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THE NEED TO BELIEVE IN THE POWER OF REASON AND IN A RATIONAL ORDER

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Summary. The lecture aims to discuss the limitations of scientific knowledge and their consequences in research on changes in human behavior and development. The starting point is the problem of trust in scientific knowledge. I am looking for the sources of the loss of confidence in knowledge based on facts in two areas: (a) the formation of post-formal ways of thinking in the cognitive development of an individual after adolescence in dealing with many possible solutions to real problems encountered in life, and (b) the lack of a "good" theory of human behavior and development in psychology, that is, a theory that is not only correct from a formal point of view but also useful in social practice. In this context, I suggest the need to repeat the measurement of the behavior and development we are interested in in the process of introducing systematic modifications to improve the theory and/or research procedure until we find that the model built in this way is useful in predicting and explaining dynamic changes in the functioning of people and groups. social situations in real situations.
Key words: scientific knowledge, reasoning, cognitive limitations, good theory of changes in behavior and development

Introduction

The title of the lecture may intrigue and even arouse resistance. It covers the relationship of contradiction between belief and the scientific image of the world, established in popular thinking.

In the lecture, I refer to the criticism of empiricism presented by Adam Niemczyński, initiating a panel discussion on the theory of human development at the 24th National Conference of Developmental Psychologists (UKSW, Warsaw, 2015). In the first panel organized by Adam Niemczyński, I strongly supported empiricism in psychology (see Trempała, 2017). Please treat the title of this lecture as

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an intellectual provocation. I have not changed my views on the importance of empirical facts in scientific knowledge. However, I wonder about the limitations of scientific knowledge and their consequences.

Psychology used to be concerned about the lack of a single, general and comprehensive theory of human behavior and development. Today something else is starting to worry me. While modern science is based on the belief in the "power of reason" and the universal perfection of the principles of formal logic in describing and explaining reality, there are many indications that nowadays, despite increasingly better education and wider access to information, or perhaps because of this reason, public trust in evidence-based science is declining.

Generally speaking, we see increasing signs of loss of Enlightenment respect for scientific knowledge in social life. Resistance to the Enlightenment is not new. It has its own history. Its manifestations are changing (Phillips, 2020). Nowadays, this phenomenon is expressed, among others, in:

- the increasing popularity of conspiracy theories related to the intellectual laziness of Internet users, wallowing in nonsense and half-truths (which strengthens **deviations from rationality**),
- increasingly brazen and unpunished lies, intellectual frauds and manipulations of social awareness to achieve the goals of current policy and marketing needs (which strengthens **resistance to facts**, expressed in the tendency to reject knowledge based on facts),
- in the decline of the authority of scientists, who sometimes engage in mindless media debates in which scientists are unable to cope with the unjustified, accidental associations of their participants (which reveals **the gap between scientific and common knowledge**).

We say we live in the **post-truth era**. This term was announced by the *Oxford Dictionaries* as the word of the year 2016, and the phenomenon itself has recently become the subject of empirical research and quite serious analysis in the social sciences (see, e.g., Marmion, 2019; Phillips, 2020).

Two questions arise in this context:

(1) Where does people's resistance to facts come from, expressed in the tendency to reject knowledge based on facts, deviations from rationality and the observed distrust and even ignorance of scientific knowledge?

(2) No less important is the question of what this means for the scientific disciplines in which scientists work they collect facts and use them to describe the image of the world and look for applications of scientific knowledge in social practice.

Finding answers to these questions is not easy. It exceeds the boundaries of one discipline. However, it seems that the belief in the "power of human reason" and the rational order of the world is not enough to find comprehensive answers.

Nevertheless, I put these questions at the center of the presented lecture. Out of necessity, I will limit myself to issues that are close to me as a developmental

psychologist. I will look for the sources of the decline in social trust in theories based on facts and scientific knowledge in two areas: (a) the formation of post-formal ways of thinking in the cognitive development of an individual (at the **ontogenetic** level), and (b) the lack of a "good" theory of behavior and human development in psychology (at the **epistemological** level).

Development of logical thinking

I will start with the problem of cognitive development in ontogeny. I will briefly address the thesis that: *The individual's cognitive development does not proceed solely towards increasingly more perfect forms of logical thinking and does not end in adolescence when the ability to use formal logical operations is achieved*.

