

“Move with Your Muscles, Arrive with Your Brain”: Philippe Tissié and the Psychophysiology of Athletes

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Abstract

In light of recent historiographic approaches that identify a fundamental step in the development of the worldwide concept of “physical education” in the work of Philippe Tissié (1852-1935), this essay examines the French doctor’s scientific journey by specifically analyzing his passage from an interest in movement pathology to a true psychophysiology of training. At that time, French public opinion was showing widespread enthusiasm for school reform and for the inclusion of physical education among the subjects taught. On the basis of this enthusiasm, Tissié intended to develop a discipline based not just on strength-building as an end in itself, but one in which a broader educational plan would also include using gymnastics for the psychological education of young people. The origin of this process becomes clear only in light of a historical and critical analysis of Tissié’s early writings. Although often overlooked by secondary literature, they are fundamental for putting into context both his complete commitment to the late 19th-century theories of nervism and his connection to French psychopathology at that time, represented primarily by the Salpêtrière and Nancy schools. Dream analysis, an insistence on a difference between functional impotence and nervous fatigue, and the characterological classification of an athlete indicated not only his efforts to get French youth into shape but also his desire to place an individual’s psychological and physical life within a unitary model.

Keywords

Philippe Tissié, History of Physical Education, Physiology of Movement, History of Training

1. Introduction

In 1897, in his review of Philippe Tissié’s recently published book on fatigue and

training (Tissié, 1897), Alfred Binet called the work “a popular book, comparable to works by Mosso and Lagrange”. Moreover, he recalled how the author was a go-getter, the soul of the Girondins League of Physical Education, and someone who had done a lot for the sake of future generations” (Binet, 1897: pp. 594-595). However, Binet took the opportunity to highlight in his review what to him were the work’s most obvious limits, from its overly general style to a lack of illustrative clinical cases, up to the author’s difficulty in framing some psychological dysfunctions within a “normal” pathology.

In reality, as Tissié himself recalled in the initial dedication to his colleague Charles Bouchard, the essay was indeed the result of exclusively empirical research that, due principally to a lack of means, had to disregard “the whole experimental part” (Tissié, 1987: p. IX), and instead focus on collecting field observations from the athletes and young high school students.

However, more recent historiographic approaches identify in Tissié’s work a fundamental step towards the development of French physical education (Thibault, 1987; Klecker & Bäumlér, 1995; Durry, 1997; Saint-Martin, 2006). His 1897 essay represented a turning point in the French doctor’s scientific passage from an interest in movement pathology (the so-called mad travelers as well as compulsive athletes) to a true psychophysiology of training, intended both as a central part of young people’s education and the preferred means of support for physical and mental health.

At that time, French public opinion was showing widespread enthusiasm for school reform and for the inclusion of physical education among the subjects taught. On the basis of this enthusiasm, Tissié intended to develop a discipline based not just on strength-building as an end in itself, but one in which a broader educational plan would also include using gymnastics for the psychological education of young people.

However, the origin of this process becomes clear only in light of a historical and critical analysis of Tissié’s early writings. Although often overlooked by secondary literature, they are fundamental for putting into context both his complete commitment to the late 19th-century theories of nervism and his connection to French psychopathology at that time, represented primarily by the Salpêtrière and Nancy schools. Nevertheless, dream analysis, an insistence on a difference between functional impotence and nervous fatigue, and the characterological classification of an athlete indicated not only his efforts to get French youth into shape but also his desire to place an individual’s psychological and physical life within a unitary model.

2. A Pathological Movement

Born in La Bastide-sur-l’Hers in 1852, Tissié was left fatherless before he was fifteen years old, as mentioned in one of the few existing biographies (Thibault, 1981). Working tirelessly day and night, he supported his family and continued to pay for his own studies, receiving a degree in medicine from the University of

Bordeaux in 1887. The scientific climate in the city of Bordeaux, and especially its social environment were crucial to the young Tissié's career. In the 19th century, the endemic nature of some contagious diseases typical of that area intensified the evolution foreseen by Guillaume and characteristic of all the late 19th-century France that steadily reinforced the doctor's public responsibility towards the population (Guillaume, 1979: p. 299). This growing interest in public health and related disease-prevention measures made for a compelling juxtaposition (Thibault, 1972: p. 265) of two figures working in Bordeaux towards the end of that century. The first, Arthur Armaingaud, distinguished himself in the fight against tuberculosis and the other was Tissié who advocated for sports in schools.

