Applications of psychological knowledge: Five theses and an example

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ABSTRACT

Objective
The objective of the paper is to analyze problems with applications in psychology, reflect on their origins, and seek ways of overcoming them. The presented theses are illustrated with an application example: the use of the Circumplex of Personality Metatraits for the comprehensive diagnosis of the personality and the emotional and social functioning of children and adolescents. This application project involved the development of an extensive theoretical model as well as tools for testing a total of 36 variables at different stages of human development in individuals ranging from one to 25 years old. Post-diagnostic materials for profiled interventions were also designed.

Thesis
– Thesis 1: A negative approach to applications is driven by the topos of the scholar as an observer and truth-seeker (Pythagorean legacy).
– Thesis 2: A positive approach to applications has been inherent in science from the very beginning (Platonic and Aristotelian legacy).
– Thesis 3: Today's problem with the application horizon of science is attributable to advanced scientific specialization (Pythagorean justification).
– Thesis 4: An application-oriented criterion for selecting research problems poses the risk of obtaining fragmentary answers (the scholar's mind as Milton's/Selfridge's pandemonium).
– Thesis 5: What is needed to maximize the scholars' potential for applications is a new function: that of an agent-manager (just as in the case of artists).

Conclusions
Science and applications synchronized in the Aristotelian rather than Pythagorean spirit may bring about substantial scientific as well as practical benefits. The possibility of

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such a synchronization is indicated by cases of successful applications; however, systemic change is needed for them to become the rule rather than the exception.

INTRODUCTION

The scholar conducts scientific research. Depending on the domain, the extent of available knowledge on the subject, and the research paradigm, his research objectives may be variously formulated, but they can be generalized to the question: "what is the state of things?" in a given area. Answers are usually provided in the form of papers published in scientific journals or, increasingly less often, in chapters or monographs.

Thus the standard sequence of a scholar's activity can be described as the question–research –publication triad. What is missing from this sequence is application understood as the implementation of knowledge in practice, or using scientific findings to solve real-life practical problems, whether of economic or social nature. On the other hand, in the public sphere, in social discourse, and in the economic world, there are increasing calls for applications. Indeed, applications are sometimes postulated as a criterion of the quality of scientific knowledge, and certainly as a criterion for financing research. In the area of academic evaluation, this approach has led, *inter alia*, to the adoption of a formal criterion concerning the social and economic effects of research, which directly translates into the public financing of universities that can demonstrate such effects.

However, many psychology scholars have an ambivalent attitude towards applications. Ostensibly there is a consensus that applications are important and valuable, but at the same time *applied sciences* are often considered the poor relations of *true science*, which does not concern itself with applications. While many scholars would like to see the practical consequences of their findings, they are not sure how to get there.

This paper formulates five theses describing and elucidating this application-related ambivalence, and then presents an application example in the context of those theses. While the presented considerations and argumentation concern psychology and the applications of psychological knowledge, they are likely to be relevant for other domains of science, and in particular the social sciences.

PART I – FIVE THESES ON THE PROBLEM
WITH APPLICATIONS IN PSYCHOLOGY

Thesis 1: A negative approach to applications is driven by the topos of the scholar as an observer and truth-seeker (Pythagorean legacy)

In European culture, scientific endeavor has a rather pronounced axiological component – the overarching value of science is truth. Scientific activity as a quest

for truth can be variously distinguished from that which is not scientific and that which is not (only) a quest for truth. There are several topoi in culture which address these questions in different ways. And, as is often the case with topoi – while dating back to antiquity they also organize contemporary thinking about science.

Pythagoras can be considered the patron of a topos negatively disposed towards applications. According to the testimony of Diogenes Laertius (3rd century BC / 1984), Pythagoras *compared life to the Great Games, where some went to compete for the prize and others went with wares to sell, but the best as spectators; for similarly, in life, some grow up with servile natures, greedy for fame and gain, but the philosopher seeks for truth.* The Pythagorean philosopher became the prototype of a scientist seeking truth, and not interested in any gain from it. In this topos, a selfless quest for truth is contrasted with self-interested gain sought after by the competitors and merchants from the abovementioned metaphor.

