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PRESENCE AND BODY-OWNERSHIP: THE CASE OF THE EXERCISING AVATAR

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Abstract:
This theoretical study on the sport exercises of virtual bodies (avatars) in virtual Fitness Clubs discusses the *sense of being* in the Virtual World (VW) in relation to virtual exercises and concepts on *body ownership* and *presence*. Based on interdisciplinary research and data, the purpose of this theoretical reflection is to contribute to the formulation of a more coherent theoretical model surrounding the issue of sport exercises and the virtual body. This matter emerges as a significant topic in the field of sport sociology and sport science in general and provides fertile ground for multiple analyses for future research.

Keywords: avatars, sport exercise, presence, body-ownership

1. Introduction

Accelerating advancements in computer technologies, computer graphics and computer interfaces, are altering not only our relationship to the world and our perceptions of it, but notions of our self and our physical existence as well. We are thus forced to continuously redefine the boundaries between the biological/natural and the virtual/technological. In our technologized/virtualized culture, the characteristic of which is the increasingly intimate relationship between the human body and computer technology, we have to think and experience, even our physicality (corporeality) in a perspective of multiplicity, flexibility and ambivalence. These elements are clearly reflected in virtual sport places and mainly in virtual Fitness Clubs, where virtual bodies (avatars) exercise.

In sport literature, there is some research that focuses on eSports, trying to define them in relation to 'traditional' sports. Certain studies question if eSports[ii] should be

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recognized as 'real sport' by sport organizations (Himmelstein et al., 2017; Jenny et al., 2017; Kane & Spradley, 2017).

In Sport Sociology, although there are studies and theoretical research on the body and emerging technologies (Butryn & Masucci, 2009; Crawford & Gosling, 2009; Kamberidou, 2007; Kamberidou & Labovas, 2012), those focusing on virtual bodies (avatars) and exercise are limited. This underrepresentation includes discussions on the effects of these virtual exercises on our self; on our way of constructing and reconstructing (sport) identities; on our social and cultural existence; on the physical body; and notions on presence and on body ownership among others.

The avatars that perform sport exercises in virtual Fitness Clubs (FCs) are the starting point for this theoretical reflection. Here, in the FCs, the users (the human operators behind the regular screens), directly control via a mouse or joystick, the motion of their own graphical representations, their own virtual bodies, their own avatars. As a result, through simulation they have a virtual experience of sport exercises, without doing the actual exercises. This simulation can evoke a subjective sense of 'being there', that is to say being inside the Virtual World (VW), a feeling referred to as *presence* (Meijsing, 2006; Lee, 2004; Wirth et al., 2007).

When the virtual body exercises in the virtual FC, the user—through an identification with his/her avatar— may perceive him/herself as situated in this virtual space, which offers opportunities for simulated sport-related experiences. Users may also have the feeling, that their avatars are parts or a natural extension of their selves (Taylor, 2002; Villani et al., 2016).

Experimental research beyond sport[iii] (Lenggenhager et al., 2007; Blanke & Metzinger, 2009) suggests that when users identify themselves with their avatar—which performs exercises in a virtual FC as a representation of the self— they may have the sensation that they are consciously present as bodily selves inside the virtual FC. This generates an illusion of ownership or the sensation of owning the exercising virtual body. Furthermore, research findings suggest that identification and ownership with the digital self-representation (the avatar), can be achieved by reflecting the avatar's body on computer surfaces (González-Franco et al., 2010).

Users immersed in Virtual Environments (VE) identify themselves at one moment with their physical body and with their avatar at another (Taylor, 2002). Their mental/internal perception of the whole/entire body ('phenomenal body') can be changed (Biocca, 1997). Accordingly, we can suppose that users whose avatars perform exercises in a virtual FC, may have the subjective sensation that they are mentally and physically inside the virtual FC. This sensation—in line with Haraway's (1985) views—

[ii] The question whether virtual exercise of the avatar could be considered as a version of e-sports or in general as sport will not be discussed in this paper. For such reflections see also Thiel & John, 2018; Hemphill, 2005.

[iii] Studies on virtual exercises are limited, consequently it is necessary to use those *beyond sport*. We also take into consideration certain laboratory studies, which cannot be generalized. However, such studies are useful in formulation a theoretical perspective on virtual bodies exercising.

arises through an elimination of the basic opposition between what is natural-physical and what is artificial[iv].

This elimination, does not mean that the exercising virtual body implies the annihilation of the physical body, but instead it changes our perceptions and senses regarding the limits/boundaries between physicality and 'virtuality'. The interactions and interpenetrations[v] between the physical and the virtual body create changes in our subjective sense and our subjective experience of the body. It is this subjective sense that makes the user feel that the virtual body is his/her 'own body' (body ownership), and in the case of the virtual exercises the user feels he/she is really there, namely present inside the virtual FC.

