

Bio-Connectivity in Tai Chi: Attunements and Mirrorings

The concept of biological connectivity is a fundamental aspect of Tai Chi, emphasizing the role of internal energy activation in the interplay of various bodily systems. At its core, bio-connectivity pertains to the movements of organisms within ecosystems, illustrating a direct correlation between the level of movement and overall connectivity. In nature, movement manifests in multiple forms—such as soil shifts, fire, wind, water, and the mobility of both plants and animals—akin to the metaphors utilized to convey the qualities of movement associated with the Eight Trigrams in Tai Chi and Bagua. In a paradigmatic sense, Tai Chi fosters inner awareness, energetic balance, and mind-body integration through the exploration, discovery, and cultivation of the principles of biotensegrity—principles that have demonstrated their profound validity and effectiveness over time and which, not coincidentally, have found significant confirmation in contemporary neuroscience. Research utilizing neuroimaging techniques has demonstrated that regular practice of Tai Chi induces structural and functional alterations in brain regions linked to executive functions and emotional regulation. This enhanced bio-connectivity is associated with advancements in cognitive flexibility, emotional resilience, and self-awareness. Furthermore, daily practice underscores the importance of cognitive control, facilitating the reconciliation of dualistic thinking with holistic perspectives.

Keywords: *Tai Chi, Bio-Connectivity, Bodily Mirroring, Attunements, Social Enaction*

Introduction: The Tao of Bodily Bio-Connectivity

If we view our bodily system as an organism interacting within a network of similar bodily systems, it becomes evident that the concept of biological connectivity is a fundamental principle of Tai Chi; specifically, it involves preserving and developing connectivity through various forms and modes of internal energy expression, communication, and interaction (Lehnertz et al., 2020; Gu et al., 2026).

In its most basic definition, connectivity is linked to the degree of movement of organisms within ecosystems. The relationship between the extent of movement and the level of connectivity itself is direct and interdependent (Crooks & Sanjayan, 2006). In nature, movement manifests in diverse forms—including the shifting of soil, fire, wind, and water, as well as the mobility of plants and animals—much like the metaphors used to explain and describe the qualities of movement associated with the Eight Trigrams in Tai Chi and Bagua (Yang, J.-M., 2006).

The ancient practice of Tai Chi, steeped in Taoist philosophy, serves as a profound manifestation of Chinese cultural and philosophical thought. This discipline emphasizes the cultivation of inner awareness, the balancing of

energy (Qi), and the integration of mind and body. Its foundational principles have endured through centuries, long before the advent of contemporary neuroscience. Recent advances in scientific research, particularly through neuroimaging techniques like functional magnetic resonance imaging (fMRI), have provided invaluable insights into the effects of Tai Chi practice.

Evidence indicates that regular engagement in Tai Chi fosters both structural and functional modifications in brain regions linked to executive functions, emotional regulation, and interoceptive awareness. Practitioners commonly demonstrate enhanced cognitive flexibility, emotional resilience, and self-awareness. These findings not only reaffirm the historical significance of Tai Chi but also underscore its multifaceted cognitive, emotional, and physiological benefits, making it a valuable practice in contemporary wellness (Tao et al., 2017; Taren et al., 2017; Cui et al., 2021).

The practice of Tai Chi serves as a prime example of the critical role that cognitive control plays in navigating the inherent tension between dualistic thinking and a more holistic, embodied approach. As highlighted by Giovine (2022), this complexity reveals that Tai Chi is not simply a physical discipline; rather, it is a profound medium for personal exploration and comprehensive growth. By actively examining individual perceptions and the boundaries that shape their experiences, practitioners embark on a distinctive learning journey that can facilitate both physical transformation and personal development.

Furthermore, embracing an experiential approach to research within the context of Tai Chi can greatly enhance personal growth. This method encourages individuals to venture beyond conventional frameworks, fostering a spirit of exploration that transcends traditional limitations and emphasizes the vast growth potential that is both personal and transformative.

