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# Emotional Intelligence, Identification, and Self-Awareness According to the Sphere Model of Consciousness

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## Abstract

While emotion and cognition were previously considered separate concepts, current research demonstrates an interplay between them. In the current chapter, we discuss the importance of the body in relation to emotional intelligence (EI) and executive functioning. In particular, we address a specific movement meditation called Quadrato Motor Training (QMT), which has been shown to enhance emotion regulation and neurocognitive functions. We then examine the importance of emotion regulation in the context of the Sphere Model of Consciousness (SMC) and related neurocognitive studies. The SMC is a neuro-phenomenal model of consciousness based on three main axes: Emotion, Time, and Self-Determination. It presents all phenomenal experiences in a sphere-shaped matrix, aiming to account for different interactions among the axes. Through this model, the processes leading to improved EI can be framed in a general theory of consciousness and described in relation to the three axes. We discuss three key concepts in relation to the SMC: (1) EI; (2) identification, namely excessive self-involvement or feeling caught up by experience (3) self-awareness, or awareness and management of ongoing inner processes.

**Keywords:** emotional intelligence, regulation, executive functions, attention, Sphere Model of Consciousness (SMC), Quadrato Motor Training (QMT), waiting, identification, self-awareness

## 1. Introduction

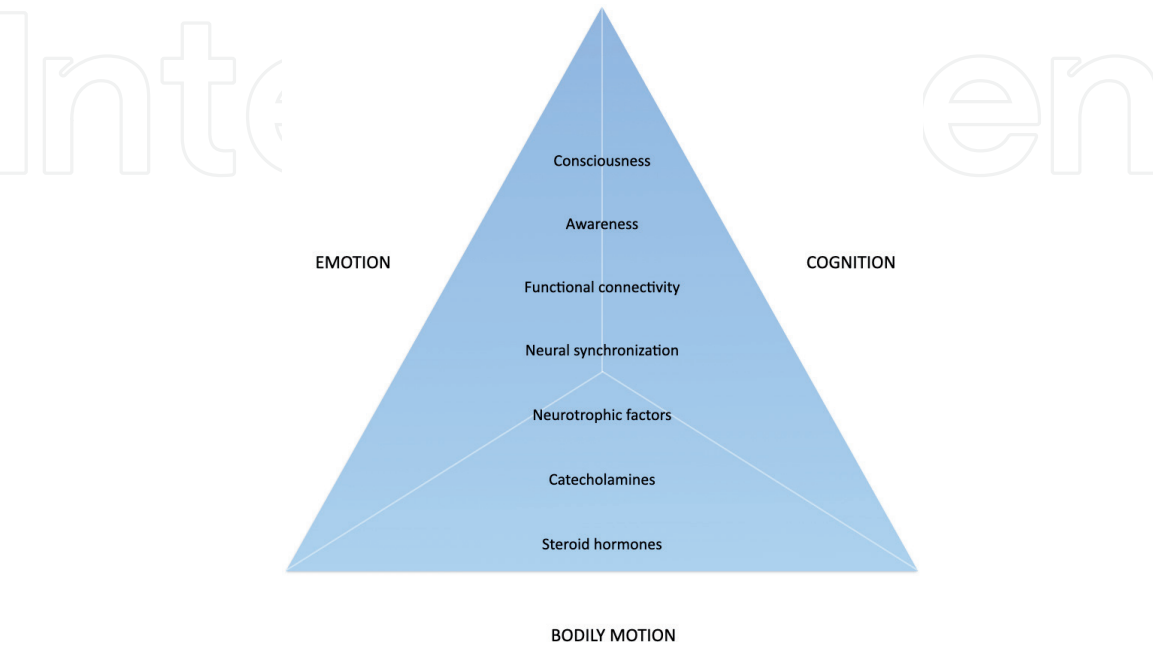
Emotional Intelligence (EI) is a relatively new concept, related to emotion and cognition [1], which has been defined as the ability to (1) perceive accurately, appraise, and express emotion; (2) access and/or generate feelings when they facilitate thought; (3) understand emotion and emotional knowledge; and (4) regulate emotions to promote emotional and intellectual growth [2]. Emotional intelligence plays an important role in daily life and can significantly impact our own quality of life and that of those around us [3]. However, relatively little is known about the cognitive processes underlying EI, and about how EI can enable better management of cognitive resources.

