

# Łukasz Wiśniewski

---

## In the Claws of Absolute Rationality “New Matura” as a Decision-Making System

---

Kultura i Edukacja nr 4, 46-57

---

2006

Artykuł został opracowany do udostępnienia w internecie przez Muzeum Historii Polski w ramach prac podejmowanych na rzecz zapewnienia otwartego, powszechnego i trwałego dostępu do polskiego dorobku naukowego i kulturalnego. Artykuł jest umieszczony w kolekcji cyfrowej [bazhum.muzhp.pl](http://bazhum.muzhp.pl), gromadzącej zawartość polskich czasopism humanistycznych i społecznych.

Tekst jest udostępniony do wykorzystania w ramach dozwolonego użytku.



*Łukasz Wiśniewski*

## IN THE CLAWS OF ABSOLUTE RATIONALITY “NEW MATURA” AS A DECISION-MAKING SYSTEM

---

### 1. Introduction

We live in a world of modern technology. However, its social reception remains a problematic issue. Tomasz Woźniak, who on the basis of the content of daily press and periodicals of various political groups performed the analysis of technological discourse in Poland, emphasizes the existence of consensus as to ignoring the consequence of the influence of technology on social change. The issues of technological dangers, the relations of power in disciplinary institutions for citizens (also serving to manipulate citizens), the expansion of experts and the social conditioning of nature studies are usually entirely neglected, technological progress, on the other hand, is generally considered to be an “unproblematic benefit”<sup>1</sup>. Meanwhile, a critical look on technology and its creations has a long tradition in social study, the beginning of which can be marked with technological determinism of Karl Marx who treated the development of technology as the main source of social change. The followers of Marks (especially the representatives of *logical sequence account*) study technological progress from the point of view of universal nature laws<sup>2</sup>, ignoring entirely the issue of social influence on technological achievements. Such a biased approach to the relation between technology and society resulted in a substantially different concept, sometimes called the perspective

---

<sup>1</sup> T. Woźniak, *O bezradności poznawczej społeczeństwa wobec zmiany technologicznej*, “Zagadnienia Naukoznawstwa” 2004, no. 2(160), pp. 341–359.

<sup>2</sup> See B. Bimber, *Karl Marx and Three Faces of Technological Determinism*, “Social Studies of Science” 1990, vol. 20, no. 2, pp. 333–351 and D. MacKenzie, *Knowing Machines. Essays on Technical Change*, Cambridge 1996, pp. 23–47.

of social shaping<sup>3</sup> or social construction of technology<sup>4</sup>. The theory questions the concept of technology as trajectories that cannot be regulated<sup>5</sup>. Instead, it suggests a heterogeneous model that takes into consideration the variety of factors influencing the ultimate shape of technological artifacts. The evaluation of a particular technology *ex post*, after introducing it to common use, was postulated to be replaced with a model in which its final shape would be the result of wide compromise. The above was to result in regaining social control over the progress of technology<sup>6</sup>. Nuclear power plants, nuclear weapon, or genetically modified food<sup>7</sup> were enumerated as potentially most dangerous. These are also the most extreme, thus drawing most attention, examples of modern technology. The danger of technological progress is not only apparent in spectacular disasters, such as radioactive pollution, or genetic mutation slipping out of control<sup>8</sup>. Its influence on social life is much more refined.

According to Neil Postman, at the modern level of technological progress we have to do with overall triumph of technology over culture. The governing dogma became the view that the only motivation of human work should be efficiency, which can be measured only in quantity, with help of standardized statistic tools. In the world of modern technology, the greatest power goes to experts – modern shamans that deal with introducing to life of the technocratic idea of progress. Due to them, the cult of efficiency and the common standardization begin to enter consecutive spheres of social reality<sup>9</sup>. George Ritzer also notices the growing importance of standardization and efficiency. He claims that modern consumption society cannot be separated from the ideas. Yet, he adds that the “reversing of magic” in reality that they cause must be balanced with another “spell-casting”, courting and discreet manipulation, otherwise people would not associate pleasure with buying. Nevertheless, this contradiction of cold technology and breathtaking magic is not consequent, since the very impression of the

---

<sup>3</sup> R. Williams, D. Edge, *The Social Shaping of Technology*, “Research Policy” 1996, vol. 26, no. 6, pp. 865–899.