Taking into consideration that the physical/biological body is represented but not present in the virtual FC, the purpose of this study is to discuss and understand the following theoretical questions: How is the coupling between the visible (virtual body) and the invisible (physical body) made possible? How does this compound between presentation and representation take place in the case of virtual exercises? How does the virtual body become part of our existence and understood as an extension of our bodily selves in the case of the virtual exercises? Could this virtual activity influence or have an effect on the user's physical body in addition to his/her personal and social life? A theoretical reflection concerning virtual exercise in relation to these questions, appears to be a very complicated issue as it is not possible to discuss them by focusing on only one scientific field. An interdisciplinary road needs to be followed. The contributions of other scientific fields are emphasized today in order to approach, explain and understanding sport scientific and sport-sociological questions (Donnelly, 2015; Pringle & Falcous, 2018).

This study selectively uses research from the social, cognitive and computer sciences which focuses on the virtual body, presence and body-ownership (Varela et al., 1991; Biocca, 1997; Shilling, 2005; Kilteni et al., 2013; Aymerich-Franch & Ganesh, 2015; Ratan & Dawson, 2015; Tsakiris, 2010). It interrelates these concepts with broader sociological perspectives, such as Merleau-Ponty's (1962, 1968) existential phenomenology—which seems to have particular relevance to the study of the exercising avatar[vi]—and Allen Badiou's (2006) philosophical thought, in the framework

[iv] This study does not discuss artificial intelligence or question raised concerning disembodied brains.

[v] This research does not focus on the differences between the virtual and the physical body, nor on the virtual exercise per se. It does not examine how the sense of movement is created by the brain (See among others Tsakiris, et al. 2006), or how kinesthetic perception is built. It does not deal with the specific effects of the functionality of the physical body due to the combination of real and simulated motions/movements (See among others Plante et al., 2003; Fox & Bailenson, 2008; Vogt et al., 2015; Caudron et al., 2018).

[vi] Phenomenology points out that human experience cannot be understood one-dimensionally on the basis of human corporality (being body) by ignoring or by leaving behind the subjective dimension of the body (having body). Conversely, human experience cannot be understood one-dimensionally on the basis of the subjective dimension, by leaving behind its corporality. Our theoretical thinking in this study follows, in certain points, this orientation.

of which we understand the unity of the physical, the virtual and the phenomenal body on the level of presence as a multiplicity, as a set.

2. Virtual Bodies in the Digital FC

Avatars are three-dimensional graphical things: 3D characters, figures with three-dimensional forms, which represent a person-user in a Virtual Environment (VE), in Virtual Worlds (VWs). Avatars can mimic the morphology, motion, and communication behaviors of human beings. The possibilities of creating, shaping, forming, and using an avatar (animated bodies in general), including its motions and behavior, depend primarily on the existing platform (Yang Yu et al., 2017). Moreover, the way an avatar is customized also plays a decisive role as regards the question of presence and body ownership among others (Ratan & Dawson, 2015).

In the case of the Fitness Club of Second Life –which is the starting point of this study and our theoretical reflection—the avatars were figures, like small puppets used in standard computer interfaces. They were iconic representations of the self, seen on regular computer monitors and moved via a mouse or a keyboard. In this Virtual World (VW) the participants/users chose a virtual body provided by the platform or they designed their own avatar, according to their preference and with the greatest degree of freedom. [vii]

Such avatars are just passive bodies the motions of which are completely controlled by their 'creators', the users behind the screen. They have no external reality and are incapable of self-generated motions. They exist only within the VW. Their existence is only in the context of particular processes which indicates that something exists under the condition of one other existence, the human operator behind the screen. In strictly physiological and biological terms, these avatars per se are equivalent to 'nothing'.

However avatars involved in virtual actions and situations, make sense to the users, affecting them in a variety of ways. In most studies they are connected to issues concerning subjectivity, self, identity, embodiment, presence, body-ownership and so forth. Studies also highlight that people's offline life is affected by the avatar in a very powerful way (Schau & Gilly, 2003; Ott, 2003; Vicdan & Ulusoy, 2008). Such studies reveal the ways individuals define and make sense of their own interactions with the avatars, ways which are (multi)complex and contingent.

When someone enters a virtual FC, such as Second Life (SL), he/she could for example observe the other avatars working out, performing aerobic activities and strength-training workouts, running on the treadmill, using the swimming pool, biking, etc. Such FCs are virtual-digital simulated sporting spaces, exact copies of a gym in the

[vii] This paper was inspired by research conducted in 2013, which began in a seminar held for my graduate students, which included participant observation of the Virtual Fitness Club (FC) of a three-dimensional Virtual World (VW) called Second Life (SL). In this virtual FC, virtual bodies, known as avatars, were able to do sport exercises.

physical world[viii]. People involved in such virtual situations have the opportunity by using their avatars, to experience sport exercises through simulation, a fact confirmed through our participant observation. Virtual exercises are carried out mimetically, like the exercises of the physical body in the gym, with the same equipment and in the same way (Patsantaras & Kamberidou, 2017).

