COACHING REVIEW 1/2017 (9) s. 24–41, ISSN: 2081-7029

Marta Czerwiec[1], Bożena Wujec[2]

# Toward Neuroscience in Coaching

## Abstract

This article presents the results of the preliminary study conducted by the authors in the field of neuroscience and coaching. According to the neuroscience findings, each person has his or her own way of looking at the world and responding to it. Those responses fall into patterns, referred to as behavior preferences. Therefore, authors investigated behavioral patterns presented by coaches during their work with clients to define which behaviors make them successful in this area. For the purposes of their study authors used the *PRISM Brain Mapping* model, which has its scientific basis in neuroscience. Findings from the study will be useful in supporting professional development of coaches, by enabling them to assess their possible competence gap and address it.

Keywords: Coaching, Neuroscience in Coaching, Coaching competences, *PRISM Brain Mapping*

# Wykorzystanie neuronauki w coachingu

## Abstrakt

W artykule zaprezentowano wyniki wstępnych badań przeprowadzonych przez autorki w obszarze neuronauki i coachingu. Zgodnie z odkryciami neuronaukowców każdy człowiek postrzega świat w unikalny sposób i inaczej reaguje na otoczenie. Reakcje te tworzą wzorce, określane jako preferencje behawioralne. Z tego względu autorki zbadały wzorce zachowań prezentowane przez coachów podczas ich pracy z klientami, aby określić, jakie zachowania przynoszą sukces w tym obszarze. Dla celów badania autorki korzystały z modelu *PRISM Brain Mapping*, który ma swoje podstawy w neuronauce. Wyniki badania będą pomocne w procesie wspierania rozwoju zawodowego coachów, umożliwiając im oszacowanie możliwej luki kompetencyjnej i uzupełnienie jej.

Słowa kluczowe: Coaching, Neuronauka w Coachingu, Kompetencje Coachingowe, *PRISM Brain Mapping*

[1] Radom Academy of Economics, Poland, e-mail: junem.research@gmail.com

[2] The Maria Grzegorzewska University in Warsaw, Poland, e-mail: bozena.wujec@inspired.pl

## Introduction

Coaching is a billion-dollar industry, with consulting groups offering worldwide coaching programs for their clients, as well as educational programs designed for future coaches. There is a lot of impact in the field of coaching to maximize the outcomes of coaching process, enhance relationship between coach and coachee, and provide innovative tools for human development. We all are aware of the importance of the skills and attitudes of coaches, however there is only limited research worldwide on the competences of coaches in practice – and in Poland none of them. This means, that it is not yet scientifically proven what really makes coaches successful. It has a very high importance to us, as coaching practitioners and lectures on several Universities in Poland, in terms of the effectiveness of educational methods and programms for new coaches.

Bearing all this in mind, in this article we attempt to address the question, which behavioral patterns and aptitudes of coaches are the most important for the success of coaching process and the outcomes of sessions. Competences of coaches have been examined so far in three different ways. Firstly, based on the opinions of master coaches as, for example, was in the case of International Coach Federation's Core Competencies. Secondly, based on a self-assessed questionnaire, as proposed by Griffith and Campbell (2008), Passmore (2008) and Grant and Cavanagh (2007). And thirdly, based on a modeling process, as demonstrated by Hall (Linder-Pelz, 2014) who provided the more specific scale with a description of what is happening in the coaching process.

For the purpose of our study, we have chosen a neuroscience approach as a more novel and promising direction in exploring behaviors and aptitudes of coaches, which are crucial factors that determine the success of a coaching process.

Neuroscienceexplains human behaviour in terms of the activities of the brain, how the brain marshals its billions of individual nerve cells to produce behaviour, and how these cells are influenced by the environment. Although neuroscience was originally classified as a sub-discipline of biology, it has become a more interdisciplinary science combining linguistics, chemistry, philosophy, medicine and others. Therefore, neuroscience can make a major contribution to the effectiveness of the coaching process by enhancing awareness of existing behavioral patterns of coaches as well as understanding of a mechanism, which enable

 DOI: 10.7206/cr.2081-7029.46

coaches to adapt their behaviors accordingly. It is worth noticing that, to develop themselves further, coaches must be aware of their own behavioral preferences, and in what extend they tend to use them in their everyday business practice.

As this area is rather novel and not sufficiently explored, we begin our article by describing some theoretical background of the neuroscience approach in business coaching. Further we present methodology of our study, including the *PRISM Brain Mapping* model, as we have chosen the *PRISM* on-line questionnaire as the research tool. We describe *PRISM* colors and dimensions which we use to show the connections between the behavioral preferences and coaching effectiveness. Finally, we summarize the findings from our study to demonstrate how neuroscience might be used to understand the future of education and development of coaches.

Although all coaching courses provide modules covering coaching competences, we know much less regarding the behavioral patterns and aptitudes of successful coaches. We hope that findings from this research will be useful for identifying these aptitudes, which are crucial for coaches to succeed. Our purpose is also to support coaches, who already provide their own services, in their professional development by enabling them to assess their possible competence gap and to address it on the individual level.

