

# Embodied Consciousness During Meditation in Movement: neurocognitive theories

## Extended Abstract

Aska Sakuta

University of Chichester

P.O.19 1AG

Chichester, West Sussex, U.K.

pomme-atelier@hotmail.com

### ABSTRACT

The paper explores the core concepts of this doctorate research including the process of meditative moving, altered or deeply embodied states of consciousness during movement, and the notion of optimal movement efficiency during such states of consciousness. Beginning with the literary pool from which these notions arise (i.e. phenomenological accounts on Eastern Zen Buddhist movement practices), the paper will illustrate the interdisciplinary junctions between neuroscience, sports science, and the philosophy of embodied cognition.

### KEYWORDS

Flow, meditation, dance, Buddhism, neurophenomenology

### 1. INTRODUCTION

A number of texts on Eastern movement practices identify a common philosophical narrative underpinning their pedagogical and artistic language: that there is an embodied process of altered consciousness within the act of moving, and that such a state of consciousness results in refined movement performance.

Japanese philosopher Yasuo Yuasa makes a remark on movement performance which has become a point of resonance for practitioners and scholars of Eastern movement practices:

When there is repeated training in the practice of performing techniques, the body-mind is disciplined, then the state of conscious movement changes into one which the hands, legs, and body unconsciously move of themselves. This is the state of 'no mind.' [1]

Tomie Hahn, an ethnographer who has written about Nihon-buyo (Japanese traditional dance) recognises a similar state of mind which appears during the most refined moments of performance:

When a dancer effortlessly executes the many requirements of a dance while projecting a keen awareness of multiple sensory modes, a vibrancy of energy, or presence, arises. I believe that this state is what Mihaly Csikszentmihalyi refers to as 'flow,' an optimal experience of consciousness and focused awareness. [2]

Similarly, philosopher Barry Allen, notes a tight connection between the state of 'no mind' and masterful performance in Eastern martial arts practice:

The Chinese word for "unconscious competence" is wuxin, 'no mind.' The less action depends on consciousness, the more masterful, the more perfect, the knowledge will be. Only then is movement ziran (from itself, spontaneous) and wuwei (effortlessly efficacious). [3]

Another Eastern derived movement practice, Japanese Butoh also views the phenomena of moving as a process of reducing conscious effort and refining physical intuition [4]. Dance anthropologist Rachel Sweeney notes that Butoh involves a process of 'stripping' away habitual thoughts, intentions and movements. The resulting 'empty' mind-body state is referred to as the "*butoh-tai*" (Butoh-body) – the ultimate state of being, where no unified or continuous sense of 'self' exists, and movements just simply emerge without active agency. In this state, the mind-body is thought to be in harmony with the laws of nature, and it is claimed that this harmony manifests in performance, as the performer fluidly and fluently shifts his/her presence [5].

What these philosophical and phenomenological accounts share is the recognition and suggestive valorisation of a meditative, attention-training process embedded in the act of movement. Moreover, the same authors and practitioners seem to acknowledge that, within this process of meditative moving, the mover experiences an altered state of consciousness, which can be expressed as the state of 'no mind' – a sense complete emptiness of the mind. It is thought that the strong concentration on the felt experience of moving facilitates a state of deeply embodied consciousness by stripping the mind of distracting thoughts. The mind, thereby 'emptied' of higher level cognition, allows for movement execution at the most intuitive level. The narrative of these Eastern movement practices asserts the notion that, only in this state of ultimate embodiment, can the mover perform at his or her best; truly refined movements only arise in a state of unconscious bodily attunement and embodied intuition. This paper aims to examine this notion from a combination of various perspectives in an attempt to re-articulate these phenomena into a framework which can more effectively relate to the context and methodological stances of scientific study.

## 2. BACKGROUND

A body of research in the field of dance discuss the notion of deeply embodied, transcendent experiences in the context of spirituality in somatic movement practices [6-8]. Scholars and practitioners in the field acknowledge that, throughout the past few decades, there have been increased interest and focus on introspective, mindful modes of movement, much of which stand upon the notion that such a process of careful 'self-sensing' can facilitate changes in the mover's consciousness [9]. Some researchers recognise distant Eastern philosophical heritages in these types of practices, surfacing (albeit indirectly) in some of the phenomenological accounts made by practitioners [10]. One of such heritages is Zen Buddhism, which is both an underlying philosophy of the aforementioned Eastern movement practices, and one of the major influences of today's somatic practices [11]. Zen-Buddhist teachings prioritise the act of 'doing' over 'thinking,' asserting that true enlightenment can only occur at the embodied level [12]. This way of thinking has engraved a new value and purpose to somatically informed moving, thus encouraging many movement practitioners to quest for embodied enlightenment through movement. Owing to its eclectic nature, the current pool of somatic movement practices has exposed many of today's movement practitioners to an Eastern-derived philosophy on the spiritual process and aesthetics of meditative moving.

