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Futurology and Heuristics (with Posthumanities in the Background). Selected Aspects

Abstract: Forecasting social phenomena can, in many ways, be difficult. The reason is that it is the nature of these phenomena to be closely and multilaterally linked with physical, biological, and other social phenomena. The main aim of this article is to present selected problems related to futurology. Although various research methods are presented in this text, the main focus was put to heuristic methods (their development, rules, ways of application ect.).

Key words: futurology, intuitive method, heuristics, time, posthumanities

Forecasting is associated with forms of programming, of planning the future, where the determinants of a phenomenon can be analysed quantitatively (for example, in economics, statistics, and demographics) and testability is expected to be relatively high. For many advocates of a purely scientific attitude to the future, especially before the 1990s, forecasts, and so scientific predictions with a high degree of testability, can be academically acceptable, whereas any other predictions are to them only a trip to the future in a vehicle driven by wild fantasy. They do admit, however, that prognology serves to improve methods of planning and management, which indirectly means challenging other forms of prediction, especially in politics and culture, where the necessity for predictions is obvious. Many leading academics remain wholly convinced that only quantifiable forecasts are acceptable, and this is why Weber argued that any forms of prediction in the social sciences were impossible, by which he indirectly suggested that we should not create any future designs or attempt to visualise our future, which in turn questioned the legitimacy of taking account of hope, fears, and dreams (Sepkowski, 2005, p. 65).

Forecasting is understood as predicting based on specific trustworthy data. Futurology, in turn, is the science of predicting the future. The purpose of scientific forecasting is to show a vision (model) of the future in the most probable way that the phenomenon under investigation will develop, including the directions and dynamics of its development. In the course of forecasting, we also aim to determine the conditions for the evolution of the analysed phenomenon. A forecast prepared for this purpose must take account of the known relationships, types, and intensity of external influences and internal changes expected in the development of the phenomenon (Stryjski, 2003, p. 1). The term *forecast* should be understood as a 'a judgment based on scientific research practices, relating to a specific future, not the future in general; verified empirically; uncertain, yet accepted, or reliable, credible, and plausible' (Guzik, Appenzeller, Jurek, 2004, p. 7).

As rightly noted by Stryjski, forecasting social phenomena can, in many ways, be difficult. The reason is that it is the nature of these phenomena to be closely and multilaterally linked with physical, biological, and other social phenomena. Thus, making judgements about the future course of social phenomena, which, unlike physical phenomena based on “strong” science, are dependent on a large number of factors with varying degrees of stability, is a complex task. It should also be added that it is rarely possible to carry out experiments on a social phenomenon. All this makes the basis for predicting the future course of social phenomena weak – in this case, the forecast itself is a social phenomenon that, together with others, may influence forecasting in various ways (Stryjski, 2004, pp. 30–31).

Predicting social phenomena (especially in a global sense) is hindered (limited) by: 1. *the qualitative character of social science laws* (formulated at a high degree of generality); 2. *the Oedipus effect* – predicting triggers action that accelerates the predicted effect; 3. *the syndromatic nature of social phenomena* – the phenomena that we study occur in certain wholes, often heterogeneous. Man and his behaviour as the object of study is a bio-psycho-socio-cultural being, so his behaviour is guided by genes, brain, and education (culture). The premise of predictions has to be laws of different nature, such as anthropology, psychology, sociology, and philosophy; 4. *the evolving nature of social reality* – the reality we live in is changing radically. The demands of history require that new general knowledge be complemented by new information about new epochs. Therefore, general knowledge has little relevance, in itself it must be saturated with new information. Consequently, in order to continue to predict, new concrete historical knowledge must be taken into account (*Materials*).

The latter problem is very much like *panta rhei* ‘everything flows,’ the phrase uttered in antiquity by Heraclitus of Ephesus. You cannot enter twice into the same river. The only constant phenomenon in the world is change. The environment in which people live, businesses operate, and regional and government policy is conducted, changes. All these changes make the conditions under which decisions, especially strategic ones, are taken increasingly unpredictable and complex. The dynamics of change are increasing and the degree of difficulty in adapting to them is changing, too. The desire to learn about future phenomena and explore potential opportunities constantly accompanies man’s professional and personal life. To satisfy that desire, people are still trying to develop effective methods of studying the future in order to best prepare for the unknown (Borodako, 2009, p. 7).

Sepkowski indicates that few experts in forecasting would bow to Lech Zacher, for whom it is necessary to take account of irrational and accidental elements, catastrophes, accidents, failure to perceive linearity, continuity of phenomena, and processes in time, because this is one of the most serious barriers to the exploration of the future. According to the theorist, this is not easy, but we can manage, using chaos theory, catastrophe theory, or fuzzy logic, which requires interdisciplinary studies and close co-operation between specialists, on an assumption of openness to other sciences, which is possible only in institutions exclusively engaged in prediction, which has repeatedly been stressed by the “Poland in the 21st Century” Forecast Committee (Sepkowski, 2005, p. 67).

It should be mentioned here that the future can be predicted in a scientific way, when we use proven methods and scientific tools; in a rational way, when we rely on experi-

ment, without the use of scientific methods; or sometimes an irrational manner, when we rely on fortune-telling, prophecy, or intuition, and such methods do not necessarily have to be false more often than rational ones (Sepkowski, 2005, p. 65). As a side note, there is a problem of interest not only to theorists. It is assumed that action is rational if it is based on rational knowledge. There is, however, *substantive rationality* and *methodological rationality*. An action will be substantively reasonable when it is effective, and methodologically rational, when it has a real knowledge base. As W. Morawski asks, “Why should substantive rationality, effectiveness, be based solely on science, and not on other types of beliefs?” This contradiction will sooner or later call for a correction of the existing paradigm of knowledge and its understanding. Science deals mainly with discovering the rules that govern the world around us, the truth about it and about us (Pawnik, 2005).