## Theoretical background

Nowadays, more and more impact is put on the neuroscience and the implications of its findings to the field of coaching. As we now know much more about how the human brain works, many coaches tend to use this knowledge to enhance the coaching process. In this section we would like to picture in what extent the new and fast developing 'brain-based' knowledge could support development and adaptation of the coaches' behavior. We assume, that the better we know ourselves and our clients, the quicker we build rapport with them, and achieve better results of the coaching process.

Our aim is not to provide the neuroscientific explanation for the major elements of the coaching processes or models, as it is well explained by such pioneers as, among others, Brann (2012), or Rock and Page (2009). The shortcomings of the neuroscientific approach toward coaching are quite evident: the direct research on the impact of coaching on the brain, for example based on 'before and after' study using fMRI technology, according to our current knowledge is very limited. For now, the best what we can do is to make some logical conclusions and 'connect the dots'.

A major goal of neuroscientists is to investigate how the functions of the brain gather information about the world, how they are involved in the decision--making process, and where different functions live in the brain. As Curran describes in his book (2008), the identification of brain regions associated with specific functions should not be taken too literally. These functions are mediated by interconnected systems of brain regions that work together, rather than by individual areas working in isolation. In addition to that, which makes understanding the human brain activities even more complex, neuroscientists have discovered that brain structure is not predetermined and fixed. That means, that we can alter the ongoing development of our brain and thus our capabilities. This is, the so-called 'brain plasticity'(Restak, 2013). This feature of a brain is a great advantage in the coaching process. Having this idea in mind, coaches can conduct the coaching process in a better way, even talking to their clients about neuroscience findings.

To implement the neuroscience discoveries into the coaching process, it is essential to be aware how is the human brain physically organized. Looking from above on the brain, we can see that it is divided into two main parts, which are called the right and left cerebral hemisphere. Many scientists investigated how all the functions of the brain are assigned to the both hemispheres. For example, Iain McGilchrist (2010) claim, that the left part of the brain is rather analytical, logical, and precise. It is capable of conceiving and executing complicated plans and is good in calculating available data. The left hemisphere is therefore frequently held to be: materialistic, controlling and rather unfeeling. The right part of the brain is seen as opposite, as gentle, emotional and more at one with the natural world. It processes things in holistic way rather than breaking them down. The right hemisphere, according to Siegel (2010), plays a leading role in the sensory perception, while left – in analysis and cognition. This quite simple, general view helps us to understand better how the brain is organized, however the science obviously has moved far beyond this. The constant interaction of two brain hemispheres continues to participate in language processing as demonstrated by functional imagining studies. The brain is also very malleable and it's wiring can be influenced by all sorts of environmental factors and can change in response to different experiences (Rose, 2006).

The language of neuroscientists is very complicated, and such a simplified dichotomy helps to classify some basic information about the brain, seldom however we focus on the other interdependence between the front and the back of the brain. The latter is the sensory or input half, which receives input from the outside world and sorts, processes, and stores all our sensory information. The front part of the brain, in turn, generates motor programs or output, so in

 DOI: 10.7206/cr.2081-7029.46

simple words, we use this area to react to the input data. It is here we plan, strategize, and mold our responses to the world, and it is this area that has been adapted for use in abstract thinking as well as in planning (Ratey, 2002). Such an understanding is also very useful regarding coaching process, to explain to coachees where their strategies come from, which areas of the brain are responsible for them and why stepping out of the comfort zone may sometimes be very challenging.

The frontal part of the brain – namely: the frontal lobes, and predominantly the right prefrontal cortex, play a critical role in dealing with novelty. This part of the brain works a lot during the coaching process. As Goldberg (2001)states, motivation, drive, foresight and clear vision of one's goals are central to success in any walk of life. All these prerequisites of success are controlled by the frontal lobes. What is very important in the coaching process, prefrontal cortex is extensively linked to the emotion-mediating limbic system. That means, that when emotions threaten to get out of control, the prefrontal cortex restores the balance. However, the limbic system can also inhibit some changes that we are willing to make in our lives, because of a fear of something unknown. Taking this finding into consideration, we have to say that mindfulness techniques, as well as all the other coaching work undertaken to 'cool down' the limbic system in the process of a major change, is very much needed (Ochsner 2008).From the neuroscience point of view, this is one of the most important areas of coaching work.

The main challenge in the coaching process is therefore, not describing the reality or formulating strategy, but implementing a change, taking steps forward. Thus, we must be aware that when a coach interacts with a coachee to change his or her behavior, there are conflicting forces working 'for'and 'against' a change. And, the very first challenge coaches face, is that the human brain does not like change. The brain thrives on what is familiar, certain, and known because it requires less energy and therefore – less risk. As Schwartz states in his interview conducted by Rock (2006): 'brains are built to detect changes in the environment and send out strong signals to alert us to anything unusual'. Most people recognize that for change to occur, they must analyze the specific situation that they wish to change. However, many of them don't consider the significance of feeling and emotions that usually emerge when they are trying to introduce a change to their lives. Coaches can use this knowledge to encourage a coachee to make many small decisions on the way to a big decision, because each step on the way to the chosen path will increase the commitment to that final decision. Some coaches call them 'baby steps'. Every time we make a small step forward, we reward the brain and its signal becomes stronger, propelling us in the direction of the desired change.