The staying power of this topos is evidenced by the fact that up to this very day all successful PhD candidates taking the doctoral oath vow that they will pursue science *not for the sake of gain or vain glory, but to spread the truth and its light* (*non sordidi lucri causa nec ad vanam captandam gloriam, sed quo magis veritas propagetur et lux eius*). If science is taken to be a quest for truth, as opposed to greed and vanity, it will have hardly any room for applications. The latter are not an inherent element of truth-seeking and they come dangerously close to what the newly-fledged doctors pledge to refrain from.

The opposition between truth-seeking and self-interest has been additionally amplified by Poland's history in recent decades. At the time of the People's Republic of Poland, scholars, and especially social scientists and humanists, were pressured to subordinate their research activity to ideological purposes. Under the circumstances, many of them preferred to embrace the topos of a truth-pursuing scholar who sits in the grand stand like a Pythagorean philosopher, looks on, and seeks to comprehend, but himself does not participate in daily life, and so is immune to ideological exigencies. In the aftermath of the 1989 systemic change and the advent of the Third Polish Republic the ideological pressure relented, but the new opportunities brought about by capitalism provided renewed fuel for the Pythagorean topos. Knowledge became a commodity with customers willing to pay for it. However, from the scholars' perspective, the knowledge in demand was (a) somewhat obsolete, already to be found in handbooks, and so it was not particularly fascinating for those who endeavor to discover that which is not yet known, and (b) generated at the university, generally independently of the needs of the world of praxis. Indeed, it was "ready-made" knowledge, already generated and established, that could be applied in practice. It was then as if Pythagoras had left the grand stand at the games, visited the market, and advised the merchants how to increase their profits (a thing rather obvious to him) and the competitors as to ways of increasing their likelihood of winning, while securing a share in their gains for himself. However, a Pythagorean scholar would not do so in his capacity of a researcher, as that would mean a renunciation of his duties: observation of the games from the grand stand and seeking truth for truth's sake. From the perspective of the Pythagorean topos, he would have become akin to the merchants and competitors. As a result, even though after 1989 the political system and cultural

climate in Poland changed, the cultural discord between the Pythagorean quest for truth and various practical consequences (including self-interest) was still very much alive, and was overcome only by a few and on rare occasions.

However, the Pythagorean topos does not have to be, and is not, the only organizing principle of thinking about the relationship between science and its applications. Moreover, alternative approaches to the issue are of an equally respectable antique provenance.

Thesis 2: A positive approach to applications has been inherent in science from the very beginning (Platonic and Aristotelian legacy)

Despite the fact that the Pythagorean topos is deeply rooted in European culture, the history of every particular science shows that actual scientific activity has not followed it from the very beginning. The various sciences emerged and developed as a result of specific practical needs: mathematics arose in response to the need for measurements and calculations associated with construction and management (Więsław, 2011); chemistry – as noted by Lichocka (2011) – from the chemical craft; zoology – in an attempt to take opportunities and avoid dangers related to animals (Jura, 2011); botany – connected to medicine from the very start – in an evident effort to contain diseases (Zemanek, 2011; Gryglewski, 2011). One could mention here the circumstances of the emergence of every science, as all sciences initially consisted of practical knowledge, being prototypical responses to application demand, already in the ancient world. However, applications were characteristic not only of the particular sciences. At the heart of philosophy, ancient Greece developed a topos of science that stood in stark contrast to the Pythagorean proposal.

Raphael's fresco entitled *The School of Athens*, displayed in the Vatican Museums and reproduced in numerous philosophy handbooks, features two founding fathers of European philosophy, science, and thinking about science: Plato and Aristotle. In that painting Plato points to heaven, symbolizing a world cognized with reason, while Aristotle points to the earth, indicating the need for an empirical complement to rational knowledge. However, despite substantial differences between them, the two thinkers represented, or rather initiated, a different topos of a scholar than Pythagoras. In contrast to the latter, Plato and Aristotle could be considered the founding fathers not only of European science, but also of the application of scientific knowledge to the world of praxis. Each of them did it in his own way, accentuating different elements of this process, but it seems that the general proto-idea of application was present in their thought.

