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# Epistemological and cognitive aspects of the phenomenon of dance and corporeality

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## ABSTRACT



This study explores the cognitive and corporeal aspects of choreography as a means of expressing the human subconscious. Recent interdisciplinary research, including studies of somatic intelligence and mirror neurons, suggests that dance can influence human cognitive abilities through psychosomatics. Mirror neurons allow for kinesthetic empathy, enabling dance observers to experience movements, emotions, and experiences as their own. The authors argue that dance, which engages multiple aspects of a person, is a crucial tool for educating the younger generation and should be included in compulsory education programs, rather than just as extracurricular activities.

**KEYWORDS** Dance phenomenon; cognitive aspects of dance; corporeality; somatic intelligence; mirror neurons

## Introduction

Research into the epistemological nature of choreographic art has revealed new, previously untapped possibilities for using dance's psychosomatic effects to enhance human cognitive abilities, based on the latest interdisciplinary scientific research. Dance and corporeality have been long-standing, fascinating topics for scholars in various fields. The multifaceted nature of dance involves intricate interactions between the body, mind, and culture, which raise significant questions about cognition and epistemology. How does our understanding of the world and ourselves change when we engage in dance? What role does the body play in shaping our cognitive and emotional experiences? How do cultural norms and values influence our perception of dance and the body? By examining the nature of dance and corporeality, this article sheds light on important questions about human

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nature, identity, and knowledge (Uspensky 1994; Cuddy, Wilmuth, and Carney 2012; Voytsekhovich 2020).

There is still no General Theory of Creativity in scientific knowledge (Koblyakov 2020). The words of I.L. Vikentiev (2020), characterise the creative process as precisely as possible:

...Of the many unsolvable mysteries of the world, the deepest and most intimate one remains the mystery of creativity. It never allows a glimpse of the last act of creation: neither how the earth came into being, nor how the little flower arose, nor how verse and human being are conceived.

The New Philosophical System, an electronic library of the Philosophy Institute at the Russian Academy of Sciences, offers the following definition of the human being: 'Human is a being who is best known to him or herself in his or her empirical facticity and who is most elusive in his or her essence'. The way of human existence in the universe is so unique, and its structure is made up of such heterogeneous and contradictory elements, that it serves as an almost insurmountable obstacle to any concise, non-trivial and at the same time generally accepted definition of such notions as 'human', 'human nature', 'human essence' (Frolov and Borzenkov 2020).

Dance is a tremendously valuable pursuit that encompasses a range of related yet distinct dimensions, including the act of dancing itself, the art of choreography, and the experience of watching and appreciating beautiful dance performances (Bekh et al. 2020). While these facets are intimately interconnected, they can also be considered individually in order to fully appreciate their unique contributions. Ultimately, it is the act of dancing itself that lies at the heart of this complex and multifaceted pursuit, as even those who merely watch a dance performance can find themselves drawn into the joy and expression of movement that characterizes this timeless art form. The purpose of this article is to explore the epistemological and cognitive aspects of the phenomenon of dance and corporeality. The hypothesis is that dance, through the activation of mirror neurons, can improve a person's thinking and volitional abilities, and is an essential tool for educating the younger generation in addition to the rest of the arts.

## **Understanding dance as one of its epistemological aspects**

Stage choreography is a type of dance intended for the audience and involving the creation of a choreographic image. It is characterised by professional performance, a precise and defined form, a special type of composition in time and space, the conditionality of choosing expressive means by the genre of performance and much more, unlike the traditional and folk dances. And its perception requires a certain sensitivity of the viewer to the images created on stage by the means of choreography. And not every viewer is

able to understand the meaning of a choreographic performance, but the one watching the dance subconsciously perceives the overall message of the piece. Difficulties in understanding the dance images are due to their indirect, 'allegorical', figurative form and complex structure. Natalya Balandina (2010) writes: 'In dance, as a work of art, the subjective and the objective, form and content, conception and embodiment, representativeness and expressiveness are dialectically intertwined'. The choreographer's subjective thoughts are objectively embodied in the specific movements of the dancers, manifesting also the categories of conception and embodiment. The form in which the dance is presented, including the costume, the scene and certain symbolic movements, helps to unravel the content of the dance in the process of perception. The imagery (imitation of nature – mimesis) in dance is combined with figurative expressiveness, which has a symbolic meaning.