Thanks to neuroscience findings, we can explain and understand more clearly, why it is better for people to create their own options and answers, instead of

taking an advice, why it is much better to focus on solutions, and not on problems, why it is a good thing to set a goals and write them down, and why it is important for a coach not to judge, and provide a constructive feedback instead (Boyatzis and Jack, 2010). Taking a 'brain approach' help coaches in understanding the behaviors of their clients as well as their own behavior. 'Brain knowledge' is also crucial for assessing the competences of coaches and addressing the competence gap when needed. Now, it is scientifically proved that our brains have got plasticity, and we can 'rewire brains with our thoughts' (Doidge, 2007). Therefore, we can change our behavioral patterns to better suit in the role of an excellent coach.

## Methodology

As we have based our research on the neuroscience insights, we have chosen the neuroscience-based tool, *PRISM Brain Mapping* questionnaire, to measure aptitudes and preferred behaviors of successful coaches. We have decided to use the *PRISM Brain Mapping* tool for our research for several reasons. Firstly, unlike many psychometric instruments, *PRISM Brain Mapping* is not based on the theories of any one individual. The science on which *PRISM* is based is drawn from the published works and expressed opinions of numerous members of the neuroscience community. *PRISM Brain Mapping* is the one of the most comprehensive and accurate tool worldwide that measures accordingly behavioral preferences of people, and further we provide the explanation of how does the *PRISM* work.

In our preliminary study, the sample of the 70 coaches from Poland has been explored to identify the most commonly occurring behavioral patterns and existing aptitudes of mentioned coaches. The analyzed group of coaches was divided into five main categories:

1) experienced coaches, that have over 5 years of practice,
2) less experienced coaches that have got less than 5 years of practice,
3) coaching students and beginners,
4) managers that use coaching in their everyday practice,
5) business consultants and trainers who provide coaching sessions.

First phase of our study covered a group of the 25 experienced coaches, in terms of their qualifications, practice experience, reputation and prosperity (Weiss, 2009). Bearing in mind our research questions we have decided to examine this group of coaches to search for some similarities or dissimilarities of their behavioral patterns and aptitudes.

 DOI: 10.7206/cr.2081-7029.46

## *PRISM Brain Mapping*

Although, the mentioned primary difference between the hemispheres, as well as between the frontal and the rear part of the brain has been characterized in many ways by different researchers, the *PRISM* model assumes that it is the different style of processing of the two hemispheres that influences the functions they perform. Every human brain is as unique as a fingerprint, so no two are exactly alike, and one can assume that no two brains function identically. We find this as a great advantage of *PRISM*, because as we are searching for some patterns of behaviors, we urge for the most accurate tool based of neuroscience to rely on. Another advantage of *PRISM* is that, although the science 'behind' *PRISM* is wide and very complex, the tool itself is transparent and easy to use. To prepare our research, we also put effort in translating the tool into Polish, and in verifying the cohesion of the behavioral 'maps' in Polish and English language.

What is more, *PRISM* is not marketed as a psychometric test because it measures expressed and observed behavior preferences, rather than personality, which works well for our research, as our aim was to identify behavioral patterns and aptitudes of successful coaches. It is worth noticing, that personality is not only the single factor, that influences human behavior, but it is behavior that in fact provides the most easily verifiable and useful information about individuals and their future performance. The root of the *PRISM* Model is the basic fact that all behavior is brain-driven. Each person has his or her own way of looking at the world (perception) and responding to it. Those recurring responses – part inherited, and part learned – fall into patterns, referred to as behavior preferences (Restak, 2013). From the perspective of our research, it is vital to investigate the most preferred behavioral patterns among successful coaches, versus the less experienced coaches, or beginners. Mentioned patterns are not just declared actions, but behaviors that coaches represent in their practice.

## *PRISM* Maps

As it was stated earlier, the aim of our research was to investigate the behavioral patterns of successful coaches. The *PRISM* tool, that we have used for research presents behavioral patterns as three different 'maps': The *Underlying Map*, the *Consistent Map* and the *Adapted Map*. The *Underlying Map* represents the natural behavior of an individual. This map is an indication of how the person tends to behave when they are totally relaxed and feel no need to present themselves in any particular way, or are under such a strong pressure, that they don't bother

to adapt their behavior to the demands of others. Although the *Underlying Map* represents the person's most comfortable behavioral pattern, they will sometimes feel a necessity to adapt that behavior to cope with their job role or everyday life. This possible shift is covered by the *Adapted Map*, which indicates the extent to which the person modifies their natural behavior on occasions to meet the perceived needs of their environment. As person's overall behavior is not based totally on either their 'Underlying' or 'Adapted' behaviors, *PRISM* delivers also the third, *Consistent Map*, which provides a picture of what is likely to be the person's overall behavior for most (approx. 70%) of the time in public – this is also the view that most other people will probably have of him or her (Restak, 2013).

