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FOR AN EDUCATIONAL EPISTEMOLOGY OF THE EXPRESSIVE, COMMUNICATIVE, AND TRANSFORMATIVE VALUE OF THE BODY IN MOVEMENT: BETWEEN BODILY PHENOMENOLOGY AND MOTOR PHILOSOPHIZING

PER UNA EPISTEMOLOGIA DIDATTICA DEL VALORE ESPRESSIVO, COMUNICATIVA E TRASFORMATIVO DEL CORPO IN MOVIMENTO: TRA FENOMENOLOGIA CORPOREA E FILOSOFARE NOTORIAMENTE

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Abstract
After arguing the role of phenomenology in rediscovering the communicative and transformative expressiveness of bodily movements in different educational contexts, also having tried to offer an epistemological and foundational contribution to the topic inherent in educational research through performance arts and transformative learning (of bodies, in bodies, between bodies), the essay delves into enactive teaching in the connection/supervision between enactive paradigm and phenomenology. The human mind is embodied in the affective and lived body, which is situated in the world in a continuous recursiveness of reciprocal relations between mind, body and world. The cognitive structures of mind would therefore emerge from sense-motor dynamics, recurring between the embodied agent and embedded in a natural environment, allowing action to be perceptually guided. Perception is thus enactive, that is, it is a type of action. From this perspective, enactive didactics stands as a privileged avenue of transformative learning, thanks in part to the biotransactional training of emotions and the neurophysiological study of empathy, turning its interest to the educational relationship in the multiple and interdependent aspects of affectively experienced corporeality, including its relation to multiple sense-motor processes. Concluding with an experiential explanatory node, a dancer's motor-kinesthetic performance becomes philosophical motricity, as the inner dialogue that arises from the intensity of experience allows a more intense return to life to transform it again and again.

Dopo aver argomentato il ruolo della fenomenologia nella riscoperta dell'espressività comunicativa e trasformativa dei movimenti corporei in diversi contesti educativi, altresì aver cercato di offrire un contributo epistemologico e fondativo al tema inerente la ricerca educativa attraverso le arti performative e gli apprendimenti trasformativi (dei corpi, nei corpi, tra corpi), il saggio approfondisce la didattica enattiva nel collegamento/superamento tra paradigma enattivo e fenomenologia. La mente umana è incarnata in corpo affettivo e vissuto, che è situato nel mondo in una ricorsività continua di relazioni reciproche fra mente, corpo e mondo. Le strutture cognitive della mente emergerebbero pertanto dalle dinamiche senso-motorie, ricorrenti fra l'agente incarnato e inserito in un ambiente naturale, permettendo all'azione di essere guidata percettivamente. La percezione è così enattiva, cioè è un tipo di azione. In questa prospettiva la didattica enattiva si pone come via privilegiata di apprendimenti trasformativi, grazie anche alla formazione biotransazionale delle emozioni e allo studio neurofisiologico dell'empatia, rivolgendo il suo interesse alla relazione educativa negli aspetti plurimi e interdipendenti della corporeità vissuta in modo affettivo, inclusa la sua relazione ai molteplici processi senso-motori. Concludendo con un nodo esplicativo esperienziale, la performance motorio-cinestesica di un danzatore diviene motricità filosofica, in quanto il dialogo interiore che

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nasce dall'intensità dell'esperienza consente un ritorno più intenso alla vita per trasformarla sempre di nuovo.

Keywords
Performing arts, Transformative learning, Phenomenology, Enactive paradigm, Epistemology.
Arti performative, Apprendimenti trasformativi, Fenomenologia, Paradigma enattivo, Epistemologia.

1. Human person and own body in the phenomenological philosophy

The expression 'human person' can be associated with many definitions, but none provides a full, satisfying description because each definition emphasises one particular aspect of the phenomenon it refers to. Fully aware of this limitation, we will consider human beings as "*microcosms in which every stage is united - a human being is matter, a living creature, an animated being and a spiritual person*" (Stein2000). According to Plessner (1928), the life of animals is characterised by *centricity*, whereas the life of man is *eccentric*. The eccentric positionality is the *vis-à-vis* positionality of man and the environment.

A living person is a living body, is in the body and outside it. An individual with this triple positionality is called 'person'. The human corporeity is characterized by a triple dimensionality: the felt-lived body, the transcendental body and the original body (*corps senti*, *corps trascendantal*, *corps originaire*, Henry 2000).