Even Lucian of Samosata (Kagan 2019; Lucian 2020) the Greek author of the first treatise in the history of dance, wrote:

... in other spectacles is shown only one side of human nature: either mental, or bodily abilities. In a dance, however, both are inextricably linked: its action reveals both the mind of the dancer and the exertion of his bodily exercises.

Because of the connection with 'spiritual life and the ability thereby to express it directly' (Kagan 2019) dance is a way of the dancer's non-verbal self-expression. Even in everyday life, the nature of movement, its dynamics, its sweep, and the posture of a person can be used to judge their emotional state, personal qualities, attitude towards others, and even their professional affiliation. Every movement as a form carries some kind of information, content. This is confirmed by the teachings of the legendary George Gurdjieff, described systematically by his associate Pyotr Uspensky (1994): 'It is naive to claim that our movements are intentional. They are all automatic. And our thoughts and feelings are also automatic. The automatism of thoughts and feelings is definitely linked to the automatism of movements, and it is impossible to change one without the other. Thus, if one's attention is focused, for instance, on changing the automatism of thoughts, one's habitual movements and postures interfere with the new train of thoughts by linking them to old associations'.

Quite indicative is the opinion of the classical dance founder George Noverre (2007): 'Painting and dance have the advantage over other arts that they exist in all countries and among all nations, that their language is understandable to all and that they make an equal impression everywhere'. A person can express all his or her emotions and worries, thoughts and feelings without saying a word. The language of dance movement does not require translation, it can express any human emotions. This is also confirmed by the words of Maurice Bejart (1987) from the film 'Grand pas in the White Night', based on the script of the famous choreographer, ballet master Oleg

Vinogradov during the tour of the theatre company 'Bejart ballet Lausanne' in Leningrad: 'Dance is a universal communication language... a fantastic language, which connects peoples and cultures'. Non-verbal self-expression, which is dance, can also reflect a person's strength of spirit and culture through their physically perfect movements, imagination and talent.

If one asks any practicing choreographer, he or she can confirm that the particular impact of dance on the performer's psychosomatic state is reflected in an improvement in motor or kinesthetic memory, spatial thinking, movement coordination, concentration, emotional expression, energy expenditure control and stamina. Lucian (II century), reflecting on dance in human life and on the qualities a dancer should possess, wrote: '... The main task of a dancer consists in mastering a peculiar science of imitation, representation, expression of thoughts, ability to make clear even the innermost' (Lucian 2020). Dance, like music, is known to be permeated by mathematics. The dancer must memorise the number and sequence of movements in each beat of the music to the count, memorise the pattern of movement around the stage in accordance with the musical accompaniment, which also requires a perfect ear for music. The 'geometricity' of classical dance is due to the space of the ballet stage, where the dance pattern is built in a circle, diagonally, in a square and so on for the expressiveness of the dance (Erovenko 2020). Teaching dance requires inevitable reference to mathematics and logic, but it cannot be overlooked that there may also be ways of feedback, that is, where the subject or process of learning is influenced through dance.