Having constructed an idealist ontology, epistemology, and ethics, Plato proposed a comprehensive implementation of his theoretical findings: the building of an ideal state supposed to be founded on the newly discovered principles governing the world (Plato, 4th century BC / 1994). Plato's republic was obviously a totalitarian state, and luckily he was not able to put it into effect, but nevertheless a transition from the discovery of how things are to a proposal of a large-scale practical implementation of that discovery constitutes a prototype of application. Reale (1996), the author of a handbook on ancient philosophy, calls Plato's

republic *the summa of Platonism* (p. 287), indicating that this fragment of Platonic legacy is not an accident or philosophical digression, but lies at its core. Obviously, it is an ominous prototype since the first application planned on such a large scale in the domain of the humanities and social sciences turned out to be destructive (cf. Popper, 1945/1993), and it is little consolation that the world may have been free from it for two thousand years, until it was finally implemented in 20th century totalitarian regimes. The history of Plato's republic – the prototypical application in the social sciences and humanities – appears to tell us not only that science and application were inextricably intertwined in antique thought underpinning European science, but also warn that Hippocrates's principle p*rimum non nocere* (*first, do no harm*) should also encompass applications.

Aristotle – the other founding father of European science featured in Rafael's Vatican painting – arranged the sciences in a hierarchy, with the theoretical ones (including metaphysics) being at the very top (Reale, 1996). However, in that case the special status of the philosopher-metaphysician sprang from a different source than that of the scholar in the Pythagorean topos. In the first paragraphs of his work that was to shape European thinking about philosophy and science for millennia, i.e., the *Metaphysics* (4th century BC / 1990), Aristotle analyzed distinctions between different types of knowledge and demonstrated the superiority of the sciences dealing with the causes over those that merely deal with the outcomes. His examples of knowledge of outcomes include: (a) physicians' knowledge about what cures are effective for what illness and (b) craftsmen's knowledge about the activities that need to be done to obtain a specific outcome of craftsmanship. Knowledge about the causes of the effectiveness of cures and craftsmen's activities is more valuable than knowledge about their outcomes alone (without an understanding of *why* those outcomes *are the way they are*). One of the main issues in Aristotelian metaphysics is the nature, classification, and operation of causes. But this interest in increasingly general causes arose in successive levels complementing knowledge about outcomes. In today's parlance, one could venture to say that Aristotle's metaphysics is a kind of complement to and justification of application knowledge.

The relationship between Aristotelian knowledge about the effectiveness of certain sequences of activities and knowledge about the causes of their effectiveness is then completely different from the relationship between the Pythagorean scholar – an observer and truth-seeker – and the merchants and competitors from the games metaphor. In the case of Aristotle – philosophical knowledge about causes is a deepening of practical knowledge about activity and effects, while in the case of Pythagoras philosophical knowledge derived from the observation of the games is totally unrelated to the practical knowledge of the competitors and merchants.

Thesis 3: Today's problem with the application horizon of science is attributable to advanced scientific specialization (Pythagorean justification)

If according to the above interpretation particular sciences developed in response to practical demands, and for the prototypes of European scholars – Plato and Aristotle – scientific activity was intrinsically associated with applications of sorts

(albeit they obviously did not use the term), then why the topos of the Pythagorean scholar did not fade into oblivion in centuries past, but continues to hold its allure to this day? It seems that its staying power results from the far-reaching specialization of sciences. At the time of Plato and Aristotle, and also over the next several centuries, one man or just a few men could know everything or almost everything known to humanity. Ancient scholars dealt with most, or sometimes almost all sciences at the same time, and thus the practical application of knowledge came to them naturally. However, modernity brought about a major change, with some claiming that Leibniz was the last European scholar who knew everything. As a result of the intensive development of the individual sciences and the growing body of knowledge, scholars knew increasingly little about progress in other sciences. Today one could even argue that researchers dealing with specific problems within a discipline, such as psychology, know less and less about the findings accumulated on other problems within the same discipline.

Today the pursuit of science means the pursuit of a particular science and of a specific issue within it, because only then is it possible to contribute to science that which is not there yet – new knowledge. However, although a scientific problem may be specific, the practical questions and problems are usually not. Therefore, the issue of applications, the practical benefits of specific research may indeed elicit in an individual scholar confusion, concern, or resistance. Consequently, the scholar may readily activate the Pythagorean topos, which imparts meaning, and sometimes also appreciation, to his very specific research efforts. When on the hot seat, he can adduce a variety of cases from the history of science, such as Einstein who was not interested in any applications of his special theory of relativity, even though it has enabled us to use GPS, without which we could now hardly imagine our everyday lives.

