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Empatia e Prestazione Sportiva

Empathy and Sport Performance

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Abstract

Lo scopo del presente studio è di chiarire il legame tra empatia e modelli percettivo-motori. Tale legame è proposto come modello per arricchire il modello prestazionale sport-specifico e di conseguenza per favorire lo sviluppo e la massimizzazione delle prestazioni sportive.
Partendo da questa ipotesi, verrà dapprima trattato il legame neurofisiologico tra empatia e azione motoria e in una seconda fase verrà proposta una revisione critica della letteratura scientifica sull'argomento.

The aim of the present study is to to clarify the link between empathy and perceptual-motor models in order to improve the sport-specific prestational model, hence, the development and maximization of sport performance. In this way, the neurophysiological link between empathy and motor action will be highlighted first and in a second step a critical review of the scientific literature on the topic will be proposed.

Keywords

Prestazione sportive; Empatia; Allenamento; Neuroscienze.
Sport performance; Empathy; Training; Neuroscience.

Introduction

Sport science has expanded greatly over the past few years and numerous research lines lead to empirical results that cross and integrate with each other. The latest vision of sport training is more and more targeted towards the world of neuroscience. It is about growing sport-specific prestational models by integrating the cognitive side which is connected to the organization of action. The latter refers to the ensemble of mental processes that are used to elaborate cognitive-behavioral adaptive schemes, as a response to new and challenging environments. These abilities require the individuals to predict imminent events as well as recognizing people's intention and adapt their actions to the others'. Therefore, having empathic abilities. This study is an informative model that aims to clarify the link between empathy and perceptual-motor models that can improve the sport-specific prestational model, hence, the development and maximization of sport performance.

1. Empathy and motor action

The word empathy appeared for the first time in neuroscientific literature over fifty years ago in an article by Paul Mac Lean in 1967. He defined empathy as the "art of identifying your own feelings and need with those of another person". It was considered as a characteristic of pro social behavior, as the ability to both take care and wanting to take care of others. For this reason, it is seen as important topic when trying to solve urgent issues of the modern era, such as interpersonal insensitivity and aggression. Mc Lean (1967), by describing empathy as a holistic phenomenon, cognitively complex, related to the function of the prefrontal cortex, started a new interpretation that took distance from the original idea of *Einfühlung*, feeling inside, which was mostly relate to art and aesthetic (Titchener, 1909; Gladstein, 1984). Nowadays, although its definition and function are still debated (Batson, 2009; Engelen & Röttger -Rössler, 2012), empathy seems to involve multiple dissociable processes that are based on ancient structures that work in the same way in order to promote empathy in various social spices. Speaking of empathy, it refers to the ability of identify oneself with the feelings and thoughts of someone else by understanding their emotional signals, taking their subjective perspective and sharing their feelings (Bonino et al., 1998). Empathy is therefore considered an experience of emotional sharing. Moving from social to neurobiological science, it is possible to see that the understanding of the mind and experiences is sustained by a particular type of neurons, that are the mirror neurons. Taking part as witness in any action, feeling or emotion felt by others activates the same brain areas that are usually involved when we perform the same action of perceive the same feeling (Gallese, 2005). Empathy is therefore considered an experience of motor sharing.

According to Gallese (2006), the basis for empathy is the process of "embodied simulation", that is an ancestral mechanism with motor roots characterized by neurons that act right before each cognitive processing. To perceive an action and understand its meaning is to simulate it internally. The observer uses his own resources to enter in the other's world through a modelling process that looks like a motor simulation mechanism that is not conscious, automated and pre-linguistic. It creates in the observer a body state that is shared with the actor of that expression. The state of sharing the same body state between the observer and the observed, allows this direct form of understanding, that is empathy (Gallese et al., 2006).

The ability to understand the cognitive and affective state of an individual depends on the observer's sensor-motor experience, therefore, the description of bidirectional bonds between empathy and the domain of performance is fundamental. Taking into account the motor system as the fundamental system of our life and our understanding of the world and considering the motor function as an emerging property of the system itself that allows the variable organization of the relations compared to a goal, allows us to find those bonds mentioned above that involve specific brain areas which are implied in the integration and organization of executive functions.