Forecasting currently offers a couple of types of methods. M. Sułek shows that, generally speaking, forecasting as a way to predict the future can be rational or irrational (Sułek, 2004, p. 133). A prediction is said to be rational when the process of creating the prediction is based on logical reasoning; moving from analysis of a set of facts belonging to the past, or premises (diagnosis phase) to conclusions (future determination phase). A rational prediction can be scientific (based on scientific principles) or common-sense (based on experience). An irrational prediction occurs when the premises are not stated, and/or the relationship between the premise and the conclusion is not respected (Sułek, 2004, p. 133).

One of the tasks that predicting as a science faces is to fulfil its practical function, which involves, among others, determining the degree of accuracy of a prediction. A prediction gains its degree of accuracy from laws derived deductively from statistical laws relating to specific facts. The components of accuracy of this inheritance are both the degree of the certainty of the truth and the contents of causal, coexistential, and statistical laws. The forecasting procedure must come from a recognition of the current situation. The diagnosis of a situation should be sufficiently developed to lay down the current phase of its fluctuation and the expected succession of future phases. Scientific prediction that performs a practical function requires development diagnosis, also called predictive diagnosis. It involves inquiring about the future development of a given process or phenomenon based on the previous phases of partial diagnoses (typological, genetic, meaning, and phase) and their findings. Predictive diagnosis is both a result of these and their complement, by making inferences mostly from hidden development trends and sometimes also known causal laws (e.g., extrapolation). In both cases, it is probabilistic reasoning that leads to uncertain hypotheses, for even hidden development trends are conditioned by the specific situation of the studied phenomena and processes, and especially the presence of appropriate regulations and interferences that in international relations – as in all kinds of social relations – play an important role (Kukułka, 2000, pp. 252–253).

Practical prognostic approaches can be divided on the basis of different criteria. According to one division, there are five main approaches: (1) data-oriented (empirical and experimental-empirical), (2) model-oriented (analytical), (3) combining the first two approaches, data and models (iterative), (4) goal-oriented (teleological), (5) conflict-oriented (dialectical) (Sułek, 2004, p. 133).

Stryjski, in turn, divided forecast methods into passive and active. The first two below, under subparagraphs 1 to 2, are considered passive, as they are placed primarily in

the sphere of intellectual and cognitive research, and the third, under subparagraph 3, is commonly referred to as active, oriented directly to practice. The methods are:

1. Intuitive method. This depends on, for example, *brainstorming*, a procedure which is also known as *groupthink*, a method that occurs, in contrast to the former, within a dispersed group of people, and variant forecasts, a time horizon, and the terms of their realisation are sent to the “centre” by post where they are processed by computer.
2. Research methods, also known as exploratory methods. They combine inferential prediction with studies of the present. These methods include, among others:
   a) Extrapolation of the trend, sometimes called projection. Because of the techniques used and its nature, this method can be used successfully only in the short term. It is based on two passive assumptions: (1) it assumes a relative stability of the situation and (2) it is based on the high probability of the possibility of extending in time current trends and external conditions;
   b) Analogy method. This is limited in principle to compiling and comparing phenomena, processes, and international systems from time periods that are different, but can be attributed similar or analogous, timeless features, and on their basis drawing forecast conclusions;
   c) Scenario method. This is used primarily when a forecast is drawn in the time frame for a couple of important elements of a current situation changing significantly. Using conditional or complex extrapolation, we create variant scenarios (models) of the predicted development of a current state;
   d) Inferential factor analysis. This depends on setting the direction, methods, and intensity of the desired changes, doing so on the basis of retrospective observation and ongoing analysis of the factors accelerating or delaying the changes (Stryjski, 2004, p. 52).
3. Normative methods, also known as technological methods. They belong to the aforementioned active methods, directly targeted at the planning or alteration of reality. They precede such actions as drafting a model of the future and determining the direction of changes and methods of their implementation in a desired and predefined manner. Proponents of this method also assume that close cooperation between theorists (predictors) and the practices of political life (decision makers) may in the future lead to the creation of a normative model of reality. This position rejects not only the case of incidental or fatalistic concepts of the future, but also the conviction that, having set future goals, we can define (programme) effective measures and ways to realise the most theoretical models of the future (Stryjski, 2004, pp. 52–53).

Heuristic techniques (methods) facilitate creative problem solving (including futurological), finding new solutions, discovering something new. Their name comes from the Greek word *heurisco*, which means “discover”, “find”. Heuristics had its origins in antiquity. The first, most well-known use of a prototype of the word is credited to Archimedes. During the famous bath, during which he is said to have discovered the fundamental law of hydrostatics (known as Archimedes’ principle), he shouted, “Heureka!” This was wrongly interpreted as “eureka”, which meant “I have discovered”, “I have found” (Piech, 2013).

These techniques rely on the phenomenon in which consciousness uses the services of the subconscious to associate known facts and the relationships between these facts in order to discover new truths, to formulate hypotheses through independent thinking. The problem of free will is linked with intuitive decision-making. According to Prof. S. Pinker, a Harvard University evolutionary psychologist, free will and the personal responsibility of man for his action associated with it are related to the activity of the brain. It is a mistake to say that hunger, thirst, and sexual desire result from biology, and reasoning, decision-making, and learning are something different, nonbiological. It is just a different variety of biology. Such a biological understanding of human nature does not threaten equality, freedom, or responsibility. It does not diminish the meaning of human life, either. What threatens these values more is the belief that man is born a *tabula rasa*. Only in this case there is a worry of whether what is written on it is right. The robotisation of man should not be feared though, because the brain is so complex that there is no threat that it will be taken over in any way. We are not robots, genetically engineered to only breed and die. The genes encode the potential of the mind, which allows us to create an infinite number of ideas and behaviours. This ensures that our humanity has unlimited possibilities. The possibilities themselves, however, are not encoded in the genes. The neurological and psychological processes occurring in the brain when making difficult decisions have always fascinated scientists. One of the experts in this field is Prof. Damasio of the American University of Iowa, who specialises in questions related to so-called emotional intelligence. The case of Elliot, a lawyer who as a result of the activity of the brain lost the ability to recognise his emotions, went down in history due to A. Damasio’s study. In a short period of time, the decisions taken by Elliot brought him to total ruin. He lost his fortune, his wife left him. It turned out that without emotions, we are not able to truly manage our lives. Prof. Damasio, together with researchers from Harvard University and the California Institute of Technology, decided to examine decision-making processes by people who might have impaired emotional responses. For that reason, a group of specially selected people were put in a situation where they had to choose between the life of a loved one and the so-called common good. Six people who were invited to participate in the experiment had had a portion of nerve tissue in the mid-ventral prefrontal cortex removed during neurological surgery. The treatment had not adversely affected their intelligence, ability to think logically, or consciousness. The experiment also included 12 patients with other brain injuries and 12 healthy people. With the help of functional magnetic resonance imaging, CT scans, and a special computer program, Brainvox, the researchers created three-dimensional, detailed maps of the brains of the volunteers, in particular the region of the ventral premotor cortex (the so-called VPMC) that they were interested in. This is connected to the frontal cortex, which is responsible for complex mental operations, including the sense of morality, and to the brain stem, the structure that controls the body’s physiological responses to emotional stimuli. In the crucial phase of the study, the researchers confronted the volunteers with a number of situations that required difficult decisions. The situations differed in degree of difficulty, some of which did not require much effort, others were simply heartbreaking. Each of the participants had to choose one answer: During an escape attempt, would you leave a child behind to get rid of the extra ballast?, Would you kill your own child to save twenty other people?, Or, would you kill a friend with AIDS, if you knew