<sup>4</sup> W.E. Bijker, J. Law, *Postscript: Technology, Stability and Social Theory* [in:] *The Social Construction of Technological Systems. New Directions in the Sociology and History of Technology*, (eds.) W.E. Bijker, T.P. Hughes, T. Pinch, Cambridge/London 1989.

<sup>5</sup> The concepts of *Social Shaping of Technology* and *Social Construction of Technology* are not entirely synonymous, the difference between them, from the point of view of this article, are so unimportant that I decide to overlook them.

<sup>6</sup> A. Rip, T.J. Misa, J.W. Schot, *Constructive Technology Assessment: A New Paradigm for Managing Technology in Society* [in:] *Managing Technology in Society. The Approach of Constructive Technology Assessment*, (eds.) A. Rip, T.J. Misa, J.W. Schot, London/New York 1995, pp. 1–12 and J.W. Schot, *Constructive Technology Assessment and Technology Dynamics: The Case of Clean Technologies*, “Science, Technology, & Human Values” 1992, vol. 17, no. 1, pp. 36–56.

<sup>7</sup> P. Stankiewicz, *Ekologia w społeczeństwie ryzyka*, “Krytyka Polityczna” 2005, no. 9–10, pp. 438–447.

<sup>8</sup> C. Perrow, *Normal Accidents. Living with High Risk Technologies*, New Jersey 1999.

<sup>9</sup> N. Postman, *Technopol. Triumf techniki nad kulturą*, Warszawa 2004.

spectacular manner in which the efficient and standardized means of consumption (the term of Ritzer that refers to Marksian means of production) are able to fulfill human needs, can be perceived as magic by the customers<sup>10</sup>.

The cult of efficiency, standardization, an unwavering trust in quantitative indicators, and thus in technology that enables their existence (especially computer) could be defined with one term of absolute rationality<sup>11</sup>. In the article I would like to present the influence that it exerts on one of the most conservative social institutions – education. One of its aspects – “matura” school leaving exam will constitute the subject of my interest. I will endeavour to show how the values indispensable in modern technology world transform the maturity exam into a machine directed mostly at efficiency, one that standardizes people and limits their initiative.

I will begin with a short historical note and characteristics of the form of maturity exam today, often called – to differentiate from the one before the educational reform – “new matura” exam. Secondly, I will commence to present the tools that will be necessary to present the phenomenon. I will use to do so the term of a system (sometimes called a *setup* or a *setting*) taken from the Actor-Network Theory by Michel Callon and Bruno Latour. With help of the term I will try to show how much the ideas constituting the basis of “new matura” introduction to schools are in agreement with the theory of absolute rationality. To finish with, I will present my suggestion of calling “new matura” (as well as similar systems) a decision-making system and I will give a more detailed explanation of the idea.

## 2. The history and characteristics of “new matura” exam

“New matura” was supposed to be the top achievement of the educational reform introduced by the coalition of Akcja Wyborcza Solidarność and Unia Wolności from September 1999. Its premiere was planned for the year 2002, however, the weakening government had difficulties in introducing all educational acts in the parliament. The Left, that was predicted an easy and effective victory in the following parliamentary election, openly demanded the abolishment of the educational reform. Despite strong announcements, it appeared impossible to entirely eliminate the project of “new matura”. Finally, the decision was made to use in 2002 a mixed option – students could choose between the old and the new form of the exam. The introduction of the one and obligatory new version of “matura” exam was postponed to 2005<sup>12</sup>.

The reformed maturity exam was obligatorily performed for the first time in the spring session of the year 2004/5 for the graduates of secondary vocational schools, four-year comprehensive secondary schools and youth that graduated in the previous

---

<sup>10</sup> G. Ritzer, *Magiczny świat konsumpcji*, Warszawa 2001.

<sup>11</sup> C. Perrow, *op.cit.*, pp. 315–321.