What we are going to analyse here is a person in the sense of his/ her physical body – a particular body, a body like no other. We cannot say that the man has a body, the man is his body (*je suis mon corps*, Marcel 1927). The man is embodied conscience, *Leib*, own body, felt- lived body (see Rosmini 1830). A body that constitutes the rooting and, at the same time, the opening of the man to the world (see the concepts of *Weltoffenheit* in Scheler, Plessner, Gehlen and of *Lebenswelt* in Merleau-Ponty). The body is *point zero* of every glance, of every perception which looks onto the world. It is a *here* that cannot in any way become a there, in the way it portrays itself as a cognitive frame (*geometrale conoscitivo*, Melchiorre 1987) around which the world and the intersubjective dimension disclose themselves to the conscience (see Stein 1917).

But to the phenomenological reflection, we will add that it is not sufficient to state that man is embodied conscience, as he is at the same time conscious body of himself. It is substance which, after having acquired life, has become conscious of its existence. We do not want to support here a strictly materialistic prospective, but we aim at enriching our prospective with the contribution of metarealism (Guitton 1991), in a conception in which spiritualism and materialism find synthesis on an ontological level, as much as idealism and realism do on a gnoseological level.

2. Leib as Limen

What does the expression '*Leib* as *Limen*' mean? Is it just a play on words? An excuse to combine three different languages? In German it is possible to distinguish an inanimate body (*körper*) from a living body (*leib*) because two different words are used. The same applies to the Greek used in the Bible, where dead and living bodies are called in different ways (σῶμα and σάρξ). Latin allows us to understand two meanings of the word 'border'. Let us consider, for example, the walls of a medieval city. Their purpose is to establish the town's limits, separating what is inside from what is outside. At the same time, because there are doors in the walls, the purpose of the walls is to be the threshold between 'in' and 'out'. As Cacciari (2000) reminds us, *limes* is the path that surrounds an area and determines its shape. *Limen* is the threshold, the step with which we enter a domain or leave one (Gomarasca 2004).

What we are particularly interested in considering is the body, not only for its being a rooting of man in the world but also for its development as a 'place' of his manifestation in the world. At this juncture the body can be considered as a *limen* – i.e. a boundary meant in the sense of a threshold,

entrance or passage – between two worlds, since it has a double opening: inwards and outwards. Therefore the body represents the threshold, the transition, the 'communicating' place between the inner and the outer world. In so doing it is possible to find a dual directionality: from the outside to the inside (as for instance in the perception of an object) and from the inside to the outside. What we mean to focus our reflection on is the second of the two modes. How are the contents of conscience 'taken' outside? How are they manifested, expressed and communicated? (Scarpa, Gobbi, & Carraro 2010).

3. Expressive and communicative sense/value of body movements

Paraphrasing Wojtyla (1969), we will not study the action that implies a person. We will study the action that reveals a person. We will study a person through an action, which is the moment in which a person is revealed. Our experiment shows that man is a person and we are convinced of this because he acts.

According to Husserl (1991, p. 159):

> The Body is an organ of the will, the one and only Object which, for the will of my pure Ego, is moveable immediately and spontaneously and is a means for producing a mediate spontaneous movement in other things [...] Only Bodies are immediately spontaneously ("freely") move-able, and they are so, specifically, by means of the free Ego and its will which belong to them.

The human person expresses itself through movements of its own felt-lived body. Each intentional expression of man is carried out in the fulfilment of voluntary movements, creative and filled with meaning for the subjectivity which gives them life. At the heart of all problems are actions. Man must be defined as a being that acts or as a being that can predict or create culture - which is the same thing (Gehlen 1940). It is impossible to represent a completely immobile living being. To be bound to a place without moving means 'being made of stone'. If there is no movement, a filling empathy is not possible. To build an individual, free movement is essential (Stein 1917).

To understand what movement essentially is, or rather its value as an expression, one must start from becoming aware of the movement itself (interiorization).

Human movement is not simply the result of a mechanism, but is distinguished by its intentionality.

«Through internalization, the subject will be able to analyze the events that he will be the only one to observe and that he will eventually be able to transmit with language. [...] The clear experience we have of the intentional character of our movements and which distinguishes them from those we passively undergo, or which are imposed by our bodily automatisms or external forces, make them a privileged field» (Le Boulch,1971, p.71).