Thesis 4: An application-oriented criterion for selecting research problems poses the risk of obtaining fragmentary answers (the scholar's mind as Milton's/Selfridge's pandemonium)

The far-reaching specialization and accelerating development of the particular sciences also has some problematic consequences for the attitude towards applications. The everyday functioning of the contemporary psychologist-scholar is characterized by overabundance: an overabundance of scientific papers in his area of interest, which he can access immediately in online repositories as soon as they are released, but which he does not have the time to peruse, although many are interesting and well-worth reading; an overabundance of questions and research ideas he would like to address, but there are too many of them for all, or even most, to be implemented, even if they are worthwhile. A multitude of otherwise interesting research proposals compete for the scholar's attention and resources; and when there are too many of them, the scholar's mind becomes a kind of pandemonium from Milton's *Paradise Lost* (1663/2011), in which demons noisily demand attention by screaming over one another, turning the range of available opportunities into tumult and disarray.

Milton's pandemonium has been introduced to psychology by Selfridge (Maruszewski, 2011), who used it to describe the way people recognize objects in the process of visual perception, with the key role fulfilled by so-called feature detectors. As a result, Selfridge's pandemonium imposes some order and organization on the unbridled chaos of its Miltonian counterpart. Going along these lines, it seems that what could be called "application-oriented sensitivity" might potentially serve as a detector of voices worth hearing in a scholar's pandemonium. If there are so many research options, all interesting, perhaps one should select those that can be applied in the world of praxis. Unfortunately, there is no easy way out of the pandemonium as such a practical application criterion could be deceptive. The thing is that while in the European tradition science is inherently application-oriented (as shown above), the application horizon of a science and a scholar's individual perspective are two completely different things. The tempting proposal to prioritize voices calling for applications in the scholar's pandemonium implies the risk that applications will be based on narrowly designed studies, a biased interpretation of results, or generally, on science that is not good enough. This threat on the one hand derives from scientific specialization, and, on the other hand, it is a general problem of research quality as revealed by the so-called replication crisis, i.e., the fact that a substantial part of published findings cannot be reproduced (Open Science Collaboration, 2015).

From the standpoint of individual scholars, the selection of those research projects whose results could be applied in practice imposes a special confirmation-oriented frame of reference. And that is exactly what the replication crisis is about. It has shown that a confirmation-oriented research process leads to the recognition of many theses that should not be recognized because they cannot be reproduced in other studies. This crisis has certain ramifications for the problem of applications, but, as is often the case with crises – while posing a threat, it also presents some opportunities.

A number of solutions have been implemented in basic research to prevent non-reproducibility. One could argue that they amount to the gradual elimination of the partition between the scientific *restaurant* and *kitchen*. In traditional science, the client is presented with findings just like patrons are served a meal at a restaurant. They are able to taste it, but they do not know the specific ingredients or the recipe, and so they are not able to cook it themselves. As a result of the replication crisis, nowadays efforts are made to allow the restaurant's patrons into the kitchen to see how their meals are prepared and from what ingredients; they are also given a recipe describing how they can make it on their own. Moreover, only after a given meal is made by multiple patrons in different kitchens does the meal gain the status of an eligible dish. Such a procedure is rarely possible in research that is directly application-oriented because (1) full access to the kitchen is not always permissible, if only for the reason that restaurants compete with one another and guard their recipes, and (2) research is conducted within a well-defined time horizon which may not necessarily be sufficient to enable confirmation under successive sets of new circumstances.

At the same time, the above problem is also an opportunity for connecting scientific research with applications. Perhaps it is the case that successful

applications may take as their subject only those findings that were obtained in basic research seeking answers to the fundamental questions about the causes and the state of affairs, rather than research oriented towards application or even towards confirmation, and thus meeting Popper's falsification criteria (Popper, 1935/2002). Only under such circumstances can the findings come close to classically understood truth, or a description of how things are. Truth, however, in addition to the nimbus of disinterest in daily life found in the Pythagorean topos, it has yet another, non-Pythagorean and application-oriented, quality of being a precondition for effectiveness. The closer the model comes to *truth*, the more effective its application will be, just as *true* gold is more valuable than gold amalgamated with other materials.

An additional risk of application-oriented research is seeking answers within a previously delineated theoretical horizon, within an already adopted paradigm. In turn, basic research may be conducted in the luxury of being able to discard old paradigms and adopt new ones. This leads to a rather paradoxical conclusion that in the long term scientific research which is not oriented towards potential practical applications (at least not initially) could actually be the most beneficial for praxis. However, certain systemic conditions must be met to put this opportunity into practice. One of them is stipulated in the next thesis.