Jean Piaget established in psychology the belief that the cognitive development of children and adolescents proceeds in a universal, necessary and unchanging sequence from sensorimotor intelligence (0), through pre-operational ideas (I) and concrete operations (II) to formal logical operations (III), which undergo consolidation in adolescence (IIIB). Piaget identified the stage with maturity and the end of people's cognitive development, and in fact with the genesis of scientific cognition, which was the basic goal of his great research project.

I will ask perversely: what does it matter if an individual achieves the ability to use consolidated methods of formal and logical reasoning if they often turn out to be useless in solving problems encountered in everyday life?

It should be emphasized that to this day no one has questioned the sequence of changes in the development of logical reasoning in children and adolescents described by Piaget. Doubts only apply to:

(a) age limits, and
(b) what happens in the cognitive development of an individual after adolescence, after achieving the ability to reason formally and logically.

At the end of the 20th century, the number of empirical reports began to grow exponentially, the authors of which proved that **non-operative or post-formal** ways of cognition develop after adolescence.

An extremely interesting dispute has arisen as to whether the ways of thinking identified in adulthood are, for example, relativistic (Perry, 1970; Sinnot, 1984; 1998), dialectical (Riegel, 1975; Basseches, 1980), or inter-systemic (Labouvie-Vief, 1980; 2003) or mata systemic (Commons, Richards, Kuhn, 1982), is an expression of: (a) a **revisionist position**: qualitatively new forms of cognition compared to Piaget's, emerging in human development after adolescence (e.g. relativistic or dialectical thinking), or (b) **conservative position**: further development of formal operations described by Piaget, their further consolidation (e.g. metasystemic – logic of a higher order than described by Piaget).

In my research in this area, I initially opted for a revisionist position, in the belief that **cognitive development is not one-dimensional**, in line with the

direction of logical reasoning described by Piaget, and **does not end in adolescence** (Trempała, 1986; 1989). At the same time, my belief in the power of reason and the usefulness of logical reasoning in solving real problems began to weaken as a result of research on children and adolescents' resistance to the temptation to cheat (Trempała, 1993). In a natural experiment, I proved that resistance to fraud increases not only with the level of development of logical and moral reasoning of the subjects but also depends on the situation of temptation: **There are no honest people in general, they are honest depending on the situation**.

My doubts were deepened by the suggestions of many researchers that educational and technological progress has expanded people's access to information, but its surplus exceeds the cognitive capabilities of an individual in a coherent approach: (a) it increases the **impression of chaos** (Obuchowski, 1997) and **information stress** (Ledzińska, 2002); (b) generates **cognitive uncertainty and departures from rationality**, expressed in cognitive biases and errors described, for example, in social psychology (see Kruglanski, Ajzen, 1983; Kahneman, 2012; and in Polish literature: Mądrzycki, 1986; Lewicka, 1993 et al.).

Today I am not sure that rejecting the conservative position is a mistake. I lean towards an integrative position. I see Piaget's reasons, but also his critics at that time, pointing to alternative paths of cognitive development (see, e.g., Siegel, Brainerd, 1978, and Labouvie-Vief, 1980; 2003).

When thinking about the sources of people's trouble dealing with facts, I focused my attention on two issues:

- **The contextual nature of human cognition**. Cognition is only possible in the context of a specific cognitive system (e.g. point of view, cognitive perspective or assumptions underlying the expressed judgments and their justification);
- **Limitations of logical systems** in removing cognitive uncertainty related to the multitude of possible judgments/solutions depending on the adopted cognitive context.

Development of contextual thinking

In my research on the development of contextual reasoning in early adulthood (Trempała, 1989), I used Gilligan and Marphy's (1979) 9-point scale operationalizing Perry's concept of epistemic commitment (1970).

Because I had trouble clearly identifying specific stages/phases, I distinguished three stages of contextual reasoning according to Perry's (1970) three categories of nine levels of growth in epistemic commitment: (a) modified judgment dualism; (b) discovered relativism; (c) a developed commitment to relativism (see the discussion: Schommer, 1990).

