

INTERDISCIPLINARY EMBODIMENT APPROACHES. IMPLICATIONS FOR CREATIVE ARTS THERAPIES

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The chapter introduces interdisciplinary embodiment approaches from anthropology, linguistics, and psychology and relates them to creative arts therapies. It particularly focuses on the role of the body proper, body motion, basic dimensions of movement, body memory, and gender, fields that lie at the intersection of cognitive sciences and dance/movement therapy. It is argued that the body may be the place where the usefulness of the computer metaphor ends. The potential and limitations of the embodiment perspective in relation to the creative arts therapies are discussed.

Keywords: Embodiment, human movement, body memory, creative arts therapy research, dance/movement therapy

“Well, what do you think you understand with? With your head? Bah!” (from Nikos Kazantzakis’ “Zorba the Greek”, cited after Andy Clark, 1997, p. 9)

Creative arts therapies (CATs), i.e. dance, music, art, drama, and poetry therapy, have acquired increasing acceptance and application in recent years. The professional fields are prospering internationally, accompanied by numerous qualitative research studies and a smaller number of outcome studies, which altogether almost unanimously support CATs’ effectiveness. CATs work well for all clients for whom the verbal channel is not the primary means of expression. In dance/movement therapy (DMT) for example, if indicated, “assessment and therapy can proceed entirely in the nonverbal realm of movement, touch, rhythm, and spatial interaction” (Goodill, 2005, p. 16). It has, however, continuously been emphasized that it remains unclear how exactly creative arts therapy interventions work. New findings in neuroscience and cognitive science increasingly shed light on the mechanisms underlying CAT. Some embodiment approaches go so far as to proclaim a paradigmatic change in favour of the inclusion of the phenomenal, lived, subjective body into behavioural sciences’ major theorizing.

RECONCILIATION OF BODY AND MIND

Creative arts therapists have always assumed the union of body and mind as a basic underlying principle of their work (e.g., Loman & Brandt, 1992), even though -- lacking a more adequate vocabulary -- they still have been talking about the two realms as two separate capacities. On the basis of their clinical practice, for them self and world are interconnected, and the mind speaks through the body in numerous ways. Conversely, only now are the cognitive sciences on the verge of reconciling the body and the mind. This new trend is reflected in the emerging embodiment approaches.

Descartes (1596-1650) most clearly formulated the separation of body and mind for the sake of the emerging bio-medical sciences being able to do research on and with the body, expelling the mind from “the hard sciences” to the realm of philosophy and theology. The heritage of Cartesian dualism has taught us to think in dichotomies, and to value them as scientific ways of looking at life. Scientific psychology has adapted much of this belief to develop its own theories and methods. Finally, at the turn of the millennium, the body-mind problem has reached cognitive psychology as a

serious topic of empirical investigation. Ever since Merleau-Ponty's groundbreaking work on the ontological and epistemological meaning of the body for our human condition (Merleau-Ponty, 1962), the reconciliation of body and mind emerged in many scientific disciplines. Merleau-Ponty (1962) wanted us to start from the experience of authentic perception. Asking where perception begins, he then answered, in the body. The body is in the world from the beginning and phenomenology as the descriptive science of existential beginnings leads Merleau-Ponty to describe the body as a "general power of inhabiting all the environments, which the world contains." (Merleau-Ponty, 1962, p.311). In philosophy the problem of embodiment has further been treated by Richard Zaner (1964; reflecting on the philosophical contributions of Marcel, Sartre, and Merleau-Ponty) and lately by Fuchs (2000) and Hurley (1998).