Thesis 5: To maximize the scholars' potential for applications we need a new function: that of an agent-manager (just as in the case of artists)

As it was already stated above, today one needs to be highly specialized to be able to expand scientific knowledge and discover something that was not known before. A scientific discovery must necessarily be very specific, and so science demands a focus on the detail. On the other hand, an application makes it necessary to depart from the specific detail and take into account elements from different levels. The two activities require quite different competences, and so the expectation that the same person can deal with both is unfounded, or perhaps doomed to failure in a systemic way.

Let us consider the question when a Pythagorean truth-seeker is the most valuable and useful from the perspective of establishing how things are, as this knowledge is a precondition for a successful application. It seems that this is the case not when he leaves the grand stand at the games and goes down to the merchants in the market or to the competitors in the arena. From the standpoint of applications, the truth-seeker should remain himself and refrain from wearing someone else's hat, as a renunciation of the quest for truth usually does not bring anything good for applications. The scholar will best help applications when he remains who he is. However, that can happen only if in the scientific structures he has have a communication partner who will not expect him to leave the grand stand, but rather stay there as long as possible and tell the partner what he can see there. The person acting as such a partner should be one fulfilling the role well known in the world of artists, musicians, painters, and sometimes writers – that of an agent-manager whose task is to make

commercial use of the artistic potential of the artist. In the world of science, the task of the agent-manager would be similar – to deploy the scientific potential in practice to optimize some economic or social processes. Essentially the only difference would be that in the world of art the agent usually works with an individual artist, while in the world of science he should rather work with a larger research team led by the scholar.

Today it may be the case that the scholar himself has to act in the capacity of an agent-manager. He may be more or less successful at this, but it is almost always a suboptimal, or downright bad, solution both for science and applications. Of course now universities have a variety of structures responsible for the implementation of projects, but they have nothing in common with the agent-manager role proposed herein. The task of an agent-manager would not be to assist in the implementation of a project designed by the scholar acting out of character (at least for some time ceasing to be a scholar), but to let him remain in character and utilize his scientific potential. This is an issue of scientific and application effectiveness. Just as a vocalist focuses on preparing his concert repertoire rather than on concert organization or stage lighting gives a better concert, a research team concentrated on solving scientifically salient problems will turn out better material for applications.

In this cooperation between scholars and agent-managers, the scholar does not end his work when the application stage begins. Just on the contrary, from a scientific point of view, an application can be considered yet another type of research, a kind of experiment, which may result in the confirmation or falsification of previous findings or the entire theoretical model (which had been obviously tried and tested in the course of some previous studies). This can be so when the application is subjected to analysis characteristic of the methodology of basic research. Thus, if one were to find a metaphor for the relationship between science and application, it will not be a straight line on which one point (application) is located after a previous one (scientific research), but a spiral in which the application of a model follows the research that has generated it; but from the standpoint of science this is nothing more and nothing less than yet another study subjected to typical analysis and leading to improved models. The model is then used again for another application and again verified in a study, which is none other but an application viewed from another perspective. But the principle of the aforementioned spiral is that the roles of the scholar and agent-manager are separated. Otherwise the spiral would be reduced to a spinning circle.

PART II – THESES IN ACTION, OR AN EXAMPLE
OF A DELIBERATE APPLICATION

The five theses in action

In 2017 the Ministry of National Education announced a competition entitled *Development and dissemination of diagnostic tools in support of psychological*

and pedagogical aid.[2] The diagnostic tools for children and adolescents were divided into three areas, and it was stipulated that separate applications should be submitted for each. These were: (1) the personality area, (2) the emotional and social area, and (3) the cognitive area. One of the criteria in the competition was to develop *a novel concept of diagnostic tools* (Criterion 5, p. 33 of the Competition Rules, Ministerstwo Edukacji Narodowej, 2017).