Researchers argue that participants who watched avatars exercising (in the laboratory environment), had themselves began exercising in the physical world by imitating their avatars or learning to exercise through their avatars (Plante et al., 2003; Fox & Bailenson, 2008). Indeed, studies in the cognitive sciences (using the simulation approach) suggest that play in the virtual environment—in this case virtual exercise—leaves cognitive traces that exist after play (Hesslow, 2002; Garbarini & Adenzato, 2004; Klimmt et al., 2010; Ambrosini et al., 2012). Through regular use the avatar, can be integrated into the neurological gestalt of the self, into body schema (Ratan & Dawson, 2015). Even the observation of virtual objects, and mainly avatars in VW, as underlined in behavioral and neural research, through the mediation of the canonical neuron system (Martin, 2007; Kilteni et al., 2013) could cause changes in the physical body, in motor behavior in the physical world, as well as body distortions with regard to body image/schema (phenomenal body), among others.

The sport exercises of the virtual body can appear as a factor that influences, regulates, reforms and modifies 'external' and 'internal' states, as well as biological ones. So the avatar can be considered a co-modulation factor of internal and external relations and, in this perspective, the avatar cannot be simplified into a thing or a puppet which exercises for 'its own sake'. It is not the virtual body, the avatar per se that is important. Virtual exercises penetrate the physical body through its receptors, affecting the 'whole body's' perception (Patsantaras & Kamberidou, 2017).

Hence, avatars are not perceived as unreal objects, but as different objects, that are so real as the real objects of the physical world (Holzwarth et al., 2006). Correspondingly, the exercising avatar in the virtual FC is not equivalent to 'nothing'. It is a different object, a virtual object but nonetheless it too is real since it affects the physical body and influences the life of the user. The experience of virtual exercising could be approached not as real or unreal, but as different. In this context virtual exercises could be understood as part of a new alternative sport reality, as a novel alternative version of sport (Patsantaras & Kamberidou, 2017).

Today, there are many computer-based simulated multi-media environments, viz. immersive virtual environments (IVE) that provide numerous opportunities to experience, through virtual body representations, sport-related simulated activities (skiing, bike, riding etc.) or sport exercises in a virtual Fitness Club. This indicates that the sporting body, in another dimension, is also present in the virtual world.

Studies highlight that avatars are mediums that can generate the most compelling, appealing and captivating sense of body ownership and presence (Biocca, 1997; Taylor, 2002; Aymerich-Franch & Ganesh, 2015). How these concepts can be related with the exercising avatar will be discussed shortly.

[viii] We use the term natural world as opposed to the virtual world for purely technical reasons.

2.1 Body-ownership in the case of the exercising avatar

This study, when referring to the concepts of body ownership and presence, does not aim to investigate complex brain activity and neuro-psychological mechanisms through which a representation of the body is shaped, distinguishing what is part of ourselves and what is not.[ix] In order to form a brief theoretical reflection this study selectively uses theoretical views and research results, primarily from the cognitive sciences.

The sensation, the feeling that 'this is my body', the feeling that 'my body' belongs to me, the body I inhabit is 'my own', and ever-present in my mental life, is called body-ownership (Tsakiris, 2010). Our understanding of body ownership has increased significantly in the last decades after the discovery of the rubber hand illusion (RHI) (Botvinick & Cohen, 1998), which enables controlled manipulation of limb (limb ownership) in the laboratory environment. Current studies indicate, that connections between the avatar and the physical body could take place in the same way: i.e. people experience various types of physical connections with artificial objects, such as the 'rubber hand illusion' (Ratan & Dawson, 2015), or fake limbs in a virtual environment (Kilteni et al., 2013).

Furthermore, experimental findings suggest that ownership of virtual limbs and bodies may engage "*the same perceptual, emotional, and motor processes that make us feel that we own our biological bodies*" (Slater et al., 2009, 219). Experiments suggest that virtual bodies in virtual reality could be owned by participants/users, just as rubber hands can be perceived as part of one's body in physical reality (Slater et al., 2009; Aymerich-Franch & Ganesh, 2015). Respectively, studies also highlight that people in virtual reality can have a conscious experience of body ownership towards an avatar/a virtual body (Lenggenhager et al., 2007).

The concept 'body-ownership' is perceived as crucial and as a fundamental component of one's self, or one's bodily self (Tsakiris et al., 2006). Body ownership, in the perspective of embodiment, encompasses the sense of one's body as intimately related to the sense of self, including bodily self-consciousness (Longo et al., 2008).

Experimental studies that investigate bodily self-consciousness in the perspective of sensory, emotional or cognitive layers argue, that one could experience a virtual body as if it were his/her own and localize one's self outside the body borders at a different position in space (Lenggenhager, et al. 2007, 1096). Accordingly, arguments are being raised that the virtual bodies "*could count as being situated and embodied*" (Dobbyn & Stuart, 2003).

In this framework the exercising avatar in the virtual FC, does not exist in an intemporal and aspatial ideality. We have to think of it as a second body that feels as if it is our own in an "*extracorporeal space*" (Blanke & Metzinger 2009, 9), namely as a second digital body in a different position in space, where a new (novel) bodily self can be created (and located). This causes changes–or confusion related to specific circumstances—regarding our perceptions on the embodied self, because the sense of our embodied self is transformed.

