where, by an unconscious ruse, human beings first began to distance themselves from nature. It lies, in other words, in play» (*ibidem*, p. 26).

Interplay

One *uses* the older machines, but one *plays* with the new ones. Interacting with the new machines has a recreational aspect that is not present in the clockwork-like machines, since these latter are foreseeable. The behaviour of the apparatus does not depend entirely on our inputs, but also on its inacces-

[2] Baudrillard 1993 compares Benjamin's concept of test performance to feedback, but unlike Wiener, he considers a feedback-based society a non-democratic one.

sible internal program, and especially on the environment, and it is therefore partly unpredictable for the user. This potential surprise, or, as Benjamin calls it, «the shock effect», creates an emotional expectation and induces «heightened attention» (*ibidem*, p. 53): the one who interacts with an apparatus is both alert, since he is expecting a partly unpredictable result, and distracted, *zerstreut*, which in German also means entertained. The kind of interaction Benjamin is thinking of is not an intellectual one: he writes about a «physical shock effect» and «primarily tactile» distracting elements (*ibidem*, p. 39).

The playful aspect of the second technology is not restricted to entertainment, but it also includes learning, just as children's games have both a recreational and an educational dimension. Playing with the new machines, the user improves his «know-how» (Wiener 1950, p. 183): the interaction with the apparatus is a «true training ground» (Benjamin 2008, p. 41). But what do we learn? What do we need to be trained for? Of course, we need to learn how to handle the machines themselves. However, one needs to be trained not only to use the machines properly, but especially «to preserve one's humanity in the face of the apparatus […], for the majority of city dwellers, throughout the workday in offices and factories, have to relinquish their humanity in the face of an apparatus» (*ibidem*, p. 31). The loss of humanity, according to both our thinkers, is due to the lack of *responsibility*, which has to be understood in the sense of *capability to respond*.

> I have spoken of machines, but not only of machines having brains of brass and thews of iron. When human atoms are knit into an organization in which they are used, not in their full right as responsible human beings, but as cogs and levers and rods, it matters little that their raw material is flesh and blood. *What is used as an element in a machine, is in fact an element in the machine* (Wiener 1950, p. 185).

Wiener, just like Benjamin, thinks that only a machine, which is able to adapt itself to its environment, can establish with the user a "human" interaction, but the user also needs to learn how to dialogue with it. The human being is testing the apparatus, while the apparatus is testing the human performance: they are both learning from each other.

The main example of a learning apparatus, in *God & Golem Inc.* (Wiener 1964), is a computer that was developed by A. L. Samuel of IBM Corporation in 1959, and that could play checkers. The computer, just like the human

player, improves its performances by its own experience of the actions of the other player (Figure 1). In this case, it is apparent that the human is not using the machine, as the computer is not using the human being. *Use* is a term that belongs to the first technology, while at this stage we should rather talk of interplay. «The first technology really sought to master nature, whereas the second aims rather at an interplay between nature and humanity» (Benjamin 2008, p. 26). *Zwischenspiel* in German means interplay, ludic interaction, but it is also employed to mean an *intermezzo*, a musical interlude that separates two parts and at the same time relates them.

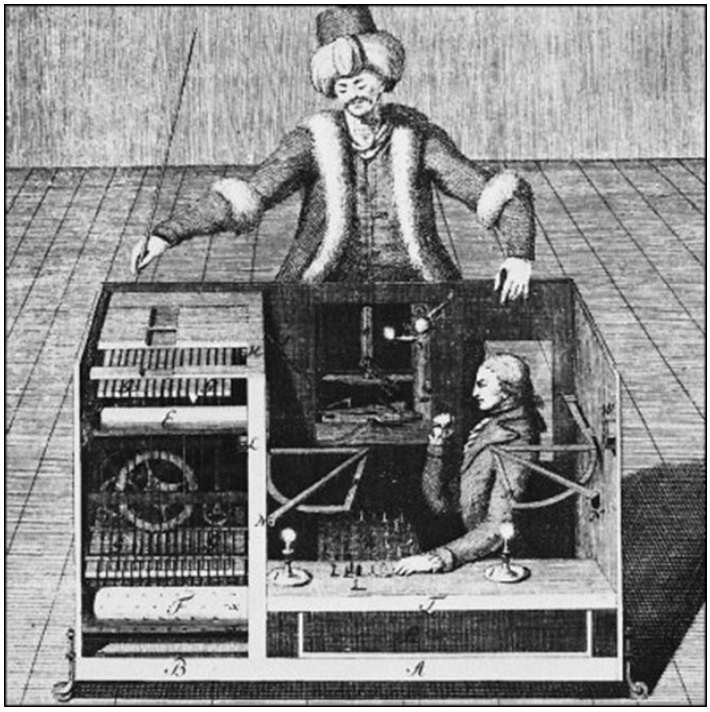

Figure 1. The Mechanical Turk, Von Kempelen's fake Automaton Chess Player, from Racknitz 1789, quoted by Benjamin 1968, p. 253.

Mixed systems

The relationship between human and machine establishes a new unity that includes the two components and the environment: the camera is connected to the photographer and the photographed subject, the car to the

driver and the street. Modern machines, according to Wiener, are «systems of a mixed nature, involving both human and mechanical parts» (Wiener 1964, p. 76).

