

Ramón y Cajal on the pedagogy of sport (Thoughts of an octogenarian)

Sousana Papadopoulou

International Hellenic University, School of Health Sciences, Thessalonica, Greece

Ana B. Vivas

University of Sheffield International Faculty, City College, Thessalonica, Greece

Lazaros C. Triarhou

University of Macedonia, School of Social Sciences, Humanities and Arts, Thessalonica, Greece

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ABSTRACT

The article highlights the thoughts of the Spanish neurohistologist, Santiago Ramón y Cajal (1852–1934), on the pedagogy of sport, based on passages from his books *The World Seen at Eighty Years*, *Pedagogical Thoughts*, *Café Chats*, and *Recollections of My Life*. The ideas discussed by the illustrious Spaniard in the early part of the twentieth century are made available in English, because of his foresight regarding current trends in the balanced combination of nutrition, training load, and recovery as far as sports performance and health maintenance are concerned.

Ramón y Cajal sobre la pedagogía del deporte (Pensamientos de un octogenario)

RESUMEN

El artículo destaca el pensamiento del neurohistólogo español Santiago Ramón y Cajal (1852–1934) sobre la pedagogía del deporte, a partir de pasajes de sus libros *El mundo visto a ochenta años*, *Pensamientos pedagógicos*, *Chácharas de café* y *Recuerdos de mi vida*. Las ideas discutidas por el sabio español a principios del siglo XX están disponibles en inglés, debido a su previsión de las tendencias actuales en la combinación equilibrada de nutrición, carga de entrenamiento y recuperación en lo que respecta al rendimiento deportivo y el mantenimiento de la salud.

Introduction

The Spanish neurohistologist Santiago Ramón y Cajal (1852–1934) was awarded, together with the Italian histologist Camillo Golgi (1843–1926), the 1906 Nobel Prize in physiology or medicine for

their landmark discoveries on the structure of the nervous system. A passing meteor in the scientific and intellectual vault of the twentieth century, Cajal probed the workings of the human mind from multiple perspectives, constantly seeking to understand the psychological implications of his neuroanatomical findings (DeFelipe, 2002).

Correspondencia Lazaros C. Triarhou: triarhou@uom.edu.gr

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Amidst the tribulations of senescence and viduity, the octogenarian Cajal maintained his undaunted spirit and intellectual vigor to the last minute. On 25 May 1934, he published the book 'The World Seen at Eighty Years: Impressions of an Arteriosclerotic' (Ramón y Cajal, 1934), an amalgam of nostalgic reminiscence, the perusal of human civilization and its vicissitudes, a foresight into the future, and an unfading concern for the young (Fig. 1).

In 1968, *The Gerontologist*, the journal of the Gerontological Society of America, published by Oxford University Press, duly called for an English translation of *El Mundo Visto a los Ochenta Años* (The World Seen at Eighty Years), Cajal's "wise and understanding effort to clarify some of age's problems for the laity" (Editorial, 1968, p. 55). Thirty years later, Hoare (1998, p. 164) reiterated the argument that the book deserved to be better known among English-speaking readers, calling it "extraordinary as both medical history and a personal statement." Cajal's 'swan song' has yet to be translated into English. The only language, other than Spanish, in which *El Mundo Visto a los Ochenta Años* was ever published is Portuguese, in a translation rendered by the Brazilian professor Hélión de Menezes Póvoa (1899–1944), Director of the Institute of Neurobiology of Rio de Janeiro, who modified the book's subtitle to 'Counsels and Precepts for Making Life Long and Healthy' (Ramón y Cajal, 1946).

Mariano Ruiz-Funes (1889–1953) was a renowned criminologist and member of the Spanish Republican Left, and a Professor of Law, Dean and Vice Rector at the University of Murcia. He was twice elected Deputy of the Spanish Congress in the 1930s and served as Minister of Agriculture, Minister of Justice, and Spanish Ambassador to Poland and Belgium. With the conclusion of the Spanish Civil War in 1939, he was exiled to Mexico, where he was appointed Professor of Criminology at the National Autonomous University and the University of Xalapa. He greatly influenced the development of criminal law in Latin America, receiving honorary professorships in Perú, Guatemala and El Salvador (Ruiz-Funes, 2005).

While in Mexico, Ruiz-Funes edited select writings of Cajal centered around educational themes, which he compiled into a small volume called 'Pedagogical Thoughts' (Ramón y Cajal, 1947). Sponsored by the Mexican Secretariat of Public Education, that booklet comprised five chapters with fragments and epigrams from Cajal's literary works (Fig. 1). The third chapter is entitled 'Thoughts of an Octogenarian' (Ramón y Cajal, 1947, pp. 53–55); according to the booklet's editor, it contains "some fine general considerations on the aging of humanity and certain loose ideas that I have ventured to call *Sport Pedagogy*" (Ruiz-Funes, 1947, p. viii). We herein provide an English translation of that chapter, as Cajal's erudition may interest modern readers in the social study and culture of sport.