For our research we have found that the *Underlying* and *Adapted* maps are the most useful, as our aim was to investigate how the 'natural' behavior of coaches changes for the purposes of delivering coaching sessions, how far it changes and to what extent. Using different *PRISM* maps, we will be also able to verify, at the next stage of our research, how the adapted behaviors of less experienced coaches, or the beginners, change in time. Very interesting would be also investigating adapted behaviors of coaches at the very beginning of their coaching program at the given Academy or University and after the full training.

The mentioned maps show the preferences that coaches tend to use for their coaching practice versus their natural, innate behaviors. However, the intensity of each presented behavior may be very different among coaches. They may have a very high preference for one behavior and tend to avoid other. To give an example: we may anticipate that a good coach will tend to avoid 'judgmental' behavior in their work and tend to present supportive behavior instead. Knowing that we have used the preference scale (from 0 to 100) to find out which behaviors have the strongest preference among coaches (65+), which are moderate (35–64), and which are rather avoided and why (0–34).

## The *PRISM* model and the science behind

We have mentioned before, that we can simply view human brain as a 'walnut' divided into the two hemispheres by the longitudinal fissure, and the central and lateral sulci divided the frontal lobes (including the motor cortex) from the parietal, occipital and temporal lobes (including the somatosensory cortex). Such a simplified structure forms four 'blocks' that are represented in the *PRISM* model by the Green (Expression), Blue (Stability), Red (Drive) and Gold (Analysis) quadrants, covering different types of behaviors. *PRISM* is based on scientific principles and complex facts, which have been simplified into a workable model to facilitate

 DOI: 10.7206/cr.2081-7029.46

understanding. In the *PRISM* chart, each quadrant is divided into two dimensions, which share the basic characteristics of that quadrant, but also have some significant differences.

Four colours chosen for this model match with widely recognized psychological meanings of these colours. Red was chosen for a dimension that represents 'drive', because red is a very powerful, intense colour, which enhances human metabolism, stimulates us, and even increases the pulse rate. Red is associated with energy, danger, strength, power and determination, as well as passion. Blue colour represents 'stability' in the *PRISM* model, because blue is essentially soothing, and has got a calming effect for our minds. This colour slows human metabolism and symbolizes trust, loyalty, wisdom and truth. Green dimension in *PRISM* model is associated with 'expression', because it symbolizes growth, freshness, and fertility. It's a colour of nature and balance and has got a strong emotional correspondence with safety. For the 'Gold' *PRISM* dimension that represents 'analysis', a yellow colour was chosen. Yellow is the strongest colour, psychologically. It can create feelings of frustration and anger, but also stimulates mental activity and attention.

*PRISM* colours are chosen wisely to indicate sets of certain behaviors covered by each colorful quadrant in the *PRISM* model. As dr Viki, who carried out three reliability and validation studies of *PRISM* between 2005 and 2008 states, the *PRISM* tool is not used to classify individuals into only one colour category (Restak, 2013). Instead, the *PRISM* model recognizes that individuals will have characteristics from all four colours to a greater or lesser extent (see Appendix).

Dr Viki during mentioned study carried out a series of analyses, among them the widely recognized Cronbach's Alpha. The results showed very high levels of internal consistency for the *PRISM* subscales. For all the four-colour subscales the reliability scores were above 0.90, which is a very high level of internal consistency, as good internal consistency means Cronbach's Alpha > .70. In the *PRISM* model scales are bipolar, and therefore both low and high scores have a meaning. Overall, these findings suggest that *PRISM* is a highly reliable measurement instrument (Restak, 2013).

As brain chemicals, and particularly neurotransmitters and hormones, play a great role in the brain functioning and communication, *PRISM* model considers the impact of dopamine, serotonin, testosterone and estrogen on the produced behavior. Numbers of independent studies have confirmed the links between these chemicals and the behaviors in the *PRISM* scales (Restak, 2013). Four behavior dimensions used in *PRISM* represent, respectively, the activity of dopamine for Green behavior, estrogen for Blue behaviors, testosterone for Red behaviors, and serotonin for Gold. *PRISM* model takes into the account also a pace of work,

