

BRAIN DOMINANCE IN SPORTS MANAGERS – A PRELIMINARY STUDY

Alexandra PREDOIU¹, Claudia Ioana CRISTEA², Radu PREDOIU^{1*}, Mihaela ROCO³,
Germina COSMA⁴, Raluca DĂNOIU⁵, Constanța-Valentina MIHĂILĂ¹

¹ National University of Physical Education and Sports, Faculty of Physical Education and Sport, Bucharest, Romania

² S.C. Sport Logistic, Bucharest, Romania

³ University of Bucharest, Faculty of Psychology and Educational Sciences, Bucharest, Romania

⁴ University of Craiova, Faculty of Physical Education and Sport, Craiova, Romania

⁵ Doctoral School of Social Sciences and Humanities, University of Craiova

*Corresponding author: radu_predoiu@yahoo.com

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Abstract: Cerebral preference refers to the dominance of a certain brain quadrant, each quadrant having its own perceptions and language. The aim of the research was to investigate the brain dominance among sports managers and future sports managers. Twenty-eight participants: presidents, directors and managers of sports federations and sports clubs in Romania, and, also, future sports managers (students at the National University of Physical Education and Sport, Bucharest, preparing for a career in sport management) were included in the research. The Cerebral Preference Questionnaire, adapted and reconstructed by Roco (after Herrmann and consulting Chavlin's work on brain dominance assessment) was used. Data analysis revealed that experienced sports managers (ESM) use more the lower right quadrant of the brain, being socially oriented individuals, empathetic, expressive and sensitive to others. In the case of future sports managers (FSM), the results show that they predominantly use the lower left sector of the brain (limbic system), being people who want to form habits and to respect them. Using the Mann-Whitney (U) non-parametric test, possible significant differences between the two groups under investigation (ESM and FSM), in terms of the dominant brain quadrant, were investigated. Experienced sports managers are significantly better at performing logical, analytical, mathematical activities, being, also, significantly more socially oriented individuals, understanding better the reactions of others, comparing to future sports managers. Not least, the relationship between rationality and emotionality and, also, brain's predominant mode of operation (left or right brain hemisphere), in the case of sports managers (present and future) were discussed.

Keywords: sports managers, cerebral preferences, brain dominance, Whole Brain Model.

Introduction

The creator of the „Whole Brain Model”, Ned Herrmann asserted that in the case of each person one hemisphere of the brain has dominance (Herrmann, 1981). The researcher explained (for example) in his research from 1991, how it came to the quadrant concept, developing a metaphorical whole brain model – there are four specialized parts which form the “whole brain”: lower left, lower right, upper left and upper right quadrant of the brain. According to the specialized literature (Tanner, 1997) cerebral preference refers to the dominance of a certain brain quadrant. Each mode has its own perceptions, language, has its own way of being/ knowing, and can be modified through specific and appropriate training (Roco, 2004). The four quadrants

interact and work together, but one or two may take the lead. Organized, structured, controlled and sequential mental tasks occur in the lower left quadrant of the brain. The lower right quadrant is involved in emotional and interpersonal mental activities. When talking about the upper right quadrant of the brain - is intuitive, imaginative, better at risky activities, „operates outside the norm, gets flashes of ideas and solves problems on the basis of feelings and hunches”, while the upper left brain „is better at performing analytical, logical and mathematical activities [...] can solve problems through reasoning and logic” (Roco et al., 2014). Figure 1 shows the four different selves from a thinking perspective (see Herrmann-Nehdi - Creativity and Strategic Thinking):