Together with Włodzimierz Strus and other members of the Research Center Personalitas (Center for Research on Development and Personality, Institute of Psychology, Cardinal Stefan Wyszyński University in Warsaw) we conducted basic research; or indeed the most radical form of basic research falling under the Pythagorean paradigm from Thesis 1, albeit it was also consistent with the topos of Aristotelian basic studies from Thesis 2, as we asked questions far from practical applications – about the number of the fundamental dimensions describing personality and its functioning, and the relationships between those dimensions. It might seem that in the first quarter of the 21st century a question about the number of basic personality dimensions is unusual, to say the least. On the one hand, it has already been answered by the Big Five model, which is considered standard handbook knowledge. On the other hand, the very question about the number of basic dimensions appears so academic as to be anachronistic, almost akin to the medieval question of the scholastics as to how many angels can dance on a pinhead. After all, contemporary psychology asks questions about explanations and mechanisms of functioning rather than descriptions and basic dimensions. The prevalent approach is that one can distinguish as many dimensions as is necessary to construct a mechanism for explaining a given phenomenon, and since there are numerous phenomena to be explained, there can also be many mechanisms and dimensions.

Our question about the number of dimensions was, however, associated with the issue of relationships between them, or indeed a question about a universal set of dimensions for personality description that could account for the diversity of existing models, and so this question was close to Aristotelian generalizations from Thesis 2. In this way, we expanded Schwartz's line of thinking about values (Cieciuch, 2013; Schwartz et al., 2012) to include the whole personality. The novel idea in Schwartz's model of values was that it was supposed to account for all values, both those which have already been studied and those which have not, as it formulated general principles underlying the relationships between all possible values, graphically represented with a circle. We used this idea to describe the whole personality, seeking the fundamental rules governing relationships between psychological variables from different domains and models. Our efforts resulted in the development of the Circumplex of Personality Metatraits (CPM; Cieciuch, Strus, 2017; Strus, Cieciuch, Rowiński, 2014; Strus, Cieciuch, 2017;

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[2] The competition was announced as part of the Knowledge Education Development Operational Programme, 2nd Priority Axis *Effective public policies for the labor market, the economy, and education. Measure 2.10 High quality of the educational system*. Competition no. POWR.02.10.00-IP.02-00-009/17).

Strus, Cieciuch, 2021). Our work was conducted at a relatively high level of abstraction, and the considered models and variables were located within a circular space of the CPM with an accuracy of half a degree using trigonometric functions (Strus, Cieciuch, 2017; Rogoza, Strus, Cieciuch, 2021).

The CPM has been applied in different areas and has made it possible to (1) integrate within one matrix different models of temperament, emotion, motivation, values, well-being, and mental problems (Strus, Cieciuch, 2017), including (2) personality disorders (Rogoza, Cieciuch, Strus, Baran, 2019; Strus, Łakuta, Cieciuch, 2021; Zawadzki, 2016, 2017); (3) incorporate and connect the Big Five with the six-factor HEXACO model (Strus, Cieciuch, 2021); (4) systematize subtle differences between the Big Two personality factors from the psycholexical and questionnaire traditions (Strus, Cieciuch, 2019); (5) explain previously incongruous results in terms of the number and content of personality types (Strus, Cybis, Cieciuch, Rowiński, 2021a, 2021b). The CPM has also made it possible to develop new models in which variables are defined according to precise rules describing relationships within the circumplex. This has been done for (6) a model of vulnerable narcissism (Rogoza, Cieciuch, Strus, 2021), and (7) a temperament model integrating Strelau's Regulative Theory of Temperament (2006) with the CPM (Strus, Ponikiewska, Cieciuch, 2021).

Despite the purely basic nature of our research with no application consequences, it was nevertheless designed in the spirit of seeking the fundamental principles that may be used for issues associated with praxis. Thus, it represented an inspiration with knowledge about Aristotelian causes which elucidated knowledge about Aristotelian outcomes, as in Thesis 2. An example of such an application was the reconceptualization of type C personality (Rymarczyk et al., 2020) and the use of the CMP to resolve the debate between the DSM-5 (American Psychiatric Association, 2013) and ICD11 (World Health Organization, 2020) as to which pathological Big Five is better suited for the new dimensional model of personality disorders, which has direct ramifications for practice – diagnosis and, consequently, therapy.

Both DSM-5 and ICD-11 make use of the Pathological Big Five, which is a dysfunctional form of the normal Big Five. The two models are in full agreement in terms of four factors, but there is a significant difference in terms of the remaining one. DSM-5 contains psychoticism (a pathological counterpart of openness to experience), which is absent from ICD-11. In turn, the latter distinguishes two pathological variants of conscientiousness: disinhibition and anankastia. Using the CPM matrix, we were able to prove both theoretically and empirically that the ICD-11 proposal was better justified and more theoretically coherent, even though at first glance one would think otherwise: in contrast to DSM-5, ICD-11 used only four of the Big Five factors (without openness to experience), while one of the factors from that model (conscientiousness) was divided into pathologically low (disinhibition) and high (anankastia) levels (Strus, Łakuta, Cieciuch, 2021).