### **Impact of somatic (bodily) intelligence on cognitive abilities**

The main epistemological aspect associated with the phenomenon of dance manifests itself in the corporeality and somatic intelligence of the individual. Recent advances in physiology in the field of somatic (bodily) intelligence have proven that motor activity, including dance, can influence human cognitive abilities through psychosomatics. According to Nadezhda Osintseva (2006): 'Dance, by creating a certain mood, brings us closer to the state of the cognising subject'. And this 'mood bringing closer to the state of the cognising subject' is directly related to the psychosomatic nature of dance and its connection with the somatic intelligence of the individual. 'Somatic intelligence' reflects the ability of dance and other motor activities through the large and fine motor skills of the body to influence a person's thinking abilities. The American doctor of holistic disciplines Suresha Hill (2015) writes: 'In the same way that we read new books, travel to new countries or learn new languages to keep the mind flexible, new different ways of moving the body will help keep it flexible, and when it becomes intelligent and responsive, it is likely to begin to demonstrate the same openness and willingness to [learn](#)'. This means that new and different ways

of moving the body help maintain not only the flexibility of the body, but also the flexibility of the mind and its ability to learn.

Hill (2015) also writes:

Developing the efficiency of one's body's reaction speed in any action enhances somatic intelligence. Our bodies are not only deeply intelligent, but they are also the very source and basis for effective processing of any information that comes from within or outside.

Thomas Hanna (1987) argues the inverse: the control and self-regulation of the body by the mind also leads to changes in the physical state. The growing popularity of somatic disciplines in the modern world, such as dance therapy, Hanna somatics and the Feldenkrais method, demonstrates the inseparable unity of the soul and body in humans, i.e. the psychosomatic nature of motor activity. Based on the above information, one can conclude that consciousness is as much conditioned by the body as the body is conditioned by consciousness. This view is also supported by the following statements. The words of Leonid Zharov (2006) confirm this idea: 'It is well known... that the body contact of mother and father with child is irreplaceable by nothing and no one and is one of the most significant factors in forming a human personality. Moreover, the spiritual origin in the human being grows only on the basis of assimilating certain traditions of bodily culture', and also: 'The understanding of the body ... proceeds from a certain unity of Body and Spirit'.

Volodymyr Krutkin (2020) writes:

Corporeality is a characteristic derived not from the fact that one has a body, but from the fact that one is a body. Corporeality is inexplicable through traditional philosophical categories. The body is not a part of a person, but the whole human being; it is a species or type of wholeness. It is a part of the world, but it is where one comes out to another being and to the world in general. The body, as a human body, cannot be considered only as an object, for it is originally a sphere of human subjectivity (activity and expression). Therefore, in order to know the body, all reduction (author's note – reduction of the complex to the simple) is contraindicated... The body is the way nature becomes human.

You may have noticed that a person engaged in physical work, under intense strain, tires quickly and needs to rest, but a person having fun at a wedding can dance for hours and still not tire. What is meant here is not the direct effect of dance on knowledge acquisition, but the effect of dance on the general preparation of the body to be receptive to new information by creating new synaptic connections of brain cells and increasing the overall physical endurance of the body through muscle training and the engagement of new muscles and nerve connections not normally involved in daily life of a person (Gerasimova 2000). The authors also suggest that a certain role

is played here by the release of endorphin, a hormone of joy, into the bloodstream of the dancer, which enhances well-being and stamina during the dance. This general preparation of the body, the elevation of its health level, the prerequisite and creates that 'special mood of being' in which one 'turns out to be capable of thinking'.

According to Johan Huizinga (2004):

About dance – whether one speaks of sacred and magic dances of primitive peoples, of dances in a Greek cult, of the dance of King David before the Ark of the Covenant, or of dance as a festive pastime, in all peoples, at all times - one may say that it is Game itself in the full sense of the word, and therewith in one of its purest and most perfect forms.