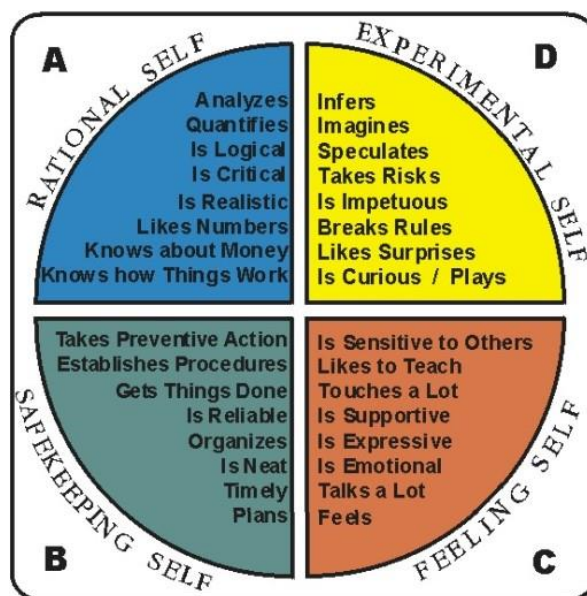


Figure 1. The four different selves (Herrmann-Nehdi - Creativity and Strategic Thinking)

Herrmann created, also, the Herrmann Brain Dominance Instrument (HBDI) to measure a person's brain dominance (emphasizing a person's profile of thinking and behaviour). Research demonstrated that HBDI validly measures the four integrated systems (cerebral preferences) of the brain (Ho, 1988). The "Whole Brain Model" helps people better understand their preferences for each of the quadrants of the brain, thus helping individuals, teams, and organizations to maximize performance (Bunderson et al., 1982). Therefore, individuals can understand better their own thinking preferences, being facilitated: learning and development, decision making, communication, productivity, and subjective well-being. Moreover, thinking preferences impact problem solving and management styles (Meneely & Portillo, 2005).

The success of the learning activity in the case of athletes (or employees of sports organisations) depends on the success of the communication between coach/ manager and players/ employees. Based on athletes' (or employees') results at the HBDI questionnaire, sports managers can optimise communication with them by tailoring messages to their brain preferences. When the information is presented taking into account the cerebral preferences, the material of interest is more easily processed by the

cortex. Predoiu (2016) summarizes how specialists should communicate with athletes or employees (in the case of sports managers) according to how the brain works:

- In the athlete or employee within sports organisations - when the left mode of the brain (the lower left and the upper left quadrant of the brain) dominates: the person needs practical solutions, a detailed plan with fixed deadlines; it is important that the specialist be methodical, organised, otherwise the person easily gets into a state of fear; he/she needs facts, numbers, wants to assess the level he/she has reached in training, learn more easily through case studies;
- In the athlete or employee within sports organisations - when the right mode of the brain (the lower right and the upper right quadrant of the brain) dominates: words bore him/her quickly, the person prefers a good drawing, he/she prefers the specialist to visualise everything in the presentation (diagrams, graphs); he/she does not like details, the atmosphere in which communication takes place is very important (conflict-free); the person learns through personal discovery and learn more easily through role-playing exercises.

Estimates from the Herrmann Brain Dominance Instrument (HBDI) tell us that almost 60% of the population tends to fall into more than one of the four areas (upper

and lower left, respectively upper and lower right quadrant of the brain); also, is important to note that there is not a better cerebral preference than other (Hodgkinson & Sadler-Smith, 2003).

Considering that management is the art of getting things done through other people's efforts (Graham, 1995), a definition which involves both the pursuit of objectives and the use of resources (organisational resources), elements found, also, in other definition of management, in the literature (Bateman & Snell, 2012). Within an organisation people work together to achieve a common goal (Shermerhorn, 2013). A sports organisation was seen as any public or private organisation that provides products and services related to sports (Slack, 1998). It means that economic entities such as, for example, Nike (explicitly mentioned by Slack among sports organisations), an industrial company or sports-related media companies can also be defined as sports organisations. However, the term „sports organisation” should be reserved for those companies that have sports activities at their core.