This chapter provides an overview of the interdisciplinary embodiment theories that have developed in the tradition of Merleau-Ponty's philosophical-phenomenological approach. With them, a more holistic, and systemic thinking came into the sciences. Embodied theories have their roots in philosophy, neurosciences, medical anthropology and cognitive linguistics, but nowadays also include artificial intelligence research, arts and art-related research, communication research, dynamic systems approaches, educational sciences, linguistics and language-related research, psychology, robotics, sociology, sports, and other fields. One of the main characteristics of embodiment theories is that they take the body as the existential ground for perception and action; they collapse such dualisms as body and mind, subject and object (Sax, 2002), perception and conception (e.g., Lakoff & Johnson, 1999), and perception and action (e.g., Hurley, 1998; v. Weizsäcker, 1940/1996). They assume a perceptual, modality-specific way of knowledge representation (as opposed to an abstract, symbolic way), a way that leads via the sensory-motor system and uses this system for thinking through embodied simulations (Barsalou, 1999; Barsalou, Niedenthal, Barbey, & Ruppert, 2003; Gallese, 2003; Glenberg, 1997). Embodiment approaches are furthermore closely related to approaches of situated cognition (e.g., dependency of cognition on cultural context) and dynamic systems approaches (e.g., Thelen, 1995) in fact overarching literature speaks of humans as situated, embodied, dynamical agents (cf. Beer, 2000). Whether embodiment approaches offer a simple shift in cognitive psychology or a full paradigmatic change remains to be determined (cf. Clark, 1999).

This chapter focuses on theoretical developments in anthropology, linguistics, and psychology. Within psychology it introduces the subdisciplines where embodiment approaches presently emerge, and addresses connections to and future directions in creative arts therapies research.

EMBODIED COGNITION: EMBODIMENT APPROACHES IN ANTHROPOLOGY AND COGNITIVE LINGUISTICS

Anthropological Perspectives: Human Nature and Culture are Grounded in the Body

"The locus of the sacred is the body, for the body is the existential ground of culture." (Csordas, 2002, p.87).

One of the early precursors of embodiment theories was Margret Lock's and Nancy Scheper-Hughes' widely quoted article "The mindful body" (1987), transmitting a medical anthropological analysis in order to "problematize the body (...) by investigating the lived experience of the individual body-self and its interwovenness with the social and the political body" (Lock & Scheper-Hughes, 1987; p.6).

Shortly after Lock and Scheper-Hughes, Thomas Csordas published his influential article "Embodiment as a Paradigm for Anthropology" (1988; here quoted from the reprint in 2002). To successfully confront the "hard sciences", in his view, it is necessary to formulate a "science of subjectivity" (and he quotes Shweder, 1986; p.178, here) "the real world it seems is populated with subject-dependent and object-like subjectivity, two types of phenomena for which there is no place in the mutually exclusive and exhaustive realms of the symbol-and-meaning-seeking hermeneuticist and the automated-law-seeking positivist." (Csordas, 2002, p.86). Csordas suspects that "embodiment has paradigmatic scope" for example for the dissolution of dichotomies, such as cognition and emotion. Andrew Strathern in "Body Thoughts" (1996) continues this line of thought. Strathern (1996) asserts that the term embodiment has reached the status of a major concept in cultural analysis. Yet, in his view it is not enough to switch from one side of the Cartesian dichotomy to the other. It might, however, be a necessary step in the process to a more adequate conceptualization. Creative arts therapies work within and between body/mind. For instance, in searching with the patient for an adequate metaphor as an anchor that allows them to work toward health.

Linguistic Perspectives: Concepts and Language are Grounded in the Body

„Our ability to move in the ways we do and to track the motions of other things gives motion a major role in our conceptual system. The fact that we have muscles and use them to apply force in certain ways leads to the structure of our system of causal concepts. What is important is not just that we have bodies and that thought is somehow embodied. What is important is that the peculiar nature of our bodies shapes our very possibilities for conceptualization and categorization“. (Lakoff & Johnson, 1999, p.19)