In this sense, a good example is a particular pathological condition, called *Locked-in Syndrome*. It can be caused by thrombosis in the basal artery, at the height of the brainstem, which causes a kind of 'general paralysis'. Put simply: 'patients' are aware but cannot per- form any voluntary movement except for blinking - something akin to being walled alive in one's own body. The only way these patients can communicate is through their eyes. This example is by no means superfluous even if it may seem a digression. It allows us to confirm what we said earlier - the only possible kind of voluntary expression is the rational movement of the body.

Somebody may naively reply that the main way human beings communicate is actually through words – verbal language. Saying that, however, means they have not realised we are supporting the same theory. What are words if not the result of rational body movements?

Starting from phenomenological investigations up to the intuitions and experimental data of neuroscience, we know that we have a body, but above all we are a body and this essence certainly cannot be put "outside us", falling into the tradition of knowledge which develops from the head up. It is necessary to declare that knowledge is embodied and that the processes of its transmission take place thanks to the word, but not only. «True knowledge occurs when information is embodied in experience: we must act in the world to understand it» (Lotto, 2017, p.28).

4. The verbal language as resultant of body movements

The movement is the only possibility that man has to consciously express its own inside world as even the verbal language, peculiar way of human communication, could be understood as a result of a series of voluntary and complex body movements, and particularly of the apparatus destined to phonation. The same neurosciences have highlighted how even for speaking, as every other voluntary human movement, a sensory area (*Wernicke's Area*) and a motor area (*Broca's Area*) are present at the level of the cerebral cortex.

Surely the importance attributed to movement is due to its function in the development of a body scheme which, in effect, is a necessary basis for cognitive development. As we have already said, movement is the foundation of cognitive as well as motor experience. In the analysis between motor skills and cognition, as often happens, the most interesting results are obtained by observing children in the first months and early years of life, that is, when external conditioning elements have not yet intervened - be they of a cultural or parental nature. A child in this first phase, in addition to communicating with crying, carries out an intense bodily activity that involves all four limbs: opening movements when he expresses joy, fast and jerking movements when they feel disappointment, or slow and closing movements when they feel sadness. With advancing age, these spontaneous characteristics tend to get lost, because during growth the motor spontaneity disappears, in favor of a greater preference for verbal language: words or other sounds become the preferred means of expressing emotions and communicating. It is clear that if language is not structured adequately, it risks leading to relational difficulties and consequently attitudes of detachment even with objects and the environment, as well as with people.

Here the extreme importance of human movement as unique and irreplaceable possibility for the person to manifest his own way of thinking is recognized. The philosophical dialogue cannot be purely understood as a 'spiritual' activity because it is thanks to the dynamic interaction of its own bodies and the fulfilment of 'rational' movements that the content of conscience can be shared within the research community.

A not very accurate analysis could fail to see the full implications of the intrinsic movement-related nature of verbal communication. The mistake could arise because we identify words as sounds that can be heard and not as movements that can be seen. Yet what are the sounds we hear if not the vibration of air, produced by the movement of specific body parts?

The movement that produces words is triggered by the central nervous system, which starts the contractions of the muscles involved in phonation. Simply stated, the combined movement of the muscles of the pharynx, of the vocal cords and of the respiratory muscles that permit the flow of air (required for making sounds) leads to the pronunciation of vowels (as well as determining the tone of voice, etc). The movement of the muscles of the tongue leads to the pronunciation of consonants. The vibrations of the air that we perceive as *words* are the result of the interaction of all the muscles mentioned above. Phonation involves an incredible number of muscles. In a certain sense, logopedists could be considered physical education trainers of a special sort. If we focused on the fact that there are about sixteen muscles in the tongue, we may consider the old saying 'all muscles, no brain' in a different light.

To sum things up, verbal communication – considered the most important means of communication between humans – is part of motricity, because sounds are the results of air vibrations produced by movements in the body. This is in line with the fact that all voluntary expression is linked to body movements.

We will make a short digression here to explain that it is a mistake to state that there is *verbal communication* and *non-verbal body language*. Spoken language and body language are not distinct, because spoken language is a kind of body language. Digital and analogic languages are products of the body. Their particular differences are not linked to corporeity and must be explained differently.