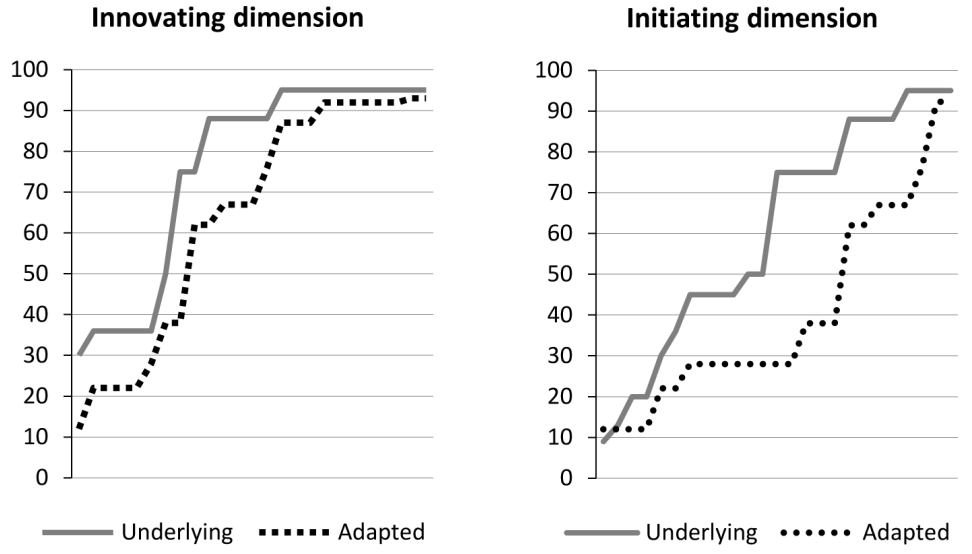
as well as making decisions by individuals. Therefore, the model covers two main axes: Dynamic axis – Red and Green quadrants, and Discerning axis – Gold and Blue quadrants. It also presents Introversion-Extraversion scale, as well as the possible domination of a certain part of the brain in individuals' behavior.

## Preliminary findings

The first part of our findings regards to the most and the least preferred behaviors among the most experienced coaches in eight main *PRISM* sub-dimensions (Innovating, Initiating, Supporting, Co-ordinating, Focusing, Delivering, Finishing and Evaluating) divided into four quadrant colours: Green, Blue, Red and Gold.

Research found that, according to *Underlying Maps*, 75% of coaches have got the Innovating behavior, and 50% – Initiating behavior among their most preferred ones (Figure 1). There is clear tendency for coaches to demonstrate Green behavior, especially that only 15% of coaches tend to avoid it. Green colour in *PRISM* is connected to holistic thinking, openness to change and to other people, expressiveness, enthusiasm and communicativeness (see Appendix). It corresponds with such a widely known coaching competences as *Communication, Building Rapport and Active Listening*, among others (ICF Core Competencies).

Figure 1. Innovating and Initiating (Green) Behaviour among coaches




Source: own elaboration.


DOI: 10.7206/cr.2081-7029.46

However, when it comes to 'Adapted' behaviors, our research findings clearly show, that in their work coaches tend to avoid Initiating behavior, or at least moderate it. Innovating behavior is also a bit toned down among coaches, 25% less presented, then the natural preferences.

This finding is crucial, as Initiating behavior relates to a high level of dopamine and is presented when a person likes to be in the center of attention, meeting new people, and approach them in a confident manner. As preliminary contact with many clients in undoubtedly a good thing for a coaching business (as in any other business), when it comes to the coaching session, coach should be able to 'switch' his or her attention onto the client, building rapport, instead of making an impression.

According to coaching competences promoting by number of coaching institutions, it is expected, that a coach should be rather a caring and supporting person, to *Establish Trust and Intimacy with the Client* or to create *Coaching Presence* (ICF Core Competencies). Indeed, this is the case, when we have a look at our research findings. *Underlying* maps of analyzed coaches show that they are very much confident in presenting Supporting and Coordinating behaviors which can be describe as attentive listening, relationship focus, patience and helpfulness (see Appendix). This relates to high level of oxytocin and estrogen, which reduces the effect of stress and create some space for building intimate, trusting relationship.

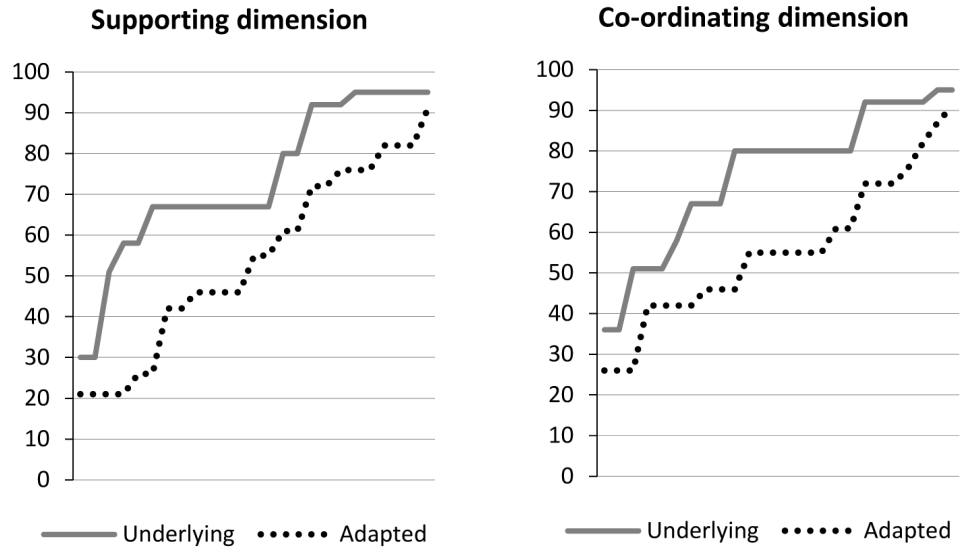
Again, when it comes to the coaching practice, Co-ordinating behavior, which refers to the relationships within a group, not to individual facilitation, tends to be less presented (Figure 2). It seems that in one-to-one session there is no specific need to co-ordinate talents of coachees, or to put them in a certain role. It refers to fundamental coaching presupposition that coach, even if sees a certain solution to the problem, shouldn't suggest it to the client. That means that Co-ordinating behavior is not very much needed in the coaching process.