From 'Thoughts of an Octogenarian' by Santiago Ramón y Cajal (English Translation)

The Old Age of Humanity.—Neither in the other living beings nor of course in humans, does one notice substantial metamorphoses. Humanity keeps centering with tedious obstinacy, like it did ten thousand years ago, around four foci of attraction: food, love, indolence, and a zeal for dominion. It has not learned how to invent a

new passion or an original vice. Unless one has the zeal for knowledge, an attribute that was anathematized by the Ecclesiastes.

The Pedagogy of Sport.—We forget the high moral and intellectual values of the Nordic race. These values (ambition, perseverance, labor, patriotism, discipline, Spartan militancy, etc.) are not taught in the stadium, but at schools and colleges.

During my visits to England, I had the opportunity to converse with eminent savants about the possible intellectual influence of sports, and I learned, as I had already presumed, that the impetuous and persevering athletes did not develop any first-rate understanding. The savants, the energetic and foreseeing politicians, and the great industrialists, many of them educated at Oxford and Cambridge (venues of sports competitions) took greater care, during adolescence and youth, of hypertrophying and differentiating their neurons than of strengthening the muscles and expanding the thoracic casing.

It is important to note that the heart becomes fatigued and the veins dilated with violent exercise. Every *recordman* or athlete, unless one is assisted by an exceptional complexion, is condemned to premature aging, like the gymnasts at fairs. And the worst is the crushing stimulus caused by the triumphant over the weak and the inadequate. Physical sports must not be directed toward producing aces, of exceptional bid, but toward prudently elevating the robustness of the species' average, which is a nursery of soldiers and fighters in the peaceful battles of social work.

These docile adolescents, victims of fashion, should remember the old maxim, reiterated by Francisco de Quevedo (1580–1645), that goes "supper, sorrow, and sun are the three things with the disposition of dispatching us from this life to the next."

Our hygienists, undoubtedly inspired by foreign wise authorities, seem to have forgotten certain trivial truths: that almost all us Spanish live between the 38th and 42nd parallel, and that the majority of our motherland is raised on an elevated plateau, almost anhydrous, where an African sun alternates with glacial cold; much opposite to what occurs in northern Europe, where the reigning star is pale (when it appears, rarely), the lands are low, green and wet, and the atmosphere, even in scarce clear days, shows itself blurred by the mist suspended just above the earth level, moderating the inauspicious action of shortwave rays and eliminating the noxious ultraviolet rays.

The crude and deleterious action of our implacable Sun, rich in such invisible undulations, reveals itself with ineffaceable effects on our poor peasants, who are less robust and less tall than the inhabitants of the misty hyperborean countries. See them spare and worn out, bent over the sterile land, which reflects the wave of fire; notice their premature wrinkles in the forehead and lips, their coarse hands and muscular arms, albeit mummified by the absence of subcutaneous fat. In their thirties they look like fifty years old.

And who is not impressed by the aesthetic tragedy of the unhappy peasant women? Rarely can be found there, among the innumerable girls who partake of farming jobs with their fathers and husbands, one whose face is free of the unequivocal signs of premature aging. Only daughters of wealthy peasants or girls that are by necessity devoted to housekeeping and childcare are kept away from the corrosive effects of the implacable solar rays and the destruction from the open air. Such face tanning and premature wrinkles are accentuated in the

shepherds of our mountains, where under the implacable blue sky they withstand the darts of an inclement sun.

Discussion

In 'The Pedagogy of Sport' Cajal mentions that the most important values in life are taught at schools and colleges, not gymnasiums and stadiums. He repeated the same statement in some of his other works. In his autobiography he describes how one of the lessons he learned during the period of his "gymnastic mania" was that exaggeration of physical exercise by the men of letters can diminish their intellectual work. Consequently, men devoted to study should cut down on physical exercise in order to remain focused on their intellectual work.

Cajal recalls Plato's maxim: "Dream and fatigue are the enemies of the sciences" (Ramón y Cajal, 1936, p. 191). He elaborates by saying that, during exercise, blood congestion may cloud the ideas and the passion of scientific activity. Accordingly, his advice is to avoid reading or writing while one's face is reddened from physical exercise. In the same text, Cajal brings up the trend commonly repeated in his era: "It is necessary to exercise all the noble organs (the brain, the hand, the heart); that is, the complete man" (Ramón y Cajal, 1936, p. 185). However, he objects to that trend, arguing that it is impossible to achieve an absolutely perfect vital machine: exceptional human types, whose hearts, minds and bodies are all perfect, are exceptionally rare occurrences.