All the attention given so far to verbal languages as a manifestation of the body may, at first, appear superfluous, especially if the specific context of P4C is considered. It is important to remember that the community of inquiry, typical of P4C, is characterised by a dialogue that is the result of the collaboration, reasoning and contributions of all the participants (Santi 2006).

Skipping considerations on dialogues (especially on philosophical dialogues), no one can deny that dialoguing is possible because words are used. Members of the community of inquiry use verbal communication to express their ide- as and communicate them to the other members of the community.

5. Body and movement in different educational contexts/concepts: A comparative analysis of three teaching contexts

It is important to remember that the body 'subject' mentioned here is the living body that interacts and communicates – it is not the discussed body 'object', the body divided from the self. With this in mind, we will now try to analyse its role in the creation of the *community of inquiry* typical of P4C. To help us perform this analysis, we will try to compare this situation with the situation occurring in *traditional lessons* on one side and *motor learning classes* (physical education) on the other (Nart & Scarpa 2010).

Traditional lessons are based on the *classic idea* of the teaching/ learning relationship and on the transmission of knowledge. The effects of this can be seen in the way students and teachers are positioned in a classroom. The analysis of posture and proxemics helps us understand the underlying principle regulating the relationship between teacher and pupils. In this specific case, it is obvious that the teacher – the source of knowledge, the 'sun' that enlightens the world – is in a dominant position. The teacher's desk is on a platform, putting teachers in front of, above and at a distance from students. The students are all seated facing the teacher and their body movements are restricted by desks. Their having to sit still and being unable to look at each other is not considered important. Students sitting at the last desk may not be able to see the teacher easily and the ones at the front desk will be closer to the teacher, but a *personal* closeness is unlikely to be established, even in this case. The students' desks and the teacher's desk are useful teaching tools but they will always be dividing elements. In this 'typical situation', body movements are limited to verbal expression and writing. Bodies are used as tools and the use is focused on producing results that cannot be identified in the body. In this context, the suggestion and recommendation of Gamelli (2004, p. 97) to 'move' desks – a restricting element, a limit to achieving real training and educational objectives – is emblematic.

> Desks and schools have the same relationship of white gowns and the medical profession - they define the status of the teaching contexts. Their positions are linked to roles. They represent the limitations of the actions and the asymmetrical relationships and different power that are linked to those roles.

The situation in P4C is very different. The basic principle is pedagogic activism, which prefers to use the romantic model of inquiry. Students remain seated but everything else changes. There are no desks, everybody sits in a circle, including the facilitator, who is no longer in a dominant position (unless we consider the fact that he/she is the closest to the 'agenda', a landmark for the community). By arranging chairs in a circle, teacher and students are more on the same level and everybody can see everybody else, can look at speakers in the eye and answer more comfortably, as well as having a dialogue with the rest of the community. Another positive aspect is that all distances are reduced and it is easier to achieve a personal closeness, even if the spatial relationship is fairly fixed (in one session, participants will always be seated next to the same person and opposite another and so on). Even if the 'body to body' relationships do not change much, the setting described above allows the members of the community to interact in an infinite number of ways. This is the ideal situation for participants to discuss and speak and it is particularly suitable for listening. The movements of the upper half of the body are extremely important because they are involved in spoken language, the main kind of communication in this context. In motor learning classes, all possibilities are allowed. There is no fixed posture, no defined proxemics, there are multiple relationships with space and hundreds of possible body movements. The starting posture may be a seated position but it can change in hundreds of ways. The body can move and

turn in all directions and interact in all kinds of ways.

If proxemics are analysed, the distance between people is never fixed and determined. There can be public, social, personal, even intimate proximity. Other than being able to see and hear other people, physical contact is possible, with the perception of the intensity of other people's feelings and their smell. It is possible to yell at someone who is far away and to whisper to someone who is close. There are thousands of possible movements that lead to a number of body-to-body interactions and relationships. All kinds of relations with space and other people can be established. This educational context is very particular. It overcomes the limits set by cultural, emotional, cognitive and movement barriers and prejudice. This is the perfect context for our previous plea («move the desks! »). This request is not made only to movement experts. It is for anybody who wishes to use an educational procedure that aims at valorising – as Maurice Merleau-Ponty said – not simply bodies-in-situation but bodies-in-movement, i.e. in a dynamic relationship with others. These bodies must be free and not restricted by desks.