Stages of development of contextual reasoning

(Trempała, 2021, pp. 96–99)

Stage 1. **FORMISM**[2]: absolutism and certainty of judgment. Absolute judgments and unambiguous solutions concerning authorities or standards set by authorities. Statements often contain contradictory judgments and/or their justifications. The individual is not aware of their contradictions and avoids discussing alternative judgments/solutions to the problem.
Stage 2. **UNCERTAINTY**: awareness of contradictory judgments and confusion. Typical statements for this stage often begin with the statement: "and yes…, and… no." The individual formulates contradictory judgments, and is aware of their contradiction, but does not understand it and cannot resolve it. Even if they can justify separately each of the contradictory directions of judgments, they are not able to choose between them. Hence, they usually end their statements with the statement: "I don't know."
Stage 3. **CONTEXTUALISM**: relativity of judgments. Typical statements for this stage often begin with the statement: "It depends…", accompanied by the belief that there are many possible solutions to the problem and that they are all logically equivalent. However, the individual chooses a specific answer or way of thinking from many possible ones, considering them, for some important reason, as better than others in a given situation/task.

The results of the discussed empirical research showed that the development of formal operations in logical and moral reasoning is a necessary, although not sufficient, condition for the development of contextual reasoning: people using contextual ways of reasoning achieved the ability to use formal operations, but not all people achieving the ability to formal thinking used contextual reasoning.

The results of this research also suggested a hypothesis worth testing, that in striving to remove anxiety associated with cognitive uncertainty, an individual looks for pragmatic ways of thinking in solving complex problems.

To my knowledge, the idea of the development of pragmatic thinking after adolescence was first explored in developmental psychology by Labouvie-Vief (1980). She pointed out that while adolescents see possibilities in the real world, adulthood requires a change in the use of logic as a tool in integrating the cognitive-affective complexity of real problems. Further research on her concept of the development of intersystemic integration (e.g. Labouvie-Vief, 2003; see Michalska et al., 2016)

[2] I do not insist on calling Stage 1 "Formism." We could call it "logicism" or logical "constructionism." Due to the numerous paronyms in science, I would like to clarify that by saying by formism I simply mean formal-logical ways of reasoning and solving problems.

suggests that in adulthood something that can be called epistemological "disengagement" gradually occurs – the subject moves away from the context of rational assumptions towards a more intuitive and instrumental treatment of logic in solving problems/tasks.

To sum up, it can be said that people **cope with the facts they encounter in life using various cognitive forms/capabilities available at a given age, depending on the needs, goals and values they want to achieve in the short or long term**.

Firstly, not only children have difficulties in dealing with facts (due to the limitations of pre-operational forms of cognition), but also adults capable of formal-logical thinking (due to the limitations of classical logic). The reasons for this are different and need to be thoroughly described and understood (the fourth Copernican revolution compared to the three revolutions described by Piaget).

Secondly, people are not immune in their thinking to facts "in general". They can adjust their way of thinking to the possibilities and regulatory needs in solving real problems/situations (pragmatism in applying logic).

Thirdly, the discovery of cognitive relativity after adolescence and the achievement of the ability to think contextually does not mean that this is the only way of thinking of people or the last stage of cognitive changes possible in ontogeny. Systematic tracking of cognitive changes after adolescence in dealing with facts that occur throughout a person's life can deepen the understanding of the "logic" of cognitive development.

No "good" theory of behavior and development

In psychology we need a "good" theory, including the psychology of human development, that is, a theory that is not only correct from a formal point of view but also useful in social practice.

What does it matter if a researcher managed to construct a formally "elegant" theory of something that is confirmed, even in the results of well-controlled and replicated experimental studies, if it does not "work" in real situations or simply its functionality and usefulness have not been well-tested in practice?

The reason for people's loss of trust in facts and scientific knowledge may be the problems of science in dealing with the description of facts and in explaining the studied reality (epistemological perspective).

Reasons for failure

Two reasons are most often given for failures in research on developmental changes (see, e.g., Baltes, 1987; Lerner, 2006; Overton, 2006; 2013; Bornstein, Lamb, 2015; Lerner et al., 2015 et al.):

- conceptual defects, e.g. the primitive dualism of key problems of traditional developmental psychology regarding the **nature of developmental changes**,

i.e. quantity – quality, continuity – jump, constancy – variability or generality – partiality, which cannot be clearly solved, as well as **their mechanisms**, i.e. inheritance – environment, maturation – learning;
- methodological problems in testing models derived from development theory, related to, for example, (a) the mismatch of data measurement and analysis methods to the complex, dynamic field of variability; (b) the excess of data, exceeding the capabilities of their mental and machine processing; (c) with the integration of data of a diverse nature, coming from different levels of the systemic organization of reality.

Effects of failure: Ambiguity of research results

Conceptual and methodological flaws can be considered as underlying the ambiguity of empirical research results.