Methodological Framework

A cycle of generative feedback based on empathy and responsiveness

Tai Chi stands out as a rich and multifaceted domain for comprehending the intricate integration of cognitive and physical elements. It serves as a solid foundation for lifelong learning and continuous development, inviting practitioners to engage deeply with both their inner selves and the world around them. Through this practice, individuals can cultivate a deeper awareness of their capabilities and nurture a path toward holistic well-being.

Additionally, Tai Chi embodies an extensive array of relational competencies, prominently featuring adaptation and mutuality. Engaging in shared practice not only cultivates an empathic interchange between partners but also serves as a medium for self-discovery and the emergence of alternative identities that transcend individual experiences. This practice is rich in opportunities for participants to explore various aspects of themselves and their relationships with others, fostering a deeper sense of connection.

When individuals align their movements and behaviors toward common objectives, they significantly enhance the efficacy of collective action. This alignment is achieved through both cognitive processes—like shared understanding and strategy development—and relational mediation, which involves empathy and responsiveness to one another's actions and intentions. As practitioners engage in this dynamic interplay, the seamless alternation and sequencing between action and observation create a continuous feedback loop that enhances learning and growth.

Bodily mirroring, embodied cognition, and social interaction

The coordination in Tai Chi—both general and temporal—requires practitioners to be acutely attuned to the behaviors they observe in their partners and those they enact themselves. This meticulous attunement, as outlined by Knoblich et al. (2011), allows for a refined awareness of both individual and shared dynamics within the practice, crafting an environment ripe for collective learning.

The practice becomes not just a physical exercise but a relational art form that emphasizes collaboration and shared experience. In the paradigm of shared corporeal experiences, processes of attunement and interpersonal mirroring come into play, enabling profound self-exploration from both internal perspectives—such as awareness of one's physical and emotional state—and external observations, where practitioners glean insights from the movements and reactions of their partners. This interplay is supported by research from Rizzolatti, Fogassi, and Gallese (2001), Jeannerod (2001), and Calvo-Merino et al. (2006), who highlight the significance of mirror neurons and embodied cognition in the understanding of movement and social interaction.

Through these mechanisms, Tai Chi practitioners not only develop a deeper understanding of their own movements—enhancing their technical skills and emotional regulation—but also cultivate heightened relational awareness and interconnectedness with others. This relational awareness strengthens bonds among practitioners, fostering a supportive community that values collaboration, empathy, and growth. As individuals engage deeply with both the physical and relational dimensions of Tai Chi, they embark on a transformative journey that enriches their lives well beyond the practice itself. The importance of bodily imitation in social interactions is profound and multifaceted, as it is deeply intertwined with our ability to convey and recognize emotional states. From an evolutionary perspective, this mechanism is not merely a social oddity but a crucial component that facilitates enhanced mutual understanding and empathy among individuals (Fuchs, 2002: 7; 12).

At the core of this phenomenon lies the concept of a shared representation of the "self," which provides a foundation for what can be described as the "as if" framework of simulation. This framework allows individuals to bridge their own experiences with the actions they observe in others, enabling a reciprocal process where we not only witness behaviors but also internally replicate them. This internal simulation fosters connections not only between individuals but

also enriches our cognitive abilities related to abstract conceptualization (Aziz-Zadeh & Damasio, 2008).

Building adaptive mental models

In educational environments, the dynamics of bodily imitation can play a transformative role in cultivating a richer, more exploratory understanding of both reality and interpersonal relationships. By actively engaging in this imitative process, learners can reconstruct and redefine semantic structures, thus providing deeper insights into change and promoting personal development.

Such engagement is essential for building adaptive mental models, which contribute to enhanced resilience and self-regulation in individuals. Research highlights that mindset shifts—often sparked by these experiential learning processes—can lead to significant changes in behavior and overall perspectives on life (Armor & Taylor, 2003, pp. 86-95).