In the present chapter, we aim to address the cognitive processes underlying EI and to suggest new ways to improve it. To this end, we attempt to place the building blocks of EI in the wider context of a model of embodied consciousness. In addition, we look at an example of EI “in action,” namely, a specific movement meditation, to further investigate embodied consciousness and executive functions.

2. Emotion and consciousness

Many scholars view emotion and consciousness as conjoined (e.g., [4–8]), since each conscious state is endowed with some form of emotion, to the point that even the perceptual representation of everyday objects carries subtle affective tone [9]. Research indicates that emotions are manifested by physiological, cognitive, and behavioral changes [10], and that they can have both positive and negative valences [11]. If, for example, you are given an unexpected gift, you will probably be surprised. Your surprise will be expressed at three levels: physiological (e.g., accelerated heartbeat, which in different circumstances and interpretations can have either negative or positive valence); cognitive (e.g., thoughts about the person who gave it to you and maybe the reason why), and behavioral (e.g., impulsively open the box).

It is therefore generally agreed that emotional states bear two important phenomenal features, one mental and the other bodily. Schachter and Singer [12], for example, described emotional experience as a combination of general arousal and cognitive attribution regarding the cause of this arousal. Similarly, Damasio [4] views emotional experience as a combination of sensory changes that occur in the viscera and internal milieu (which he calls emotions) and the mental image of these sensory patterns (which he calls feelings). Similarly, Lambie and Marcel [5] define any emotional state as the combination of readiness for action (and its representation) and evaluative description (a mental representation). The first includes neural and somatic systems that are activated in response to stimuli, the second is an appraisal that leaves a record of how one’s concerns, or one’s self, have been affected. These theories, by linking together bodily states and cognitive features to explain emotions, create a body-emotion-mind triad (see **Figure 1**).



**Figure 1.**  
*Adapted from [13, 14].*

### 3. The cognition-emotion-bodily motion triangle

To date, as noted above, EI has mainly been examined in the context of emotion and cognition. Yet, given that the body also has an important part in embodied cognition and consciousness, it should be considered part of the equation [13–15]. Our simplified model (see **Figure 1**) links the three trajectories of bodily motion, cognition, and emotion, to indicate their interdependent contribution to the enhancement of self-awareness, which is considered the basis of EI [14, 16].

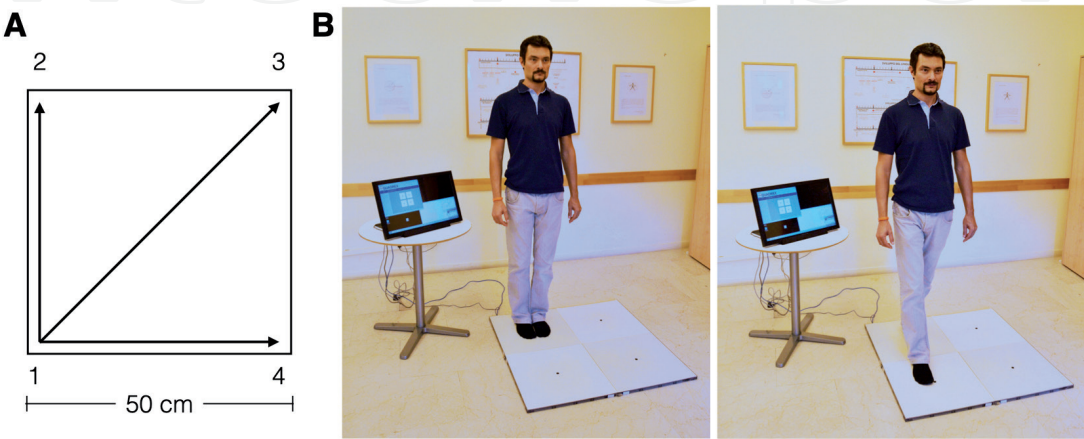
Each of these three trajectories has been linked to increased neuronal synchronization, which in turn is considered a marker of brain integrity, and connected to enhanced moral problem-solving, greater emotional stability, peak experiences, and flow [17, 18]. In fact, neuroscientific studies have demonstrated that our brain can be regarded as fragmented, and that increased neuronal synchronization can enhance internal integrity [17]. This is especially the case within the alpha (8–12 Hz) band, which is related to cognitive flexibility, attention, and self-awareness [19, 20].