Yet Tissié came to the world of sports almost by chance when he took up cycling regularly at the Véloce-Club in Bordeaux, in 1884 while still an undergraduate. As a medical student, he was particularly fascinated by the many physiological changes—from breathing to blood circulation, from digestive processes to psychomotor aspects—typical of a cyclist's body (Tissié, 1888).

In the pathological sense of the term, movement also dominated the young Tissié's research interests as early as his degree thesis, which was published the same year as his discussion (Tissié, 1887). Dedicated to mad travelers and with the meaningful subtitle of "medical-psychological essay", his research—the first on this topic in the history of medicine (Hacking, 1998)—was inspired by the clinical case of Albert Dadas (1860-1907). An employee of the Bordeaux Gas Company and a violent pathological fugitive, Dadas was so famous in France at that time that he attracted the attention of Charcot and Gilles de la Tourette. Tissié's memory of his first visit to the patient in July 1886 follows: "A young man of about 26, crying in his hospital bed and exhausted after a long journey on foot. However, the cause of his complaints was not exhaustion: he was unable to stop himself from absconding. Whenever this need overwhelmed him, he would abandon his family, job, and routine, even to the point of walking 70 km in one day until being arrested as a vagabond" (Tissié, 1887: p. 7).

In Albert's case, his fugue was not an illness per se. However, in Tissié's interpretation, it was the main indicator that made it possible to identify delusional, hallucinating, impulsive, epileptic, demented, and "institutionalized" individuals under conditions similar to post-hypnotic suggestions. Besides cataloging various clinical cases consistent with late 19th-century French psychopathology and inspired by the Salpêtrière and Nancy schools, Tissié's degree thesis anticipated some of the main themes of his later research: perception of muscle exertion, fatigue, training, and the human body's efficiency. One common feature among nearly all the mad travelers like Albert was their constitutional strength, extraordinary stamina, and a marked tendency to locomotor hyperactivity.

However, the same year he graduated, Tissié began to reconsider questions regarding movement and fatigue in educational terms following his meeting in Paris, with the journalist-writer Jean-François Paschal Grousset, who had introduced football to France and was bitterly disposed towards competitive sports in

particular. Inspired by the National League of Physical Education founded by Grousset in 1888 and with the support of much of the academic world, Tissié decided to open in October of that same year the Girondin League of Physical Education to promote sports for children and adolescents (Tissié, 1901: pp. 6-7).

Thanks to Tissié's personal commitment—and having met Pierre de Coubertin on that occasion, the regional *Lendit*, a university games event with prizes and parent-teacher participation, was held in Bordeaux for the first time in 1890. The event's rules explicitly stated that “a team with the highest score in all the races could be penalized if its members generally behaved in an unsportsmanlike way” (Thibault, 1987: p. 130). Nevertheless, the event was enormously successful not to mention being a personal victory for Tissié and his belief in the general correspondence between exercise and education.

That same year, 1890, Tissié published a book on dreams as a demonstration of both a continuing interest in the psychopathology of the nervous system and movement, and of the great curiosity aroused by the clinical case of Albert Dadas. This book (Tissié, 1890) was accompanied by a detailed self-analysis of the author's dreams as well as a series of observations on the difficulty of remembering the next morning the many details of dreams that had instead seemed very clear when awakening during the night.

The first part of the book concentrates on the formation and origin of dreams tied to sensory stimulation. For example, a dream of swimming in a pool was linked to night sweats, erotic dreams to the random stimulation of the genitalia, and so on. Specifically, however, there was no demonstrably direct relationship between organ stimulation and sensation (a visual stimulation, for instance, could trigger an auditory dream!).

In terms of later developments in Tissié's research, the case of dreams dependent on muscle sense seemed particularly interesting, beginning with the assumption that “wanting to carry out a movement [during the waking state] means initiating that movement” (ibid., p. 17). Thus, starting from the reciprocal relationship between an idea or a thought and the corresponding movement (with a movement being an idea and a thought being triggered by a movement), Tissié argued that any movement, even while sleeping, could generate a thought, as happened on an experimental basis during hypnotic sleep.

The idea of a close relationship between muscle activity and brain activity was by no means a novelty, especially in late 19th-century French psychiatry. Mainly linked to the Russian Sergei Petrovitch Botkin's nervist theories (Giurgea, 1986: p. 25), it was interpreted through both Bernheim's theory (1884) on reflexes and instinctive automatisms, and Charcot's interpretations of hysterical phenomena regarding the neurophysiological correlates of dynamic pathologies. The latter stated pointedly, “When you think about numbness in your hand, your hand is already numb; you think about moving your hand, your hand moves” (Charcot, 1889: p. 139).