<sup>12</sup> A. Kaczmarczyk, *Do szkoły z dobrą panią minister*, “Tygodnik Powszechny” 2002, no. 36(2774).

years<sup>13</sup> (now the division for a winter and spring session has been abolished and the exam takes place only once a year). The completion of the introduction of “new matura” to schools is planned for 2008. The exam consists of an oral and written part. Each of the exam subjects can be taken on an equal for all the graduates level, or it can offer a choice between the basic and extended level (where the extended level contains elements of the basic level). The obligatory subjects are: Polish and a chosen modern language (taken orally and in writing), and a chosen subject (taken only in writing; such as biology, mathematics, history, geography, as well as the history of art or knowledge about dance). In the written part it is possible to take additionally up to three chosen subjects. “New matura” allows also to take the languages of national and ethnic minorities or the regional language (Kashubian).

The maturity exam, just like before the reform, is not obligatory. Graduates take it in their schools, and the head of the school’s examination staff, namely the headmaster is responsible for the organization. The oral part of the exam is performed by subject examination boards, which consist of a representative of the district examination commission and two teachers, one of whom can work in the school in which the exam takes place. A supervising team watches over the written part of the examination in a particular school, a part of which must be a teacher who does no work in the same school. A teacher of the taken subject or the tutor of the students cannot be present. The supervising teams are in power to invalidate a part of the exam of each of the students when they notice an incorrectness (e.g. not individual work). The sheets necessary for the written part come from the Central Examination Commission and are the same for all schools. The results of the exam are expressed in percents. The exam is considered passed when a graduate receives 30% of the points in the oral part and the same percentage in the obligatory written part. The graduates that pass the examination are endowed with a maturity certificate. The oral part is evaluated by a subject examination board and there is no appeal from their decision. The written part is evaluated outside by listed examiners summoned by the director of a district examination commission. They are in possession of very detailed evaluation criteria of every examination sheet, which are generally called the “key”. This is one of the basic differences from the “old matura”, which allowed the teacher to evaluate works with more freedom in interpretation.

To conclude, it is worth noticing that the shape of “new matura” has not been finally consolidated. The detailed instructions that are in force today are different than last year, and the regulations of next year will differ from the contemporary ones. “New matura” is a dynamic phenomenon that I present in the form captured in the specific moment of its existence.

---

<sup>13</sup> This and other data on the structure of “new matura”, as well as the detailed regulations that refer to the exam were taken from the internet page of the Central Examination Commission ([www.cke.edu.pl](http://www.cke.edu.pl)).

### 3. The characteristic of the term “system”

I will present now an overview of the term “system”, with which I will show the phenomenon of “new matura”. This term is immensely popular in sociology, a proof of which is the variety of definitions<sup>14</sup>. The meaning I will use here is linked to the *Actor-Network Theory* (ANT in short), by Michel Callon and Bruno Latour, and it originates in the organization theory.

Before I commence in a more detailed analysis of the system concept, I would like to briefly justify my theoretical choice. The Actor-Network Theory, though yet not widely known in Poland, offers a considerable cognitive potential, especially from the point of view of this article’s subject matter. In a successful way it links the world of people with the world of objects, usually treated in sociology as a simple function of human activity, which is accurately reflected in the term “material culture”. Nevertheless, the vision of a man as the maker and master of objects (*Homo faber*) is followed by a very biased vision of the relation between a man and technology. Generally, as I mention in the introduction, it is a vision of neutral technology or one remaining in service to human kind. As a result, to present how it influences social structure I require a theory that allows for its substantially different conceptualization. As far as I am concerned, the Actor-Network Theory offers such a chance<sup>15</sup>.

It was the concept of an actor that underwent the greatest transformation in ANT. In the traditional organization theory<sup>16</sup>, an actor simply stands for an individual with their specific features, such as the ability to plan their actions or to interact with other actors. From the point of view of ANT, an actor is only defined by what they do. Consequently, it is possible to use this term when referring to objects, since they can perform the same function as man, an example of which is the process lasting since the industrial revolution of replacing employees with increasingly efficient and infallible machines<sup>17</sup>. Such a “remastered” concept of an actor (often replaced in ANT by an **actant** to devoid of anthropomorphic association) requires an entirely fresh approach to the idea of a system.

A system is defined in the theory of actor-network as a network consisting of human and nonhuman actors, among which competences are distributed. It is always

<sup>14</sup> J.H. Turner, *Struktura teorii socjologicznej*, Warszawa 2004.