that they would infect other people thereby sending them to death? The results of the questionnaires were shocking. People who had had the VPMC removed behaved extremely coolly in situations that should have unleashed in them a deep moral crisis. Without batting an eyelid, they were willing to sacrifice the lives of their loved ones for the greater good, or to save the group. “Most people with a healthy brain are in such a situation torn internally, are in crisis. Our patients did not have this kind of dilemma, they were free from any distractions, emotional suffering,” said Prof. Damasio (Minta, 2013).

Heuristic methods are usually presented as a set of methodological principles, approaches/tips, efforts, etc., without a clearly defined code of practice. Creating one that fits, according to the conditions of the problem or the phase of finding a solution, is treated as a heuristic process when solving a problem (Penc, 2008, p. 449).

The history of the development of heuristics can be, as noted by Piech, summarised as follows: (1) a period of philosophical activity in antiquity; (2) a period from the Middle Ages to early modern times, when the first attempts were made to create heuristics, with *ars inveniendi*, art of discovery, discovering the learning process, universal rules that made scientific discoveries possible; (3) the fifties and sixties, a period of the domination of the belief that it was impossible to create a system that would guarantee scientific discoveries, that the goal should not be to discover universal methods, but individual heuristic rules that based on experience simplified the process of finding a solution; (4) the seventies, a period of tests that led to order in unclear sets of rules so that they could be useful to a greater extent for the purposes of scientific research; (5) the eighties, a period of disappointment with the lack of the effective use of heuristic methods, also due to a higher interest in the rapidly increasing computational capabilities of computers and their accessibility (in terms of their price and ease of use), (6) nineties, the years of the “hidden” development of heuristics as a method and technique used in computer software and in applications of artificial intelligence (Piech, 2013).

Thus, the term *heuristics* has come a long way in history. Heuristic methods are increasingly being used not only in philosophy, teaching, psychology, and logic, but also in management and marketing, in economic theory, applications of mathematics in economics, but especially in technologies, including advanced software solutions used in computers (Piech, 2013). It would therefore be good, if these methods were used by broadly understood humanists in their studies.

Sułek is right, that for many years in the social and technical sciences (especially economics) heuristic methods were considered synonymous with creative (non-routine, unconventional) methods, as opposed to routine (algorithmic) ones. Currently, this division is losing importance – on the one hand, to develop an algorithm requires creative thinking, but on the other, heuristic algorithms are developed. Heuristic methods and reasoning use analogy, induction, and some universal procedures – objectives and measures analysis, planning, and others (Sułek, 2010, pp. 80–81).

Piech seems to be a supporter of the separation of these concepts. He pointed out that a best solution is possible in the case of deterministic methods, but with heuristic methods one cannot be so sure. Therefore, there is a huge difference in achieving results through heuristic and algorithmic means. They are two counter notions. An algorithm can be defined as a procedure leading to solving a problem. This concept is applied in practice in two senses: (1) a completely mechanical sequence of steps, (2) a general procedure lead-

ing to a purpose. Heuristics, according to Piech, should be understood in the second sense, not the first. In line with the meaning of the former, we will always get an answer. Heuristics, though, does not provide such certainty. An example of the former meaning of the word algorithm is the algorithms used in mathematics, for example, finding the roots of a quadratic equation. The latter meaning of the word algorithm is derived from computer science and is a concept of a general code of practice. Thus, any computer program, no matter how complex, is in this sense an algorithm. Heuristics is a rule that can be useful sometimes, but not necessarily always. Such an approach was popularised by G. Polya, and it is widely used in artificial intelligence for *nonlogical reasoning*. Thus, the main difference between the routine approach (using algorithms) and the creative one (using heuristics) lies in the fact that the former always gives a solution (although the waiting time may be very, or even theoretically, infinitely long), while the latter can be unreliable. Algorithms assume a deterministic approach to the problem, and heuristics, in part, a stochastic one (Piech, 2013).

Depending on the type of heuristic technique, the stages of its construction may differ. Generally, in the cycle of problem solving the following phases are the most important: (1) formulating the problem; (2) collecting and analysing information; (3) searching for ideas; (4) analysing and evaluating the ideas; (5) creating solution projects (alternatives), (6) turning the solution into reality (Antoszkiewicz, 1982, pp. 18–19).