Tissié expanded the analogy between reflexes and a hypnotic condition from the key principle of the “ability to transform thought into action” to a broader

concept that also included a large part of motor behavior in normal conditions. One example taken from his everyday experiences is particularly illuminating. Once when lunching, Tissié was absorbed in reading an article from a very interesting magazine. Needing a knife, he moved his hand toward it, continuing, however, to follow the ideas of the article's author rather than thinking about "grasping a knife, which was secondary" (Tissié, 1890: p. 18). Tissié's concentration on reading was abruptly broken when his arm responded violently. "My brain," he explained, "sent an overly powerful nerve impulse to my hand in regard to the action taken as the evaluation of the effort required to perform [this act] and of the strength necessary had been distorted by the mental stress linked to the article I was reading" (ibid.: p. 18).

Nonetheless, the relationship between the nervous and muscular systems also appeared crucial to providing context to this category of movement in the sports world since an assessment of the effort required by a good athlete was fundamental throughout the exercise. "Jumping on a springboard," he wrote, "is difficult if you do not ask yourself which foot will be used for leverage during the preceding approach" (ibid.: p. 19).

However, the question appeared even more complex as one thinks of the works by Brücke (1876) and Meynert (1890) that are consistent with the concept of nervous energy introduced by Georges Cabanis in the very early 19th century (Cabanis, 1824: p. 153) and very popular in the latter part of that same century. Tissié believed that a certain amount of nervous energy present in the body could be used for any physical or psychological act. This "neural force" (Tissié, 1890: p. 19) could even be absorbed almost entirely by the muscular system of particularly strong athletes, even for the purpose of merely maintaining the body's equilibrium. Hence, he concluded that "people with overdeveloped muscles are generally poorly equipped for intellectual work" (ibid.: p. 20).

After dreams of sensory and muscular origin, Tissié reviewed dreams of psychological origin, identifying also in this case many applications to movement pathology. The starting point was the subjective ego, understood, however, in dualistic terms because of its twofold origin—a vegetative state and the sensory system—of the information that the human brain could receive and analyze. The ego, therefore, was divided into two parts: a "splanchnic ego", connected to the internal organs and a vegetative state, and a "sensory ego", related to the external world. When awake, a balance was established between these two egos and the individual managed to coexist within the limits imposed on their activities by the outside world. During sleep, the sensory ego's almost complete suspension of activities caused this balance between the two egos, typical of the waking condition, to break down with, the splanchnic ego consequently prevailing. In the sleep state, the possible stimulation of a sense organ by an external agent (light, noise, etc.) would indeed evoke mnemonic images connected to the organ being stimulated. However, this stimulus was processed by the splanchnic ego that, lacking any temporal notion in its makeup, provided incoherent mental representations, i.e., dreams.

The cases of “split personality” (ibid.: p. 45) often present in dreams may be traced back to this interpretation. Once again resorting to the “very close relationship between thought and muscle movements” (ibid.: p. 50), Tissié wrote, “In a waking state, a man caught up in a powerful notion, feels the need to walk, to wiggle his arm, [...]. A sort of neural force emanates that, unable to be completely absorbed by cerebral work, is freed through muscular work” (ibid.: p. 50).

A similar thesis had been supported a very short time before by the psychophysiologicalist Beaunis. According to this theory, “the nerve centers resemble a tank gradually being filled up and slowly exerting greater pressure, so that when it reaches a certain point, the need for movement is produced and a contraction follows” (Beaunis, 1889: p. 19). Tissié revised this basic principle by adding that “just as a thought or action prompts the muscle, thus the latter acts on the thought”. Accordingly, the position taken by an arm or a leg “induces a performance related to this position” (Tissié, 1890: p. 50).

At this point, the origin of the subject’s actions during sleep remained to be clarified. In this regard, Tissié reported an example from the world of sports. It was the case of a seventeen-year-old pupil from Bordeaux’s high school. After finishing second in a cycling race, for which he had expended a lot of energy during training, the boy spent the entire night moving his legs as if he were pedaling. Tissié reported, “His brother, who slept with him, asked what he was doing. Open your eyes; [the first boy] replied that he was pedaling, convinced that he wasn’t sleeping (hypnagogic sleep). He closed his eyes again and, with the same movements, immediately continued with the same hallucination” (ibid.: p. 115).

It was unquestionably a case of intense hallucination—in which the “muscles are added to the interplay of the sensory organs” (ibid., p. 116) —accompanied likewise by sleepwalking, a pathology that Tissié had already studied in depth the previous year when attending to Albert (Tissié, 1889a, 1889b). However, a confrontation was emerging with Charcot who was advancing a theory based on the epileptic origin of sleepwalking symptoms (Charcot, 1889: vol. II, pp. 303-327), whereas Tissié subscribed to the hysterical interpretation of sleepwalking.