6. The enactive paradigm and didactics based on embodied cognition and learning by doing

The notion of embodied cognition (embodied cognition) refers to the theory that illustrates how human cognition, in all its forms, is embodied (or embedded, we would prefer to say), that is, it occurs through bodily experience (Maturana and Varela, 1984; Varela et al, 1991): the primary thesis, of neocognitivist and neurophenomenological derivation, is that all knowledge is the elaboration of bodily experiences and that higher cognitive processes, although involving a greater degree of abstraction, are also embodied. This theory holds that in knowledge processes the body has a role of both a causal and constitutive nature, in that the knowing subject, through its bodily actions, can facilitate or hinder acquisitions by posing binding functions; the "human system" does not respond deterministically to environmental changes but is coupled with them structurally, coming to realize mutual transformations by virtue of variations in one or the other. Knowledge is thus held to be not so much a function of the living as the living itself, so much so that Maturana and Varela believe that this conception is well expressed by the motto "to live is to know."

Drawing from various humanistic and scientific disciplines, even going so far as to combine principles from biology and Buddhism with concepts from Western philosophy and psychology, over the past three decades the theory of embodied cognition has contributed important understandings inherent in the human mind, producing evidence on the close connection between psychic functions and interactions between the body and the environment. Much has been written and continues to be written on this perspective, keeping alive the discussion on the type of knowledge that can be said to be "embodied," its quantity and the ways through which the process takes place; several authors consider the role of the environment as part of cognition to be central, others focus on the role of action as a means to support the construction of knowledge processes, and others argue for the role of sensory perception, deputed to regulate actions in space, in determining the incorporation of knowledge (Caruana and Borghi, 2013). The theory has been significantly consolidated by experimental evidence on the functions of mirror neurons (among all see Rizzolatti and Sinigaglia, 2006). It should also be noted that the emergence of the paradigm of embodied cognition has made it possible to outline a new approach to the problem of intersubjectivity, placing the sensorimotor system at its center.

According to Maturana and Varela's view, the co-implication between subject - cognitive system - and object - cognitive domain - is constantly at work, as can well be seen in the circular interaction between one's own mind and the minds of others, from which a kind of "collective mind" emerges; put another way, on the basis of this view it can be argued that all cognitive processes emerge from a circle immersed in the concrete, that is, in embodied historicity and vital biological context. Thus, sensorimotor processes, perception and action become inseparable from cognition in that process called, precisely, enaction. In this regard, Margiotta (2011, p. 12) believes that the most recent discoveries in neurophysiology, and in particular the identification of mirror neurons, have gradually undermined the classical perspective of cognitive functioning according to which cognition is the product of the rehashing of symbols (cognitive theories), favoring the advancement of the embodiment approach, instead considering cognitive processes entirely connected to corporeality and the functions of the sensory-motor system. To give an example, if we think about imitative ability, direct assimilation, the role of the motor system, empathy, and language acquisition, the implication of mirror mechanisms in learning is clearly evident, hence the educational practices underlying teaching-learning processes

should be rethought in the light of the new conception of the relationship between perception, action and knowledge derived from the theory of embodied cognition.

Hence, the leading assumption of embodied cognition - which understands the mind to be embedded and situated in an external environment with which it has an active dialectical relationship and emphasizes the role of the body in cognition - intends that cognitive processes cannot be analyzed apart from the intersubjective relationship, the intricate mechanisms of which must instead be brought to light. In light of this, it could be argued that when subject (considered in its inseparable unity of mind and body) and object are co-implicated, the flow of information is structured in a circle, vicious or virtuous, typical of self-organization phenomena from which "emergent" properties arise that are not found in the interacting components.

What does this perspective suggest relative to the object of our interest, namely the importance of the body in the teaching-learning process? It suggests that the evolutionary dimension of embodied cognition leads to the view that just as there is no mind that governs the body but both (body and mind) are in constant dialogue to expand worlds of experience and to generate a continuous progression of the individual's cognitive and evolutionary horizons (and this determines consciousness), in the same way for education it becomes decisive to configure itself in the same terms with regard to teaching-learning processes which, as is established by a large body of evidence-based literature, never take place outside of an intersubjective arrangement, that is, the educational relationship (Zambianchi and Scarpa, 2020).