In response to the increased prominence of such movement practices and practitioners, scientists such as Laura Schmalzl and others [13] have called attention to the need for an operational definition of movement-based meditative practices for studies based in cognitive science. In line with this current research, the authors acknowledge a deep connection and potential contributions between meditative movement practices and the growing neuroscientific research on embodied cognition. Furthermore, psychologist Shannon Len Deets [14] focuses on the phenomenon of altered consciousness induced through movement, noting alongside her literature review that there is a lack of interdisciplinary research on the matter. She states that, although the dance field has produced phenomenological studies on the topic, none of which has succeeded in founding a comprehensive theoretical framework which speaks to scientific areas of study such as cognition and human motor functions. For the purposes of this current research, the researcher has identified and defined two concepts which lie at the core of this Zen-based movement philosophy: meditative elements embedded in the act of movement, and the state of deeply embodied consciousness. The first concept can be defined as movement *episodes* which involve meditative intentions and qualities, such as self-initiation, focused concentration, internal sensing, elimination of distraction, and releasing objective judgement of performance outcomes. These episodes are not limited to those which appear during a specific movement practice (e.g. Yoga, Aikido, or other formalised somatic movement practices) but rather, they include meditative elements appearing

(throughout or temporarily) in various movement situations like dance technique classes, stage performances, and leisurely activities like walking or moving to music. Note that the definition acknowledges the potential width of movement-related research areas to which this project could contribute, in the sense that findings can be applied to a wide range of movement instances unlimited to those explicitly associated with dance or somatic practices. The latter concept – a deeply embodied state of consciousness – can be defined by a set of feelings or sensations arising during that state; this includes an effortlessly sustained attention, the loss of self-consciousness, and a sense of automatically arising movements. The definition aims to draw connections between the Zen Buddhist notion of the 'no mind' and other similar theories of altered mental states identified in fields such as psychology and neuroscience.

## 3. NEUROPHENOMENOLOGY

As a part of the current shift towards a phenomenological approach to the study of consciousness – one form of which being somatic or meditative movement practices – Zen Buddhism has developed tight connections to neuroscience [12, 15]. For instance, neuroscientist James Austin [16] presents a theory which focuses on the notion of effortless attention and a heightened intuition during the deepest level of meditation. Through this theory, Austin draws a neurological connection between optimal movement performance and the state of unconscious functioning, much in line with how Krein and Ilundain [17] describe the phenomenon of true mastery in Zen-influenced martial arts:

[W]hen we perform at our best, we must have an empty mind; thought gets in the way of action. [...] it often seems as if we simply act, only later consciously processing what our action was. [17]

Austin identifies two distinct neural pathways of information processing which are involved in focused-attention meditation: the Egocentric System and the Allocentric System. According to his descriptions, the Egocentric System can be understood as the self-fulfilling, top-down neural pathway. This System functions as a task-oriented, pragmatic network which processes sensory information through a dorsal pathway in the cortex (e.g. parietal lobe), filtering and structuring it according to relevance and utility in one's given situation. For example, while reaching for a product in a store, the Egocentric System extracts the visual information that would be relevant in obtaining the goal. This includes the distance and positioning of the product *in relation to ourselves*. Because we are engaging in an *enactive* task, we naturally prioritise self-referential information over other irrelevant sensory inputs (e.g. other shoppers' movements, sounds, etc.). As such, the Egocentric System is a large part of our sense of agency and enactive subjectivity. The Allocentric System, on the other hand, processes sensory information through a ventral pathway (e.g. temporal lobe) in a non-hierarchical, bottom-up way, independent of task-relevance. For instance, in the aforementioned scenario where we are reaching for an object,

we might become distracted by the sound of someone yelling angrily in the distance; here, this task-irrelevant information was retrieved by the Allocentric System, which runs underneath the Egocentric System to ensure that we do not become completely unaware of our environment during a specific task. Austin explains that the Allocentric System has fundamentally served the purpose of self-protection for early primates which were constantly in the need to recognise potential danger approaching from the distance. The Allocentric System governs our sub-conscious thoughts, decisions and emotions, and it is involved in habitual, intuitive, and instinctive actions. This system is mostly independent of the prefrontal cortex, where conscious decisions and analyses are made, and it consists of direct interactions between non-frontal cortical areas, the limbic system and cerebellum.