In the past, each trajectory has been examined separately in relation to neuronal synchronization: the connection between enhanced neuronal synchronization and cognitive change [21] and consciousness [22, 23]; the connection between increased neuronal synchronization, consciousness, and dopamine secretion following mental training [24]; and the importance of awareness and being embodied to awaken consciousness [25].

Considering the importance of embodied cognition and consciousness, to suggest new ways for improving EI, we now move on to examine a specific movement meditation practice called Quadrato Motor Training (QMT). QMT has previously been investigated from molecular, electrophysiological, and psychological perspectives, and has been found to improve perception of time and self-regulation of affect, and to enhance neuronal synchronization [26].

### 4. EI in the body: the case of quadrato motor training

QMT is a sensorimotor training protocol that is conducted on a 50 × 50 cm square placed on the floor (see **Figure 2**), and requires smoothly executed, goal-directed behavior in response to verbal instructions separated by short varied interstimulus intervals (ISIs), which are known to increase the duration of attention [27]. “Active waiting” is defined as the general state required of a QMT practitioner.



**Figure 2.**  
*Quadrato Motor Training (QMT). A. A graphical illustration of the QMT platform. B. A participant performing QMT (on the Quadrex electronic platform), stepping in response to a verbal command.*

The practitioners is required to either produce or inhibit a motor response in the Quadrato space (which has four corners named 1–4) based on specific verbal instructions (e.g. “1–2,” which leads the practitioner to take a step forward from corner number 1 to corner number 2; or “1–1” in which the practitioner should inhibit the impulse to move and wait for the following instruction).

Thus a main feature of the QMT is inhibitory control needed to make a decision related to the instruction, as well as required in continuing to the following instruction rather than stopping when a misstep occurs [28]. This type of inhibitory control is directly related to the ability to regulate emotions through attention when, for instance, a mistake occurs or a distracting thought or inappropriate emotion arises, requiring “active waiting” [29].

As we will see in more detail in Section 5.3, attention control and attention shifting, modulated with an optimal difficulty level, can allow practitioners to be more ‘body-centered’ and thus closer to a state of flow (see Section 5.4).

Diamond and Ling [30] have claimed that practices aiming to improve cognition in general, and executive functions in particular, must not only recruit cognitive resources but challenge them continually. Combining different skills appears to be beneficial, as evidenced by research indicating greater improvements in executive functioning as a result of combined cognitive, physical, and emotional engagement [31, 32]. Diamond and Ling [33] further found that, compared to conventional exercise, the addition of embodied mindful practices like QMT results in greater improvement in executive functions. QMT-induced gains in ideational flexibility likely result from motor and cognitive inhibition acquired through the cognitively engaging motoric practice. We discuss this important topic, and its relationship with attention, below in 5.3 and 5.4.

QMT has further been found to enhance self-efficacy [34, 35] and affect balance [34], which are both closely related to higher-order cognitive functions and self-regulation [36, 37]. The acquisition of emotion regulation abilities, one of the main features of EI [1], is considered a critical developmental milestone. Emotion regulation is closely related to attention [38, 39] and contributes to a healthy lifestyle [3].

For example, emotional stimuli can modulate the time course of temporal representations. In the context of QMT, this could suggest that the required emotion regulation (e.g. the necessity to deal with uncertainty and the fear of making an error, call yourself back and go on with the QMT session when making a mistake) could be related in a way to temporal precision essential in the task.