[ix] Scientifically how the "link between a body and the experience of this body as mine is developed, maintained or disturbed" remain in many levels unclear (Tsakiris, 2010, 703).

Studies also indicate, that those who have experienced avatars may be unaware of where their physical bodies end and where those of the avatars begin. In other words, they feel their avatars are natural extensions of themselves or an extension of their physical bodies (Villani, et al. 2016). The sense of body ownership can also occur or be experienced with virtual objects (i.e. avatars) which appear in VW as non-anthropomorphic shapes (i.e. small puppets) (Aymerich-Franch & Ganesh, 2015).

Studies also emphasize that it is easier for the brain to embody avatars that are able to attain motion/actions in a given environment, even when the avatars are obviously non-human (Ahn et al., 2015), or different in size (Maister et al., 2014). Taking into consideration research data from the computer and cognitive sciences (Tsakiris et al., 2006; González-Franco et al., 2010), we can assume that the motions of the exercising avatar controlled by the user behind the screen, play an important role in how the brain decides ownership. The sense of body ownership is present also during passive experience (Tsakiris et al., 2006). This could also apply to the case of virtual exercising in a virtual FC, where the physical body sits passively behind the computer screen and watches his/her avatar or other avatars exercising.

2.2 Following up the course of the 'phenomenal body'

In the case of the avatars examined in this paper (i.e. figures with three-dimensional forms, small puppets), when a virtual body exercises in the virtual FC, a new version of bodily selfhood is created, associated with the virtual body's position and the (social-structural) situation in which it is involved. This new bodily self appears or arises as a basic component of the phenomenal body, which in line with the views of Merleau-Ponty, is understood as my body as I experience it. Merleau-Ponty "*distinguishes between the objective body, which is the body regarded as a physiological entity, and 'the phenomenal body', which is not just some body, some particular physiological entity, but my (or your) body as I (or you) experience it*" (The Cambridge Dictionary of Philosophy 1999, 258). Accordingly we perceive our bodies as physical, as structures and as lived, experiential structures, in short, as both "outer" and "inner," biological and phenomenological and we continuously circulate back and forth between them, and through this circulation we form and live our experience (Varela et al. 1991, xv). The phenomenal body, in this context, refers to the mental or internal representation of one's own body, as a representation of the whole/entire body (Taylor 2002, 57), and citing Merleau-Ponty (1962, 231), it refers to "*the body as it is conceived by the understanding*". The exercising virtual body, in this case, appears as a dynamic and decisive factor that formulates the phenomenal body, namely the experience of the 'whole body's' perception.

The influence of virtual exercising on the physical body penetrates or goes through this course, in other words through the phenomenal body. Through the phenomenal body— understood as a coherent whole-body representation (the body as I experience it)—can emerge a sense of 'sporting selfhood', which is associated with bodily self- consciousness[x]. To paraphrase Merleau-Ponty (1962, 486) the user behind

[x] Self- consciousness is understood as an "embodied consciousness" (see among others Lenggenhager, et al., 2009). Our thinking here develops beyond Cartesian mind-body separation and in correlation to the

the screen is the subject which causes the avatar's motion: the user intentionally (consciously and voluntarily) cause the movements of the representational virtual body in the virtual FC.

The phenomenal body does not necessarily correspond to the physical body. It is not a static internal copy of the physical body, nor "*some mysterious thing or individual substance*", but an ongoing process of tracking and controlling the entire body's properties (Blanke & Metzinger 2009, 8).

Undeniably the physical/biological body—part of which is the brain— is the cause for the creation of the phenomenal body, but does not constitute a priori or exclusively the unique constitutive condition for having a conscious experience (a subjective sensation) of a sport bodily self and accordingly, for building—among others— a sport identity in the case of digital exercising. Contemporary technology has the potential to transform our sense of embodied self, sporting embodiment, sport self and identities (Patsantaras, 2019). In such places as the virtual FC, the virtual body has greater value and importance (Schau & Gilly, 2003), as opposed to the physical-biological body, with regard to the formation of the phenomenal body.

The phenomenal body is not stable but may be altered, through the interaction, inter-influences or competition between physical and virtual body. In this framework researches discuss competition between the virtual and the physical body as far as the form of the phenomenal body is concerned (Taylor 2002, 57; Biocca, 1997). In the context of this competition for example, some integration processes which lead to the phenomenal self-model, can be disturbed and isolated from the subject's whole control (Blanke & Metzinger, 2009, 7).