In their 1999 book "Philosophy in the Flesh" Lakoff and Johnson define an embodied concept as "a neural structure that is actually part of, or makes use of, the sensorimotor system of our brains. Much of the conceptual inference is, therefore, sensorimotor inference" and not just preceded by or followed by sensorimotor inference (Lakoff & Johnson, 1999, p. 20). They state that the embodied mind hypothesis radically undercuts the distinction between perception and conception. In an embodied mind, the same neural systems engaged in perception or in motion play a central role in conceptualization and reasoning. This implies that *movement is a direct part of reasoning*. Lakoff and Johnson emphasize that replacing traditional disembodied with embodied concepts is a gain for science, and how it is in line with the most recent neuroscience and cognitive findings. In their view, traditional scientific thought misses that "*what has always made science possible, is our embodiment, not our transcendence of it, and our imagination, not our avoidance of it.*" (Lakoff & Johnson, 1999, p.93). It is exactly the human embodiment, the human experience, and the use of metaphor and imagination that makes science possible. The authors' theory on metaphor as a central human capacity could benefit from creative

arts therapists knowledge on how metaphor on a nonverbal body-level and art-related level is part of that capacity.

TABLE I: OVERVIEW OF MAJOR EMBODIMENT THEORIES

<i>Major Embodiment Approaches (Overview)</i>		
Philosophy	Merleau-Ponty, 1962 Hurley, 1998	Perception is grounded in the body Unity of perception and action
Anthropology	Lock & Scheper-Huges, 1987 Csordas, 1988, 2002	The phenomenal body Culture is grounded in the body
Linguistics	Lakoff & Johnson, 1999	Concepts are grounded in the body Language/metaphor is grounded in the body Unity of perception and conception
Neurosciences	Gallese, 2003	Embodied Cognition/Simulation
Artificial Intelligence	Clark, 1997	Intellect/being is grounded in the body
Psychology	Varela, Thompson & Rosch, 1991	The embodied mind
Social Psychology	Barsalou, Niedenthal et al., 2003 Niedenthal et al., 2005	Cognition is grounded in the body Attitudes/emotions are grounded in the body
Memory Research	Glenberg, 1997	Memory is grounded in the body
Developmental Psych.	Thelen, 1995; 2000	Development is grounded in the body Primacy of Motion

THE ROLE OF BODY AND MOVEMENT: EMBODIMENT APPROACHES IN PSYCHOLOGY

Cognitive Psychology and Neurosciences: Cognition and Emotion are Grounded in the Body

“We explicitly call into question the assumption -prevalent throughout cognitive science- that cognition consists of the representation of a world that is independent of our perceptual and cognitive capacities by a cognitive system that exists independently of the world. We outline instead a view of cognition as embodied action“. (Varela, Thompson, & Rosch, 1991, p. XX)

Varela, Thompson and Rosch (1991) were the first authors to introduce embodiment approaches into cognitive psychology. Their approach is revolutionary. They state that cognitive science has hardly brought forth any applicable knowledge, and therefore it was time to change this trend. Since their original work, embodied mind theories gain influence in the context of explaining situated social cognition and behavior (e.g., Jeannerod, 1997; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005). Action simulation is an integral part of embodiment theorizing. Empirical evidence for action simulation comes from Rizzolatti, Fadiga, Fogassi, & Gallese

(2002) study on “mirror neurons” and subsequent research into similar “hard wired evidence”. Rizzolatti et al. (2002) have shown that in apes observation of a grasping movement, led to the same activation in motor centers that in the individual that was actually performing the grasp, just less strong. Hormonal and endocrinal findings also suggest convergent evidence for the central relevance of the body as an organ of perception, internal communication, memory, and other human capacities (cf. Pert, 1997). Meanwhile a strong body of convergent evidence has accumulated in favor of cognitive simulations while perceiving motor activity (Barsalou, 1999), of the interconnectedness between perception and action (Hurley, 1998), on the sensory-motor qualities of thought, shown by the activation of the same sensory-motor pathways while thinking about the activity as if actually performing the activity (Gallese, 2003; Rizzolatti et al., 2002). For CATs this means evidence for functional mechanisms in relaxation and mental imagery exercises.