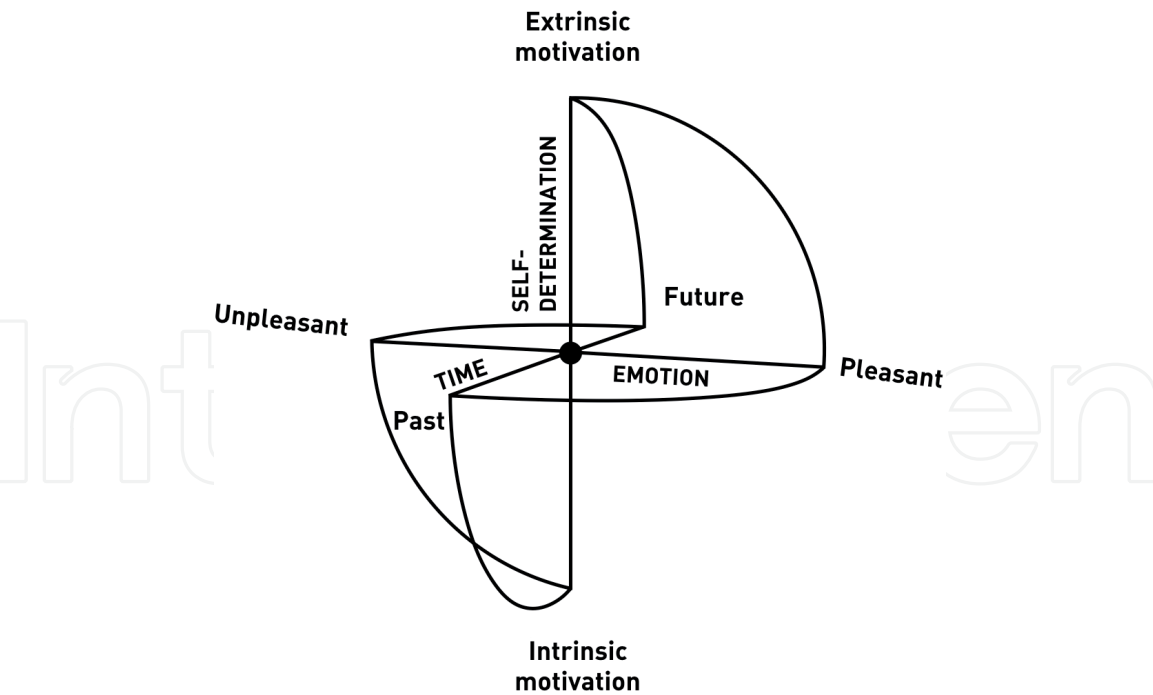
Noteworthy in this context is the fact that studies report improved emotional regulation [40] following different mental attention training regimens, in parallel to activation in neural areas that are closely linked to motor learning, including the cerebellum [41–43]. When the cerebellar timing function is disrupted, the information processing stream becomes desynchronized, which can lead to a range of psychopathological conditions [44]. Enabling or actively stimulating cerebellar oscillations through specifically structured sensorimotor training, such as the QMT, can normalize cerebellar activity and therefore enhance emotional and cognitive functions [23].

In the following section, we detail the connection between state of awareness, attention, flow, and increased emotional well-being, utilizing the Sphere Model of Consciousness.

## **5. The sphere model of consciousness**

The Sphere Model of Consciousness [45] offers a symbolic representation of the phenomenology of consciousness based on the geometrical properties of spatial coordinates within a sphere (see **Figure 3**).





**Figure 3.**  
*The Sphere Model of Consciousness (adapted from [45–48]).*

Each axis of the SMC represents the deployment and polarity of an aspect of experience. The central place in the sphere represents an equilibrium point of the three axes of time, emotion and self-determination [45], and it is regarded in the model as a state of “Overcoming the Self,” that is, a state of neutrality and detachment from the usual experiences of future-past (time axes), pleasant-unpleasant (emotion axes) polarities of the Narrative self, as well as of the more embodied Minimal Self [45, 49]. Briefly, the Minimal Self has a short temporal extension and is endowed with a sense of action, property, and first person nonconceptual content, while the Narrative Self involves personal identity and continuity through time and includes conceptual content. Overcoming of the Self constitutes a third state designated by the SMC, in which all sense of self disappears.

With this model as a foundation, we can now deepen our discussion of the emotion axis and its interaction with the other two axes.

### 5.1 Emotion axis and the conditioning of emotions

According to the SMC, the possible interactions between the emotion axis and both the time and self-determination axes express all the phenomenology of emotional experience. Autobiographical experiences do not exist as a neutral recording of a set of perceptions, nor does the brain normally produce emotionally neutral predictions. Rather, these recordings and projections inevitably have a certain emotional coloring [4–8, 45, 49]. Even in the case of emotions, there is a crucial interpretative function, which might be related to EI.