- The ambiguity of the results of increasingly frequently undertaken meta-analyses of data reported by various teams of development researchers (e.g. on the effects of cognitive training, Au et al., 2015; Soveri et al., 2017; Sala et al., 2019; Teixeira-Santos, 2019);
- Recapitulations of over 100 classic psychological studies, including those in developmental psychology (Nosek, 2015), did not confirm the results of the original research, showing the instability of many regularities considered in the psychological literature to be constant, universal and certain.

Such observations allow us to talk about fluctuations in empirical statements and a loss of confidence in the accuracy of scientific knowledge accumulated about changes in human behavior and development.

The effects of failure: The gap between scientific psychology and practice

The ambiguity of empirical research results and doubt in the certainty of scientific knowledge may cause a noticeable gap between scientific psychology and social practice.

> *…the two most important varieties of psychology: scientific psychology and psychology as a social practice fall into a state of chronic isolation. They stop speaking the same language, they stop using similar tools of knowledge, in short, they stop being able to understand each other. The consequence is not only the growth of easily noticeable mutual prejudices, not only the ghettoization of each of these varieties of psychology, but above all, an escape into folk psychology* (Łukaszewski, 2011, p. 17).

This quote points to the widening gap in psychology between scientific theory and social practice. The problem becomes even more complicated when we deepen the analysis of scientific psychology with the issues of the relationship

between basic, applied and development research (see Journal of Laws 2020.0.85 of July 20, 2018; criteria for the evaluation of scientific activities). It is difficult to draw strict boundaries between basic, applied and development research. Even basic research may have hallmarks of development work (see the OECD Frascati Manual, 2015).

However, many researchers do not want or do not know how to engage in development research (R & D), and even more so how to implement research results into practice and commercialize them. This lack needs to be made up for in Polish psychology. We forget that the application of research results in practice and development work (R & D) may prove **useful** in everyday life and **increase social trust** in theory and scientific knowledge.

"Good" theory

The question arises: Why is the formal correctness of a theory not enough to consider it "good"?

From a scientific point of view, thought/idea/theory is first and basic. It precedes people's cognition and actions as well as research activities (Brzeziński, 2019; see also in ontogenetic research Karmiloff-Smith, Inhelder, 2006).

However, even the most original and correct theory from a formal point of view does not determine the truthfulness of knowledge on a given topic: two concepts may be correct from a formal point of view, but at the same time they may lead to contradictory (logically inconsistent) conclusions about the same phenomenon or fragment of reality described.

I am inclined to the view that an important criterion of truthfulness is practice, i.e. the experience of applying theory in real action: in individual and social experimentation. I derive this view from, among others, the pragmatic theory of truth (Tatarkiewicz, 1978) and the paradigmatic theory of the development of science (Kuhn, 1968)[3].

The proposed discussion on the pragmatic approach in scientific research covers the differences between two positions: logical absolutism and logical pragmatism.

Logical absolutism

This position states that *it is not important what the reality is, but what is important is that the principles of classical logic should be used in its description* (Wilk, 2017).

Problem-solving is carried out according to the principles of classical (two-valued) logic using socially agreed standards, treated as axioms that do not require

[3] See overview: D. McDermid, Pragmatism, *Internet Encyclopedias of Philosophy*, https://iep.utm.edu/ (access date: March 17, 2022).

justification. As a result, the individual confidently formulates absolute judgments/answers, rejecting or ignoring other possibilities. It can be assumed that such thinking is characterized by logical absolutism. This position corresponds to Stage 1 of the development of contextual reasoning, which I call formism.

Logical pragmatism

According to this position, *what matters is not so much what reality is like, but whether the judgments are functional and useful from the point of view of the values and goals of real action* (Wilk, 2017).

There are two premises for the above position (logical pragmatism):

The first can be derived from the postulate of the "pragmatic criterion of truth" by Pepper (1942; after: Wilk, 2017). In this approach, every cognitive system when applied to real problems is based on basic assumptions (ontological and epistemological) that cannot be justified or verified within classical logic, and therefore it cannot be said that one concept is "more true" from another: they can only be rejected or accepted depending on your own assumptions/beliefs.

The second one can be derived from multi-valued logic (e.g. from Zadeh's concept of fuzzy/indefinite sets; see Wilk, 2017; Malinowski, 2020). The choice of one of the possible judgments/solutions is determined not by whether they are true and justified, but by their degree of justification.