According to Austin, when meditators consciously focus on a task (e.g. attending to somatic senses), their Egocentric System activates, and they undergo a phase in which they are aware of their agency in their actions. During this stage, the prefrontal cortex maintains their focus on the task, while the parietal lobe gathers and integrates relevant sensory information. The parietal lobe then relays all necessary information back to the prefrontal cortex, where further decisions are made. This dorsal pathway of information relaying is generally what Fox [18] and other neuroscientists refer to as the Task Positive Network. At this stage, the prefrontal cortex is responsible for the meditators' conscious decisions, intentions and efforts. However, as the process of meditation moves forward and the concentration towards the task becomes effortless, the role of the prefrontal cortex – explicit monitoring of their actions – becomes unnecessary, and the Task Positive Network slowly deactivates. In turn, the Allocentric System gains more energy than its usual allowance during normal waking states, and much of the neural processing becomes deeply implicit. Austin associates this state to the concept of 'flow,' a state of deep immersion in the task [19]. Austin hypothesises that this purely Allocentric state could be the key to unlocking some of the motor or cognitive functions which are normally inhibited by other functions such as that of the Egocentric System. He explains that, without the constant energy consumption of explicit networks, other brain areas involved in implicit motor functions – such as the cerebellum – could gain more activity, thus disinhibiting our potential to experience surreal states of being, as well as exhibit extraordinary motor performance.

#### 4. MOVEMENT EFFICIENCY

The Eastern definition of optimal performance contains elements such as an implicit ability to produce highly refined movements, intuitively, and seemingly automatically. Sellers-Young [20] explains that, in the learning process of Nihon-buyo, accustoming oneself to this specific mode of sensing requires effort and concentration, but by continuing to attend to those sensations through movement, the dancer attains an implicit sense of kinetic economy. After this sense is achieved,

the dancer reaches the state of 'no mind,' where movements arise without intention. Sellers-Young identifies an initial stage of effortful (cognitive) concentration, an intermediate stage of finding and embodying optimal movement economy, and a final stage of complete automation. In other words, the training philosophy of 'no mind' asserts that optimal performance is achieved through a process of cognition, embodiment, and automation. Here, the idea of optimal performance points to an implicit somatic awareness, refined movement efficiency, and autonomous movement generation.

Christopher Cordner, a scholar in philosophy, discusses the idea of 'graceful' movement, as a concept inseparable from this type of optimal movement performance [21]. He mentions that the perception of grace involves the observer's recognition of the mover "being at home in the world (p.141)." He explains that, when the mover has an implicit and deeply internalised sense of the relations within the body and how it is situated in its space, this understanding manifests as an effortlessness or ease in movement. This comfort and ease in the mover's state of being, he says, is what produces the aesthetic quality of grace – consistent with previously outlined notions within Eastern movement practices. This section will attempt to unpack this notion of effortless ease and kinetic efficiency which is associated with the aesthetic values of movement.

Sellers-Young reflects on her own experience learning Nihon-buyo, mentioning that the teacher had taught her to be "strong," not in terms of gaining muscular force, but of increased muscular efficiency [20]. In certain methods used in the field of biomechanics, efficiency in muscular effort could be measured through comparisons between repeated trials of the same movement sequence performed by a single individual [22-24]. However, this type of method would not apply to the current research, as the movement practices and episodes mentioned earlier are not limited to choreographed dance forms, and includes other improvisational episodes of meditative moving, such as those seen in Butoh. As such, there is a need to identify what 'efficiency' might mean in a non-formalized, non-repetitive movement context. In order to gain a more generalised idea of what movement efficiency entails, some ideas commonly addressed in the field of sports and biomechanics, in relation to movement expertise, will be explored.

In many solo dance performances, the only constant tactile stimulus that the dancer receives from the external world is their connection to the floor. Apart from restrictions which arise within the dancer's own body (e.g. musculoskeletal functions, cardiovascular functions, capacity of neural activity, etc.), the floor (or the gravitational force from the earth) is the only factor determining the limit of the dancer's movement range. As much as it determines the limit, it also provides a source for motion – energy, resistance, force, friction, etc. In the idea of a kinetic chain [25, 26], all motions on earth are initiated by the units' interactions with gravity; for example, running is initiated by one foot pushing into the ground at an angle, which, in other words, is the ground pushing into the foot in the opposite vector. That vector of force then extends