Sports organisations (both in Romania and abroad) have experienced an evolutionary dynamic that has changed the way they operate. Cherubini (2004) talks about a transformation of sport management from monobusiness to multibusiness. Researchers discussed about the right and left brained leaders in relation with the existing improvement in an organisation (Kumar & Sharma, 2016). As the authors underlined „the right brained leaders emphasize innovation and managing, while left brained leaders focus on continuous improvement and planning”. The cerebral preferences of sports managers (present and future) represents a less investigated topic in the literature.

The *aim* of the current paper is to identify the brain dominance among sports managers and future sports managers, in other words, to investigate how sports managers think and act.

Objectives

- Identifying dominant brain quadrants in sports managers;

- Determining the relationship between rationality and emotionality and knowing the operating mode of the brain (predominantly left or right) in the case of present and future sports managers.

Hypothesis

There are significant differences between experienced sports managers and future managers in sports facilities in terms of cerebral preferences.

Materials and method

Participants

The participants in the study were represented by: presidents, directors and managers of sports federations and sports clubs in Romania (12 experienced sports managers, 2 women and 10 men, $M_{age} = 42.3$ years), and future managers, students of the National University of Physical Education and Sport, Bucharest, specialising in Sport Management (from all years of study) and preparing, therefore, for a career in sport management (16 people, 5 women and 11 men, $M_{age} = 21.5$ years).

Instruments

The Cerebral Preference Questionnaire, adapted and reconstructed by Mihaela Roco (after Herrmann and consulting Chalvin's work on brain dominance assessment) was used in the present research (Roco, 2004). The questionnaire has 72 items, arranged in four sections corresponding to the four brain areas: lower left, lower right, upper left and upper right quadrant of the brain (18 items for each quadrant).

A 5-step Likert scale was used, where 1 = Very little and 5 = Very much. Participants were asked to choose the answer that best corresponds to their own way of thinking or acting, in the case of each statement. Example of items: "When planning a trip, you think about the smallest details?" (upper left quadrant of the brain); "Do you engage in actions that involve risk?" (upper right quadrant of the brain); "Are you concerned about getting your projects done as soon as possible?" (lower left quadrant of the brain); "Are you prone to strong emotions that you express through behavior?" (lower right quadrant of the brain). Scores (for each

cerebral preference) range from 18 to 90. Knowing the results for each quadrant of the brain one can determine:

- 1) the relationship between rationality (upper left + upper right quadrant of the brain) and emotionality (lower left + lower right quadrant of the brain);
- 2) the brain's predominant mode of operation: left (upper left + lower left quadrant of the brain) or right (upper right + lower right quadrant of the brain).

Procedure

The questionnaire for the study was prepared, sent and completed by the participants between October 2021 and May 2022. The questionnaire was applied online (via Google Forms).

Ethical principles were ensured, the informed consent from the participants was obtained, while anonymity and confidentiality are guaranteed.

Quasi-experimental model

The model used was the quasi-experiment (ex post facto design) which involved comparing

groups of participants, managers with experience (ESM) with students training for this profession (future sports managers - FSM), on brain dominance. In this case, we will not be able to know for sure which aspects are responsible for the differences highlighted in the study, but the data will be relevant to the practice of the field. The dependent variables are the sports managers' results in the case of the four quadrants of the brain.

Results

We have investigated whether there are statistically significant differences in brain dominance (preferences for a particular brain quadrant) between the participant groups. Preliminary data analysis revealed no extreme or marginal values. The main indicators of descriptive statistics were calculated: arithmetic mean, median, mode, standard deviation, standard error, homogeneity coefficient (variance).

Table 1. Descriptive statistics – experienced sports managers' (ESM) results

Cerebral preferences – the four quadrants of the brain				
	upper left	upper right	lower left	lower right
Mean	69.8	68.3	70.6	71.7
Median	71.5	70	71	72
SD	5.92	10.28	5.51	6.77
Homogeneity coefficient	0.08	0.15	0.07	0.09

The highest value among the arithmetic means is 71.7 corresponding to the lower right quadrant. Participants (ESM) with lower right (limbic system) functional dominance are socially oriented individuals, they like to teach, are expressive and sensitive to others. They want to establish contacts, are sociable, empathetic, having the ability to quickly grasp and understand the reactions and wishes of others.

