Review of: "On the Meaning of Psychological Concepts: Is There Still a Need for Psychological Concepts in the Empirical Sciences?"

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> *In this treacherous world*
>
> *Nothing is the truth nor a lie.*
>
> *Everything depends on the color*
>
> *Of the crystal through which one sees it.*
>
> *Pedro Calderón de la Barca*

To begin with, I would like to explain why I titled my paper ‘reflections’ and not ‘opinion’ or ‘review’. Because I don't feel smarter than Dr. Mika Suojanen, and therefore I don't feel qualified to point out what's right and wrong. His article simply prompted me to take a closer look at the psychological and cognitive aspects of human behaviour as a kind of fleeting glance at the much more general problem of the relationship between philosophy, psychology and anthropokinetics; the latter is my main field of interest.

The question asked by Dr. Mika Suojanen is undoubtedly provocative. Science as a whole, as well as its individualdisciplines, are ‘woven’ from theories. The world is too complex to be understood in all its complexity, hence simplifiedimages – theories – are necessary to understand it. However, for any theory to become reasonable and useful, it must be somehow connected to facts, experimental or observed, in what may be called ‘free reality.’ More precisely, somefragment of reality which is the area of interest of a given discipline of science. ‘Fragment’ – because no theory, which bydefinition is a simplification, can be fully universal. Therefore, in the ‘tangible’ reality we are dealing with facts, and inthe heights of abstraction – with theories, by means of specific interpretations somehow related to the facts. Nevertheless, "*since the seventeenth century, modern science has been possible only to the extent that theoretical progress precedes experiment*" [Sorman, 1993, p. 61].

Physicists are in the best situation. Their ‘fact field’ is relatively easy to observe, and the theory is placed not very high on the abstraction scale. In addition, they have a very elegant and user-friendly tool for combining facts and building theories based on them: mathematics. In this field of human knowledge, the ‘Queen of Sciences’ creates a very reliable and effective combination of reality and theory. That is why, since the 17th century, physics has achieved great successes and is still the 'locomotive' of all modern science.

Unfortunately, other scientists are much less fortunate [Cohen, Stewart, 1994, p. 12]. In biology, anthropokinetics and psychology, the distance between tangible reality and abstract theory is much greater than in physics. As a result, the cause-and-effect chain connecting reality to theory is longer and contains more hypotheses, assumptions, and sometimes even conjectures. All of them should form, in the area of high abstraction, a coherent, useful theory. However, due to its length, this chain is more enigmatic, ambiguous and prone to misinterpretations and errors than in physics. Nevertheless, usefulness (not the truthfulness!) of any theory can only be checked if the theory is reduced from the level of high abstraction to the level of tangible reality. The premises are embedded in reality, as is the end result of the application of the theory. Therefore, observations and experiments are inevitable in science, both as an initial inspiration for the creation of a theory and for the final verification of its credibility in some area of reality. It is this two-way combination of theory and reality that distinguishes pure fantasy from real science.

In this context, the statement of Israel Gelfand that Mark Latash called the 'Wigner-Gelfand principle' [Latash, 2008, p. 56] sounds very instructive. It reads:

> *Eugene Wigner wrote a famous essay on the unreasonable effectiveness of mathematics in natural sciences. He meant physics, of course. There is only one thing which is more unreasonable than the unreasonable effectiveness of mathematics in physics, and this is the unreasonable ineffectiveness of mathematics in biology [Borovik, 2018].*

Eugene Wigner was physicist, Nobel Prize laureate; Israel Gelfand was outstanding mathematician with profound knowledge of physiology and neurophysiology (in Moscow he collaborated with Nikolai Bernstein). Mark Latash quotes another statement of Israel Gelfand:

> *Mathematics is not a science. It is a tool provider to help find adequate languages for natural sciences [Latash, 2008, p. 55].*

This fundamentally differs from the common image of mathematics as a 'Queen of Sciences'.

Therefore, biology, anthropokinetics and psychology need a different language of description and explanation than the alleged 'Queen of Sciences'. It seems that until now such a language does not yet exist in science [Latash, Levin, Scholz, Schöner, 2010].

Each one of us, scientists, shaped independently his intellectual 'runway' for reasoning in the area of high abstraction. For me, such a 'runway' for discussions with Dr. Mika Suojanen is the system-theoretical approach (STA), embedded mainly in anthropokinetics [Petryński, 2016; Petryński, Staszkiewicz, Szyndera; 2022].