It is worth mentioning that problem solving, prediction, and the construction of the future can, and should, be learnt. This science is based on working out certain practices that would include both scientific (logical, algorithmic) aspects and creative ones: flashes of imagination and intuition. We try to establish certain codes of research practice, embed the solution, and continuously improve it. The solution to a problem should be the result of cooperation between two independent, linked, and co-creating systems, namely the solver and the solved. The former involves heuristic and algorithmic methods, a task force with its personnel and the location of the organisation in existing reality (the task force, institutions, and other links), providing the task force with the things that they need (equipment, apparatus), the existing information system in an institution, organisation and training preparation of the task force for introducing methods of solving the problem, managing the task force and institution, the climate and culture in the task force and in the institution and the environment. The latter includes, in turn, the problem with its complexity, conditions and restrictions, including its location in the existing and future reality. Solving any problem requires first identifying them, that is, defining which situations are problematic and which ones need to be addressed, and then developing variants of possible solutions containing groups of projects, leading to an improvement or complete change in the situation, assessing them (in the light of the objectives and resources of the institution), and selecting the best variant. The selected option, as the final decision, should be the basis for introducing change (Penc, 2008, pp. 453–455). In heuristic research – though not exclusively – the following methods are used (again, depending on the type of technique) to select a solution to a problem: consensus, voting, multi-voting, selection of experts, comparison in pairs, importance ranking, etc. (Muiño, 2011).

Further issues to be discussed briefly when writing about heuristic methods is the composition of the research team and the principles that should guide them. The group of experts should be chosen adequately for the type of heuristic method: it should be univer-

sal, consisting of people who are all-round and interested in the future, and include representatives of specialised areas of study and practice. Moreover, the group should be large enough to represent various views, and the people selected should think independently and have an independent vision of the future. However, there are differences as to the size of the group and its structure. The size of the group of experts depends on the method (from a few to a few hundred people) (*Metody*, 2013). Regarding the structure of the group, it is well known that when people with various views, questioning each other’s practices come together, creative solutions are born. But what kind of diversity is the basis for creativity? Researchers at Northwestern University have tried to answer this question. The results of their experiment, published in *Science Magazine*, suggest that diversity is necessary for action to be creative. But this is not about race, gender, or background. The researchers compared teams that had succeeded with ones that had not. They analysed the composition of the groups to determine what the differences between them were. They took into account research project teams from several disciplines (including the arts). It turned out that the teams that had the greatest success were characterised by two features. First, they were diverse, made up of experienced people and novices. This is nothing new – the need for “new blood” has long been regarded as an important component of success. Less obvious was the other criterion of success. The common denominator in all winning teams was having at least a few experienced actors who had never before worked together. As stated by L. Amaral, a physicist at Northwestern University and the co-author of the study: “People have a tendency to want to work with their friends – people they’ve worked with before. And that’s the problem.” (Guterl, 2005).

Researchers, when dealing with brainstorming, should especially follow the five key principles developed by A. Osborne: (1) deferred judgement principle – ideas are not assessed during the first phase of the session; (2) modification principle – if a solution suggested by someone seems good, it is adopted; (3) fantasising principle – even the most crazy and unrealistic idea can be transformed into something good; (4) suggestion principle – repeating others’ ideas is not a bad thing, on the contrary, it is encouraged; (5) the principle of the transformation of quantity into quality – the more ideas, the bigger the chance of finding the optimum solution (Kowalczyk, 2005).

In the literature on the subject, there currently are dozens, if not hundreds, of different heuristic methods. Due to the limited size of this article, only a few of them will be presented below (called simply heuristic, or based on research principles relying on intuition), divided into four groups (Antoszkiewicz, 1982, pp. 17–18):

1. Deferred judgement methods [assume that man is capable of creative activity, and the results of this activity depend on how they are used; the basic premise is a collective search for new ideas (Marszałkowska, 2013)]: one-person brainstorming, mixed brainstorming, classic brainstorming, circle brainstorming, brainstorming with breaks; brainstorming – “the most crazy idea” version, brainstorming – “stimulus trigger” version, e-storm, storyboarding, simultaneous evaluation, Philips 66 Buzz Session, 635, metaplan, “snowball” method, task tables, stimulation, jumping in the level of topic generality, gradually defining the problem (Kowalczyk, 2005);
2. Transposition methods [come to detect a conflict between two mutually exclusive claims or on a conscious and forced search for similarities between events,

solutions in order to learn and use information (Marszałkowska, 2013)]: contradictions, functional analysis, Gordon’s analogies; problem reversal, comparison, CERMA methods, MIDE (Method of Integration and Disintegration of Elements), PERT (Program Evaluation and Review Technique), CPM (Critical Path Method), Monte Carlo method, MCTS {Monte-Carlo Tree Search} (Monte-Carlo, 2013) etc.;

3. Suggestion methods [are used for research into realising or adapting an existing process (phenomenon) to a new situation, the essence of these methods is suggesting, flipping, opposing, trying using a set of questions (Marszałkowska, 2013)]: crushing, playing with words, superposition, information packs, guiding questions, Polya’s method, critical analysis and evaluation, EM-ES-ER solution network (Stachowski, 2013), pros and cons, heuristic tips, etc.;
4. Complex methods [a common feature is that they help to create and upgrade products, or technological or production processes; are used in solving the most difficult and complex problems in situations established by the tradition and treated as indisputable; the idea of these methods is based on creative thinking, destroying, creating, and perfecting (Marszałkowska, 2013)]: synectics, ARIZ (Algorithm for Inventive Problems Solving), TRIZ {Theory of Inventive Problem Solving} (Andrzejewski, Jadkowski, 2013), ANKOT (Contrast Analysis of Technical Objects), morphological box, Delphi method, techniques of creative thinking, lateral thinking, de Bono’s Six Thinking Hats (Urban, 2013) etc.

This division should be treated conventionally, because each heuristic method is used to achieve specific results and requires modification to the problem or the phase of its solution, as this affects its efficiency and effectiveness (Antoszkiewicz, 1982, p. 13).

Heuristic methods are not, as has already been mentioned, without faults. J. Galtung, a Norwegian mathematician, sociologist, and futurologist, noticed that the vast majority of forecasts formed in the seventies for the year 2000 proved to be wrong. According to him, experts are reluctant to voice views that differ from a generally accepted discourse or perception of a particular issue. Galtung believes that if experts provide decision-makers with prognostic information within a generally accepted trend, they will continue to be treated as experts. If, however, they present a new discourse and do not fit in the current discourse context, they will be called pioneers or prophets, and they are not likely to achieve acceptance in the eyes of the decision-makers (Sułek, 2010, p. 83).