Table 2. Descriptive statistics – future sports managers' (FSM) results

Cerebral preferences – the four quadrants of the brain (future sports managers)				
	upper left	upper right	lower left	lower right
Mean	64.1	64.8	67.8	63.1
Median	66	64	65.5	61
SD	7.01	10.48	7.57	9.53
Homogeneity coefficient	0.10	0.16	0.11	0.15

In the case of FSM, the results of the descriptive statistics show the highest arithmetic mean being 67.8, corresponding to the lower left sector of the brain (limbic system). In the case of these

participants, the emotional tone is strong, although controlled and hidden. They are people who want to form habits and to respect them. They plan, organize, arrange, order, precisely to have everything under control. They are not people who can easily change their minds. They need practical solutions with a detailed plan, fixed deadlines for implementation and they don't like change. In their day-to-day work, they pay attention to detail, set procedures and impose a regimen and timetable on themselves as precisely as possible.

Using the Mann-Whitney (U) non-parametric test for two independent samples, we wanted to identify possible significant differences between the two groups under investigation: ESM and those preparing for this career (FSM), in terms of the dominant brain quadrant.

Table 3. Comparison between sports managers' groups (present and future) - brain dominance

	upper left	upper right	lower left	lower right
Mann-Whitney U	48	78.5	66.5	42
Z	-2.205	-0.789	-1.346	-2.483
P	0.02	0.42	0.17	0.01

The Mann-Whitney test value (in the case of the upper left quadrant of the brain) is 48 and since $p < 0.05$ ($p = 0.02$) the result is statistically significant. It means there are significant differences between ESM (median = 71.5) and FSM (median = 66) in terms of upper left quadrant (cortical system). The effect size index is $r = 0.42$ showing a moderate to strong difference (see Predoiu, 2020) between the results.

The Mann-Whitney test value (in the case of the lower right quadrant) is 42. Since $p = 0.01$ the result is statistically significant, meaning that there are significant differences between ESM (median = 72) and FSM (median = 61), regarding the use of the lower right sector of the brain (limbic system). $r = 0.47$, in other words, a strong difference between the two groups of sports managers was underlined (in terms of the use of the lower right quadrant).

When talking about the use of the upper right and lower left quadrants of the brain, no significant differences were observed between the two groups of sports managers (present and future).

Next we were interested to highlight the relationship between rationality and emotionality, and, also, to know the operating mode of the brain (predominantly left or right), in the case of experienced and future sports managers. Figures 1 and 2 emphasize these aspects.