As noted above, several proposed models converge in describing an interpretative process that is integral to emotional experience. This interpretative process, in the case of emotions, is based on two polarizations: pleasant versus unpleasant and, from a psychological viewpoint, reward versus punishment (Figure 3). In fact, both reward and punishment are characterized by a specific brain system, and can reinforce behavior and perception [50, 51]. Experiential avoidance is related to punishment/reward system, and is namely a set of strategies aimed to control and/or alter internal experiences (e.g. thoughts, emotions, sensations, or memories) [52] which

may provide a way to enhance EI abilities and neuronal changes, and thus perception [53]. To apply strategies aimed at controlling and/or altering our internal experiences, the following abilities are necessary: (1) to perceive accurately, appraise, and express emotion; (2) to access and/or generate feelings when they facilitate thought; (3) to understand emotion and emotional knowledge; and (4) to regulate emotions to promote emotional and intellectual growth [1].

5.2 Identification as a lack of self-determination

According to SMC, the intersection of the time and emotion axes produces a two-dimensional flat, circular and repetitive life in which the repetition of experience is due to the dependence and the need for gratification, conditioned by the interaction between emotional memories and projective experiences (Figure 4).

Dependence and need for gratification can each be seen as a lack of EI, which results in a phenomenon that bonds together emotion and attention in what is called, in this model, “identification” [54]. Visually speaking, identification is represented in the SMC as the “decentralization” of the central point of the sphere that takes place when the third axis is not involved in the experience.

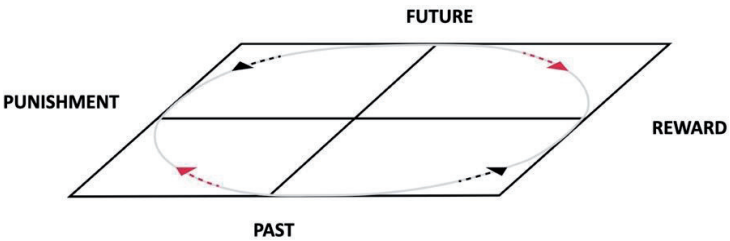
If self-determination (vertical axis) is not involved through intentional sustained attention, the intersection will be expressed only by the first two axes, time and emotion, and the intersection point can be “decentralized” and conditioned through identification with memories and emotion. For example, if a person’s mind is projected to a past unpleasant memory, it would be placed in the model at an intermediate point between the past and the unpleasant polarities (see Figure 5).

In terms of the SMC, identification is described as an imbalance along one of the axes. Attention is identified, from time to time, with elements of the past or the future that are connected to emotional experiences, aspirations, or values, but it is rarely divided between these elements and something else [15, 48]. In this regard, a refinement of the concept of absorption is required, especially in differentiating it from the concept of identification.

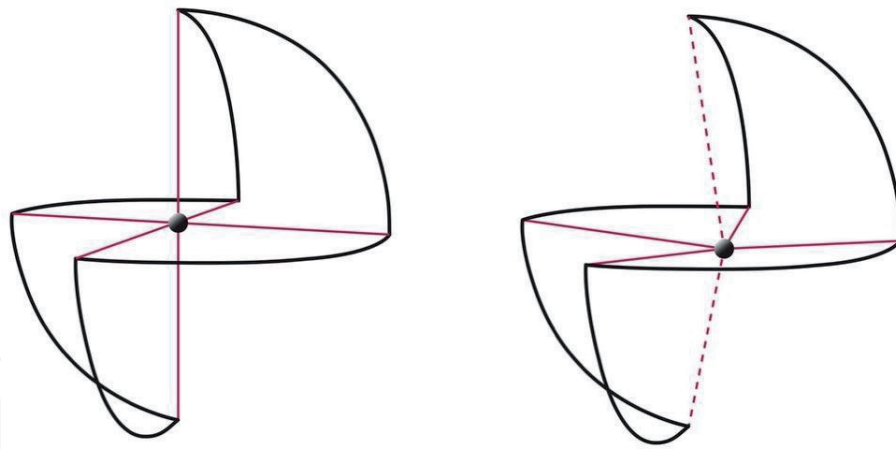
5.3 QMT, SMC, attention and self-awareness

As mentioned above, QMT is a sensorimotor training protocol that is conducted on a 50 × 50 cm square, and requires smoothly executed, goal-directed behavior in response to verbal instructions separated by short varied interstimulus intervals (ISIs).