In the coaching practice, in a few cases also Supporting behavior is very much reduced, or even avoided (30% of coaches). It can be considered as these coaches operate in 'put a coachees' feet over the fire' mode. That means, that if the role of a coach requires encouraging the client to step out of the comfort zone, or to challenge him, the Supporting behavior in this moment should be reduced. Although the coach is expected to be supporting person, very often has to adapt his/her behavior to be more challenging or at least to keep the balance between supporting and challenging conduct.

Findings show that experienced coaches are very efficient in delivering results, as their *Underlying* maps demonstrate. Red colour in *PRISM*, describing Delivering behavior refers to being independent, self-motivated and self-reliant (see

Appendix). Most of the experienced coaches are comfortable in presenting this behavior, which seems to help a lot in their everyday business life.

Figure 2. Supporting and Coordinating (Blue) Behaviour among coaches




Source: own elaboration.

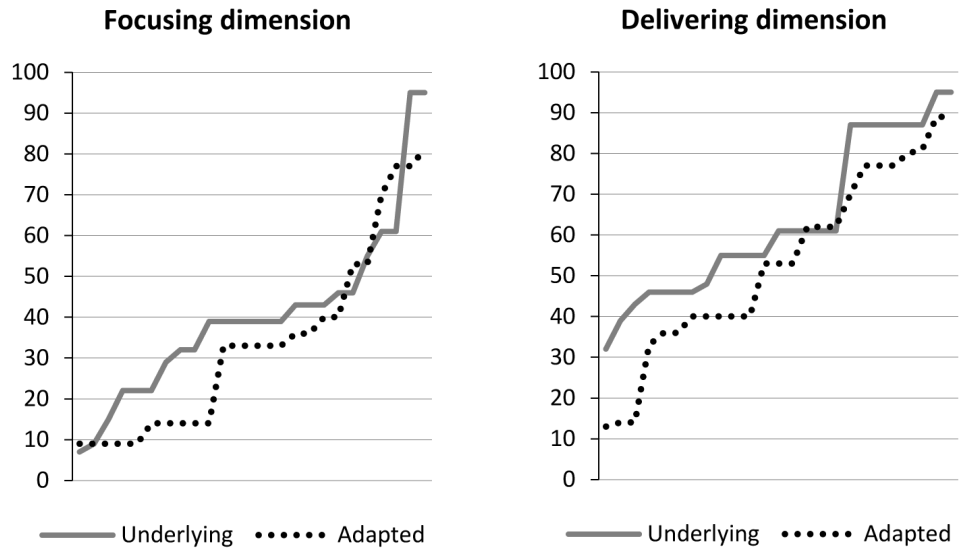
At the same time, they present 'Underlying' Focusing dimension at the low level (Figure 3). That means, that they are not driven to achieve status, and neither they are outspoken or dominant. As the Red colour in *PRISM* relates to adrenaline, it appears that the majority of coaches are not highly challenging or aggressively competitive. 30% of investigated coaches tend to avoid Focusing behavior.

When it comes to the coaching business, the Delivering dimension remains at the moderate level, whereas Focusing dimension is even lower than in the case of *Underlying* maps. *Adapted* maps of coaches show, that 65% of them avoid (lower than 35 on a *PRISM* scale) Focusing behavior in their work. This finding clearly show that experienced coaches tend to sincerely focus on the client's goals, which determines whether the coaching process is sufficient, or not.

Around 1/3 of experienced coaches represent Gold *PRISM* behaviors which means highly analytic aptitude and 'Underlying' abilities for sound judgments and interest in intellectual challenges. However, they are not always very much focus on details, as their *Underlying* maps show that 40% of coaches avoid Finishing behavior (see Appendix).