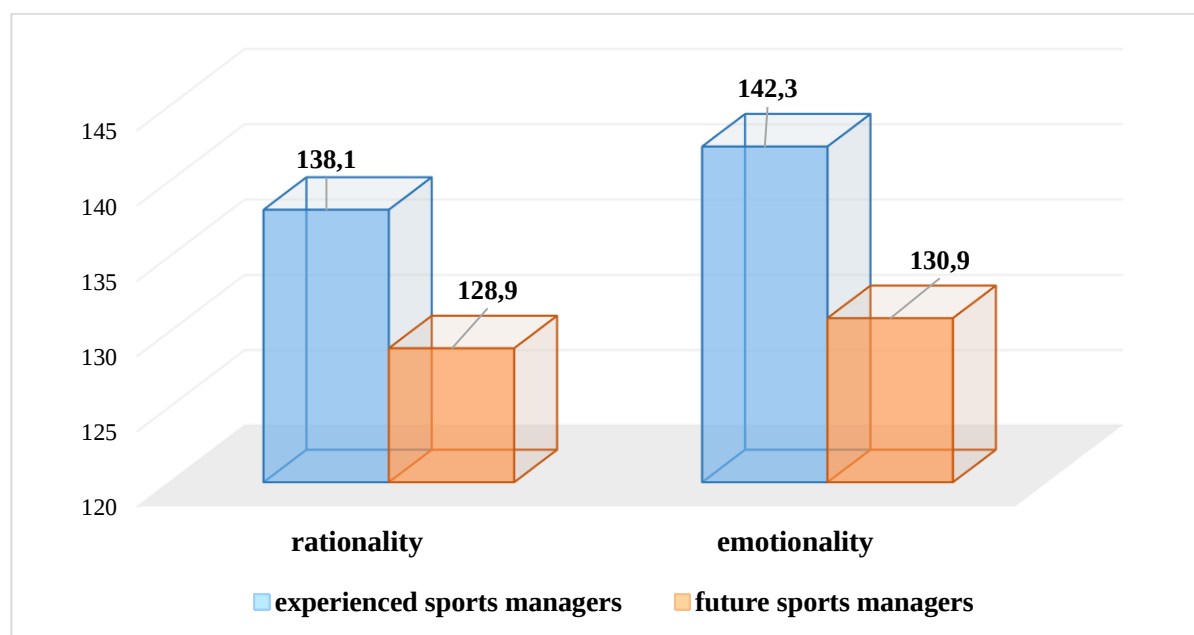


Figure 1. The relationship between rationality and emotionality – sports managers

ESM use more the upper (left and right) quadrants of the brain (rationality) and, also, the lower (left and right) quadrants of the brain (emotionality), comparing to FSM.

With respect to the brain's predominant mode of operation – left (upper left + lower left quadrant of the brain) or right (upper right + lower right quadrant of the brain), ESM use more both cerebral hemispheres (left and right), comparing to FSM (see Figure 2). One can observe, also, an integrated use of both cerebral hemispheres (in the case of experienced sports managers).

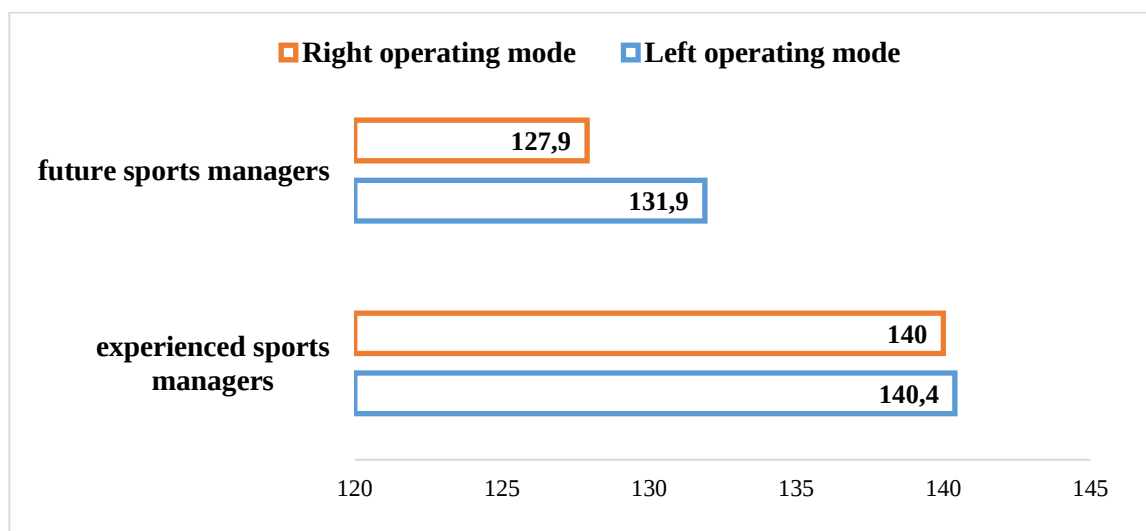


Figure 2. Brain's predominant mode of operation (left or right brain hemisphere)

Discussion and conclusions

Each person has a particular way of processing information, transforming it, processing data and interpreting it. The current paper aimed to capture the relationship between rationality and emotionality (important issues, for example, in the decision-making process) and to emphasize the brain's predominant mode of operation (left or right hemisphere), in the case of experienced and future sports managers. Also, differences between the two categories of sports managers (present and future), in the use of the four brain quadrants, were examined.