Another thing to keep in mind – though that does not mean that we should stop looking for regularities – is that the world, nature, life are inherently undetermined. C. Morel (French sociologist, former director of human resources at Renault, author of the book *Les Decisions absurdes II. Comment les éviter*) stated, “We can endlessly debate the flap of a butterfly’s wings, but no one is able to articulate it in mathematical equations or predict its disastrous consequences on the other side of the world. Even so, we obstinately pretend that science can solve everything. We kid ourselves: We pretend the belief that performing a multitude of increasingly precise measurements of various parameters will save us from all dangerous situations and dictate the right decision. But this does not work, and the excessive belief in rationality entails negative consequences” (*W pułapce*, 2012).

It is worth mentioning one more problem associated with heuristic methods. Teamwork, collective thinking, brainstorming, are the mantras of modern business. Increas-

ingly, however, it turns out that the best ideas come in solitude. Our companies, our schools, and our culture are in thrall to an idea Cain (the author of *Quiet: The Power of Introverts in a World That Can’t Stop Talking*) calls the new groupthink. According to this, creativity and achievement come from an oddly gregarious place. Most of us now work in teams, in offices without walls, for managers who prize people skills above all. Lone geniuses are out. Collaboration is in. However, research strongly suggests that people are more creative when they enjoy privacy and freedom from interruption. And the most spectacularly creative people in many fields are often introverts, according to studies by the psychologists Mihaly Csikszentmihalyi and Gregory Feist. They are extrovert enough to exchange and advance ideas, but see themselves as independent and individualistic. They’re not joiners by nature (Cain, 2012).

One explanation for these findings is that introverts are comfortable working alone – and solitude is a catalyst to innovation. As the influential psychologist Hans Eysenck observed, introversion fosters creativity by “concentrating the mind on the tasks in hand, and preventing the dissipation of energy on social and sexual matters unrelated to work.” In other words, a person sitting quietly under a tree in the backyard, while everyone else is clinking glasses on the patio, is more likely to have an apple land on his head. {Newton was one of the world’s great introverts: William Wordsworth described him as “A mind for ever/Voyaging through strange seas of Thought, alone.”} (Cain, 2012).

Prof. Sułek indicates, “The fruits of science are at least two kinds. They are, firstly, actual scientific achievements, leading to further achievements, to advances in technology. Secondly, they are in the form of irrational beliefs, ideas, ‘theories’, and ‘superstitions’ under the banner of science. The latter, which could be called poisoned, are possible, among other things, thanks to the great achievements of true science, which descending deeper into the matter, comes to discoveries that are more and more difficult to understand and more and more difficult to distinguish from false results. It is so-called parascience and pseudoscience” (Sułek, 2004). However, if we put the matter in such a way, there might be a threat to subordinate science only to practical requirements, which, incidentally, is by many postulated as the *condicio sine qua non* of science. This, in turn, may result in expelling from, or refusing entry to, the “garden of science”, areas such as classical philologies, prognology, the study of things, etc. The author of the publication does not claim that everything that we call science automatically becomes it. However, it should be remembered that, as Stanisław Ossowski (Polish sociologist, methodologist of the social sciences, and cultural theorist) once said, “A researcher is a man whose professional responsibilities include lack of obedience in thought. This is his social service, performing his professional duties, not to obey in thought... the synod, committee, minister, emperor, or Lord. If he is obedient, if his views change at somebody’s order, he betrays his obligations” (Jeszke, 2011). It is this arrogance, being reflected, for example, in action contrary to established schemes and fashions (for example, the practical application of science), that is the salt of science.

It is worth raising one more issue – the difference in the approach to time (including the future) in man and ... animals. Although some researchers consider the dilemma (like irrational forecasting methods) to be irrelevant from the point of view of science, the author of this article finds it worthy of attention.

There are various concepts of time. The most popular is the one in which time is an arrow (see Figure 1) on which we highlight the process of prediction (interestingly, the prediction of the past, i.e., alternate history). Prediction means making inferences about unknown events, based on known events (i.e., those that have already occurred and belong to the past). Unknown events are those that: occur at a later time compared to the time of the prediction (1); occur earlier than the prediction and continue in time (2); occur at an earlier time compared to the time of the prediction and end before the time of the prediction (3).

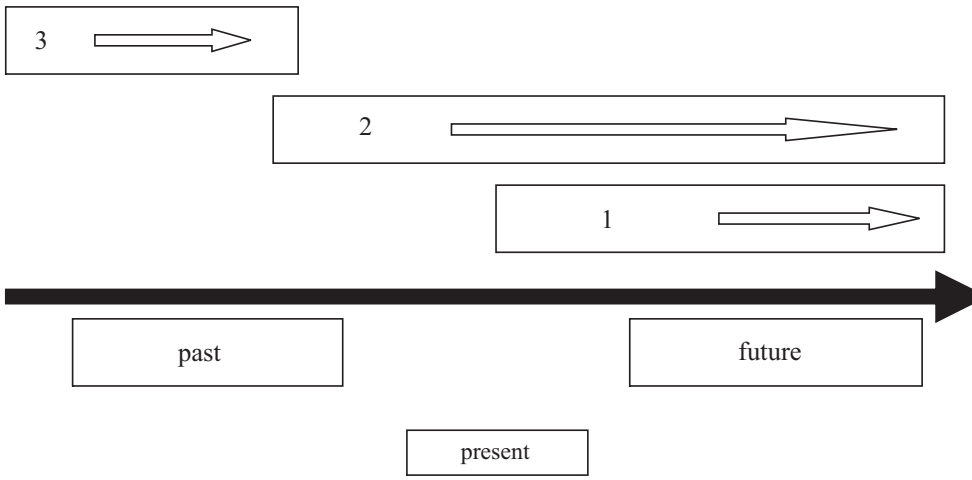

Figure 1. Linear Time

Source: Ł. Donaj.