Posner and Petersen [55] have defined attention as a complex cognitive system encompassing three independent but related networks: (1) alerting, (2) orienting, and (3) executive control, heightening (1) internal awareness, (2) focus towards selective and salient inputs, and (3) towards conflict resolution and facilitating



**Figure 4.** The “flat life” in which the repetition of experience cycles is determined by the interaction between emotional memories and projective experiences; that is, a circuit that moves between dependence and the need for gratification. Adapted from [45].



**Figure 5.**  
 (A) The balanced condition, in which all three axes meet at the center of the sphere. (B) A unbalanced condition, in which the intersection is only between the first two axes, that of time and emotion axes, and no intentional self-determination (depicted by the dotted lines symbolizing the state of lack of voluntary activation of the self-determination. Adapted from [54].

deconstruction of habitual responses, and planning, error detection, decision-making, and novel-response formation, respectively. In relation to this, it is important to note that the cerebellum and the prefrontal cortex are preferentially activated during difficult and/or new tasks that require our full attention, and they are less activated during tasks in which the ‘automatic pilot’ is satisfactory [56, 57].

In fact, training to improve attention through mental practice and verbal labeling might recruit emotion regulation processes associated with the prefrontal cortex. Consequently, training might disrupt or inhibit automatic affective responses, diminishing their intensity and duration [58, 59].

Utilizing Posner and Petersen’s [55] model of attention as a theoretical framework, we suggest that it is valuable to add attention control and attention shifting, at an optimal effort level, to physical training paradigms, in a way which can allow practitioners to be more ‘body-centered’ in a state of flow (see Section 5.4) empowering increased creativity, motivation, and enjoyment [18, 21].

Particularly in the context of movement meditations, it is worth mentioning that attention is known to alter the appearance of objects and can affect facial attractiveness [60] and emotional information [39, 61, 62]. Studies suggest that attention levels (i.e., automatic, identified, focused, or divided, [15, 48, 54] and related brain frequencies and states can significantly alter emotional and cognitive perception [53].

More specifically, by working with the minimal bodily self through paradigms like the QMT, which require us to be present in the current moment, we can enhance emotional regulation and in turn increase EI. The tasks required of QMT practitioners involve time perception and timing [63, 64], emotional regulation [29], and the capacity to enhance self-determination through attention [65]. Keeping in mind that the central point in the sphere is thought to represent an equilibrium state in which attention is divided between extrinsic and intrinsic stimuli [45], it is notable that QMT requires intentional division of attention between the internal object - the body - and external surroundings, as well as sustained attention; together, these might lead to enhanced self-awareness, in which the somatic focus is mediated by alpha modulation. This can lead to sensitization of practitioners, allowing them to better detect and regulate when the mind wanders from its somatic focus [21, 66]. Bringing the self to the current bodily state, which is not projected by the Narrative Self to previous memories of the past, nor to future projections, might allow us to become self-aware of those memories and projections



and consequently free ourselves from their conditioning. As we will now see in detail, body-centering could be related in QMT participants to the ideational flexibility that we mentioned in paragraph 4.

#### **5.4 QMT, attention and flow**

The improvement in ideational flexibility could have occurred because QMT was more engaging than the tasks performed by control groups (verbal and simple movement trainings, [21]), allowing participants to become bodily-centered in a state of flow [67]. Flow can be defined as “a state of high attention occurring during active performance. It is characterized by high creativity, as well as excellent emotional, cognitive, and motor performance” [21, 67, 68]. In addition, previous studies demonstrated that positive emotions, as compared to negative emotions, are associated with enhanced divergent-thinking [69]. Furthermore, increased cognitive flexibility and creative thinking are associated with positive emotion, possibly reflecting a change in selective attention [70]. Flow is closely related to self-actualization “peak experiences,” described by Maslow as memorable experiences of happiness, fulfillment, and achievement that create a feeling of realizing one’s human potential [18, 71]. More recently, Csikszentmihalyi [72] defined flow by “an almost automatic, effortless, yet highly focused state of consciousness” (p. 110). Thus, in accordance with Dietrich’s [18] claim that “only through the circuitous route involving actual behavior can the explicit system come to embody an implicitly learned skill” (p. 754), by increasing the connection between the Narrative and Minimal Selves, we can we improve self-awareness and, in turn, emotional regulation. Additional supporting evidence, although indirect, comes from the similarity between the electrophysiological correlates of creativity and those of flow and exercise; namely increased frontal alpha activity [18]. Indeed, a significant correlation between increased bilateral frontal alpha coherence and cognitive flexibility [21].