In the case of virtual exercises, if we use Biocca's (1997) views on the 'phenomenal body', then we have two bodies to consider: the corporeal body through which we control the virtual body and the digital body that appears to act upon the virtual FC. These two bodies may be in balance or may in constant tension, conflict and even competition, in regard to the configuration of the phenomenal body. Therefore, the phenomenal body can be altered radically, according to the circumstance, the interaction between physical-biological body (which in our case is or sits passively behind the computer screen) and the exercising virtual body. This alteration may have both positive and negative influences, consequences and effects on the user's physical body but also on her/his mental and social life. For example, changes in body ownership, and in extension on the 'whole body's' perception, affects social cognition, causing changes in social behavior (Maister et al., 2014).

views of Merleau-Ponty (1962), according to which mind and body are intertwined in perceiving and experiencing the world. We "*cease to draw a distinction between the body as a mechanism in itself and consciousness as being for itself*" (Merleau-Ponty, 1962, 160). The Cartesian body-mind separation is insufficient for understanding in general the origin of perception, thought and behavior (Papoulias & Callard 2010). We cannot think of the body and mind, reason and emotion as separate systems (Freund, 1990; Varela et al., 1991; Butryn & Masucci 2009). However how this bodily self-consciousness is produced through the complicated and in many ways paradoxical mix, between the physical body, the virtual body and the phenomenal body remains (in a pure scientifically level) unclear (Tsakiris et al. 2006; Aymerich-Franch & Ganesh, 2015).

The avatar, as a role playing tool or medium in the virtual Fitness Club (FC)—a virtual space with a different social frame/conditions and social behavior patterns[xi]—can have both intended and unintended consequences/influence on the user behind the screen (Crawford & Gosling, 2009). In approaching virtual exercise as an alternative kind or version of sport, we need to take into account alternative or novel forms of sporting embodiment and sport identities, which may have both positive and negative consequences in the user's life (Patsantaras, 2019). If, for example, a user's virtual athletic identity represented in the form of an avatar in the virtual environment, deviates from the user's actual athletic identity in the physical world – i.e. actual and virtual sport self and identities are in conflict— then, as studies beyond sport show (Flichy, 2007; Villani et all. 2016), discrepancies and paradoxes could occur. The last recipient of these discrepancies and paradoxes is the physical/biological body. Consequently, in such cases, the issue of balancing discrepancies between the different selves, identities and bodies, both online and offline appears.[xii]

On the other hand, as previously indicated, the participants/users in experiments in the laboratory environment, who watched their avatars exercising had themselves began exercising by imitating their avatar's behavior. So the virtual body emerges as a new and dynamic factor, transforming and changing the ways we experience the body! In this perspective the exercising avatar appears as an intermediary tool that opens new horizons for novel forms of experiencing body ownership, but also novel forms of experiencing *body presence*.

3. Presence in the case of the exercising avatar

The concept of presence can help us explore and understand the *hows* and *whys*, or the reasons the user could perceive the virtual sport situation in the FC of VWs as real; why

[xi] Virtual Worlds give people the chance and opportunity to use their imagination and express many versions of themselves, without any repression or need to submit to the laws and conventions of society and culture, as they exist in physical worlds (see among others Vicdan & Ulusoy, 2008). VWs are 'partially' free from such constrains. For example, following our participant observation in the virtual Fitness Club (FC) of Second Life (SL) in 2013, we observed that the users were free to play out their personal preferences without being constrained by established behavioral expectations. To illustrate, in the virtual FC of SL, a female avatar performed bodily exercises (on a treadmill) wearing a formal dress and high heels (Patsantaras & Kamberidou, 2017). From a sport perspective we have two oppositional/ conflicted identities, two competing identities here. These simultaneously existing identities are described here as oppositional, conflicting or competing identities, in order to emphasize and spotlight that the confirmation of one identity increases the deviation of the other.

[xii] Goffman's (1959) classic theory of self-presentation, complex intraself negotiations, identity and social performance could be useful in such sport sociological issues. Especially when it comes to discrepancies between virtual ideal self which a given person aspires to have but may not be able to maintain in physical life and the self-manifested in every day behaviours and interactions in physical life. Studies show that when a user's virtual identity represented in the form of an avatar in the virtual environment deviates from the user's actual identity in the physical world, then as a result we may have higher depression levels and lower self-esteem (Villani et al., 2016). This has consequences on the physical body because our mode of being is based on the union of the 'psychic' and the 'physiological' elements (Allen-Collinson, 2009).

they 'feel they have a sporting body/ an exercised body' while sitting passively behind the computer screen. Presence has many versions and dimensions, such as self-presence, social presence, and spatial presence etc. Presence appears as a very contested term in a broad range of academic disciplines: computer sciences, neuro-science, social sciences, philosophy, etc. (Gunawardena, 1995; Taylor, 2002; Lee, 2004; Badiou 2006).

Initially, in this study, the sense of presence is understood as a feeling of immersion when exposed to a virtual environment (Vogt et al., 2015), the feeling, the sense of 'being there', inside the virtual world. This sensation of being there, is psychological state in which virtual objects are experienced in sensory and non-sensory ways as actual (Lee, 2004). However, only a few studies have investigated the neural responses that underlie the sense of presence perception (Vogt et al., 2015).