Both premises complement each other: they accept the existence of the real world, emphasizing the limitation of traditional logic to a specific context of expression (see Wieczorek, 2008) and/or conditions for solving the problem (instrumentalism in the application of logic: pragmatic thinking; Labouvie-Vief, 1980). The position of logical pragmatism corresponds to the above-described Stage 3 of the development of contextual thinking, which I call contextualism).

"Good" theory according to Kurt Lewin

In the discussion on the relationship between scientific theory and practice, it is worth recalling Kurt Lewin's views on "good" theory (1936; 1946).

- His famous saying that "there is nothing as practical as a good theory";
- The proposal of "action research", indicates mutual, continuous and inseparable connections between theory and practice. The source of theory in a new research area is common knowledge collected on a given topic in everyday observation of the world (see the metaphor of the street researcher G. Kelly, his student), which the researcher formalizes and then checks its usefulness in explaining and predicting behavior in real action of people, introducing systematic modifications in research procedures and theory. Generally speaking, theory is the source of practice, but its application in practice improves theory (and vice versa);

- The postulate of "field study": systematic repetition of research in everyday life situations (teaching, work, family, training, etc.) after each introduction of changes improving the theory and/or research procedure, until we decide that the model theoretical is useful in predicting and explaining dynamic changes in the functioning of people and social groups in real situations (ecological validity; see the review of research by Lewin's successors in: Trempała, Pepitone, Raven, 2006).

To sum up, we can say that research on change in behavior and development in natural operating conditions:

(a) maximize the ecological validity of the theory in describing, explaining, and predicting changes in behavior and human development. They include all variables important in real-life conditions that do not occur in controlled laboratory conditions, or whose actions in real-life situations we sometimes cannot even predict;
(b) they bridge the gap between scientific theory and social practice. They prove that the research process includes both basic research and the implementation of its results into practice, verifying the usefulness of scientific theory in predicting and explaining behavior, but also the usefulness of psychological practices in striving to change behavior and human development.

Final remarks

I see three main benefits of using a pragmatic approach in scientific research:

(a) mastering the epistemological fear of loss and cognitive uncertainty, both in individual human cognitive development and in the process of scientific cognition (Stage 2 of the development of contextual thinking);
(b) deepening the understanding between scientific psychology and practice;
(c) increasing public confidence in scientific knowledge.

Does this mean that the neorealist concept of contextual reasoning solves the problem of the cognitive development of an individual after adolescence (in adulthood), and a "good" theory based on facts collected in a repeatable way in action in the entire field of the variability of everyday situations is the only way to deal with the limitations of traditional logic? I do not know that for sure.

However, I know one thing: it is worth continuing research on the development of post-formal ways of thinking used by adults while testing the usefulness of various research paradigms in predicting and explaining the behavior and development of living organisms. Unlike physical objects, living organisms are in their nature open systems, which is yet another argument pointing to the limitations of classical logic as a universal cognitive tool.

Belief in the universality of two-valued propositional logic is not sufficient to defend the empirical paradigm in the study of human behavior and development.

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POTRZEBA WIARY W SIŁĘ ROZUMU
ORAZ W RACJONALNY PORZĄDEK

Streszczenie. Celem wykładu jest dyskusja nad ograniczeniami poznania naukowego i ich konsekwencjami w badaniach nad zmianami w zachowaniu i rozwoju człowieka. Punktem wyjścia jest problem zaufania do wiedzy naukowej. Źródeł utraty pewności w wiedzę opartą na faktach poszukuję w dwóch obszarach: (a) kształtowania się postformalnych sposobów myślenia w rozwoju poznawczym jednostki po adolescencji w radzeniu sobie z wieloma możliwymi rozwiązaniami napotykanych w życiu realnych problemów oraz (b) braku „dobrej" teorii zachowania i rozwoju człowieka w psychologii, czyli teorii nie tylko poprawnej z formalnego punktu widzenia, ale także użytecznej w praktyce społecznej. W tym kontekście sugeruję potrzebę powtarzania pomiaru interesującego nas zachowania i rozwoju w procesie wprowadzania systematycznych modyfikacji doskonalących teorię i/lub postępowanie badawcze tak długo, aż uznamy, że budowany w ten sposób model jest użyteczny w przewidywaniu i wyjaśnianiu dynamicznych zmian w funkcjonowaniu ludzi i grup społecznych w realnych sytuacjach.
Słowa kluczowe: wiedza naukowa, rozumowanie, ograniczenia poznawcze, dobra teoria zmian w zachowaniu i rozwoju

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