6.1 The enactive teaching model

From what has been summarized above, it follows that any educational and didactic project cannot leave out the knowledge derived from neuroscientific research on the functioning of the human mind and the derived perspective of enactive education. Although the current of enactivism has been known for several decades, its combination with education has only recently begun to be studied. Enactivism presents itself as an alternative didactic paradigm to both instructivism and constructivism, recovering some aspects of both and contrasting with them on other fronts. If by didacticism we mean the science of pedagogical practice that enables the optimization of teaching and learning processes (which, while interacting with each other, follow different and autonomous paths), it is possible to represent said processes by means of two interdependent trajectories that start from the different motivations and needs of the teacher and the learner but meet in a common space-time to arrive at results that we might call "enactive" or, better, transformative-generative, and for that very reason always provisional for both. Unlike conventional didactic models-no matter how innovative-where the independence and parallelism of teaching and learning processes has often resulted in imbalances, centering now on the figure of the teacher now on that of the learners, currently pedagogical visions are emerging that consider teaching action a unitary spatio-temporal dimension within which they intersect in a kind of heterotropy, rising to "variables" that co-participate in the system of knowledge development, as well represented in a diagram derived by Rossi (2011, p. 21-23), one of the first in Italy to deal with the application of the enactive model in education, who explains that the system also evolves by itself due to its internal structures, and not necessarily only on the basis of changes induced by the environment in a mechanical way, from which it follows that meaningful learning is achieved mainly through the active and direct intervention of the subject. According to enactive teaching there exists precisely what we have called "space-time" in which director and actor interact (Coin 2013) but this interaction follows neither the directive model typical of behaviorism/cognitivism nor the romantic model typical of research where the learner is left alone in complete autonomy. There is still a shared space where both teacher and learner need to 'meet' each other, as teaching and learning are processes of accompaniment and continuous transformative confrontation. The core of enactivism theory sees in educational science the concretization of action that manifests itself in "that doing together" that affects the future way of being of teachers and learners. In the course of educational en-action, embodied and situated cognitive, affective and relational networks are built, in which each person modifies himself while modifying his surroundings just as en-action transforms the system in the process: transformation is a mode of action and not a product of it. In the course of transformation, the learning process takes place, in a fruitful reciprocity between teaching and transformation, since learning is not acquisition of content but rather transformation: the person comes to knowledge because he or she is transformed but also transforms because he or she knows. Knowledge is thus a state of the person in transformation and involves cognition-body-environment in the space of action and co-emergence of the transformative system.

Conclusion and implications

The present paper highlighted the peculiar value of the body andits faculties of movement in the context of the philosophical experience which marks ~~the P4C~~. This theoretical contribution has several implications for a con- sequent practical perspective in educational contexts. In particular, through the acknowledge of human corporeity value and its facultiesof movement, it may help every facilitator who wants to give spaceto educative practices centred on the dynamic relationships between human bodies, thus justifying an integrated approach in which the number of these activities is increased.

This paper also aimed to illustrate the role that the body takes on in knowledge processes - and thus in identity formation - seeking to highlight the consequent function that it can play as a foundational element in the arrangement of body-based educational plans and its expressive possibility as a merdiator of knowledge.

We have seen that embodied cognition and the enactive paradigm can serve as a starting point for developing research on conceptual change in learning environments, integrating to itself - and in many ways surpassing - various different theoretical approaches while hoping for the opportunity to develop a superordinate model for instructional design that assumes instructional strategies capable of integrating, in a complex and multidimensional pedagogical key, the concepts of body-in-relation and body of movement.

In enactive modeling, the student does not simply observe a dynamic system but takes on the role of one of the elements of that system, reenacting and controlling his or her motor behavior and observing the effects that occur on the rest of the system. This teaching strategy has proven to be more effective than traditional instruction using static diagrams, animations or verbal/oral descriptions. It is not the actions per se that determine learning when we interact with the environment but the constraints on our actions that we "internalize" in the Vygotskian sense: higher cognitive type functions first pass from an intersubjective dimension to be then internalized in the intra-subjective dimension. And this presupposes that the constraints on action are aligned with the constraints of the learned system or concepts. In an "action under constraint," for example, structure can be reduced to a strategy involving both cognitivist and constructivist teaching-expressible in the terms of "making thinking visible" or "making action visible." The new embodied enactive paradigm, on the other hand, is based on different teaching strategies that can be expressed in different statements than those set forth just above, namely, "making thinking accessible" or "making action feasible." In fact, making the object of learning "visible" only sometimes may be sufficient for learners to acquire a model or make a cognitive system their own.