According to the SMC, self-awareness can be visually represented as a relationship between on one hand mind contents placed along the axes (polarities of time, emotion and self-determination) and, on the other hand, the concentric circles of the selves, that is how mind content are experienced in connection with which dimension of the self. The highest degree of self-awareness is represented as an equal relationship between the periphery and the center of the sphere, named consciousness-as-such. Based on the SMC, we hypothesize that an equal relationship between consciousness and contents can be reached only intentionally. Intentionality is needed to produce divided attention [15, 48, 54], which is needed to manifest an equal relationship between consciousness and contents. In psychological research, self-awareness is often considered an expression of EI because emotional ability is required in order to detach from emotional experiences, to observe them and become self-aware, as discussed by Salovey and Mayer [1]. In their model, there are four EI abilities that require self-awareness and lead to it.

## **6. Conclusion**

Mayer, Caruso, and Salovey initially defined EI as the “ability to recognize the meanings of emotions and their relationships, and to reason and problem-solve on the basis of them” ([73], p. 267). In their view, EI “is involved in the capacity to perceive emotions, assimilate emotion-related feelings, understand the information of those emotions, and manage them” ([73], p. 267). Later, they discussed the “capacity to reason about emotions, and of emotions to enhance thinking,” noting that “EI “includes the ability to accurately perceive emotions, to access and generate

emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth" ([74], p. 197).

All of these abilities are grounded in self-awareness [14, 16]. One of the most interesting things detected by research on self-awareness is the common illusion that have it, also in the case of its absence [75]. In fact, there is a significant discrepancy between participants who believed themselves to be self-aware and those who were actually found to be self-aware [75]. When we see ourselves clearly, we are more confident and creative, make sounder decisions, build stronger relationships, and communicate more effectively. We are also more likely to be honest, to be better workers who get more promotions, and to be more effective leaders with more satisfied employees and more profitable companies [76–78]. It is therefore extremely important to investigate how self-awareness and EI in general can be improved.

As illustrated by the case of QMT, specifically tailored movement meditation trainings can be effective in improving self-awareness, and consequently cognitive and emotional regulation throughout the life span, encouraging harmonious development of attentive and motivated minds in healthy bodies. This, in turn, is an essential requirement for personal and social well-being.

The SMC provides an overall framework through which we can describe the processes involved in improving self-awareness from a neurophenomenal perspective [45, 54, 65]. Accordingly, inner experiential self-awareness phenomena related to meditative practices like QMT, as well as still meditation, can be represented in terms of Time, Emotion, Self-determination and, most importantly, proximity to the center of the sphere. Moving toward the center of the sphere means moving from the more projective dimension of Narrative Self, in which rumination is related to DMN activity, to Minimal Self, in which we are more connected to the present through the body. Being present to oneself is a prerequisite condition for enhancing awareness of emotions and the ability to regulate them. The SMC has an educative element, as it provides the practitioner with visual feedback with respect to an inner position and, eventually, a way to move from it toward the center [45, 54, 65].

In turn, these findings may also have practical implications for people's daily life, instead of negating stress or denying it, observing and verbalizing it in a conscious way, can help move from the lower default way of reacting to stress to a more forgiving and empathic way with ourselves and to the other [79, 80] and containing way to approach the stimuli we are constantly receiving.

The current state of Covid pandemic, beyond its challenges, allows great opportunities for re-valuating life on our planet through strengthening resilience at an individual level and assuming more responsibilities from a personal social perspective [81]. Strategies for coping with current stress can be diverse, such as, practicing meditation and physical exercise [82, 83], and can be achieved for both adults and children alike [56, 84, 85]. In sum, promoting enhanced self-awareness to inner and outer experiences, regulation and acceptance [85, 86] can allow us to become more emotionally intelligent and cope better with the world's current requests.

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