Although Lev Vygotsky (1998) disagreed with the definition of dance as game: 'This theory of art as game has the essential objection that it does not allow us to understand art as a creative act and that it reduces art to biological function of organ exercises... Much stronger are all those theories which show that art is a necessary discharge of nervous energy and a complex method of balancing organism and environment in critical moments of our behaviour. It is only at critical points in our journey that we turn to art, and this allows us to understand why the formula we propose reveals art precisely as a creative act'. According to him, in art 'the greatest passions, which have not found their outlet in normal life, disappear' (Vygotsky 1998) and a game suggests a kind of commonplace and repetitive action. The social forms of dance may be comparable to a game, where a person 'plays with his or her body', but stage theatrical performances and free expression of one's spiritual experiences in an improvisational dance can hardly be considered a game, as the highest spiritual hypostases of the human being is engaged here. Many essays have been written about the relationship between sport and art, providing insightful perspectives. However, the authors of the current paper have determined that this topic is outside the scope of the current paper.

According to the above quotation, dance is not only an expression in the movements of the dancer's emotional state through a particular image, dance, along with the costume and the nature of movement, is a syncretic expression of the way people think, behave and perceive the world as a representative of a particular nationality, which has its roots in the depth of centuries, having absorbed the cultural code of the nation. This communicative feature of orchestics may be faster, brighter and more accessible to the viewer than other forms of art in conveying the inner world of a person as a representative of a particular culture. The importance of non-verbal communication has been most accurately described by the famous social psychologist Amy Cuddy, Wilmuth, and Carney (2012): 'Gestures and facial expressions control how and what others think about us'. At one of the

United States private commercial fund's TED (Technology Entertainment Design) conferences, Cuddy talked about research that reveals the secrets of non-verbal behaviour and led to some very interesting conclusions. By consciously changing their non-verbal behaviour by adopting strong postures – confident and winning postures – for just 2 minutes, the subjects actually changed their state of mind as well, which was reflected in the levels of testosterone (strength hormone) and cortisol (stress hormone), which are responsible for strong and weak human character (Cuddy, Wilmuth, and Carney 2012).

It is known and assumed that the mind has the power to change the body if it wants to. But is the body capable of changing the mind and therefore changing one's behaviour, which in turn affects the outcome of events? The above experiment gives a positive answer to this question. So, here again, it is clear that even a change in body posture and facial expressions for just 2 minutes can affect the improvement or deterioration of a person's internal mental state and, what is important, the impression a person makes on other people as well. But long before this experiment, back at the beginning of the 20th century, the same thing was stated by George Gurdjieff (Uspensky 1994):

Ordinarily we have no idea how much our thinking, sensory and motor functions depend on one another, although we know how much our moods and emotional states depend on our movements and postures. If a person takes a posture that corresponds with their feelings of sadness or depression, then after a while they are bound to feel sad or depressed.

The results of this experimentally proven scientific achievement can be applied to life, since one cannot deny the importance of first impressions, which determine all subsequent communication, for instance, in situations of social danger, when an adolescent first appears in a new school, when a person takes up a new job, when a person joins the army, when a public speech is made, etc. Cuddy suggests: 'Do it until the change becomes embedded in your character' (Cuddy, Wilmuth, and Carney 2012), which dialectically describes the unity of the categories of possibility and reality as well as cause and effect. This is another demonstration of the psychosomatic nature of body language, including dance, corresponding to the law of dialectics on the unity and struggle of opposites – the interdependence of body and soul, the categories of form and content, essence and phenomenon.

Based on the above, one can conclude that by educating the body, methodically introducing new postures and movements into the habit, a person can influence his or her thinking and volitional abilities and thus improve their character and gain, for example, self-confidence by mastering the postures and movements of a self-confident person. This means that by learning new dance moves that are completely different from those



previously learned, the dancer is also learning the mental attitudes of a certain people, for example. After all, a folk dance can only be truly authentically performed by a dancer who has mastered its culture, traditions and, in part, mentality. And, in that sense, a choreographer who has studied Hungarian, Moldavian, Ukrainian, Spanish, Tatar, Belarusian, Russian and other folk and stage dances, as well as the dances of the world nations like Indian, Korean, Turkish and others, through the folk movements and folk costumes of each nation learns in part the culture and traditions of those nations. This enriches the cultural baggage, and so the professional choreographer is, if one may say so, a citizen of the world who is tolerant of the culture of many nations. And even to understand and get closer to young people, there is nothing more effective than learning the language of youth dance moves, some of which are quite difficult to memorise and reproduce. Through exploring these new movements, it is as if we are learning their way of thinking and expressing themselves in life and becoming closer to 'youth' culture. In the same way, by imitating an idol, a person who arouses a sense of respect and admiration, it is possible to learn their life attitudes and replicate their successes. The popularity of books on the habits and lives of famous and successful people is based on this, because what one person has done can be repeated by another.