This sense depends—primarily in the case of the exercising avatar— largely on the characteristics of the virtual environment: screen size, duration of exposure, user's age, realism of the presentation, credibility and speed of the avatar's motion, eye-hand coordination (fingers by using the mouse or joystick), etc. (See among others Ratan & Dawson, 2015; Yang Yu et al., 2017). The avatar's similarity to the human body enhances the feeling of presence in the virtual world and the customized avatar increases the extent to which people feel connected to and identify with their selves and their avatar (Lim & Reeves, 2009; Aymerich-Franch & Ganesh, 2015). Dissimilarities the avatar and the human body can also influence the sensation of presence. For example, if an avatar is used like a small puppet to achieve a virtual experience (such as that of exercising in a virtual fitness club) then the user may have a weak sensation of presence. On the other hand, empirical studies also point out that people identify their selves with their avatars, even when these iconic representations have different visual characteristics than their physical selves (see among others Maister et al., 2014).

Breaking through research on presence in VWs indicates that accelerated computer technologies allow the appearance of a new version of self-presence which is understood as a sub-type of presence that designates the state in which the virtual self is experienced as the actual self (Lee, 2004; Aymerich-Franch & Ganesh, 2015).

In these perspectives presence is understood as the subjective experience, as the subjective sense of 'being there', inside the VW (Wirth et al., 2007; Ratan, 2011; Vogt et al., 2015), such as in the case of the **exercising avatar**, as the subjective feeling, the subjective sensation/perception of being there, inside the digital Fitness Club.

3.1 Presence as a subjective experience

To examine the subjective sensation/perception of *being there*, being inside the digital Fitness Club, one need first conceive a theoretical perspective on which the physical body can be perceived as present in the virtual FC.

In studies such as this, we do not have to understand subjectivity one-dimensionally, to wit as a mental construction, as something totally abstract and independent of the physical body. Subjectivity and self are understood initially as cognitive phenomena, which are embodied and play a fundamental role in the whole living body, interacting in particular social worlds, that is to say natural-physical or

virtual (Varela et al.1991, 146-184). Cognitive representations and operations are fundamentally grounded in their physical context!

The perception of presence— the feeling of immersion when exposed to a virtual environment— is a cognitive result that "*depends upon the kinds of experiences that come from having a body with various sensorimotor capacities, and second, that these individual sensorimotor capacities are themselves embedded in a more encompassing biological, psychological, and cultural context*" (Varela et al., 1991, 172–173).

"*To be human, indeed to be living, is always to be in a situation, a context, a world*" (Varela, et al., 1991, 59). According to Merleau-Ponty (1962, 500) presence is a "unique structure" which discloses subject (body as I or you, experience it) and object (the objective body, the body as a physiological entity). Therefore presence is conceived not as an abstract and mysterious thing but as an embodied experience, as a result of the experience of embodiment. Presence through avatars in VW is always an embodied activity (Taylor, 2002). Presence is a subjective experience and a basic state of consciousness. It is the sensation of "being there" (or somewhere) regardless of whether "there" or somewhere is physical, mediated or imagined (Biocca, 1997).

The physical body, in line with these arguments, is understood as the constitutive and inseparable part of the conscious subject complex.[xiii] Part of this conscious subject complex in the perspective of subjectivity—and in the case of virtual exercises— becomes the virtual body. It is this subjective sense that makes someone feel the virtual body, as her/his 'own body' and in the case of the virtual exercise to feel that he/she is there ('being there'), inside the virtual FC.

In this framework, the avatar can appear as part of the embodied self, namely not in a metaphysical way, but in the subjective dimension of the body. Simulation could allow changes to the subjective dimension of the body, and in this way we can then talk about transcendence.[xiv] So the user has the opportunity through his/her exercising avatar to experience a physical transcendence' from his/her physical space, experiencing an 'essential copy' of sport exercises.

One need reiterate here that the exercising avatar in the virtual FC, is a second body in an extracorporeal space, namely a second digital body in a different position in space, where a new (and novel) bodily self can be created. According to Wirth et al. (2007, 496), the user observing/watching his/her avatar exercising, could more easily experience "spatial presence": feel he/she is in the virtual environment, in the virtual FC. The user's mental (cognitive) capacities are absorbed by the mediated environment instead of reality (Garbarini & Adenzato, 2004). An individual who is experiencing

[xiii] In the terms of phenomenology, our senses are directed toward the world as we experience it. They are directed toward a lived world and so this world is accessible to consciousness. So the lived world is a conscious experience (Varela et al., 1991, 52). In line with this argument, important but extremely complex issues arise, such as: how are all the dissimilar elements of one's self—one's thoughts, feelings, perceptions etc. — unified and grounded on consciousness, namely as "all of one's experiences as happening to a single self" (Varela et al., 1991, 52). Future research could examine if in the case of virtual exercise a disunity in consciousness could arise in regard "to visual conscious awareness, to auditory awareness and to tactile awareness which are considerably distinct" (Varela et al., 1991, 52).

[xiv] We refer to transcendence according to Heidegger's perspective. See Merleau-Ponty, 1962, 486.

spatial presence will perceive only those action possibilities that are relevant to the mediated space (Wirth et al. 2007, 497).