DOI: 10.7206/cr.2081-7029.46

Figure 3. Focusing and Delivering (Red) Behaviour among coaches

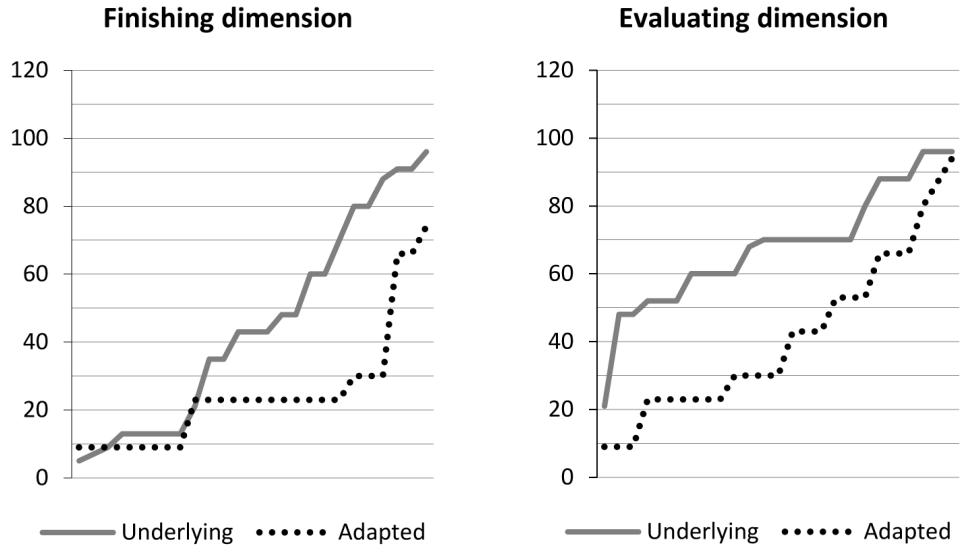



Source: own elaboration.

Results show a huge difference in Gold *PRISM* quadrants between *Underlying* and *Adapted* maps of coaches (Figure 4). Most of them (over 70%) avoid typical Gold behaviors, when they work with their clients, which mean that they in fact avoid judgments. Both Finishing and Evaluating behaviors got very low scores. This means that analyzed coaches generally do not judge clients, or probably even avoid of thinking of the best solutions during coaching sessions. It seems that brains of experienced coaches are highly flexible and can 'switch' between two or more behaviors during coaching sessions. As Finishing behavior is very low, we can expect that these coaches won't 'force' (push) their client to find the right solution, to draw the process to a quick end, but they will rather assist their clients in their journey, and allow them to create as many options, as they like.

To sum up, it is important to underline that apparently, the coaches indeed are very inspiring, people-oriented individuals with more active the right side of their brains and great brain flexibility.

Figure 4. Finishing and Evaluating (Gold) Behaviour among coaches




Source: own elaboration.

The second part of our findings regards to the work aptitudes of coaches, namely: how coaches like to work, and how they don't like to work. The findings show that most of analyzed coaches tend to be:

1) Very social and empathetic – which means that they sincerely enjoy dealing with people and dislike impersonal tasks. They prefer to form close interpersonal relationships with others, and like teaching, helping and solving social problems. They tend to be concerned about human welfare and are motivated by work that helps to overcome interpersonal problems and mediate disputes. They also have good social and inter-personal skills;
2) Strongly ambitious and entrepreneurial – they enjoy leading, influencing, persuading or motivating others. They are ambitious and thrive on taking risks and making decisions. They take a spontaneous approach to challenges and enjoy work activities that have to do with starting up and carrying out projects, especially business ventures;
3) Rather (moderately) creative and artistic – they often enjoy creative work and prefer to be in environments, which offer freedom from strict operating procedures and structured activities. They are comfortable to work independently and have a need for personal expression. They also can be sensitive and emotional at times;

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4) Not very orderly (weak preference) – they do not like strict order, procedures, and structure. They prefer ambiguity and working with people, then with the paper and/or computer. They don't really like to plan things, and they tend to avoid routine work. They are not pushy or aggressive;
5) They don't like to deal with data and numbers – it would be hard for them to focus on large quantities of data for long periods without losing concentration and they generally don't demonstrate a very strong numerical ability. They don't' perceive situations via lenses of pure logic, and so that they prefer not to make judgments.

The results clearly show strong preferences among coaches to work in flexible, non-structured environment. Results also show that preferences of coaches are mixed as it comes to being outgoing and expressive, investigative and analytical, as well as practical and mechanical – as it doesn't relate directly to their coaching practice or influence the coaching process.

## The limitations & implications for other research and practice

The limitation of the neuroscientific approach toward coaching, as it had been mentioned before, is very clear. There is the need in the field to conduct direct research on the impact of coaching on the brain, for example using the fMRI technology.

For now, we have decided to use *PRISM* Brain Mapping tool, which uses ipsative and not normative measurements with all advantages and disadvantages of such. Therefore, to verify other characteristics of analyzed research sample, Mental Toughness, Emotional Intelligence and "Big Five" traits have been measured among the most experienced coaches.

It was possible to measure mentioned features with the *PRISM* questionnaire, because it is matched with well-known personality measures, which include: 'The Minnesota Multiphase Personality Inventory' by Starke Hathaway and J.C. McKilney, 'The 16PF' by Raymond B Cattell, 'The Five Factor Model of Personality', including 'The NEO PI-R', by Paul Costa and Robert McCrae, 'The Temperament and Character Inventory, by Robert Cloninger and 'The California Psychological Inventory', by Harrison Gough (Restak, 2013). Findings which include mentioned features will be presented in the separate paper.

The limitation of our research may also relate to the cultural differences across the globe. There is a possibility, that some behaviors or aptitudes, which are very

useful for coaches in Poland to succeed, may not necessarily be beneficial elsewhere. Therefore, we plan to introduce the similar research taking in the account cultural differences of ethnic groups or nations.