Developmental Psychology: Human Development is Grounded in the Body

The notion that development is grounded in the body is not new, ever since Piaget’s influential work, it is the state-of-the-art knowledge and the ground that cognitive developmental psychology builds upon. However, there have been a number of outstanding theorists lately whose names are related to the new embodiment approaches, particularly: Ester Thelen. Thelen describes the dynamics and situatedness of human development and human motion in infant stepping ability (Thelen and Smith, 1994; Thelen, 1995; 2000; similarly, Kelso, 1996, for adult rhythmic finger motions). She found evidence for the influence of motor behavior on the cognitive and affective development of the young infant. She writes about rhythms as fundamental properties of infant movement. Nava Lotan a DMT researcher from Israel adapted Thelen’s new approaches for her work on behavior patterns of small children with the Kestenberg Movement Profile (Lotan & Yirmiya, 2002).

Additionally, Barbara Tversky (2002) points out that bodies are special kinds of categories integral to all our perceptions. She reports own and other’s findings that support the critical function of the body and of body motion in human development. Bryant, Tversky, and Franklin (1992) hypothesized that reaction times would be correlated with the degree of mental rotation needed to face an object. The results, however, were contrary to the hypothesis. Subjects responded fastest to objects located on the head/feet axis, followed by the front/back axis, followed by the left/right axis. Tversky argues that these results follow from using a “spatial framework” that is sensitive to environmental asymmetries (such as gravity) and perceptual asymmetries (we generally look and attend to the front). In other words, retrieval processes seem to be sensitive to how we use our bodies, and in this case related to the movement planes.

In a similar vein, Pauen and Träuble (2002), two developmental psychologists specialized in early infant cognition, describe the *primacy of motion* in human cognitive development. Motion perception is a basic cognitive process. The ability to distinguish animate from inanimate objects is one of the first cognitive functions we acquire in life (Pauen & Träuble, 2002). To recognize intention from motion is psychologically and evolutionarily important at the most elementary level of social cognition (Blythe, Todd, & Miller, 1999; Krämer, 2001). Motion is a major cue to infer intentions and motivations, and to make causal attributions (Heider, 1958; Heider & Simmel, 1944).

Social- and Language-Psychology: Social Cognition, Emotion, and Interaction are Grounded in the Body

“Ago ergo cogito – I act, therefore I think” (Glenberg, 2005)

Preverbal motor development does not happen in the individual space, but in the interpersonal space. We are social beings and social psychology has contributed a new line of body-based research culminating in the *social embodiment approach* of Barsalou, Niedenthal, Barbey, and Ruppert (2003). By *embodiment* Barsalou et al. (2003) mean that “states of the body, such as postures, arm movements, and facial expressions, arise during social interaction and play central roles in social information processing” (Barsalou et al., 2003, p. 43). Social information processing means cognitive processing (or thinking) related to social situations. Four types of embodiment effects have been reported by social psychologists. First, perceived social stimuli next to cognitive states produce bodily states as well. Second, perceiving bodily states in others produces bodily mimicry in the self. Third, bodily states in the self produce affective states. Fourth, the compatibility of bodily states and cognitive states modulates performance effectiveness (Barsalou et al., 2003). Movement therapists might be strongly reminded of the empathy theory of Theodor Lipps (1903; cf. Wallbott, 1991) for the first three types of findings. The social embodiment approach bundles single empirical results and other body-based research strings and propose an alternative theoretical account for the workings of mind and memory with reference to recent results in the neurosciences. Embodiment theories offer a new view on knowledge representation. While traditional theories assume that a symbolic system “re-describes” sensory, motor, and introspective states, resulting in amodal descriptions, embodied theories of cognition proclaim the following:

“embodied theories represent knowledge as partial simulations of sensory, motor, and introspective states (...). When an event is experienced originally, the underlying sensory, motor, and introspective states are partially stored. Later, when knowledge of the event becomes relevant in memory, language, or thought, these original states are partially simulated. Thus, remembering an event arises from partially simulating the sensory, motor, and introspective states active at the time. (...) Depending on the situation, embodiment may range from simulation, to traces of execution, to full-blown execution. (...) these embodiments are not merely peripheral appendages (...) of social information processing - they constitute the core of it. (Barsalou et al., 2003, p. 44).