When people, in generally, experience presence and self-presence, they experience events and situations within virtual reality as if they were real (Slater et al., 2009). In other words, they feel they are there, present in the virtual social situations. This is a version of social presence, which refers to the degree to which avatars are perceived as 'real' in computer-mediated communication. Thus, social presence is understand here as the perception/sensation of being in and belonging to a virtual social situation, such as is the case of the exercises in a virtual FC, even when the user is sitting passively behind the computer screen, watching his/her avatar or other avatars exercising and vice versa, (his/her avatar can also be observed by other users)! The bodily exercises in the FC are understood as a (social) situation, a social event. In line with that we can suppose that users, which experience presence, social presence and self-presence in a virtual sport space/environment, may conceive/perceive virtual sport situations as real.

In today's Immersive Virtual Environments such as the virtual FCs, the bodily movements-motions seem to be done in a naturalistic way and occur so easily that we fail to see the artifice of it all (Biocca, 1997). Accelerated technological developments allow for a higher level of adaptation of the motion of the avatar to the motion of the physical body. It seems that this factor, the 'motion of the avatar' enhances the experience of all versions of presence. So users may have the feeling or sensation— in accordance to the level of simulation—that their exercising avatars are a natural extension of their selves, users having the illusion that the exercises are real. Additionally, the user's control of the avatar's movement-motion allows for a tighter coupling between the two (the avatar and the user): the user may have the subjective sensation or illusion—both are essentially the same— that he/she is physically and mentally inside the virtual FC.

3.2 Presence in Badiou's perspective

In the philosophical thinking of Badiou (2006) a set is a structured presentation, that can be understood as a multiple, or multiplicity. Accordingly, presence – i.e. the sensation of being inside a virtual FC (VFC) by means of an avatar as medium for representation – can be conceived as a multiplicity, as a set that embodies the physical and the virtual body.

Badiou (2006, 25) equates presentation with situation: "*a term of a situation is what that situation presents and counts as one.*" In this context, situation is any type of presented multiplicity, e.g. a virtual FC. The situation is the place and the taking-place of bodily exercises in a virtual environment. The physical body and the virtual body can be included or presented in this situation. The interactions and interpenetrations of the physical and virtual body form or condition the phenomenal perception of the body. The dialectic of the physical/virtual leads to the perception of the phenomenal body. The phenomenal body itself is also a multiplicity that passes through the filter of presentation/representation within the situation-set of the virtual FC. Using such

construction, we will in a brief, concise and selective way demonstrate the presence of the physical body in the situation-set of the exercising avatar in a virtual FC.

In line with Badiou's thinking (2006, 102), we suppose the physical body is a given set *(α)*, an existing multiple. The virtual body *(β)* and the phenomenal body *(γ)* are subsets (or parts) of α, meaning they are included (or represented) in α. Mathematically, this is written $\beta \subset \alpha$ and $\gamma \subset \alpha$. Every multiple is thought without unity or totality, with two distinguished types of relations between them: Belonging (ϵ), i.e. multiple as element of another multiple, and inclusion ($\subset$), i.e. multiple as part (or subset) of another multiple. The consequence of this distinction is an ontological neutrality: elements and parts are also just pure multiples. In fact, the power set axiom posits that all multiples included in a set belong to another set. If a set α exists (is presented) then there also exists the set of all subsets of α, written *P(α)*:

$$[\gamma \in P(\alpha)] \leftrightarrow (\gamma \subset \alpha)$$

This means that a second count, or metastructure, *P (α)*, exists, if the first count, or presentative structure, exists. It also affirms a correlation between belonging ($\in$) (presentation), and inclusion ($\subset$) (representation). The multiples β and γ that are included (represented) in α, also belong (are presented) in *P(α)*, i.e. $(\beta \in P(\alpha))$ and $(\gamma \in P(\alpha))$. This is an operational distinction between belonging and inclusion; it does not imply two different ways of thinking of a multiple. Belonging is in fact the only relation since inclusion can be defined in terms of belonging.

Following this line of thinking, we can consider the VFC as another multiplicity, or situation-set in which the virtual body performs exercises. The virtual body (β) belongs to the situation-set *VFC* (presentation) and is equally included in the situation (representation):

> $\beta \in VFC$ and $\beta \subset VFC$ (because $\beta \in P(VFC)$). Consequently, β is a term-part in the situation *VFC*.

On the other hand, the physical body is included (represented) in the situation-set but not presented:

> $\alpha \subset VFC$ and $\alpha \notin VFC$ (but $\alpha \in P(VFC)$). It follows that α is a part in the situation *VFC*.

From the viewpoint within the situation-set *VFC*, the physical body *(α)* is represented without being present. However, it is presented (belongs to) the state of the situation-set, *P(VFC)*, that conditions or regulates the interactions and interpenetrations between the physical body *(α)* and the virtual body *(β)*.