When viewed through this framework, practices such as Tai Chi emerge as particularly valuable contexts for development. Tai Chi not only encompasses physical movement but also represents a rich tapestry of participatory meaning-making, referred to as sensemaking.

Within this practice, participants engage in a dynamic process of mutual incorporation, where the interactions are not linear but rather retroactive and circular in nature. This allows for a deeper integration of experiences, where understanding interpersonal dynamics is not just enhanced but enriched through the shared, lived experiences of practitioners (Fuchs & De Jaegher, 2009, p. 465). Through Tai Chi, individuals can cultivate not only physical well-being but also social resonance that can enhance their relational capacities.

Bodily postures and mental states

The sensation of balanced postural tone is a nuanced experience that arises from an unconscious integration of eutonia, which is fundamentally rooted in the principles of biomechanical alignment. This sensation transcends the simplistic notion of physical equilibrium; it is deeply intertwined with a complex interplay of dynamic, interoceptive, and intentional aspects of being.

As such, a dialectical relationship develops between bodily postures and mental states—where physical configurations not only bolster but also elevate cognitive and emotional qualities. For instance, an upright stance can foster confidence and alertness, while slumped shoulders may evoke feelings of defeat or fatigue. Conversely, mental states can influence physical expressions as well; for example, an individual experiencing joy may naturally adopt open and expansive postures.

As highlighted by Osypiuk et al. (2018), proper posture does more than facilitate specific mental states; it acts as a vital and intrinsic indicator of an individual's presence in those mental states. Maintaining correct posture

reflects an alignment not only of the body but also of the psyche, suggesting that our physical state can serve as a window into our mental and emotional landscapes.

This experiential phenomenon fosters an interaction where diverse embodied agents engage in a coordinated manner, promoting a dynamic of mutual incorporation among participants. In this context, the lived bodies of individuals contribute actively to a shared corporeal intersubjectivity—an understanding of one another that goes beyond verbal communication. This collective experience aligns with the principles outlined within the frameworks of embodied cognition, which propose that our cognitive processes are deeply rooted in our physical interactions with the world.

Overall, the interplay between physical embodiment and cognitive processes reveals the intricate complexity of how posture can both mirror and shape an individual's experiential reality. This relationship underscores the importance of being mindful of one's posture, as it is not only a reflection of personal well-being but an active participant in the creation and transformation of one's mental and emotional experiences.

Practical Implications in Training and Teaching

Attunements and mirrorings

In the practice of Tai Chi, the experience of mind-body integration significantly enhances practitioners' awareness of their movements. This holistic approach encourages individuals to perceive the functional and proactive unity of their bodies in a holographic sense, within a relationship of continuity—or even intertwining—between each part and the whole. Such an experience imbues every action with meaning, whether in the context of meditative inquiry or martial practice (Carboni, 2015).

Such outcomes align with broader practices that recognize Tai Chi as a form of neuromotor activation. The reciprocal interactions within the body facilitate deeper insights and promote spontaneous, imitative processes. By fostering proprioception and adopting a proactive stance toward posture and gesture, practitioners can cultivate empathetic relationships with themselves and others (Osypiuk et al., 2018).

Two key indicators within Tai Chi illuminate its broader impact on personal and social identity. Firstly, it offers a pathway to develop an understanding of corporeal identity through shared experiences. Secondly, it encourages an internalized practice of mirroring and attunement, resulting from bodily interactions, relational insights, and the imitation of movement (Giovine, 2021). These aspects highlight the profound connections between physical practice and interpersonal empathy in Tai Chi.

Attention should be directed toward the intricate sensations that arise within the body, as well as the collective dynamics of space and time that we share with others. These dimensions should be recognized as interconnected

qualities that promote balance and unity in physical practices. This phenomenon becomes particularly pronounced during collective Tai Chi Form practices, which emphasize the importance of mutual engagement and heightened awareness among participants.