The basic assumptions of STA are:

1. Information processing in humans may use one (or several) of the following modalities: proprioceptive, contactceptive, teleceptive, verbal and symbolic; they all form a modalities' ladder (ML);
2. The only observable manifestation of all internal, mental processes (e.g. introspection) is motor operation – a deliberate set of movements aimed at solving a specific task in the environment; therefore, without anthropokinetics, psychology would be blind, and without psychology anthropokinetics would be thoughtless;
3. The reception of an environmental stimulus initiates a stream of consciousness (SC) consisting of the following links: perception – attention – motivation – intellect – prediction – decision – skills – efferent copies – physically observable motor operation [Petryński, 2016; Petryński, Staszkiewicz, Szyndera, 2022].
4. The relations between the different 'rungs' of ML and between SC links are nonlinear, systemic; therefore – unlike a mathematical equation – they are able to create a qualitatively new, unpredictable system effect.
5. The 'doubly systemic' (ML and SC, orthogonal to each other) nature of psychological processes means that they are not subject to experimental research, especially those 'monkeyed' from physics or technology, based on the unambiguous assignment of cause and effect (repeatability).

In the STA, the essential difference between the physical body and the living organism (or even structure) is that the former only passively submit to physical laws external to them, while the latter additionally have an internal purpose and, to some extent, actively shape future events on par with the laws of physics.

Nikolai Bernstein called several interconnected stimuli – sometimes with different modalities – 'sensory syntheses' [Bernstein, 2021, p. 5]. They enable quick and efficient handling of extensive information complexes, in anthropokinetics traditionally termed 'chunks'. In this regard, it is very instructive to compare the hunting strategies of cats and snakes [Gärdenfors, 2006, p. 39].

The first (reception of stimuli) and the last (final motor response) SC links are directly observable. Sensory impulses, produced by the sensory organs, and motor impulses, sent from the CNS to the muscles, can be observed and measured using appropriate laboratory devices. However, the links between perception and remembering efferent copies – i.e., the domain of introspection – do not lend themselves to any experimental research. In this field of knowledge, scientists are doomed to hypothesize and build abstract, mental models of the phenomena and processes being studied. Of the three tools of the intellect – intelligence, instinct and intuition – the latter is crucial in this area.

Let's take an example. Albert Einstein was not an outstanding mathematician. His mathematics teacher at the Technical University of Zurich, Hermann Minkowski, called him a 'lazy dog'. However, Einstein was endowed with an incredible physical intuition that made him one of the greatest minds of all time. The 'mathematical outfit' for special relativity was made by Hermann Minkowski, and for the general theory of relativity by Marcel Grossmann. So the question arises: if Einstein had been an outstanding mathematician and had become entangled in tertiary mathematical details, would he have been able to come up with such big, groundbreaking theories? The answer is: Probably not!

Nowadays, psychology (and also anthropokinetics) needs more intuition – like Einstein's – than 'new, original, experimental data'. Unfortunately, as Henry Mencken noted, "*Science, at bottom, is really anti-intellectual. It always distrusts pure reason, and demands the production of objective fact*" [Mencken, 1956, p. 411]. It is worth remembering that when in 1921 Albert Einstein received the Nobel Prize for the photoelectric effect (1905), the Royal Swedish Academy forbade him to list his greatest achievements: special (1905) and general (1916) theories of relativity, although already in 1919 Arthur Eddington observed phenomena consistent with the latter. Note that the matter of psychology (and anthropokinetics) is much more complex than that of physics, so we need more abstract hypotheses and theories than physicists. Therefore, experiments similar to physical, based on reproducibility of results and mathematical description, are not suitable for biology, anthropokinetics and psychology.

To sum up, biologists and, even more so, psychologists don't have as elegant and user-friendly, fairly reliable 'rails for thought' — mathematics — as physicists do. Hence, it is necessary to invent a new, more abstract philosophy of research, primarily mental, and not only to follow in the footsteps of physicists. In this context, the words of Bertrand Russell sound very instructive: "*The power of using abstractions is the essence of intellect, and with every increase in abstraction the intellectual triumphs of science are enhanced*" [Russell, 2001, p. 63]. Unfortunately, high areas of abstraction – especially those inaccessible to mathematics – are also a good 'natural environment' for scientific fraudsters and counterfeiters [Sokal, Bricmont, 1998].