The term executive function is often used as a label to describe a set of psychological processes necessary to start adaptive behaviors, oriented towards future goals (Stuss & Knight, 2002). They were initially called 'frontal functions' and, over the past few decades, scientific research has demonstrated that their activity goes further than the frontal area of the brain, including in a significant way the cortical areas, through a series of connections (almost of the regions of the parietal and temporal cortex as well as the pre-striated regions of the occipital cortex) with the subcortical ones (globus pallidus and thalamus). The frontal area of the brain is strictly linked to the motor and pre-motor areas. The frontal lobes, in particular the anterior zone (pre-frontal lobes), constitute an area assigned to planning complex behaviors that go from voluntary actions to motor planning as well as to verbal fluidity and to the use of concepts and strategies. Usually the executive functions cover high level processes, such as working memory, selective and sustained attention, self-monitoring and detection of errors, inhibition of automatic responses and auto regulation (Alvarez & Emory, 2006; Miyake et al., 2000). All these processes allow the individual to coordinate the activities that are necessary to reach a goal: formulate intentions, develop action plans, implement strategies to put in action those plans, monitor performance, evaluate the outcomes. The executive functions are nothing but the cognitive control of the action. They allow us to use perceptions, knowledge and scopes to select the right action and shift our behavior to reach the goal. To successfully execute a motor action, it is necessary to gather and select all the relevant information. The pre-frontal cortex acts as a dynamic filter where al the information relevant to the motor task is activated and kept inside the working memory. Here it is necessary to connect to the executive functions, the emphatic system of the mirror neurons. The latter allows to recognize the intention behind the action executed by others. The cortical system of the mirror neurons is formed by two main regions: the pre-motor ventral cortex and the lower parietal lobe. The human areas that have the mirror mechanism present a somatotopical organization (Fabbri-Destro & Rizzolatti, 2008). There are specific areas aimed to understand motor acts performed, for instance, through hands, mouth, feet. Recent studies have strengthened the supposed bond between the understanding of actions and the motor activation of the observer, highlighting that the system of mirror neurons is involved also in attributing meaning to those actions which we can infer their finality but we cannot access to the visual information that usually activate this type of neurons. This is a key step that could and should be further investigated within the sport and training science and that could open a new empathic dimension to the sport-specific prestational models where training the kinetic empathy could lead to a significant improvement to the athletes' performance level.

2. Empathy and sport performance

The vision that emerges from this interpretation of empathy, that is the ability to read ours and others' movements and understand the reason behind them, is profoundly different from the engineering hypothesis of the motor system, according to which its role is limited to controlling the execution of the movements of the muscles. In some ways, this version could seem less logical and more convenient to the engineering model where is favorable to have multi-use neurons for each type of action. In reality, the empathic system is necessary to ensure a unique characteristic of every human action: the fluidity. Every motor action 'slides' in the next one, without interruptions or glitches. The human action becomes harmonic, variable and adaptable. Here a new bond is created between executive functions, empathic tendencies and motor performance: there are as many ways to execute a motor action as there are different sequences of muscle contraction able to reach the same scope. The intention codifies specific chains of neurons, so the movements are more suitable and likely, according to the context, to smoothly produce the action necessary to reach that specific goal.

Sport performance is one of the main areas for the study of empathic tendencies because the right conditions are created. The individual can put effort or perceive actions that are evaluated, among others, through experiments with the help of neurophysiological measurements. Numerous recent scientific studies have investigated the bond between the empathic function and sport performance (Brunelle et al., 2007; Emery et al., 2009; Gano-Overway et al., 2009; Kontra et al., 2012; Lorimer et al., 2009; Stanger et al., 2012a, 2012b) and it has been demonstrated that this link is not limited to affect the central and peripheral area of the nervous system but there are effects on the behavioral side as well. Research that focus on the influence of empathic tendencies on sport performance has also shown impacts on multiple levels: studies that have used imaging techniques or their investigations have demonstrated that empathic tendencies can change the way actions are perceived. The results were similar when the actions observed communicated affective connotations or emotional states. Finally, the empathic associations extend to the pro-social behavioral level, promoting positive behaviors as tool to help. For this reason, research on empathy in the world of sport and physical exercise suggests a wide range of antecedents and consequences for empathy. Athletes and trainers, without knowing, already put into practice the properties of empathic tendencies when they observe peers or opponent's movements. The observation recalls the activation of empathic processes both when that specific action belongs to the observer's archive and is recognized by their motor system and, therefore, acknowledged as personal experience (simple imitation); and when the observer has to learn new movement schemes (hard imitation). In this case, by studying neuroimaging, researchers have demonstrated the activation of an area of the frontal lobe that was already known to be responsible for some functions such as planning movements and memory. The visual representation of the motor action is decomposed into its most basic components, that find confirmation in those segments already existent in the brain repertoire of motor acts. The selected segments are then assembled in order to allow the smoothest and most harmonic execution of the motor action that has to be learnt. Taking into account these mechanisms is useful to develop innovative models to teach sport disciplines and sport-specific movements, already when we demonstrate the learner how to do something and ask them to observe and repeat a sport movement.

Conclusions

The motor system is a structure far more sophisticated than a machine that controls the execution of muscle movements. The scope of each action is codified inside chains of neurons that, when activated in sequence, allow to reach smoothly the scope of a movement or to immediately understand the intention of an action executed by others. Due to their ability to be activated specifically for ours or other people's actions, the mirror neurons and the empathic tendencies constitute a brain archive of motor actions that grows the more the experiences are different, same as in the sport-specific performance. Having a more aware practical application of these new insights could help to improve sport performances not only among amateurs but also among professional athletes.

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