### **The impact of kinesthetic empathy on the viewer and the 'sensus communis' of I. Kant**

Vygotsky (1998) pointed out early in the last century (1920s) that art in general (not only orchestics) is closely linked to the human body:

All that art does is done in and through our body, and it is a remarkable fact that . . . researchers, . . . concerned principally with the processes of perception rather than with the effects of art action, should say that art perception is dependent on a particular body musculature setting.

Vygotsky (1998) begins and ends his book with an epigraph from the words of Benedictus De Spinoza (1677): 'No one yet has determined what the body can do'. This statement by the famous 17th-century philosopher still remains relevant today.

The statements by Georg Hegel (1968) that 'the spirit receives satisfactory sensual embodiment only in the body' (1968) and Vygotsky's (1998) words about 'the dependence of art perception on a particular body musculature setting' are proved by modern neuroscience. According to Cynthia Berrol (2006), 'The recent discovery of mirror neurons by neuroscientists has led to a number of scientific studies. . . research shows that identical sets of neurons can be activated in a person who simply observes another person making a movement, as if they are actually involved in the action or expression of

some emotion or behaviour'. Mirror neurons contribute to the occurrence of kinesthetic empathy – motor empathy in the dance observer. Activating the right neurons in this way is currently used in dance therapy as well as in the treatment of patients with motor impairment. The study of the properties of mirror neurons is now receiving a great deal of attention in the global community. For example, *Watching Dance: Kinesthetic Empathy* was an interdisciplinary project involving collaboration between four institutions (The University of Manchester, University of Glasgow, York St John University and Imperial College London) that was funded by an AHRC (Arts and Humanities Research Council) grant from 1 April 2008 until summer 2011. The project investigated the reaction of the audience to the dance, who, when observed, identified themselves with the dancers.

It can be assumed that this property of mirror neurons explaining the experience as one's own movements, emotions and experiences of the observed object lies at the heart of the notion 'common sense' (sensus communis) by Immanuel Kant (2020). In *Critique of Judgment* Kant (2020) writes: '...By sensus communis is to be understood the idea of a common sense, that is, a capacity for judgment, mentally (a priori) taking into account the way everyone is represented, so as to proceed in one's judgements as if from a common human reason...'. Thus, as early as in the 18th century Kant (2020) tried to explain why human beings react in a certain way to 'the beautiful' (art): 'If we could assume that the universal communicability of our feeling should in itself already be of interest to us... , it would become clear why the feeling in the judgement of taste is assumed in everybody and considered almost obligatory'. The mirror neurons that explain this 'common sense' of humanity and intersubjectivity also suggest that humanity is a single community of nature, roughly the same as the genus of bees or ants.

## **Art as a vital value for humanity and dance as a compulsory subject at school**

Modern society is accustomed to treating art as an afterthought in human life, as a kind of bliss, without which one can basically do without. But the views of some scholars persuade us otherwise, arguing that a society without art, is doomed to perish.

Thus, – writes Aleksandr Bondarenko (2020), – there appears a new qualitative characteristic of consciousness connected exclusively with art: the value and semantic evaluation of the world, which allows to fix phenomena not only as a utilitarian value vital only for one subject or species, but also as a universal humanised value, with which the conservation of all living and unique things on Earth is connected. Without this form of contemporary reflection – a humanised value model of the world – humanity is doomed to perish even with the most advanced utilitarian technologies for sustaining life.