Most embodiment effects are unconscious and occur automatically (Dijksterhuis & Bargh, 2001). Wilson (2002) and Niedenthal et al. (2005) distinguish online and offline embodiment. Online embodiment refers to a present situated embodiment effect where cognitive activity operates directly on real-world environments or vice versa. Offline embodiment refers to effects from memory, where cognitive activity that is de-coupled from real-world environments. For example, sitting in the classroom being called upon by the teacher and not knowing the answer to any of her questions might cause cold sweat, a dry throat, gaze aversion, and an increased heart rate (online). Imagining this situation may have the same bodily effects (offline). This distinction has implications for CAT work with traumatized patients.

A theory of embodied memory has been suggested by Arthur Glenberg (1997). Glenberg started from the open research question of how language conveys meaning and suggests that linguistic meaning is grounded in bodily activity. Glenberg and

Kaschak (2002) found that participants were faster at judging the meaning of a sentence when it was compatible with the hand movement required for the response (e.g., “close the drawer” with forward movement; “open the drawer” with backward movement). This action-sentence compatibility effect occurred even when the sentences referred to abstract actions that involved directional communication (i.e., participants were fastest in judging the sentence “You told Liz the story” with a forward movement and the sentence “Liz told you the story” with a backward movement). These findings are consistent with the claim that language comprehension is grounded in bodily action, and are inconsistent with abstract symbol theories of meaning.

Clinical Psychology and Psychotherapy: Healing is Grounded in the Body

Clinical practice is increasingly involved with nonverbal techniques, basically without being conversant of their explicit way of working (e.g., EMDR, NLP, body feedback, mirroring, passing, etc.). Authors such as Damasio (1994/1999), LeDoux (1996), and Schore (1994) have indicated important directions in clinical thinking. There is, however, no explicit embodiment approach in clinical psychology and psychotherapy research. Even though the saluto-genetic approach (Antonovsky, 1997) and trauma-related approaches (e.g., van der Kolk, 2003) are closely linked to concerns in embodiment and creative arts therapies (Koch, in press). CAT research could be contributing to understand the common principles at work behind all therapies by looking at the therapeutic intervention techniques applied by therapists of any school, and organizing them along the lines of embodiment theories.

Evidence for clinical relevance of embodiment research is presently again coming from social psychological research: Piotr Winkielmann from the University of California St. Barbara compared autistic subjects to typical subjects (Winkielman, 2005). On the basis of the mirror neuron theory and the amygdala theory to explaining autism, he finds that particularly social mirroring is impaired in autists (McIntosh, Reichmann-Decker, Winkielman, & Wilbarger, 2005). The treatment implied by this research is the use of mirroring interventions to create reciprocity, interventions dance therapists have been using ever since they worked with autists (Adler, 1969). This DMTs specific autism treatment is now finally science based.

Three Examples for Research Applications

1. Embodiment and Basic Dimensions of Motion

Social psychology has just started to investigate basic embodiment dimensions and their psychological meaning. The *movement planes* for example have been addressed in latest psychological research by Schubert (in press) in which the vertical plane is related to power, and by Boroditsky (2001) in which the sagittal plane is related to time.

The *bi-directionality of affect/cognition and motor behavior* has been investigated since research on the *body feedback hypotheses* suggested that the incorporation of distinct facial expressions or postures leads to distinct emotions or evaluations (see Hatfield, Cacioppo, & Rapson, 1994). This line of research supports that next to emotions and cognitions causing certain motor behaviors and bodily expressions, *certain motor behaviors cause certain emotions and cognitions*. The

notion of bidirectionality of affect/cognition and motor behavior supports the basic maxim according to which CATs have been working from the beginning of the profession. Yet, only recently has research in social psychology rendered empirical evidence that confirms this assumption.