Let's move on to some specific comments. The very first sentence of Mika Suojanen's paper seems debatable to me. It reads:

> *It is impossible, no doubt, for anyone to deny and simultaneously acknowledge the same thing*

Sounds logical. For the same person, the same 'private language' and individual introspection. However, science as a whole is 'woven' not from facts, but from various – not only individual – interpretations. That's why Richard Schmidt wrote:

> *Since laws are the product of human creativity, different laws can be formulated by two different individuals who are examining the same observations. Laws do not automatically spring forth from the facts [Schmidt, 1988, p. 29].*

Also Niels Bohr remarked that "*the opposite of a correct statement is a false statement; but the opposite of a profound truth may well be another profound truth".* Especially in anthropokinetics and psychology the world is not as behaviouristically simple and unambiguous, as we want it to be. By the way: Bohr's life motto was: "*Contraria sunt complementa"*.

Then the author wrote: "*Cats themselves do not use psychological concepts in context*" The question arises as to what we mean by a 'psychological concept'? Let us emphasize that purposefulness, which is a basic attribute of life, cannot work without context. Thus, in STA, every behaviour of a living being must be contextual, although contextuality is not always verbally describable. Thus, in the STA, the Cartesian *res extensa* cannot exist without the *res cogitans.*

According to Tibor Gánti, every living system (not necessarily an organism) must have and use a subsystem that carries information [Gánti, 2003, p. 77]. Humberto Maturana and Francisco Varela argue that

> *Living systems are cognitive systems, and living as a process is a process of cognition. This statement is valid for all organisms, with and without a nervous system [Maturana, Varela, 1980, p. 13].*

In the STA, the phenomenon that Ludwig Wittgenstein called ‘private language’ seems differently. Man has five codes (modalities) for information processing: proprioceptive, contactceptive, teleceptive (mainly visual), verbal and symbolic [Petryński, 2016; Petryński, Staszkiewicz, Szyndera, 2022]. They all form a single, coherent system and are not fully translatable to each other. Therefore, it is impossible to verbally describe, for example, the difference between itching and tickling, or explain verbally how to keep balance when riding a bicycle. In this context, Albert Einstein's analyses of his own style of reasoning are particularly illustrative. He wrote: "*The words or the language, as they are written or spoken, do not seem to play any role in my mechanism of thought*" [Einstein, 1954, p. 25]. In this essay, Einstein offers a brilliant introspective analysis of his thinking style. By the way: it seems that the key in Einstein's way of thinking (‘private language’) were not words or numbers that form secondary codes in human reasoning, but more primordial geometry (or even some specific meta-geometry), firmly embedded in visual – close to natural, ‘pure’ sensory experiences – representations of reality. The same goes for another Giant in physics, Nobel laureate Richard Feynman [Davies, 1992].

Unfortunately, such a ‘private language’ is always unique to one person. In biology, anthropokinetics and psychology, this produces diversity, which is responsible for development, progress and evolution. However, it ‘kills’ repeatability, which is the deepest basis of any physical experimental research. Therefore, experimental research in the living world requires a completely different experimental philosophy than the philosophy of physics. This is why one of the key principles of Nikolai Bernstein's theory is ‘repetition without repetition’ (even the same motor operation is never performed exactly identically) [Bernstein, 2021, p. 156]. Jack Cohen and Ian Stewart also clearly distinguish between reproduction and replication in the process of biological evolution, which is, after all, the basis of psychological progress [Stewart, Cohen, 1997, p. 17].

In the chapter on the fallibility of the introspective method in psychology, Mika Suojanen mentions Wilhelm Wundt and John Watson. Wundt, the father of experimental psychology, ‘aped’ (sorry, Professor Wundt) the physical experimental method and applied it to psychology. John Watson, strongly inspired by Ivan Pavlov, sought to reduce the behaviour of living beings (including humans) to an almost purely physical mechanism of ‘stimulus-response’ (S-R); in fact, it underlies what Mika Suojanen calls ‘physicalism.’ But physics deals with physical bodies devoid of any internal purpose. In a sense, Wundt has set psychology on a false path. Take, for example, the bizarre – from the perspective of STA – parameter known as intelligence quotient (IQ). In psychology, the term ‘intelligence’ has not been precisely defined, but despite this, as early as 1912, William Stern developed a numerical index called IQ. This is – oh, that seductive smell of mathematics! – used even today, although no one knows what exactly it measures. For example, as rumour has it, Marilyn Monroe's IQ was higher than Albert Einstein's. In STA, every human motor operation is a ‘product’ of the three inseparable components of the intellect: instinct, intuition, and intelligence. Above all, an engineer needs intelligence; scientist – intuition. Instinct is essential for both. However, it is impossible to determine experimentally what in a given motor operation results from instinct, what from intuition, and what from intelligence. They always work as one, coherent, inseparable system.