Quite often, in his writings, he comments that illustrious men do not generally develop their musculature. In his 'Thoughts of an Octogenarian,' on the other hand, he reiterates more than once that athletes "do not develop any first-rate understanding" and that they "not only lack talent, but genius as well" (Ramón y Cajal, 1934, pp. 80–83).

He later modified that position, past the early obsession with physical exercise of his adolescence and the corresponding emphasis of youth on body strength and appearance. At 18 years of age, he was stronger than his classmates, wide shouldered with strong muscles (Romero, 1984, pp. 26–27). However, he did not view himself as being extremely handsome: "I was not much of an Adonis" (Ramón y Cajal, 1988, p. 184). The fact that he was so muscular was affecting his gait. Sir Charles S. Sherrington (1857–1952) gave a detailed description of Cajal's physical appearance (Sherrington, 1935, pp. 440–441), with a stoop in the strut on account of the wide and long arms. Sherrington also talked about the olive complexion, large facial features and remarkable eyes, which attached a constant melancholy to don Santiago's face.

As a young boy, Cajal consistently took pride in his strength, until he was defeated by a classmate in a wrist fight. That event led him to probe his opponent about the secrets of strength. Realizing that gymnastic exercise led to increased body strength, Cajal enrolled as a member at a local gym in order to improve his physical appearance (Santarén, 2006, p. 29); he covered the membership fees by offering in exchange lesson in muscle physiology. He worked out for two hours daily, progressing in activity, from balls to horizontal or parallel bars, high jumping, and swinging on the rings and the trapeze. Committed to his aspiration, he conspicuously flowered into the strongest man of

the gymnasium in less than a year (Ramón y Cajal, 1923, p. 116, 1988, p. 183; Ibarz Serrat, 2002, p. 27).

Cajal even made self-portraits in wet colodion plates as he went into the phase of his "gymnastic mania" and the muscular growth, almost monstrous, attained with "violent exercising" (Ramón y Cajal, 1923, p. 132, 1988, pp. 182–193; Ramón y Cajal Junquera, 2000, pp. 24–26; Santarén, 2006, p. 29). The young Cajal is shown as an archer, circa 1871–1873, with a friend in athletic pose (Romero, 1984, p. 26; Ibarz Serrat, 2002, p. 27). These figures reflect the juvenile moment, while Santiago was "cultivating" his musculature at the Poblador gymnasium in Plaza del Pilar, Zaragoza, under the influence of the adventure novels of Jules Verne and the works of Romantic writers.

In a biographical memoir, the pathologist and medical historian William Henry McMenemey (1905–1977) underlined that, at the Institute of Huesca, where Cajal was honored as a past student, he continued his schooling, but the liking for the Martian arts continued to pursue him. In his third year there, Cajal as a young student reported: "My ability with my fists and my skill in the use of the sling and the cudgel inspired respect in the bullies of the upper years" (McMenemey, 1953, p. 174).

Cajal vividly described the story of an attractive young lady with a sunny countenance enhanced by great blue eyes – nicknamed "Venus of Milo" – who "electrified" both him and the other boys in town. In the name of her beauty, Cajal was challenged to a duel by another contender of the girl, a student of civil engineering. After a strenuous fight, Cajal had to come in terms with the results of his own brutality: a severely injured opponent. Deeply shocked, Cajal offered to accompany his rival home. Eventually, the two opponents reconciled (Ramón y Cajal Junquera, 2000, pp. 25–26). His one-time rival was Alejandro Mendizábal, one of the most prominent officers of the Engineering Corps (Ramón y Cajal, 1988, p. 189).

Two additional stories, centered around physical strength, are explicated in Cajal's 'Recollections.' One took place during a festival in the town of Valpalmas. Cajal was intrigued by the phrase overheard there, that "games of strength are not for gentlemen" (Ramón y Cajal, 1988, p. 189). Determined to prove them wrong, he participated in a series of games, such as throwing the bar and picking up the *cahiz*, a sack of wheat weighing 8 *fanegas* (approximately 290 lbs.); eventually, he won the competition. The second incident occurred one night, when Cajal and his family, returning home from the theater, realized that they had forgotten the keys of the house. In a display of strength and acrobatic skills, he climbed up the balcony by clinging to the grills and entered the house through the first floor (Ramón y Cajal, 1988, p. 190).