This indicates that, no matter how much the role of art and the humanities in the modern, technogenic world has been downplayed as secondary values after 'daily bread', researchers of the history of art's origin have proven that it is the 'humanised values' of art and not just material values that are the condition for the survival of humanity. Art belongs to the highest intellectual and spiritual needs of human beings, which, according to Abraham Maslow's pyramid, come after the satisfaction of basic human needs for food, shelter.

And, dance, which activates simultaneously the spiritual, intellectual, emotional and physical hypostases of a person, as well as his or her cognitive abilities, is an essential art form, along with other forms, for the upbringing of the younger generation. But unfortunately, dance is not a compulsory subject in most modern schools. Correctional rhythmic today in Kazakhstan, as well as in Russia and a number of post-Soviet countries, is only included in the curriculum of special schools for children with special needs. In antiquity, the socio-political, pedagogical, ethical and aesthetic ideal of the human being 'kalokagathie' (ancient Greek καλὸς καὶ ἀγαθός – 'beautiful and kind') was adopted simultaneously, which meant that a person had both physical beauty and morality. Kalokagathia is most closely related to the Greek education system and the 'Paideia' model of education – a system of musics in antiquity that consisted of mental, aesthetic, moral education, which included literary and musical education, military disciplines (including dance), an introduction to the basics of sciences, the study of oratory, politics, ethics and philosophy. However, in some schools, dance has become a popular mandatory subject in the curriculum. Dance can be included as a part of physical education as well as in art subjects. For example, at 'The Urdang Academy' in London, dance is a key element of the curriculum. Students study ballet, jazz dance, contemporary dance, and choreography, and also have the opportunity to participate in performances and competitions. Another example of a school that incorporates dance into its curriculum is the 'New World School of the Arts' in Miami, Florida. The school offers a dance program that focuses on classical ballet, modern dance, and choreography. Students are required to take dance classes and participate in performances throughout the year. The dance program also provides opportunities for students to work with professional choreographers and perform in community events.

If in the second half of the 20th century dance as an understudied phenomenon needed philosophical justification of its being, nowadays some Western (Cvejic 2015), and post-Soviet (Osintseva 2006) researchers of the dance phenomenon write that the question is no longer 'What can philosophy give to dance as an art form?' but 'What can research of dance phenomenon today give to philosophy and other sciences?'. Thus, the study of the epistemological nature of orchestics reveals new, previously untapped possibilities for the influence of dance through psychosomatics on human

cognitive abilities, based on the latest scientific data from interdisciplinary studies. Studies of somatic intelligence in physiology, reflecting the ability of dance and other motor activities to influence human thinking abilities, and the growing popularity of somatic disciplines in the modern world, which are not just body work in their pure form, but rather systems for retraining the nervous system in new programmes according to which the whole body moves, demonstrate the inseparable unity of the soul and the body in a person, that is, the psychosomatic nature of motor activity. Based on this information, one can conclude that consciousness is as much conditioned by the body as the body is conditioned by consciousness.

In the 18th and 19th centuries, dancing was a compulsory part of the nobility's education. The logical conclusion arises that if dance, as a playful activity, improves children's cognitive abilities and simultaneously trains their physical body, then it should be included in the compulsory education curriculum of ordinary schools, and not only in the form of extracurricular activities. Since mirror neurons are active when watching any physical activity, not just dance, it is possible to argue that introducing compulsory choreography in schools is not the only way to develop empathy in children through the work of mirror neurons. A sports education model may also be effective in promoting empathy development. However, the activation of mirror neurons is particularly relevant to choreography and dance because of the unique combination of physical movement and artistic expression.