its energy to other (rigid) masses which are attached to the foot (the leg, pelvis, torso, head etc.), and moves the whole body forward [27]. The extent of this energy expansion is often times determined by the individual's (either conscious or subconscious) tension in the joints; for example, if the individual loosened the knee muscle as his/her foot hits the ground, the chain of energy would release some of its force at that joint, and create a cushion for all of the body structures above that point. Our ability to use this kinetic chain of energy to move in daily life (i.e. transferring force from the ground to the correct muscular structure and onto the next) is acquired developmentally through continuous interaction with the earth's gravity since infancy. The efficiency of movement increases as we become more accustomed to the mechanical interactions within the structures of the body, and we gain an implicit knowledge of the micro-adjustments required to achieve the correct movement [28]. This theory of an environment-dependent learning process of implicit motor control and procedural knowledge acquisition is referred to as Grounded Cognition or Dynamic System Based Thinking, which is a major paradigm underlying the current field of cognition and motor control [26, 29, 30]. The theory states that, during stillness and dynamic actions – both active and passive – sensory signals, not only from proprioceptive receptors, but also from organs involved with sight, hearing, smell and other sensory functions integrate with one another to create a sense of relationship between the body and its environment. This constant sensory input feeds into our fine motor control in accommodating and responding to the dynamically changing environment [31]. The learning process of such fine motor control involves the sensorimotor cortex and its interactions with other cortical areas (such as the prefrontal cortex) governing attention, conscious decision-making, and self-monitoring which are required in trial and error learning. Sensorimotor skills acquired through this learning process later becomes systemized and transferred to the cerebellum and brain stem; for example, our ability to efficiently transfer weight according to the gravitational force is established throughout the process of learning how to walk as a toddler, and then eventually becomes an implicit skill as we reach adolescence [32].

While motor skills like walking is a common ability for many individuals who have undergone typical sensorimotor development, more complex movements like dancing requires further refinement of the sensorimotor system. The idea of mastery, grace and movement efficiency addressed in Sellers-Young [20] and Cordner's [21] writing can be equated to this higher level of motor refinement, made possible not only by longitudinal muscular training but also by attentional and sensory attunement. Drawing on Austin's theory of the Allocentric switch during meditation, the lack of analytical, judgmental, or critical engagement of the mind during this state may contribute to an overall movement efficiency caused by the activation of non-cortical motor systems – such as the cerebellum – in the brain, as the energy normally required for frontal activation can be distributed to deeper structures in

governing implicit motor control [33]. In other words, attentional training such as meditative moving could produce a hypofrontal state [34] which awakens the movers' normally inhibited implicit motor skills, and could allow them to exhibit extraordinary movement efficiency; this may be one of the qualities to which are referred in Eastern movement practices, as mastery, grace, or even an other-worldly presence on stage. The significance of this paradigm lies in the reciprocal relationship between movement, sensory input, attention and consciousness; the act of moving heightens the volume of sensory input, thereby supporting the attentional task of kinesthetic sensing. This attentional task facilitates a state of deeply embodiment consciousness and heightened intuition, which then manifests in movement as an intuitive motor efficiency. The refined movements become the source for further sensory arousal, which continues the reciprocal cycle. The current researcher believes that, it is this reciprocal relationship which defines the Zen-based philosophical accounts on the phenomena of meditative moving, and that, through this research so far, the phenomenological narrative has been re-articulated into a more scientifically grounded theory.

## 5. CONCLUSION & FUTURE DIRECTIONS

This paper has examined philosophical and phenomenological notions shared among Zen-influenced, Eastern movement practices through an interdisciplinary perspective, involving those from the neurophenomenology of consciousness, theories on embodied cognition, and biomechanics. Along with a literature-based validation of the relevance of this topic to the current community of dance and movement practitioners, the paper has introduced a possible way to systematically define the phenomena in a way which could suit further empirical studies. Through further discussion on existing literature, the paper has made cross-disciplinary connections between neuroscientific theories (e.g. Allocentricism) and theories of biomechanics and movement cognition (e.g. kinetic chain / Grounded Cognition), which have expanded and re-framed the narratives of the original Eastern literature to a wider scope. While this scope provides a theoretical framework which generally supports the notion that there could be an enhancement in the quality of movement performance during meditative states, further research, specifically in finding empirical evidence of this notion, must be conducted. The research will thus continue to utilise this re-articulated framework to solidify the scientific mechanisms of meditative moving and the state of deeply embodied consciousness, as well as their relationship to implicit movement efficiency. As an ultimate outcome, the researcher aims to provide a synthetic theoretical framework of such phenomena which reflects the felt experience, and also speaks to the context and methodologies of science.

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