Given these circumstances of research, in 2017 specific demand for an application emerged in the form of a competition announced by the Polish Ministry of National Education. The practical need was evident for us all. In the market

there was an abundance of diagnostic tools for children and adolescents in the emotional, social, and personality areas, but the problem was that they measured sets of variables that differed in terms of range – from narrow ones (e.g. a sense of control) to very broad ones (e.g. neuroticism); in terms of level – from fundamental, lasting dispositions to variable behavioral patterns; and in terms of mutual relationships between them – some variables from different areas and levels may partially or completely overlap despite differences in terminology. As a result, the diagnosis of children and adolescents conducted within the educational system is usually fragmentary or pieced together from elements that may not necessarily form a coherent whole. This problem reflected the fragmentary nature of models in the psychology of emotions, motivation, and personality deployed for diagnostic purposes. Thus, the application of the integrative CPM (and its implications) to various areas of personality and emotional and social functioning seemed to be a promising point of departure as it neither referred to the Pythagorean topos under the circumstances presented in Thesis 3 nor ran the risk of fragmentation described in Thesis 4.

One challenge in making the decision to submit our competition entry or express readiness to carry out the proposed application, which was socially necessary and scientifically bold – was the structure of the competition and the division of diagnosis into three areas: (1) the personality area, (2) the emotional and social area, and (3) the cognitive area. While this last area clearly stood out, the other two evidently overlapped, with the division line depending on the adopted theoretical perspective. Under the circumstances, the likelihood of obtaining different answers from different specific perspectives made the risk of specialization and fragmentation mentioned in Theses 3 and 4 very real. As a result, we proposed a consistent demarcation of the two areas within one model, which gained the approval of the reviewers and the institution running the competition. Finally, we are now implementing application projects concerning both of the non-cognitive areas.

In a stereotypical understanding of the term, an application means a transfer of a finished product created in the world of science into the world of praxis. However, in Theses 4 and 5 we propose a different approach whereby an application is not a transfer of a ready-made product between the two worlds, but rather an interaction between them in the process of continuous product improvement. This approach was very evident in the case of our application, which was designed in such a way as to enable its optimization after a scientific analysis of its first effects, as described in the next section.

It should be added that experience in conducting grant projects financed by the National Science Center and in managing research teams as part of those projects had little bearing on managing application-oriented projects. Contrary to Thesis 5, I acted both as a research leader and, by necessity, as an agent-manager for the project. It is very difficult to combine those two capacities and, irrespective of one's efforts, it both decreases the scientific effectiveness of the project and leads to suboptimal management. On the other hand, given the conditions found at Polish universities, where Thesis 5 remains only a postulate, the performance of both functions by one person may probably optimize the

implementation process. Here, it was certainly the case, especially as the application project happened during the pandemic, which necessitated extraordinary flexibility and rapid reactions to chaotic reality.

A theoretical model as a response to demand for an application

As part of the application in question, we are developing tools for diagnosing children and adolescents aged 1–25 years, split into several age groups (in each group the variables are measured according to the same model). The tools can also be used for testing children and adolescents with special educational needs and will be available in paper and online versions. In addition, we developing a set of post-diagnostic materials, precisely aligned with the measured variables and the theoretical model.

The set of tools developed as part of the project is designed for comprehensive diagnosis of personality, and emotional and social functioning, based on one coherent theoretical model, which was built on the foundation of the CPM, although it is not identical to it; indeed, it can be said to deconstruct the CPM to some degree. In existing research, the CPM appeared to be one, ultimate circular matrix organizing multiple variables in the area of personality and emotional and social functioning, just as Mendeleev's periodic table organized the chemical elements (Strus, Cieciuch, 2017, 2021; Strus et al., 2014). In the course of the application project, it was found that for the description of different areas of functioning it is theoretically justified, empirically proven, and practically useful to use several circular frames of reference, albeit working according to the same principles and remaining in precisely defined relationships with one another, consistent with the original CPM model.