Certainly, the methodologies proper to the enactive approach do not differ from those of the teaching models most widely adopted to date: cooperative learning, experiential learning, learning by doing, use of digital technologies, but the innovation lies in considering individuals not in their singularity and individual structures deputed to learning but in the interdependence with their environment, in the greater attention to the intersubjectivity between subject and environment, in the greater recognition of the bodily function as the primary tool for knowledge construction. «The process of building identity begins with the body: the perception of the self passes through a body no longer understood as the result of negative stigmatization. The body does not only imply the ability to coordinate movements between its parts but represents the fundamental and the first instrument of relationship (there is a continuous relationship between it and the environment)» (Palumbo C. 2018, p.90).

Beyond the methodologies used, the enactive approach looks at the classroom as a whole as a set of bodies-subjects-including teachers-that enter into "structural coupling" for the purpose of a common and shared cognitive, behavioral, and relational growth and where each evolves by receiving and bringing trans-formation.

To conclude, through enactive teaching, embodied and situated cognitive, affective and relational networks are built, in which each person changes while modifying his or her surroundings just as en-action transforms the system during the process of knowing (cf. Rivoltella 2021) . In the course of transform-action, which is a mode of action and not a product of it, the learning process takes place in a fruitful reciprocity: the person comes to knowledge because he or she transforms but also transforms because he or she knows. Knowledge is thus a state of the person in transformation and involves cognition-body-environment in the space of action and co-emergence of the transformative system.

Rossi's (2011) application of the enactive model to education led to reflections on its application consequences in the study of motor sciences as well, thanks to his description of the complex - but fascinating as well as educationally useful - marriage between man and robot in the artistic expression of dance: a scene in which Étoile Roberto Bolle experiences a two-step with a robotic arm weighing more than a ton, not letting the viewer forget that a dancer is at the same time an artist as well as an athlete. Such a dancing encounter with the mechanical arm, in an incredibly human mode, leaves no room for theoretical description: one can only admire those lines drawn by the human-robotic bodies in the space-time of the performance, which vanish the very moment they are staged, to remain imprinted only in the minds of the viewers of that unique and unrepeatable performance. Put another way, to arrive at an explanatory and experiential node, the immersive performative action of a dancer elicits in the circumstantial embodied minds condensed guiding images of all the information from the five sense analyzers, reproducing in each embodied mind - rooted in the world to which it is at the same time open - the image of its own gesture which, in turn, refers back to the optical image with which the kinesthetic experience was previously connected (Prinz 1997).

More specifically, the mental image of the gesture is the result of a processing of visual, auditory, tactile and kinesthetic perceptions that are incorporated into a unified conception of it. The information that is gathered from the environment, reaches the cerebral cortex in a few milliseconds, once it reaches the cortex it is subjected to further comparison, recognized and transformed into information useful for solving the problem under consideration.

It is thus, finally, that, the motor experience itself of the dancer becomes reflexive as the inner dialogue that arises from the intensity of intra- and inter-subjective experience allows a more intense return to the performance to transform it again and again.

Educational research has therefore received a quantity of input and information from dance studies, useful for analyzing the resources that the body activates thanks to movement and which constitute its educational potential. The interpretations, gestures, transformations as a whole constitute a "visible expression of simple properties" (Palumbo, 2013) which include specialization, modularity and speed. «Faced with complexity, living organisms have chosen specialization, modularity, separation of functions, division of labor, categorization, distinction» (Berthoz, 2001, p. 67).

Dance is a complex yet natural space, made up of gestures and movements that are individually unique and specific, but acquire their meaning through the fluidity and continuity of the movement considered as a whole. Part of this complexity, which can be understood immediately is the artistic sense expressed in the interpretation, yet the continuous coordination of the flow of movements carries out a proactive process, with respect to the perfection that is to be achieved in the gesture.

In summary, the merging into dance of the individual actions, if performed in a functional sequence, corresponds to the realization of the "complexity of the dynamic dimension of the person" (Berthoz, 2001, p. 71).

Furthermore, the dance space includes different views such as the enactive, constructivist, cognitivist and behaviorist ones, which concur together and act in complementarity within the teaching-learning process, thus making it able to provide diversified tools, suitable for facing the complexity of in front of which we find ourselves.

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