Technical apparatuses connected to an organism are usually called prostheses. Wiener distinguishes them into three kinds. A simple, mechanical substitution of a missing limb, such as a wooden leg, is the most trivial case. A more interesting one is the prosthesis that substitutes for muscles and damaged sense organs, such as a robot hand connected to the nervous system. But the third example is the most important: «this type of engineering need not to be confined to the replacement of parts that we have lost. There is a prosthesis of parts which we do not have and which we never had» (*ibidem*). On our airplanes, we have the wings of an eagle, thanks to our sonars we navigate like dolphins. This enhancement is not only for the single individual, but also for groups of people and for the whole society.

In a similar way Benjamin writes that a «new, historically unique collective» is born, «which has its organs in the new technology» (Benjamin 2008, p. 45). To refer to the connection between this new collective and its technological organs, its prostheses of parts which it never had, Benjamin uses the term *innervation* that he borrows from Freud's early writings. It means both the distribution of nerves in an animal to any of its parts and the act of stimulating an activity in any of its organs. This deep connection is still more a project than a reality, and that is why Benjamin writes about «efforts at innervation»: a stimulation that expects a response – a playful training again. «Just as a child who has learned to grasp stretches out its hand for the moon as it would for a ball, so humanity, in its efforts at innervation, sets its sights as much on currently utopian goals as on within reach» (*ibidem*). A seemingly useless gesture like stretching out one's hand for the moon may actually reveal itself as a training that will eventually help learning how to better grasp a ball, but at the same time it reveals that one could grasp much more than a ball.

> Dealing with apparatus also teaches them that technology will release them from their enslavement to the powers of the apparatus only when humanity's whole constitution has adapted itself to the new productive forces which the second technology has set free (*ibidem*, pp. 26-27).

> Because this technology aims at liberating human beings from drudgery, the individual suddenly sees his scope for play, his field of action, immeasurably expanded. He does not yet know his way around this space. But already he registers his demands on it (*ibidem*, p. 45).

Benjamin offers two examples of second technology: the remote-controlled aircraft and the movie camera. They both require interplay and establish together with the human being a mixed system: they expand the human field of action (*Spielraum*: a space for playing) as prosthesis of parts humans never had. Thanks to his new mechanical eye the human being can now extend movements with slow motion, and expand space with enlargement, disclosing his «optical unconscious» (*ibidem*, p. 37).

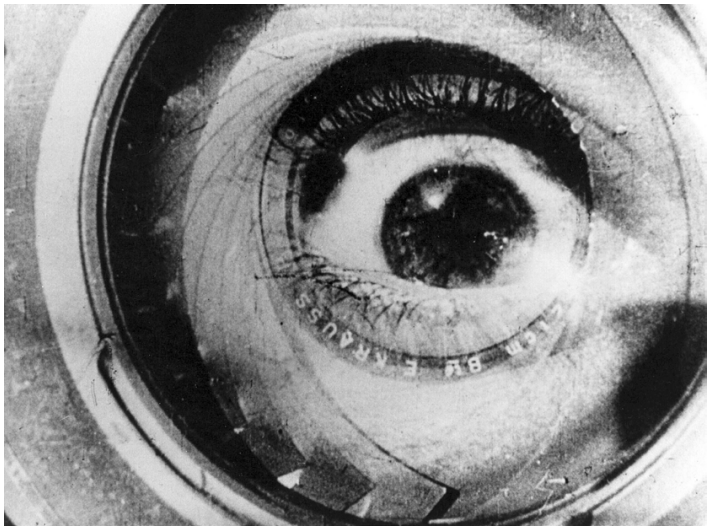

Figure 2. Frame of Dziga Vertov's Man with a Movie Camera, 1929, a director quoted by Benjamin 1968, p. 231.

Know-how and know-what

The more technology is automatized, the more our field of action is extended. Do we still need to feel responsible for a completely automatized technology? Does it «take over from us our need for difficult thinking»? Only if we believe that it thinks *for* us and not *with* us, we will make this

mistake. Automation is «literal-minded»: a modern apparatus will reach its goal with unforeseen strategies, but it will only reach *that* goal. «A goal-seeking mechanism will not necessarily seek *our* goals, unless we design it for that purpose» (Wiener 1964, p. 63). The unpredictable results of such a machine are very interesting, because they show us something we did not think of; however, this can also be very dangerous. That is why the programming of an apparatus is a very important task.

> If you're playing a war game with a certain conventional interpretation of victory, victory will be the goal at any cost, even that of the extermination of your own side, unless the condition of survival is explicitly contained in the definition of victory according to which you program the machine (*ibidem*, p. 60).

Automation should not be a way of delegating our concerns to machines; on the contrary, we should learn to use our new extended field of action to face these concerns in a new playful way together with the apparatus. «Vital questions affecting the individual – questions of love and death which had been buried by the first technology – once again press for solutions» (Benjamin 2008, p. 45). What we should try to understand in our interplay with the second technology is what we want, no matter if it is or it is not within reach.

> Our papers have been making a great deal of American "know-how" ever since we had the misfortune to discover the atomic bomb. There is one quality more important than "know-how" and we cannot accuse the United States of any undue amount of it. This is "know-what" by which we determine not only how to accomplish our purposes, but what our purposes are to be (Wiener 1950, p. 183).

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