Mika Suojanen cites eminent scholars – Wilhelm Wundt, John Watson, Burrhus Skinner, Ulric Neisser and Michael Eysenck – to support the assumption that introspection is not a reliable tool for psychological analysis. In STA, it cannot be such a tool. SC, by combining stimulus and motor response in living creatures, can produce the same results using different information-processing pathways or different outcomes with the same input stimuli. Thus, the methodology of experimental data analysis referred to by Suojanen as 'physicalism', which in fact is the basis of classical behaviourism, is not suitable in psychology. It is no coincidence that Antonio Damasio stated: "*The value accorded to images is a recent development, part of the cognitive revolution that followed the long night of stimulus-response behaviourism*" [Damasio, 1994, p. 280]. Biology, and even more so psychology, needs a specific language to describe the issues covered by the research, as well as other research strategies than those used in physics or modelled on physical experimental methods. There is therefore an urgent need to create and adopt a different philosophy and methodology of psychological research.

By the way: the assumption of five information codes (ML) avoids contradictions in Gibson's theory. Only physical bodies can 'interact directly with the environment.' In a living being, any external stimulus must first be received by the sense organs, then the information associated with it is processed in a certain way (SC) and only then can it cause any response – no longer a pure reaction! In STA, the process of perception and interpretation can take place in any modality. In other words – roughly – each modality has its 'own' intellect (instinct, intuition, and intelligence), although all together form one coherent system. Therefore, at STA, James Gibson's considerations, quoted by Mika Suojanen – with all due respect, Professor Gibson – lead to nowhere.

The Author discusses the unreliability of the introspective method in psychology and confronts it with empirical and cognitive methods. He wrote: "*When we use psychological concepts, then we are talking about some internal states, even if these are physical states*." It seems obvious that modern science is unable to connect the physical, physiological, and psychological aspects of the human physiological brain (or, more generally, the central nervous system) and the psychological mind. Mathematician Ian Stewart argued:

> *A network of 100 billion neurons – a brain – poses a serious challenge for biologists and mathematicians alike. In fact, there is no real prospect of gaining a complete understanding: the brain is too complex [Stewart, 2011, p. 161].*

As Emerson Pugh put it, *"If our brains were simple enough for us to understand them, we'd be so simple that we couldn't."*

By the way: the methodology of 'classical' experimental research turned out to be too 'tight' even in physics. James Maxwell, Max Planck and Albert Einstein – to name just these Giants of physics – conducted experiments not in laboratories, but in their minds. It seems that the power of such a mental strategy should be more widely used in biology, anthropokinetics and psychology.

Mika Suojanen mentions John Locke, David Hume and George Berkeley. They lived in the 17th and 18th centuries.

However, their ideas – as well as, for example, the ideas of Aristotle, Plato or Thomas Aquinas – can (and should) guide our way of thinking, but they cannot constitute the 'main corpus' of modern science.

Very symptomatic is Mika Suojanen's statement that "*Introspection essentially reveals the existence of psychological processes and phenomena, not their essence, as empirical psychologists and cognitive scientists have shown*." In STA, the essence of "*psychological processes and phenomena*" is not accessible with 'classical' experimental method.

In this perspective, the process of introspection acquires a different, more complex, 'fivefold face'. It can use not only each of these codes separately, but some, or even all, together (Bernstein's 'sensory syntheses' and their equivalents in the purely abstract realm of reasoning). Moreover, they are not a sum, but a system. As a result, such a mechanism can produce – in contrast to a simple sum – a qualitatively new, unpredictable system effect that is responsible for any novelty, both biological and psychological.

Consequently, the modern scientist is in a much more difficult situation than the slave in Plato's cave. In STA, s/he is faced with five different shadows, cast by a five-dimensional, ever-changing object. Each of the shadows has its own introspection, usually not fully translatable into introspection expressed in a different modality. All together form the ultimate introspection. Therefore, in my opinion, these issues are the greatest challenge for all modern science.

By the way: already in antiquity, Aristotle formulated the 'peripatetic axiom': "*Nihil est in intellectu quod non prius in sensu*" ("*nothing is in intellect that was not first in senses*"). In STA, of course, this applies to sensory codes (proprioceptive, contactceptive and teleceptive), because verbal and symbolic modalities do not have their 'own' senses. Almost two thousand years after Aristotle, Gottfried Leibniz supplemented the peripatetic axiom with the words: "*... Excipe: nisi ipse intellectus*" ("*…except the understanding itself*"). This undoubtedly applies to those verbal and symbolic modalities – specific only for people – not directly related to reality, and sometimes completely detached from it.