<sup>15</sup> There is no place here for a detailed analysis of the ideas of ANT, and it does not seem necessary. To find more information on the Actor-Network Theory read the book by Radosław Sojak (R. Sojak, *Paradoks antropologiczny. Socjologia wiedzy jako perspektywa ogólnej teorii społeczeństwa*, Wrocław 2004).

<sup>16</sup> See e.g. M. Crozier, E. Friedberg, *Człowiek i system – ograniczenia działania zespołowego*, Warszawa 1982.

<sup>17</sup> M. Akrich, B. Latour, *A Summary of a Convenient Vocabulary for the Semiotics of Human and Nonhuman Assemblies* [in:] *Shaping Technology/Building Society*, (eds.) W.E. Bijker, J. Law, Cambridge/London 1997, pp. 259–264; and B. Latour, *Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts* [in:] *op.cit.*, pp. 225–258.

reconstructed by a researcher, its shape can never be the starting point<sup>18</sup>. The elements, of which a system consists can be potentially much varied. In case of “new matura” they can be teachers, students, the representatives of the Ministry of Education and Academic Study, examiners, but also the examination sheets, the models of evaluation (“keys”), detailed instructions of the performance of the exam, schools regulations, even pencils with which it is possible to encode the exam, or the computers that read the filled boxes on an examination sheet and an evaluation sheet (the examiners cannot know the names of the authors of the evaluated works). It cannot be decided in advance if a given actor is a part of the system. A good example is here a student-actor that actually has no influence on the functioning of the system, yet it is difficult to imagine the system without them. Such actors can be defined as “*conscripted*”<sup>19</sup> by the system. They do not have to be considered as elements of the network, though its existence would be threatened without them. In this work I decided to treat the students as an element of the system, to present better the features of “new matura” on the example of the demands of the examination.

The differentiation between the system and its surroundings is very difficult and often based on mutual agreement, since networks have a tendency to expand widely<sup>20</sup>. The level of the analysis of every phenomenon can be quite freely shaped, a lot depends here on the researcher and his needs. In the reconstruction of the net, a far fetched reductionism is allowed, yet not always substantiated. Bearing the above in mind, I will focus in this article only on the selected, most important in my opinion, actors. In accordance with the postulate of the Actor-Network Theory, I will analyze their action, and then I will draw conclusions on their basis about the system that they co-constitute. As a necessity, I will narrow my study to the participating students of “matura” exam, the examiners and the “key”. I will also mention the role of computers in the “matura” system.

The concepts of input and output of the system play a substantial role in system analysis. I would like to present “new matura” as a system, the workings of which have specific and palpable results. It is based, generally, on “transformation” of the resource that is “put inside” the system into a ready-made product. The resources are students competence, their knowledge and skill that constitute the core of a cultural capital of an individual<sup>21</sup>. The system evaluates them in accordance with internally defined criteria, which results in a product in form of maturity certificates which are comparable

---

<sup>18</sup> M. Callon, *Techno-economic networks and irreversibility* [in:] *A Sociology of Monsters: Essays on Power, Technology and Domination*, (ed.) J. Law, London/New York 1991, pp. 132–161; and B. Latour, *Technology is society made durable* [in:] op.cit., pp. 103–131.

<sup>19</sup> M. Akrich, B. Latour, op.cit.

<sup>20</sup> E. Bendyk, *Antymatrix. Człowiek w labiryncie sieci*, Warszawa 2004.

<sup>21</sup> P. Bourdieu, *The Forms of Capital* [in:] *Handbook of Theory and Research for Sociology of Education*, (ed.) J.G. Richardson, New York 1986, pp. 117–142.

(or it does not give a certificate, stating the incompetence of a student). The way the above is done is to my mind the key to the understanding of the phenomenon of “new matura”.

To finish with, it is worth noting another feature of a system understood in such a way – its dynamics. The network provides flexibility, its elements can be transformed or exchanged for others, which modifies the system without threatening its existence. As I mention above, the maturity exam is not a static phenomenon, the process of its adjustment to external conditions (namely to the system surroundings) is always in action. The application of the Actor-Network Theory makes it possible to capture it, which constitutes another argument for using it in this work.