Research working on the specific embodiment effect of *approach and avoidance motor behavior* on attitude formation (Cacioppo, Priester, & Berntson, 1993; Neumann & Strack, 2000) can be directly related to the DMT concept of *Shape* and *Shape-Flow*. Cacioppo, Priester and Berntson (1993) placed participants at a table and asked them while studying arbitrary Chinese signs (written in Chinese script) to either activate the flexor or the extensor of their arm muscles by pressing against their table either from below or from above (from the table surface). The resulting movement was thus either an approach or an avoidance movement, either towards the body or away from the body. Those signs that had been studied while pulling the arms towards the body were later judged as significantly more positive, than the signs that had been studied while pushing against the table. This finding is consistent with other “motor congruency effects” (Förster & Strack, 1996). For a dance/movement therapist, parallels to shape-flow and shaping stand out (Laban, 1960; Laban & Lawrence, 1974). The findings of Cacioppo et al. (1993) are directly supporting KMP theory about unipolar shape flow (Kestenberg-Amighi, Loman, Sossin, & Lewis, 1999; Kestenberg & Sossin, 1979; Kestenberg, 1995) that offers a classification system for attraction and repulsion motion toward and away from objects.

2. Body Memory

Merleau-Ponty (1962) has almost entirely spared the issue of body memory from his otherwise very exhaustive discussion of the body’s role in perception. The philosopher who has taken on the challenge of treating the topic of body memory was Edward T. Casey (1987; cf. Pylvänäinen, 2003, and this volume). Casey defines body memory as “memory that is intrinsic to the body, to its own ways of remembering: how we remember in and by and through the body.” He emphasizes the tacit and non-deliberate nature of such memory. In fact, body memory is so much part of the ground of our experience that the topic has been ignored from the ancient Greeks to Kant. Casey distinguishes habitual body memory, traumatic body memory, and erotic body memory. Habitual body memory becomes salient when it is disrupted, such as when one gets a new keyboard for the typewriter and finds oneself in a “state of disorientation” at first. What Casey calls habitual body memory has much in common with what cognitive psychology calls implicit memory. For Casey body memory is located both in the objective, material body (fibers and tissues; cf. Pringer, 1995/2005) and in the phenomenal, lived body (after *Leib* in Husserl). “Because it re-enacts the past, it need not represent it; (...) body memory includes its own past by an internal osmotic intertwining with it.” (Casey, 1987, p.88). As Fuchs (2004) writes

“body memory mediates the basic experience of familiarity and continuity in the succession of events. It unburdens us from the necessity to constantly find our bearings again. Bodily learning means to forget what we have learned or done explicitly, and to let it sink into implicit, unconscious knowing. By this we acquire the skills and dispositions of perceiving and acting that make up our very personal way of being in the world. We might also say: What we have forgotten has become what we are. (Fuchs, 2004, p.3).

In contrast to memory categories of cognitive psychology, such as autobiographic memory only representing the past as the past, body memory mediates the living presence of the past. It is therefore the essential basis of the self. As such it can be found entirely intact in dancing, singing, or sculpting with a demented patient. Fuchs notes “*Freedom and art are essentially based on the tacit memory of the body.*” (Fuchs, 2004, p.3).

Evidence in neuroscientific research is accumulating that active remembering, such as the recall of representations or mental imagery, activates sensory (e.g., Wheeler, Peterson, & Buckner, 2000) as well as motor responses (e.g., Nyberg, Pertersson, Nilsson, Sandbloom, Aberg, & Ingvar, 2001), and that in fact, sensory and motor processing is more intimately linked than ever assumed (Tucker & Ellis, 1998).

3. Embodiment and Gender

Research is just starting to explore what differential implication embodiment views have on the cognition and affect of men and women. Warren Lamb has worked on gender differences in motion (Lamb, 1965; Davies, 2001). Recent findings from embodiment research suggest, for instance, power related differences. Schubert (2004) found that making a fist had different implications on cognition and emotions of women and men. It influenced their automatic processing of words related to the concept of power.