All ways of processing information underlie the human ability to build a complex, abstract representation of reality (Nikolai Bernstein called it a 'spatial field') and embed a specific mental-motor operation in it. First in it, and later in reality, even without inspiration from stimuli coming from the environment. This created perhaps man's most valuable mental capacity that placed him at the top of the pyramid of life: the ability to make far-reaching predictions with high reliability. Such predictions, although not so far-reaching, build the purposefulness necessary for every living organism.

In my opinion, the following sentence in the article is very symptomatic:

> *Even if the causes of a psychological process would be physiological, and the psychological process would be nothing more than a physical state of the brain, we are nevertheless aware of this state, to which we refer by a psychological concept.*

Psychological, physiological and physical (only the latter directly observable) phenomena and processes in humans and other living creatures do not form a sum, but a system. Unlike a mathematical equation, it can produce an unpredictable, qualitatively new systemic effect [Morawski, 1996; Jervis, 1997; Poczobut, 2006], which is not reducible to its components. In STA, for example, the systemic mind is formed by instinct, intuition, and intelligence. Let us repeat: from the observation of human behaviour, it is not possible to determine which aspects result from instinct, which from intuition, and which from intelligence. Modern science is unable to explain their connections. In this respect, the 'classical' experimental method leads to nowhere. Empirical psychologists and cognitive scientists see different 'shadows' of the psychological mapping of reality. Some elements, clearly visible in one perspective, are completely transparent in the other.

In this context, the following words of Nobel laureate, physicist Richard Feynman, sound very instructive:

> *Scientific knowledge is a body of statements of varying degrees of certainty – some most unsure, some nearly sure, but none absolutely certain. Now, we scientists are used to this, and we take it for granted that it is perfectly consistent to be unsure, that it is possible to live and not know [Feynman, 2007].*

Consider that the matter of physics is much simpler than that of biology, anthropokinetics and psychology.

The article by Dr. Mika Suojanen provokes a more general reflection. The author presents a typical for modern scientists 'erudite style' of writing, in which quotes are very important. This author said something, that author said something else, another still something else... The author tries to use all this knowledge in his/her article. However, each scientist builds his/her own representation of reality. They differ from each other. Thus, such an 'erudite style' sometimes resembles an attempt to mount a wheel from a tractor to a pram. In this context, the words of William James that "*the essence of genius is to know what to overlook*" sound very symptomatic and contain an extremely deep content, inversely proportional to the lapidary form.

Another extreme is the 'postmodern style', which leads to the phenomena described by Alan Sokal and Jean Bricmont in their famous book on fashionable nonsenses [Sokal and Bricmont, 1998].

However, as early as the 19^{th} century, Thomas Huxley stated that "*every great advance in natural knowledge has involved the absolute rejection of authority."* Authority – but not existing knowledge. That's why I prefer the "conductor's style" of writing. The other authors, no matter how big their names are (it's no coincidence that my nickname in science is 'Barbarian'), are simply musicians in the orchestra in which I am the conductor. In short, as an author, I have to build my own scientific picture – as complete as possible – of the fragment of reality I am talking about. And take full responsibility for this picture, without hiding behind the backs of Albert Einstein, Nikolai Bernstein, Paul McLean, James Gibson, Philip Zimbardo or other Giants of Science (with a capital "G" and "S"). Hoping that my mental construction will be accepted by other scholars.

In a scientific article, a typical 'man on the street' or an ordinary journalist is looking for obvious knowledge, as simple and 'edible' as possible. However, the scientist should look for something much more valuable: reasonable doubts. For science is not a Great, Universal Perfection, elegant, complete, and therefore... more or less sterile. One of the greatest mathematicians of all time, David Hilbert, tried to make mathematics complete and closed. Fortunately, to no avail.

Because the Science is ‘never ending story’, and its fertility is driven by inconsistencies. Some of them are what Nassim Taleb called the ‘Black Swan’, i.e., a seemingly insignificant phenomenon whose explanation becomes a milestone in science [Taleb, 2010, p. xxii]. In physics, such a ‘Black Swan’ was, for example, the radiation of a black body. In my opinion, Dr. Mika Suojanen's article (and also, I hope, my reflections) contains many debatable issues. And that is why it should be presented to a wide, scientific audience.

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