#### 4. The analysis of the “matura” system

As I write in the introduction, I will understand the concept of absolute rationality as the cult of efficiency, standardization, an unwavering trust in quantitative indicators and technology that enables their existence. The influence of the above factors on the phenomenon of “new matura” will be illustrated by the presentation of selected elements of the “matura” system.

One of the most prominent is obviously the “model of answers and evaluation”, popularly called the “key”. It is a very detailed algorithm that serves to evaluate an exam sheet, indispensable to any examiner. Thus, writing a “matura” exam in Polish, a student has to, among others, answer about a dozen questions concerning a short, double-page text. The model of answers predicts a few alternative answers to each question (there can be more when the answer is for two points instead of one, however, it is not a rule). If a student presents an interpretation which was not predicted by the author of the “key”, it will be automatically considered wrong. **Thus, standardized becomes not only the examination sheet, identical for every school in the whole country, but the cultural capital of a student, as well.** Only his adjustment to the requirements of the “matura” system ensures success in form of a passed exam. As a result, the “model of answers and evaluation” can be justly understood as a kind of “standardization vehicle” that by rendering the criteria of evaluation of “new matura” objective equalizes the views and behaviour of students<sup>22</sup>.

The presence of the “key” also influences other elements of the “matura” system.

The role of examiners, who during the “old matura” had a much greater freedom of interpretation and evaluation of students’ works, has been considerably limited. In accordance with the rule of objectivity of the exam, the “key” took over a part of the responsibilities of human actors. This phenomenon, according to the concept of ANT,

---

<sup>22</sup> Comp. K. Konarzewski, *Reforma oświaty: podstawa programowa i warunki kształcenia*, Warszawa 2004.



can be called a delegation of rights<sup>23</sup>. It takes place, when the actions of one actor are transmitted to another one, notwithstanding if it is a man or an object. More often than not it happens in the name of rising the efficiency of the system. In this case, the upgrade is a result of creating a universal answer model and treating the examiners as wardens of the following of the “key”.

On the other hand, the role of the ones that take the maturity exam has not been transformed. Basically, they do not exert any serious influence on the workings of the system. The only initiative that belongs to the student is the suggestion of the subject of his presentation that must be performed on the oral exam in Polish. However, students are successfully discouraged to this idea by the complicated procedure of communicating the subject. Their suggestion must be analyzed and accepted by the school and then added to the list of externally accepted subjects of presentation<sup>24</sup>. The procedure, as well as the number of the topics suggested by the system (which must always exceed the number of students) clearly suggest that creativity of students is not preferred here. What is more, it seems justified to claim that **the students are foremost expected “not to disturb”**. Due to such an elimination of events unpredicted by the system it is possible to enhance further the effectiveness of its workings. Students are merely required to acquire a set of rules that enable them to play the role of the ones that take the exam. According to the conceptual scheme of ANT, such rules are called preinscription<sup>25</sup>. This term includes the overall competences which are expected in an actor **before** he faces the system.

The “key”, examiners and students are not the only elements of the “matura” system. Obviously, it would be difficult to imagine the maturity exam without computers. I do not solely mean the machines that encode students’ works, or the role of computers in communication between the decision centres and schools, which is possible due to the Internet (on the website of the Central Examination Commission and pages of the District Examination Commissions exist not only legal acts, but detailed regulations of “new matura”, as well as examples of examination sheets, “matura” guides and bulletins). As far as I am concerned, the influence of computer technology on the “matura” system is much wider.

As I have mentioned, I would like to define “new matura” as a system that fulfills a specific job. It is based on transforming the elusive in numbers cultural capital of the graduates into maturity certificates, which are palpable products of the system. The marks printed on them are indicators that can be expressed in percentages and that are comparable. For this reason, as I have presented on the example of the “key” and the requirements that students face, it is justified to analyze the “matura” system in terms of effectiveness with which it performs its tasks. To make it work efficiently, it is essen-

---

<sup>23</sup> B. Latour, *Technology...*

<sup>24</sup> I received this information from the headmaster of one of the secondary schools in Toruń.