Cajal learned some lessons from his gymnastic mania. Firstly, the devotion of young men to physical exercise can substantially reduce their sexual instincts and their artistic performance. For him, beautiful girls were no more than pretty pictures or artistic sculptures. On the other hand, ladies might prefer men with an athletic figure, as physical strength would bring to mind the invincible "Knights of the Middle Ages" (Ramón y Cajal, 1988, p. 193). Moreover, excessive physical exercise might cultivate motor neurons, at the same time minimizing the cultivation of the "association" or "psychic cells" and, subsequently, lead to the attenuation of one's interest in intellectuality (Ramón y Cajal, 1988, p. 193). Based on his own experience, Cajal

deduced that effusive muscular development in young men inevitably led to violence and bullying, since they felt the need to seize every opportunity to demonstrate their strength. Therefore, men devoted to science should diminish physical exercise, since "strenuous sports rapidly diminish the aptitude for intellectual work" (Ramón y Cajal, 1988, pp. 184–185).

The two components that lead to premature aging are sun and physical exercise. This is obvious when one looks closely to gymnasts and peasants. Conversely, those who cultivate the most noble organ, the brain, are valetudinarians, as revealed by the case of Kepler, Newton, Pascal, Hertz and many others. Based on that reasoning, Cajal recalled the dictum of his time that "genius is a disease" (Ramón y Cajal, 1920, p. 156).

The most important conclusion distilled from Cajal's notes is that pedagogues should not force a student to become a "Cyclops with a frontal eye open to the world of force" (Ramón y Cajal, 1920, p. 156), but let instead one follow their own aspirations. Nevertheless, all teachers should focus on creating healthy, honest, cultivated, and rational individuals. This is the only way whereby the world will not only consist of beautiful animals, but of good animals as well (Ramón y Cajal, 1920, p. 155).

The foresight of Cajal is reflected in current trends regarding the balanced combination between nutrition, training load, and recovery in sports performance and health maintenance. Today, finding the right balance between the training and the recovery phases in athletes is one of the greatest challenges that a training team faces. Particularly in adolescents, injuries resulting from inappropriate training regimes can have a detrimental effect on future performance and career opportunities. Thus, implementing an optimal training load in young athletes is of critical importance for attaining peak performance, and reducing, at the same time, the risk of injuries (Verstappen et al., 2021).

Moreover, an adequate and balanced nutrition that meets the athletes' physical demands is essential for their overall well-being, mental and physical, in terms of endurance and resistance, as well as for the recovery and rehabilitation periods (Papadopoulou, 2020). The importance of nutrition, especially carbohydrate, protein and fluid intake, for reducing muscle damage, maintaining the appropriate body composition, and achieving best performance is the subject of research studies, reviews and position statements of professional organizations. The primary parameter that determines body composition and weight in adolescents appears to be the energy expenditure (both basal metabolism and physical activity), and, secondly, the nutritional and total energy intake (Papadopoulou et al., 2020).

Modern studies confirm the fact that the abuse and overuse of athletic pursuits and exercise intended to yield the physical rewards of endurance and muscular strength may lead to musculoskeletal breakdown, with the specific location and severity of athletic injuries depending upon the type of activity, age, and enthusiasm of the athlete, while the denial of pain may result in chronic disability, extensive surgical repair, and degenerative arthritis (Pavlov, 1990). The desire to develop a muscular figure may lead to the adoption of numerous health-threatening behaviors that present risk factors for clinical disorders and muscle dysmorphia (Cafri et al., 2005).

In particular, male youth athletes exposed to year-round athletics programs sustain thigh injuries, muscle strains, bone stress injuries and fractures, hamstring strains, lesion of meniscus and cartilage, and growth plate injuries (Martínez-Silván et al., 2020). Moreover, in professional athletes, there is a high number of reported concussions and their recurrence, as well as an association between previous injuries during their career and current musculoskeletal conditions after retirement (Hind et al., 2020).

After his gymnastic fad, Cajal, by a compensatory reaction, developed a "mania for philosophy" (Ramón y Cajal, 1988, p. 193), as if the poor association neurons of his brain, left behind by the excessive cultivation of the motor neurons, were loudly asserting their right to live. He gradually relaxed his "silly athletic vanity," and became immersed in the study of works on metaphysics, God, soul, matter, the Cosmos, life, and knowledge, convinced that it is "more laudable to overcome an adversary with reason than with blows" (Ramón y Cajal, 1988, p. 193).

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Figure 1. The covers of the first edition of Cajal's book 'The World Seen at Eighty Years' (Ramón y Cajal, 1934), left, and the posthumous booklet 'Pedagogical Thoughts' (Ramón y Cajal, 1947), right.