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 DOI: 10.7206/cr.2081-7029.46

# Appendix

## Dimension Summaries

| Dimension | Summary of characteristics |
|---|---|
| Innovating | **A creative and unstructured radical thinking approach to problem solving.** Innovating is about generating imaginative solutions to problems and challenging traditional ways of doing things. A radical approach requires lateral and abstract thinking that is truly creative and not constrained by tradition or limitations. Good at producing ingenious solutions. It requires the ability to see possibilities, visualise outcomes and not limit imagination. Such thinking can appear unorthodox and wayward and have difficulty in being accepted within rigid organisational structures. May have a strong artistic awareness, but may be forgetful and lack attention to detail. Also, may be rebellious and break rules and sulk if own proposals are criticised.<br>**Prefers a fast-paced or dynamic environment.** |
| Initiating | **An infectious and optimistic style of verbal communication and persuasion.** Initiating is about responding quickly to new ideas and moving them forward with energy and enthusiasm. It is about identifying and exploiting possibilities in a way that is both optimistic and exciting, so that their potential captures the imagination of all those involved. It is about interacting with people to gain social recognition and involves displaying a high level of enthusiasm for meeting and communicating with a wide range of people, and for searching out opportunities and challenges. Works quickly, but can become bored very quickly, loses concentration and fails to follow through to completion. Also, can be disorganised and careless at times.<br>**Prefers a fast-paced or dynamic environment.** |
| Supporting | **A need to create and maintain harmonious and stable relationships.**<br>Supporting is about being very sensitive to the individual needs and concerns of others and offering them help and encouragement. It is about placing the needs of others and harmonious relationships before their own personal ambition. It involves being unassertive and unassuming, and helping to avert interpersonal conflict by promoting unity, stability and harmony. Supporting is also about defending values or close friends and avoiding personal confrontation if at all possible. Dislikes aggressive or insensitive behaviour.<br>**Prefers a low-stress, steady paced environment.** |
| Co-ordinating | **A desire to involve others and to make the most effective use of their talents.**<br>Co-ordinating is about encouraging individuals to work together to achieve shared objectives, yet it avoids appearing at the forefront of social interactions. It involves cultivating teamwork and making use of talented people as effectively as possible. This requires clarifying group objectives and facilitating or chairing discussions or meetings to ensure that all points of view are considered and that the agenda is followed. Co-ordinating involves achieving consensus and placing an emphasis on collaboration in preference to a more individualistic approach. Tends to seek a compromise when making tough decisions. In this context, co-ordinating refers to people and their abilities and not to material resources.<br>**Prefers a steady paced environment.** |
| Focusing | **An aggressive and emotional drive to achieve own goals.**<br>Focusing is about becoming so narrowly focused on personal goals or objectives that the wider picture becomes lost. It is about having an inherent need to control, to achieve and to challenge people or things that stand in the way of results. It often involves being disinclined to listen to others' points of view and having a tendency to be intolerant, confrontational or forceful. It frequently involves a lack of structure and attention to small |

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| | details, as well as showing a strong emotional response to disappointment or frustration. It can involve a willingness to break the rules if necessary to achieve the desired results. Is most effective in difficult and demanding environments.<br>**Prefers a fast-paced and dynamic environment.** |
| **Delivering** | **A self-sufficient and structured drive to achieve objectives.**<br>Delivering is about meeting tight deadlines by working in a very structured way that can be inflexible at times. It involves being independent, having the ability to work without supervision and being good at ensuring that things work properly. Delivering involves being self-sufficient and purposeful, as well as being concerned with realism and efficiency. Effective in tough environments, Delivering thrives on crises, but can be frustrated when others show a lack of ability or motivation, or when there is sudden unexpected change. Likes to have authority to make decisions, but can be overly competitive for status.<br>**Prefers a fast-paced or dynamic environment.** |
| **Finishing** | **A conscientious, methodical and tenacious approach to detail and quality.**<br>Finishing involves seeing tasks through to high quality completion. It is about paying great attention to accuracy, detail and quality and enjoying tasks that are intellectually challenging. It is about having a high regard for obligations, a capacity for fulfilling promises and working to the highest ethical standards. Finishing is about being intolerant of mistakes, disorganisation or casual attitudes, and is uncomfortable delegating or dealing with strangers – especially those who are overly-friendly. Although not particularly assertive, it is also about having high self-control and strength of character to avoid being deflected from long-term objectives.<br>**Prefers a slow-moving and well organised environment.** |
| **Evaluating** | **An analytical and unemotional approach to making sound decisions from complex data.**<br>Evaluating is about having the ability to make sound judgements, unaffected by emotional pressures. Good at analysing and evaluating lots of complex details, it is also about being serious minded, detached and questioning at times. It displays hard headedness and sound decision making abilities, but it can appear uncommitted and uninspiring on occasions, and not inclined to take things at face value. Can sometimes do this tactlessly and disparagingly to such an extent that allows the cold logical abilities to inhibit receptiveness to new ideas. Tends to be uncomfortable dealing with emotional issues or human relationships.<br>**Prefers a slow-moving and well organised environment.** |




DOI: 10.7206/cr.2081-7029.46