<sup>25</sup> M. Akrich, B. Latour, *op.cit.*

tial not only to eliminate from it the unpredicted situations, but to organize it properly, as well. A thesis that seems substantiated to me is that “matura” system is similar in its construction and functioning to a computer system, in which there is software and hardware. The system could not function without either of them. As software of the “matura” system we can treat the “model of answers and evaluation”. Similarly to computer software, the “key” is an algorithm of functioning which can exist both as a document (called the source code in case of computer programs) and as an abstract idea. Taking into consideration computer software, we most often deal with the second form, in case of the “model of answers...” – with the first. The “key” is a real artifact. It is an algorithm that must be followed by hardware, the role of which is played by examiners in the “matura” system. They are especially trained to evaluate the works of students in agreement with the objectives of the scheme. The division of competence is clearly visible here. Examiners can be replaced by others without any disturbance to the functioning of the system, just as a part of a computer system. Only the change of algorithm – the “key” – results in change in its operation. An algorithm is from this point of view the least flexible part of the system, since it can fulfill only the functions that have been entered into it. Hardware is another case, it is flexible and can be easily reprogrammed.

In conclusion, the “new matura” is a system organized around one artifact – the algorithm of evaluation. It is limiting towards other actors, both the students and examiners. **The lack of flexibility of the “model of answers...” results in the fact that the maturity exam is not ready for unpredicted circumstances which could disturb its functioning. To prevent their appearance, all student initiative is hindered, which makes graduates devoid of the right to shape the exam. The gratification of the “key” with the supreme role, from which there is no appeal, reduces also the function of examiners, who are lessened to the role of hardware that fulfills the objectives of an algorithm.**

## **5. “New matura” as a decision-making system**

After the analysis of the workings of some actors of the “matura” system, and having drawn conclusions referring to its functioning as a whole, I will now proceed to present my suggestion as to calling the maturity exam, as well as systems organized in similar ways, with the term of a decision-making system and I will explain this term.

As decision-making system I suggest calling all systems that are characterized with the following features:

- they function on the basis of inflexible algorithms, from the decision of which there is no appeal or such is very difficult;
- these algorithms solely rule the most important rights, which limits the role of human actors, thus making them subordinate to the “key”;

- they try to eliminate situations not predicted by the algorithm, which could potentially disturb the functioning of the system and negatively influence its workings;
- they widely use computer technology and / or their construction is similar to a computer system, in which it is possible to distinguish software (e.g. the “matura key”) and hardware (the tool to introduce the concept of the “key”).

The term of a decision-making system makes it possible to distinguish from social reality a specific kind of phenomena, an example of which is the phenomenon of “new matura”. These are the systems that embody a specific type of rationality, namely absolute rationality. The priorities for them are: efficiency, standardization and trust in quantitative indicators and computer technology that enables their usage. It is directly reflected in the visible features of the system, which can be summarized in the features enumerated by me in the points above.

I chose the adjective “decision-making” to emphasize the role that the system plays in an individual’s life. In case of “new matura”, the criteria implemented in the algorithm fully decide if a student passes the exam, and which mark he or she gets (since they cannot appeal from the decisions of the algorithm, they cannot either influence its creation). Using the terminology of organized action theory by Michel Crozier and Erhard Friedber, it is possible to claim that decision-making systems, by definition, tend to reduce the sphere of uncertainty that is present in each of them. It is a sort of unspecified sphere that makes it possible for the actors to negotiate their position even in an extremely disadvantageous position<sup>26</sup>. Decision-making systems, by privileging non-human actors and limiting the role of human ones, aim at making any negotiation impossible.

## 6. Conclusion

A metaphor of the system of education as a factory that releases masses of graduates to the market is quite often present not only in academic studies, but in popular writing, as well. However, rarely are the transformations in the approach to the issue of education viewed on the background of entering into education a specific type of rationality, characteristic for the world of science and modern technology. This work deals with this problem on the example of a “matura” exam, a phenomenon with a very long tradition. I have tried to show how the influence of absolute rationality transforms “new matura” in a kind of system, which I suggested naming a decision-making one.