In other words, the physical body can be considered a part of the VFC. In fact, we can argue that the physical body, although invisible, is present during the avatar's virtual exercises. In line with Badiou's (2006, 99) thought, the moment that the physical

body finds itself (re-) presented in the VFC, means that it belongs to the representative structure (i.e. the metastructure) and is thus also included in the situation itself. The body, through which the presentation of the FC is being constructed, is the physical-corporeal and the virtual as well, i.e. the virtual "*is used to root the self*" in the virtual space (Taylor 2002, 42). Using Merleau-Ponty's words (1968, 151), the physical body "*is therefore not a de facto invisible, like an object hidden behind another, and not an absolute invisible, that would have nothing to do with the visible. Rather it is the invisible of this world, that which inhabits this world, sustains it, and renders it visible*".

The biological body is part of the multiplicity (presentation) – even when sitting behind a screen – without being directly involved in the situation of the virtual exercises! In the case of virtual exercises, the physical body (as representation) and the virtual body (as presentation) are of course distinct, but at the same time they are inseparable: elements and parts are still pure multiples.

Since the logical structure of the power set axiom is not one of equivalence but one of implication, there is no need to question the gap between the set and the power-set (i.e. "*the point in which the impasse of being resides*"). In other words, we are not interested in equating the physical body with the virtual body or measure the aforementioned gap. What we are interested in are the possible relations between the physical and the virtual body, within the power-set or metastructure of the VFC. These relations can directly influence each multiple or sub-multiple. In other words, the user behind a specific avatar that is working out in a virtual fitness center, can have the sensation of being there.

We would like to draw attention to the fact, and remind ourselves, that the metastructure, $P(\alpha)$, is distinct from the presentative structure, α, itself. This is a consequence of the theorem of the point of excess, which posits that the power set is immeasurably larger than the initial set. In this perspective it is also understood why the phenomenal body does not necessarily correspond to the physical body.

The phenomenal body may be a consistent or inconsistent multiplicity, compatible or incompatible to the physical body. It is possible to discuss at this point the discrepancies, conflicts, competitions and paradoxes that can appear between the virtual and actual bodily selves. This is because of the foundational interruption of ontological disputes due to the axiomatization of set theory employed here. We can ascertain that $P(\alpha)$ exists if α exists (Badiou, 2006, 83), in other words, the 'phenomenal body' exists if α exists.

The connection between α and $P(\alpha)$, i.e. the connection between the native structure of a situation-set and its statist metastructure, within Badiou's line of thinking, can help explain why users inside a virtual world can at times feel their avatars as an extension of their physical body, or feel as just being included in the situation.

4. Concluding Remarks

In using an array of theoretical approaches and empirical studies from different disciplines, this study contributes to contemporary debates surrounding the issue of

sport exercises and the virtual body. It provides fertile ground for multiple analyses and emerges as a significant topic in the field of sport sociology and in the field of sport science in general. Interdisciplinary approaches arise as a powerful means of understanding and creating new knowledge about avatars and sport (exercises).

This study shows that avatar exercises—programmed intentionally by the human user, operating behind the screen— are not merely abstract things in the virtual world, without meaning and separated from consciousness. To reiterate, the avatar's exercises are not meaningless, but become part of the incarnate subjectivity of the human operator. The relationship between the exercising Avatar and the human operator behind the screen is quite complex!

Using Badiou's thinking this study showed that the physical body, although invisible, is in fact present during the avatar's virtual exercises. This way of thinking could help us see if and to what degree, our analyses regarding virtual exercise should be realized on the level of a metastructure.

Moreover, if the physical body and the virtual body are inseparable—as was indicted through the concepts of 'body ownership' and 'presence'—then we can formulate many theoretical questions. For example, from a sports sociology approach, if the physical (biological) body is considered present in the situation of virtual exercises in the virtual FC, then from a transcendental perspective and in certain circumstances some biological characteristics—or social meanings associated with those characteristics on the level o 'physical sport reality—could comprise factors that co-formulate this virtual experience. Consequently, certain biological parameters/characteristics could, in accordance with the circumstances, determine and influence (or the complete opposite, not determine or influence) the experiential sport (social) experience in the virtual space.

Studies show that in VWs, the social role of the avatar's body, virtual identity and so forth, are partially determined, but not decisively designated, by implicit and explicit social norms that may be imported from the user's social-cultural environment (Bioca, 1997; Villani et al., 2016). Consequently we can argue that lived experiences or those experienced through avatars in VFC's can occasionally be affected by the users 'physical life' selves and identities, and vice versa.

We may not be able to experience or to experiment with different sporting selves and identities in digital sport places, totally independent and free of nature (physical-biological body). Paraphrazing Shilling (2003,2) at this point, we can argue, that even in our technological age the firm foundation on which to reconstruct a reliable sense of self appears to be the body and this self is not separate from bodily self.

Quantitative studies in the future could examine, in the case of virtual exercises in a virtual FC, how this experience may influence user's perceptions, actions, social life and physical bodies as well. In such a perspective for example sport sociological research could consider, how participation in virtual bodily exercises is shaped along the lines of gender, class, age, disability, and so forth, and to what extent this participation supports, undermines or fits into existing social patterns.

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Conflict of interest
The author declares that he has no conflict of interest.

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