Embodiment theories are closely related to gender issues. As we increasingly investigate embodiment we will also increasingly move to an understanding on the different forms of embodiment in men, women, gays, transsexuals, etc. Development of sex roles is necessarily intertwined with cognitive development, and both are grounded in the body. It remains up to future research to start looking at the implication gender has on embodiment (and vice versa). An example of recent research relating gender and artificial intelligence comes from Alison Adam (2002). Starting out to investigate the role of the body in the generation of knowledge, Adam offers a critique of artificial intelligence research and embodiment in artificial life. She points out that the specificities of gender (and other embodied variations; the author) cannot be adequately addressed with methods such as computer simulations.

Outstanding Questions

Is the world centerless and is it just we searching for a center, an inner organizer (that some may call god, some may call theory, some may call metaphor, some may call psyche, some may call mind). Is it just we in search of sense and meaning (cf. Heider, 1958), contingency, and predictability, that is not objectively there but merely constructed (by categorization, dichotomization, attribution)? Or is the existential ground given in form of our bodies?

Does this existential ground bereave us humans of our special position in the universe?

Can we explain all perceptual and memory phenomena on the grounds of embodiment or are embodiment theories just a constraint for specific cases? I.e., is the sensory-motor simulation occurring in all cases or are there still other forms of processing information and of being? Is embodiment a new paradigm that will replace cognitive science or will it find its place as a part of it?

In the progression from cognitive sciences to embodied sciences, the mind is increasingly viewed as part of the body. There are at present many attempts to find the neurological, endocrinological, hormonal, etc. traces of the mind or consciousness. Is this the return to a

disenchanted view on life? Or is it, on the contrary, a reconciliation of the century-long analytical separation of body, mind, and world?

CONCLUSIONS

Embodiment approaches offer new scientific perspectives for creative arts therapies. Most embodiment approaches compile empirical results that are suited to support CAT practice, to stimulate CAT research, and to explain how CAT work. Particularly, the cognitive science model of modality specific knowledge representation (Barsalou et al., 2003) lays a foundation for CAT theory development and provides a rationale for CATs functioning. Topics of CAT relevance that thus far have been standing isolated such as body memory, basic movement dimensions, or body and gender can be tied to embodiment theories and find their place in a broader scientific framework.

Embodiment approaches claim that the typical partition of the cognitive system into a variety of neural or functional subsystems is often misleading. It blinds us to the possibility of alternative, more explanatory categories that cut across the traditional body/mind/world division (cf. Clark, 1997). For cognitive science this means that researchers need to critically rethink their subject matter. For creative arts therapists with their more holistic approach their task will be to diligently and thoroughly formulate their embodiment ideas and make them available to other scientific communities and outlets. The potential is a better visibility and a more explicit formulation of CATs theory in the light of a new paradigm. The danger of the embodiment view is a too explicit and one-sided focus on the body as mentioned above. Nevertheless, all cognition and affect can be conceptualized as embodied and grounded in the body and is describable in terms of its functions. Mind and body are not two entities related to each other but a living inseparable whole.

Embodiment approaches strengthen the theoretical underpinnings of the bodily basis of thought and affect. Theories of embodied cognition attribute new scientific value to experience-based approaches and validate major theoretical assumptions in DMT and CATs. In turn, DMT and CATs can offer their well-developed assessments and experience-based knowledge to provide these theories with a higher degree of exactness and differentiation. One starting point is the investigation of basic dimensions of motion and their dynamic feedback on cognition and affect. This research will be relevant to our fields wherever the manipulation of movement is intended for the promotion of health, improvement of symptoms, or freedom from symptoms. This applies to DMT, all other creative art therapies, all forms of body psychotherapies, and physiotherapy. All of them work with the body as an instrument of resonance and central relevance.

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