M. Rowlands in a very exciting book *The Philosopher and the Wolf. Lessons from the Wild on Love, Death and Happiness* wrote that “future is something we actually – and not merely possibly – have now, at the present time (whatever that means). And we have a future because we actually have – now – states that direct us towards the future: desires, goals, projects. Imagine these as arrows streaking into the future. Some of these arrows direct us into the future only implicitly: it takes time for them to reach their mark. To satisfy a desire, you have to survive long enough for the arrow of that desire to reach its mark. The desires of wolves and dogs are like this. However, some arrows are different. Some arrows are burning, ones streaking out into the dark night of the future, and lighting up that future for us. Corresponding to these arrows are human desires, goals and projects that direct us towards the future explicitly by way of an overt conception how that future is to be. Death harms any creature by cutting off the arrow of its desires in their flight. But death harms most those creatures whose arrows are burning ones. It is by way of these sorts of metaphors that we humans try to understand time. We think of time as an arrow whose flight carries it from the past, through the present, into the future. Alternatively, we might think of time as a river flowing from the past to the future” (Rowlands, 2011, pp. 245–246). “Or we think of it as a ship sailing from the past, passing through the present and heading into a distant and unknown future. We are caught up in this flow of time

because we are temporal beings. Like other animals, the arrows of our desires pull us in, and allow us to hook on to, this temporal stream. And unlike other animals, our arrows can, to some extent, light up this stream – making it something to be seen, understood and perhaps shaped.... The present is forever slipping away – the arrow of time constantly passing through one location on its way to the next. So, if the meaning of life is tied to moments, that meaning is also constantly slipping away. The meaning of our life, we think, must be tied to – must be a function of – our desires, goals and projects. The meaning of life is something towards which we can progress; something to be achieved. And as with all important achievements, this is not something that can happen now but only further on down the line” (Rowlands, 2001, p. 246). “… But if time is a circle rather than a line (which can resemble the Ouroboros, the ancient Egyptian and Greek symbol depicting a snake with its tail in its mouth which constantly devours itself and is reborn from itself; see the earlier part of this publication on the most serious barriers to predicting, including a linear perception of reality, and Figure 2 – author’s note), if one’s life is destined to repeat itself over and over again without end, then the meaning of lives cannot consist in progression towards some decisive point on the line. There is no such point because there is no such line. Moments do not slip away – on the contrary, they reassert themselves over and over again without end. The significance of each moment does not derive from its place on a line – on how it relates what comes before it on the line to what comes after. It does not carry the taint of past and future ghosts. Each moment is what it is; each moment is complete and entire in itself” (Rowlands, 2011, p. 254).

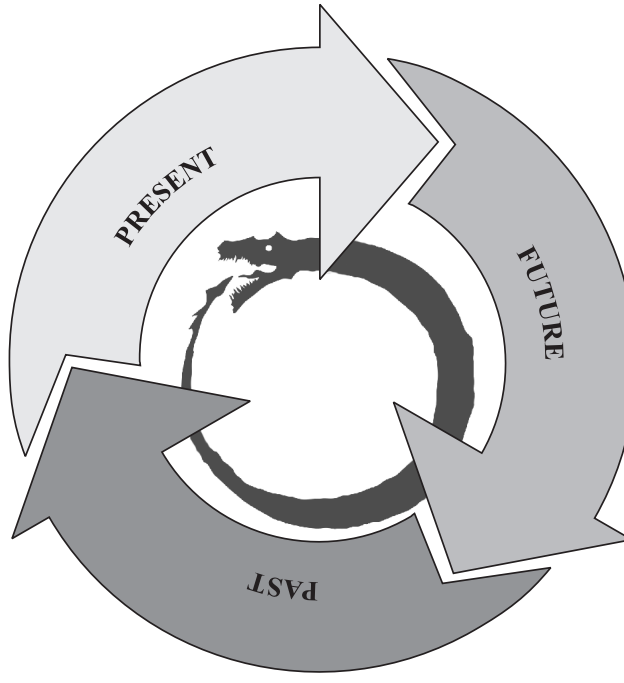

Figure 2. Circular Time

Idea: Ł. Donaj, **realisation:** F. Biały.

M. Rowlands concludes that “the time of wolves is a circle, not a line. Every moment of their life is a closed whole. And they always find happiness in an eternal return to the same. If time is circular, it has no ultimate end. Thus, existence is not organised around a vision of the ultimate end.... Where there is no sense of ultimate end, there is no sense of loss. For a wolf or dog death is really the end of life. And therefore death has no power over it. This is the essence of being a wolf or a dog” (Rowlands, 2011, p. 255).

The metaphor of the river (understood as a particular river: with no beginning and with no end, and with no banks) is developed by Z. Sarjusz-Wolski (Ph.D. in economics, specialist in organisation and management, author of over 200 publications), who in one of his articles cites several concepts of the future. The first of them, that in a way imposes itself, is a temporal concept of the future (from Latin *tempus* “time”). It says that the future is simply the time coming. In this case, the place of the river we are currently in is the present. All the water in front of us is the future and behind us – the past. Another concept is the space-temporal concept of the future (from Latin *spatium* “space”), also known as the “world” of H. Minkowski. According to this concept, the river has no springs or mouth, but it has banks, and the banks in the present approach each other at a distance zero. Another concept of the future treats it as a future world or its stretches in terms of future things. Hence the name: reistic concept of the future (from Latin *res* “thing”). Based on this view, we can say that predicting the future is to describe what will happen in relation to things. Either in the whole world or (for whatever reasons that interest us) in its fragments. Another concept is the so-called eventistic concept of the future (from Latin *eventus* “event”). This is about events that should be understood as something that could happen to anything. There are changes, or processes (kinetic events) and states, or duration (static events). As rightly noted by Sarjusz-Wolski, from the point of view of practical action by governments, parliaments, parties, businesses, organisations, associations, citizens, the last concept of the future is the most important. The subject of predictions, or forecasts are primarily future events. To some extent, these predictions are linked to the reistic concept of the future, because forecasting and occurring events will shape the world of future things. However, their starting point is predicting these events (Sarjusz-Wolski, 2005a). The river as a metaphor of the future also appears at the end of this article.