Mirror neurons are a key element in understanding why individuals who watch dance performances can feel as though they are themselves dancing. These specialized brain cells are activated not only when a person performs an action, but also when they observe someone else performing the same action. As a result, when watching a dancer, the viewer's mirror neurons may fire in a way that mimics the dancer's movements, creating a sense of unity and shared experience (Bekkali et al. 2021; Kemmerer 2021; Heyes and Catmur 2022). This feeling can be particularly strong for individuals with prior experience in dance or other physical activities, as their 'muscular memory' allows them to more easily imagine themselves performing the same movements. Furthermore, the activation of mirror neurons in individuals with dance experience can be enhanced through additional training and practice. This is because the more an individual practices and refines their own movements, the more precise their mirror neuron activation becomes when observing others performing similar movements. Despite the greater activation of mirror neurons in individuals with dance experience, it should be noted that full activation of these neurons only occurs during actual physical dance movements. While prior experience in dance or other physical activities may enhance one's ability to imagine and simulate movements, it cannot fully replicate the experience of actually performing the action. Overall, the impact of dance experience on mirror neuron activation is a complex and

multifaceted area of study. By illuminating the neural mechanisms behind this phenomenon, mirror neurons provide valuable insight into the complex and multifaceted nature of dance as both a physical activity and a form of artistic expression (Rizzolatti et al. 2021; Schmidt et al. 2021; Bonini et al. 2022).

Individuals with dance skills are more susceptible to the activation of mirror neurons when observing dance, as their previous experience and training may enhance their ability to perceive and understand dance movements. However, in general, mirror neurons are activated in all individuals regardless of their skill level or experience. So the concept of mirror neurons can be applied to other physical activities as well. For example, individuals who have never played basketball can still experience a mirrored response when observing a skilled player execute a difficult move. By highlighting the emotional and physical components of the activity and providing context for the movements, individuals may be able to develop an understanding and appreciation for physical activities they previously had no experience with, and this applies not only to dancing. To get unskilled individuals to experience dance and find meaning in it through the mirror neuron 'common sense' idea, it may be helpful to provide context and explanation of the movements and the emotions they express. Additionally, breaking down dance movements into smaller, more manageable components may make it easier for individuals to understand and relate to the movements. Recording neural activity in such experiments is still a matter of time: scientists have limited opportunities to record it in humans. Some phenomena have been described that allow us to talk about the presence of similar mirror systems in humans, but nevertheless, at the level of individual neurons, this has not yet been demonstrated.

## Conclusions

Research on mirror neurons in neuroscience, which deals with kinesthetic empathy – motor coincidence in a dance observer – shows that identical sets of neurons can be activated in a person who simply observes another person performing a movement, as if they were actually involved in the action or expression of a certain emotion or behaviour. The authors suggest that this property of mirror neurons explaining the experience as one's own movements, emotions and experiences of the observed object lies at the heart of the notion 'common sense' (*sensus communis*) by Kant and draws a parallel between them. The mirror neurons that explain this 'common sense' of humanity and intersubjectivity also suggest that humanity is a single community of nature, roughly the same as the genus of bees or ants. A person watching a dance virtually dances himself/herself, and this feeling of unity with the dancer is stronger the more experience the observer has had of orchestrics in the past, which is

explained by the person's 'muscular memory'. It can be concluded that a person, through educating his or her body and methodically learning new poses and movements in dance, can also influence the improvement of his or her thinking and volitional abilities.

Since the mirroring phenomenon is applicable to other physical activities beyond dance, it could be argued that the same reasoning used to support compulsory choreography could be extended to physical education in general. The potential for a holistic approach to physical education, which focuses on developing emotional and social well-being in addition to physical fitness, warrants further investigation. Future research could explore the effectiveness of different physical education programs in promoting empathy, emotional regulation, and social connectedness, and identify the specific elements of these programs that contribute to their success. This could include examining the role of different physical activities, teaching methods, and instructor training in promoting empathy and emotional regulation. By further exploring the potential of physical education to enhance emotional and social development, educators and policymakers can better understand how to promote the well-being of children and youth through physical activity.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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