By this time, however, Tissié seemed to have found his purpose in life in the psychophysiology of sports.

3. The *Typology of Athletes*

24 June 1893, Velodrome, Bordeaux Park: the record-holder Stéphane was about to beat his previous cycling record (673 kilometers and 316 meters in 24 hours) under the watchful eyes of Tissié who was analyzing every detail.

Beyond recording the body’s interesting physiological and biochemical variations on that occasion (Hoberman, 2001)—from urine composition to digestive system functions, from variations in the cardiovascular rate to the caloric intake from alcoholic liquid and milk-based foods—the *Report* published by Tissié (1894a) on this competitive event contained an accurate description of an athlete’s psychology and relationship with his coach.

First of all, the runners were divided into two macro-categories. Those in the first were motivated by failure, while those in the second became depressed as a result of failure. The variable in the athlete-trainer relationship was considered to be related to suggestibility, from which resulted two other categories: those athletes open to positive suggestions and those receptive to negative suggestions. In turn, those athletes open to positive suggestions were divided into “passive” (responsive to “obligatory” suggestions) and “affective” (open to “persuasive” suggestions). Conversely, obligatory or friendly statements had no effect on athletes susceptible to negative suggestions. They needed to “doubt themselves in order to be motivated or spurred on” (ibid.: p. 836). Stéphane undoubtedly belonged to the category of “affective” athletes.

Important recommendations also arise from the skills of a coach who must, above all, be able to “let himself be used systematically” by the student since “training is a suggestion given to a state of wakefulness”. According to Tissié, a runner’s psychological condition particularly resembled “that state of hypnotic semi-consciousness so conducive to accepting suggestions, especially during a prolonged effort” (ibid.: p. 836).

That same year, 1894, Tissié was developing the idea of creating a genuine “sports psychology” independent of physiology, despite being greatly in its debt. Moreover, the high standards reached by physiology in the late 19th century created conditions ideal for the psychological development of such concepts as dynamogenesis (Brown-Séquard, 1882; Féré, 1885), automatism, ideomotor actions, and the power of the imagination (Tuke, 1872). Addressing an athlete’s behavior during intensive training, Tissié (1894b) was among the first to introduce to scientific literature the use of the term “psychology” directly in connection with sports.

He himself provided a noteworthy example by refining the descriptions of athlete types (Tissié, 1897: pp. 6-7). By observing behavior during training, he was able to identify individuals as “passive” (obedient to the coach’s imperative suggestions), “affective” (who responded to the coach’s friendly suggestions), or “affirmative” (capable of giving their best as long as they questioned their own abilities). Next to them, Tissié identified some intermediate types. The “passive-affective” (a sort of loser beforehand, fearful of competition, and used to reacting negatively to the slightest doubt regarding their abilities). The “affective-affirmative” (the best individuals with whom a coach could work as they responded positively to harsh criticisms, provided they were given good-naturedly).

However, the true novelty in 1897 was the systematic description of a category of athletes previously identified the year before by Tissié. Baptizing them the “*ludoman*” (Tissié, 1896), or sports maniacs, they were a “affirmative pathological” group (Tissié, 1897: p. 8) that were truly crazy for sports. For them, it was a drug-like addiction from which they occasionally suddenly escaped to find comfort in alcohol or morphine.

In short, training became meaningful in ways that went far beyond ordinary sports and which defined “a set of methods intended to have the human body

produce maximum effect with minimum effort” (ibid.: p. 8). Here, fatigue meant a “neurological phenomenon manifested by the relatively rapid and intense exhaustion of nerve centers” (ibid.: p. XIII), which spilled over into social hygiene as the point where attention to food, rest, and regular daily effort converged.

Not surprisingly, Tissié was determined to bolster school sports to familiarize the younger generation with intellectual as well as physical effort. Moreover, he warned against the risks arising from young people’s inability to take responsibility in their day-to-day lives, maintaining that “it is essential that French youth get into shape” (ibid.: p. 3). In essence, the debate on physical education was essentially a social problem. Opposed to overtraining—except for some professional athletes, Tissié declared the importance of encouraging sports, especially among young people who, in his opinion, seemed to have been “born tired” (ibid.: p. 84), while avoiding any excesses that could contribute to mental fatigue, at which point the psychology of the athlete had to deal with the physiology of sport.