As rightly pointed out by Prof. Bakke, with subsequent discoveries of the natural sciences and the rapid development of technologies (particularly biotechnology), it becomes clear that man alone cannot be the active shaper of events, because we work in tandem with nonhuman beings without which we would not only not be ourselves, but without whom we would not exist at all (*Wykluczeni*, 2013). It is worth remembering, especially when dealing with predicting the future. Because it may be that having only a single – anthropocentric – vision of the future, we will not notice other actors of life, including political life.

The above-mentioned dilemmas come under the umbrella term *posthumanities*. This is understood as a set of trends and directions of research related to the current and intellectual and ethical attitude called posthumanism. Posthumanities is the humanities building knowledge beyond humanism that criticises and/or rejects the central position of man in the world, therefore its characteristics are any approaches that are non- or anti-anthropocentric. For that reason posthumanities can be determined as the

non-anthropocentric humanities, though the term raises concerns over its paradoxical nature. The key research questions are the problem of the limits of species identity, the relationship between the human and the nonhuman (human relationships with technology, the environment, animals, things) and issues of biopower, biopolitics, and biotechnology. The aim of posthumanities is the scientific support and legitimisation of actions designed to protect various species, as well as “improvement” of the human species (transhumanism). Posthumanities is related to the preceding research trends defined as the new humanities (such as postcolonial studies, gender, queer, ethnic studies, the study of things, etc.) in so far as they contain elements of posthumanist thinking {for example, in postcolonial studies which show that animals and things are also subject to various forms of colonisation, decolonisation, globalisation, exclusion, hybridisation, and therefore postcolonial studies revealing these processes are an appropriate research field to analyse these phenomena} (Domańska, 2013).

The world does not seem to be too well prepared for such perception. It is a shame, because, given the pace of the technological development, it may happen that in the future heuristics will be reduced to the mechanical reading of our thoughts, dilemmas that after appropriate “treatment” will be the basis for decisions.

Let us return to the surrounding – still anthropocentric – reality. As indicated by Sarjusz-Wolski, the mechanism to predict the future is to know and match past events, relevant to the object of forecasting, and the regularities between them (type and strength of cause and effect relationships), and to draw conclusions about the occurrence (or non-occurrence) of particular future events. The mechanism of prediction can be illustrated by the following simple example. Let us say that we have reached a deep wide river and want to cross it dry-shod, but there is no bridge. We know, however, that a boat would allow us to do it (regularity: if boat, then use it to cross water). By serendipity, we have just discovered one in the nearby bushes (cognition of reality). Based on these premises, we can already predict that soon we should be on the other side. However, if our information about the boat was not complete, that is, if, for example, we did not know that it was leaking and taking on water, most likely our predictions would prove incorrect. As a result, we would “end up” somewhere else than we expected (Sarjusz-Wolski, 2005b). Predicting social phenomena or their development shows (see evolving nature of social reality) that the problem is not only the boat. The problem is also that we do not know if the opposite bank of the river exists.

Zeliaś, an economic prediction theorist, believed that there is no guarantee of creating reliable forecasts, and we barely pave the way for such diagnoses that prove to be moderately reliable where we have to deal with components of the present that can be analysed quantitatively and only quantitatively. He was not the only sceptic among many optimists. Adrian Berry, a strong supporter of prospective thinking, went even further, claiming that none of the forecasts prepared at the request of the US Government after World War II included the most important events that shaped the world, and it is impossible not to accept his argument, because the only ones were self-fulfilling “forecasts” that were specific action plans (Sepkowski, 2005, pp. 65–66).

Can – using heuristic methods – we predict what awaits us in the coming years? When will the world end? Will someone invent a cure for cancer, or will we know the secret of eternal youth? People have always been interested in the future. Prophets and visionaries

became the heroes of their time, and the fame of many of them did not decrease even after their death. To this day, people still are thrilled by the ambiguous predictions of the sixteenth-century French physician Nostradamus, who allegedly predicted the bombing of Hiroshima and Nagasaki, and the death of Princess Diana (Kaniewska, 2013, p. 49).

It is worth mentioning contemporary attempts to predict the future. One is the Global Consciousness Project (GCP), which is an international research program linking researchers that work with devices that can show us possible (noteworthy) effects and traces of collective consciousness, mainly based on laboratory experiments that showed the effect of actions of human intentions on a device generating numbers. In the laboratory, a volunteer tries to affect the operation of the so-called random number generator (RNG, a physical device, not a computer program) whose goal is to achieve higher or lower results. It is sort of throwing a coin in the hope of getting more heads than tails. Experiments involving the RNG have shown that a person can in some (very small, but noticeable) ways impact the result. When we move the same instruments to the field of interest of the GCP, we can notice that there is also some kind of response to a specific event in the collective consciousness triggered by joint participation in rituals or ceremonies, or inspired by music or intellectual meetings. A tool of the GCP is a network of stations located across the planet, collecting random data. They use the same technology and procedures to carry out experiments. They also have one objective, which is to answer the question of whether there is a certain regularity in the data obtained coinciding with the time when a breakthrough happens. Also, the objective is to determine if you can get evidence for the existence of a planetary consciousness, but this is a task that needs many years of work and findings (Nelson, 2012).

Predictions that fascinated the masses amused scientists. Recently, however, this has changed. Futurology, until now linked to an esoteric world, now casts its research net wide – for example, in studies of the future of our planet. “Futurology is a quite young, but very growing branch of science. Man always looks forward. The future is like a screen that reflects our dreams and fears. We are fascinated by the unknown, even when it comes to a prediction of a billion years ahead,” explains Prof. Bostrom, professor of philosophy, Director of the Future of Humanity Institute. One of the modern futurologists associated with the Institute is the British astronomer Sir M. Rees, a cosmology theorist, who last year was awarded the British equivalent of the Nobel Prize, the Templeton Prize (Kaniewska, 2013, p. 49).