To illustrate the phenomenon of “new matura” I have used the Actor-Network Theory. It allows to analyze maturity exam as a system that is a network consisting of equal human and nonhuman actors. Due to this theory, it is possible to define how

---

<sup>26</sup> M. Crozier, E. Friedberg, op.cit.

competence is shared between them. Thus, it is possible to draw the hierarchy of the importance of particular actors in the system, at the top of which comes the “model of answers and evaluation”, the key one from the point of view of the functions performed by the system.

Obviously, the topic has not been analyzed completely, much remains to be researched. I mean especially the development of the concept of a decision-making system, which I presume would be worth discussing on other examples. Here, it is possible to consider phenomena such as various kinds of competence tests (also IQ tests, especially when they complete or are themselves competence tests), as well as Internet banks and shops and other specialized computer systems, especially the ones that slip through the control of human actors. Nevertheless, in this work I will finish on only signaling such an option.

## REFERENCES:

- Akrich M., Latour B., *A Summary of a Convenient Vocabulary for the Semiotics of Human and Nonhuman Assemblies* [in:] *Shaping Technology/Building Society*, (eds.) W.E. Bijker, J. Law, Cambridge/London 1997.
- Bendyk E., *Antymatrix. Człowiek w labiryncie sieci*, Warszawa 2004.
- Bijker W.E., Law J., *Postscript: Technology, Stability and Social Theory* [in:] *The Social Construction of Technological Systems. New Directions in the Sociology and History of Technology*, (eds.) W.E. Bijker, T.P. Hughes, T. Pinch, Cambridge/London 1989.
- Bimber B., *Karl Marx and Three Faces of Technological Determinism*, “Social Studies of Science” 1990, vol. 20, no. 2.
- Bourdieu P., *The Forms of Capital* [in:] *Handbook of Theory and Research for Sociology of Education*, (ed.) J.G. Richardson, New York 1986.
- Callon M., *Techno-economic networks and irreversibility* [in:] *A Sociology of Monsters: Essays on Power, Technology and Domination*, (ed.) J. Law, London/New York 1991.
- Crozier M., Friedberg E., *Człowiek i system – ograniczenia działania zespołowego*, Warszawa 1982.
- Kaczmarczyk A., *Do szkoły z dobrą panią minister*, “Tygodnik Powszechny” 2002, no. 36(2774).
- Konarzewski K., *Reforma oświaty: podstawa programowa i warunki kształcenia*, Warszawa 2004.
- Latour B., *Technology is society made durable* [in:] *A Sociology of Monsters: Essays on Power, Technology and Domination*, (ed.) J. Law, London/New York 1991.
- Latour B., *Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts* [in:] *Shaping Technology/Building Society*, (eds.) W.E. Bijker, J. Law, Cambridge/London 1997.

- MacKenzie D., *Knowing Machines. Essays on Technical Change*, Cambridge 1996.
- Perrow C., *Normal Accidents. Living with High Risk Technologies*, New Jersey 1999.
- Postman N., *Technopol. Triumf techniki nad kulturą*, Warszawa 2004.
- Rip A., Misa T.J., Schot J.W., *Constructive Technology Assessment: A New Paradigm for Managing Technology in Society* [in:] *Managing Technology in Society. The Approach of Constructive Technology Assessment*, (eds.) A. Rip, T.J. Misa, J.W. Schot, London/ New York 1995.
- Ritzer G., *Magiczny świat konsumpcji*, Warszawa 2001.
- Schot J.W., *Constructive Technology Assessment and Technology Dynamics: The Case of Clean Technologies*, “Science, Technology, & Human Values” 1992, vol. 17, no. 1.
- Sojak R., *Paradoks antropologiczny. Socjologia wiedzy jako perspektywa ogólnej teorii społeczeństwa*, Wrocław 2004.
- Stankiewicz P., *Ekologia w społeczeństwie ryzyka*, “Krytyka Polityczna” 2005, no. 9–10.
- Turner J.H., *Struktura teorii socjologicznej*, Warszawa 2004.
- Williams R., Edge D., *The Social Shaping of Technology*, “Research Policy” 1996, vol. 26, no. 6.
- Woźniak T., *O bezradności poznawczej społeczeństwa wobec zmiany technologicznej, “Zagadnienia Naukoznawstwa”* 2004, no. 2(160).