4. The Cyclist: A Physiology of Movement

In the late 19th century, thanks to the development of a chain to power the rear wheel, the popularity of bicycles led not only to a notable growth in cycling as a sport, but also to significant changes in the daily lives of ordinary people. Among other things, this resulted in the bicycle changing from being a “luxury pastime” (Weber, 1972: p. 103) to a popular, convenient, and safe means of individual transport.

The successful spread of bicycles, especially in France (Nye, 1982), brought training to the attention of a considerable number of even amateur athletes. As a scientific paradigm, it was a blend of human physiology, pathology, and psychology. Tissié enjoyed the advantages generated by this popular enthusiasm, addressing an aspect as apparently specific as the fundamental issue of the entire physiology of training: namely, the question of the nervous regulation of the “human machine”.

The starting point behind this line of thinking came once again from the world of cycling and specifically from the first Paris-Brest-Paris race (1891). Two competitors, Charles Terront and Pierre-Joseph Jiel-Laval, dominated the approximately 1200-km course. With almost a 40-minute lead over his main competitor, Jiel-Laval decided upon his arrival in Brest to take a break before continuing on to Paris. However, having taken a risk by using the Michelin brothers’ inflatable, removable tires, Terront instead decided to continue on without stopping. Jiel-Laval’s difficulty in resuming pedaling again after his stop helped Terront to reach Paris 7 hours and 40 minutes before his challenger.

Questioning Jiel-Laval’s difficulty in resuming muscular effort after taking a rest and repeating Angelo Mosso’s research on nervous fatigue (Sinatra, 2000: pp. 207-210)—arising “from an enervation of the cerebrospinal centers” (Tissié, 1897: p. 35)—Tissié recognized the muscle’s inability to contract as the result of

an “interruption or decrease in the nervous influx” from “functional impotence” caused by “anatomical or chemical modifications in the tissue” (*ibid.*: p. 35). In this case, the deliberate interruption of muscle function during a prolonged effort disrupted the processes for eliminating toxic organic residues and induced a functional impotence (muscle congestion). In addition, what apparently happened however to Jiel-Laval seemed to confirm the hypothesis regarding the relationship between muscle function and the elimination of organic compounds because of the high urinary toxicity level found in all athletes following a sustained effort. Nonetheless, at the time, Tissié wondered how the equally high urinary toxicity levels that *Mairet and Vires (1897)* had found in epileptic patients immediately after a seizure could be explained.

Interpreting muscle fatigue merely in terms of functional impotence and muscle congestion did not convince Tissié in the slightest. Additionally, he recalled that dreams could also produce muscle fatigue, despite the fact that there was practically no muscular work when sleeping. This latter comment reinforced the hypothesis of the nervous origin of fatigue. The idea led to a dream, i.e., “a powerful idea”—in contrast to a less powerful idea usually translating into a voluntary act—that created “a state of functional impotence” (*Tissié, 1897: p. 41*).

Thus, consistent with both *Sechenov’s thesis (1863)* on the inhibitory action of thought on reflexes and *Pflüger’s theory (1859)* on brain fatigue due to the intense activity of nerve centers, causing a deficiency of intramolecular oxygen (whose presence guaranteed constant nerve excitability), Tissié argued that the somatic phenomena of fatigue originated from cerebral anemia and not from muscle fatigue per se.

As further confirmation that this fatigue depended on a cerebral rather than a muscular condition, he also cited the suggestive power of music that, by managing to inhibit concentration, produced a form of motor automatism resulting in “reflex replacing [an individual’s] consciousness” (*Tissié, 1897: p. 47*).

5. Conclusion

The first stage of Tissié’s scientific journey ended with the discovery of significant similarity between intensive training and pathological manifestations of hysteria. In addition to the respective influences of a coach or a therapist, “shortness of breath, disgust, automatism[...], split personalities, hallucinations, illusions, [and] fears” were also encountered (*ibid.*: p. 18) in both cases.

Physical exercise, therefore, could maintain its educational influence on young people provided that the workout was not too tiring and remained at a “minimal [toning level of] fatigue” (*ibid.*: p. 21). On the other hand, he wrote, “Mental work is directly related to the force of the muscles employed. It is by facilitated by light physical fatigue, while it slackens with more intense fatigue up to compromising the positive outcome of the tests” (*ibid.*: p. 90).

The motto “move using your muscles, run with your lungs, push on with your stomach, arrive with your brain” (*ibid.*: p. 33) best summarizes those “psycho-

pedagogical” and “psychomedical” principles (Tissié, 1899: p. 15) of the “gymnastics of the will” (Fauche, 1994: p. 97) that Tissié vociferously supported in the second part of his career and that saw him play a leading role in a heated debate in France.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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