In her studies, Mihaela Roco concluded that regardless of age, about 40% of persons predominantly use two brain quadrants, and about 50% of participants predominantly use three brain sectors/ quadrants. Depending on the profession, one or other of the four quadrants dominates. For example, in lawyers, economists, engineers the left mode – upper left and lower left quadrant of the brain dominates, while in most psychologists,

chemists and partly in mathematicians the right mode - right cortex (upper right quadrant of the brain) and right limbic (lower right quadrant) - dominates (Roco, 2004). In the case of athletes, the brain activity of senior gymnasts (former members of the Romanian Olympic team), the brain activity of senior chess players (20 of the best players in Romania) and the brain activity of junior handball players were studied. The results are as follows (see Predoiu, 2016; Popescu et al., 2014; Roco et al., 2014): in the case of senior gymnasts, but also in the case of senior chess players, the left brain modality dominates (upper left and lower left), while in the case of junior female handball players the right brain modality dominates (upper right and lower right quadrants).

But which are the cerebral preferences of sports managers? Data analysis revealed that experienced sports managers (ESM) use more the lower right quadrant of the brain (limbic system), being socially oriented individuals and empathetic. Expressive and sensitive to others, ESM have the ability to quickly grasp

and understand the reactions and wishes of others. In the case of future sports managers (FSM), the results show that they predominantly use the lower left sector of the brain (limbic system), being people who want to form habits and to respect them. They organize, plan, arrange, order, precisely to have everything under control. FSM are not people who can easily change their minds. They need practical solutions with a detailed plan, fixed deadlines for implementation and they don't like change. In their day-to-day work, these participants pay attention to detail, set procedures and impose a regimen and timetable on themselves as precisely as possible. However, the significant differences between ESM and FSM were observed in the case of the upper left quadrant of the brain (cortical system) and for the lower right sector (limbic system). Experienced sports managers are significantly better at performing logical, analytical, mathematical activities, look more critically at situations, and like numbers and calculations significantly more, comparing to future sports managers. Also, ESM are significantly more socially oriented individuals, understanding better the reactions of others. When talking about the use of the upper right and lower left quadrants of the brain, no significant differences were observed between the two groups of sports managers (present and future).

Not least, the relationship between rationality and emotionality, and, also, the operating mode of the brain (predominantly left or right), in the case of ESM and FSM, were investigated.

The current research highlights that experienced sports managers use more both the upper (left and right) quadrants (rationality) and the lower (left and right) quadrants of the brain (emotionality), comparing to future sports managers. When talking about the brain's predominant mode of operation, ESM use more both cerebral hemispheres (left and right), comparing to FSM. Also, an integrated use of both cerebral hemispheres was observed, in the case of experienced sports managers.

The questionnaire may offer present and future sports managers data considering the

dominant cerebral quadrants, „being aware of the fact that the future of teaching and learning lies in the study of the *whole brain*” (Roco et al., 2014; Mannies, 1986). For their professional and personal development, future sports managers can activate, through specific exercises and activities (that can be carried out in free time), especially the upper left (cortical system) and the lower right quadrant of the brain (limbic system). For activities that can be performed to activate less used brain quadrants see Roco (2004).

The limitations of the study relate (mainly) to the relatively reduced sample of sports managers (present and future) examined. Further research must take into account gender (other results could be obtained if only women or men sports managers would be investigated), sports managers' organisational performances, identification level (with the organisation), leadership style, etc., to have an increasingly clear perspective on sports managers' cerebral preferences.

Authors' Contribution

All authors have equally contributed to this study.

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