“The Sun formed 4.5 billion years ago, but it’s got six billion more before the fuel runs out. But it is not we, people, who will see its end. Probably it will be seen by creatures similar to us as we are to today’s insects,” said Sir Rees when receiving the award. And although his predictions are much more hard science than the imaginative poems of Nostradamus, a part of the Future of Humanity Institute’s analysis resembles the futurology from Crichton’s and Lem’s books. *I’m not afraid to say it: The next hundred years is critical for humanity*, said Prof. Bostrom, enumerating a list of apocalyptic threats to modern man: from nuclear annihilation to natural or man-made viruses and bacteria that exterminate half of the world, to technological dangers such as a nanorobot attack. It is precisely because of these dangers that futurology is, according to the Briton, essential. We must look to the future in order to minimise the risk of everyday life (Kaniewska, 2013, p. 49).

The growing importance of futurology could be related to the fact that many predictions well-known for centuries came true to the letter. The inventions predicted at the end of the fifteenth century by Leonardo da Vinci such as screw propellers and steam engines were realised in the following centuries. The English novelist H. G. Wells, the author of such science fiction classics as *The War of the Worlds* and *The Time Machine*, in 1914 predicted that states would fight each other using an atomic bomb. His book later inspired Leó Szilárd, Hungarian physicist and initiator of the first atomic bomb. Wells himself gained a reputation as “a visionary of total war.” And, invented by another Englishman, George Orwell, the slogan “Big Brother is watching you” is not only an element of popular culture, but also the reality of many streets and buildings with CCTV systems (Kaniewska, 2013, p. 49).

As the well-known Polish political scientist Prof. Chodubski pointed out, “predicting the future is an important research challenge. It is dictated by both the theory and practice of life, especially the need to prepare human action for the changing realities of socio-economic and political life. Visions of the future are a major stimulus activating any entity seeking to realise certain goals, aspirations; they allow us to concretely and objectively analyse the contemporary world not only with an eye to the present, but also to the near and distant time horizon.” In his view, scientific forecasting is always associated with analysis of a particular reality, the elements of which are: (1) newly emerging and existing regularities of the development; (2) establishing relevant qualitative factors influencing regularities of the development of international relations; (3) assessing the conditions and possibilities for further development; (4) formulating bold, yet realistic forward-looking objectives. Analyses should be carried out comprehensively, that is, phenomena, dependences, relationships, engagement, interaction, etc., should be identified (Chodubski, 2012).

The starting point for forecasting is usually experience, observation, common sense, intuition, and authority. These components cannot be overestimated or underestimated. Important issues in this respect are trust and suspicion. Prof. Chodubski draws attention to the fact that despite recognition of rational premises in scientific knowledge, in the field of forecasting emphasis is placed on intuition. It is noted that actors of international relations, having experience in shaping foreign policy and recognising the aspirations, objectives, goals of different actors, global and local conditions, and “empathising with” this reality, undertake to determine the directions of the future. It is a subjective approach to the international order. It may give rise to political errors, which result from an individual overview of a broad spectrum of phenomena and processes. It depends, to an important extent, on the identity and experience of the entity determining the prognosis. Extensive experience may lead to a routine overview of processes and phenomena and an underestimation of the rights of rapid change. Minimal experience, in turn, generates an exterior overview of this reality, simple trust in the processes of change, enthusiasm. These issues are very controversial in the implementation of Human Resources diplomatic policy. Opinions whether, in diplomacy, experience in the administrative apparatus should count, or whether enthusiasm is more important for the realisation of certain ideological values in international relations are conflicting. It has been noted that experienced people usually extrapolate the past into the realm of the future. Then what is revealed is continuity, stability in relations between states, nations, and other actors of the international order (Chodubski, 2012).

Intuition – highly important in heuristics – is an influential orientation in humanistic studies, but the political science world refers to it dichotomously. On the one hand, it is criticised as subjective perception of the world, on the other, it is believed to be highly significant in decision-making by statesmen, who are not able to always refer to expert opinions on given issues. In general, in a political world that makes decisions both on an international and international scale it is important to use emotional premises, especially in *ad hoc* situations. For decision-makers, intuition replaces the function of advisors and experts. It is impossible not to agree with the conclusions of Prof. Chodubski who writes about prediction that: *firstly*, scientific prognosis is one of the fundamental challenges and vocations of political science research, including the field of international relations; *secondly*: the credibility of scientific prognosis depends on methodological awareness and its realisation by researchers; *thirdly*: the state of prognostic research in Poland and in the world is, in the field of international relations, a reflection of the development reality of this discipline. Descriptive, instrumental, and ideological functions usually obscure explanatory and predictive ones in practicing the discipline; *fourthly*, international prognosis is largely dictated by diplomatic practice; it is expected to formulate forecasts on the evolution of international relations and operational prognoses, the consequence of which is referring to intuition, reflection as a method of predicting the future; *fifthly*, an important driving force of modern interest in scientific prognosis is radical, civilisational transformation, including the development of the information society; threats to man resulting from the scientific and technical development have caused an explosion of futurological interests, such interests hold a more and more established position in the world of science (Chodubski, 2012).

To this should be added that, as noted by Michio Kaku, predicting the future is a task beyond a single person. The scope of human knowledge is simply too broad. In fact, most forecasts were incorrect because they reflected only the individual point of view of its creators (Kaku, 2010, p. 9). We can try to prevent this by the use of groupthink.

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Streszczenie

Fututrologia i heurystuka (z posthumanistyka w tle). Wybrane zagadnienia

Prognozowanie zjawisk społecznych bywa pod wieloma względami utrudnione. Wynika to stąd, że w naturze tych zjawisk tkwi silne i wielostronne powiązanie z innymi zjawiskami społecznymi; ale nie tylko – także fizycznymi czy biologicznymi. Treścią publikacji jest przedstawienie wybranych problemów, z jakimi borykają się aktualnie – zwłaszcza w naukach społecznych (w tym także w naukach politycznych) – futurolodzy. Choć artykuł przedstawia różne metody badawcze, ich klasyfikacje itd., to skoncentrowano się przede wszystkim na metodach heurystycznych: ich genezie, zasadach, sposobie wykorzystania.

Słowa kluczowe: futurologia, metoda intuicyjna, heurystyka, czas, posthumanistyka