In particular, the theoretical model underpinning the set of tools makes fine distinctions between those variables which lend themselves to post-diagnostic intervention (emotional and social competence) from those variables which essentially cannot be modified and must be recognized as such during intervention (temperamental traits). Moreover, a distinction was made between those sets of variables and target variables, which are the aim of intervention (well-being). As a consequence, we distinguished three layers (two within the emotional and social area, and one within the personality area).

(1) The first level involves well-being vs mental problems. Within the comprehensive model we constructed a sub-model of well-being integrating many contemporary approaches in such a way as to clearly distinguish well-being characteristics from variables associated with the other levels as described below. The well-being level and the presence of symptoms of problems with emotional and/or social functioning are treated as an indicator of the overall psychological condition of children or adolescents, while improving their well-being and the prevention or mitigation of problems is the objective of prophylactic and post-diagnostic efforts. We distinguished three aspects of well-being as well as three aspects of each of the three types of problems with emotional and social health:

externalizing, internalizing, and psychasthenic (a total of 12 variables in this layer).

(2) The second layer comprises emotional and social mechanisms: their proper functioning is the subject of prophylactic and post-diagnostic interventions oriented towards the development of specific competences. In this case, two sub-models were distinguished: a model of emotional and motivational self-regulation (describing intrapersonal and task-related functioning) and a model of social functioning (describing interpersonal functioning). Two orthogonal dimensions were defined in each model. In the intrapersonal model these are: impulse control and self-motivation, and in the interpersonal model – social responsibility and assertiveness. Three aspects were distinguished for each of the dimensions, which also gives 12 variables in this layer. An appropriate functioning of emotional and social mechanisms is associated with certain competences and leads to well-being; in turn, the inappropriate functioning of these mechanisms entails a deficit of certain competences and gives rise to a risk of psychological problems (emotional and social in nature). At the same time, one's (ab)normal functioning occurs in the context of one's temperamental characteristics.

(3) The third layer consists of temperamental dispositions, which provide a relatively enduring context affecting emotional and social competences. The temperament sub-model distinguishes two orthogonal dimensions (reactivity and activity), the poles of the two dimensions (sensitivity vs endurance for the former and dynamism vs inertness for the latter), and three aspects of each pole, which again amounts to 12 variables in this layer. Certain configurations of temperamental traits facilitate the formation of certain emotional and social competences, while other configurations may make it more difficult, and so knowledge about temperament conceptualized in this way is crucial for the effectiveness of prophylactic activities and interventions.

All three layers are characterized using a similar logic, and are also kept apart in a precise way. The package of tools is designed to measure all variables distinguished in all the layers, which in practice means the operationalization of 36 variables with precisely defined relationships between them and their incorporation in the process from screening tests to preliminary diagnosis to in-depth diagnosis and post-diagnostic materials dedicated for a given diagnostic result.

According to Theses 4 and 5, the sub-models of the overall model are now systematically presented in the literature and empirically verified (the entire model was discussed in Cieciuch and Strus, 2020; the model of emotional and social competences in Cieciuch and Strus, 2021; the self-regulation model in Skimina, Strus, Cieciuch, Topolewska-Siedzik, 2021; and the temperament model in Strus, Ponikiewska, Cieciuch, 2021). The application process was designed in such a way as to enable the future renormalization of the tools based on the results of diagnoses and to test the effectiveness of post-diagnostic interventions both on the basis of the materials developed in this implementation and other materials prepared in accordance with the theoretical implications of the model being implemented.

SUMMARY

In the discussed example, the practical demand for a comprehensive system for diagnosing children and adolescents in the area of emotional-social functioning and personality did not trigger a standard application of existing scientific knowledge to practice. Instead, it inspired theoretical progress, which led to a significant modification of the theoretical model that we had been developing for several years, i.e., the CPM. That model was broken up into several sub-models, but as they were all governed by a similar logic, the deconstruction of the CPM as the overall personality model meant that it was transformed into a paradigm of thinking about personality and its different areas.

The application in question is still being rolled out. It is supposed to be completed in 2022, when all psychological and pedagogical counseling centers that have signed an agreement with the Centre for Education Development receive tool packages with diagnostic and post-diagnostic materials. At the same time, it can a point of departure for research monitoring and the verification of the applied diagnoses to improve both the diagnostic and theoretical models based on the obtained data. Indeed, according to the theses formulated in the first part of the paper, science and applications synchronized in the Aristotelian rather than Pythagorean spirit bring both scientific and practical benefits.

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