One striking example of this is seen in interactive exercises like Tui Shou, or Pushing Hands, where practitioners work in tandem to harmonize their movements and energies. In these settings, participants develop both gestural and postural awareness, engaging in a continuous process of refinement that enhances their bodily awareness. This evolution not only impacts their internal energy flow and kinetic abilities but also plays a significant role in the formation and evolution of their personal identities (Taylor-Piliae et al., 2006; Wang et al., 2010).

Holistic integration and interpersonal interaction

Exploring body awareness in this context reveals the profound influence of social dynamics and shared experiences in physical practices like Tai Chi. Such communal activities cultivate a deeper understanding of oneself while fostering meaningful connections with others, all through the conscious development of embodied presence. Such practices facilitate a holistic integration of movement, awareness, and interpersonal interaction, which can lead to enhanced physical and emotional well-being.

The implementation of corporeality in educational practices, particularly through disciplines such as Tai Chi, highlights the essential role of recognizing individual uniqueness within the learning process. This approach intertwines evolutionary and intersubjective elements, envisioning learning as a vibrant journey filled with growth potential. It underscores the importance of both interpersonal relationships and intrapersonal development, achieved through embodied cognition and motor-based interventions (Harbourne & Berger, 2019, pp. 786-796).

In settings focused on the care and support of individuals facing psychophysical challenges, this educational framework accentuates not only the enhancement of motor skills but also the empowerment of personal autonomy and human potential. By fostering a supportive environment rich in intersubjectivity—where experiences and perceptions are shared and acknowledged—participants are encouraged to engage actively in their learning journeys.

This approach not only promotes interdependence among learners but also nurtures a deep appreciation for each individual's differences, recognizing that such diversity can enrich the collective experience. Tai Chi, within this framework, deserves particular recognition as a holistic practice that effectively bridges cognitive processes with meaningful bodily expression. Numerous studies demonstrate that regular engagement in Tai Chi significantly enhances multidimensional and hierarchical physical self-esteem among elderly participants, as evidenced in research by Li et al. (2002, pp. 65-89; 2003, pp. 249-256).

Foster self-discovery and a sense of community

Notable benefits arise from specific movements, such as the push movement integral to Tai Chi, which not only improves physical coordination and balance but also reinforces participants' self-worth and perception of their abilities. These findings underscore the transformative potential of such practices, illustrating their profound impact on individual well-being and self-perception. By aligning mind and body, Tai Chi serves as a conduit for personal growth, facilitating a deeper connection to self and others, ultimately leading to a more harmonious and fulfilling educational experience.

The practice of Tai Chi serves as a remarkable tool not only for enhancing physical health but also for cultivating profound personal growth. Its graceful, harmonious, and fluid movements constitute fundamental "life lessons"—embodied and socially shared—that reveal, for each participant, the potential for significant personal transformation (Strauch, 1986). This ancient martial art operates on several interconnected levels, as it encourages individuals to engage in calibrated interactions and develop relational attunement both within themselves and in their interactions with others.

The dynamics that emerge from Tai Chi practice involve mutual and reciprocal mirroring processes, where practitioners begin to recognize and appreciate the creative aspects of the human experience. Through this shared practice, individuals learn to connect compassionately and mindfully, fostering a deep sense of community and understanding (Giovine, 2022, pp. 1-12).

In the context of Tai Chi, expectations and goals should not simply be considered endpoints or outcomes subject to evaluative judgment. Instead, they can be viewed as emergent qualities that naturally arise from the intricate web of relational processes at play. This perspective encourages practitioners to embrace the journey of growth and self-discovery, recognizing that personal development is shaped by the rich interplay of connections formed during practice (Carboni, 2013b; Carboni, 2013). In this way, Tai Chi becomes not just a form of exercise, but a transformative experience that nurtures both individual and collective evolution.

Social Enaction in Tai Chi

Examining the concept of enaction requires a thorough exploration of the specific conditions that govern interactions between an organism and its surrounding environment. At its core, enactment is characterized by the organism's proactive activation in response to a myriad of environmental contexts and situations. This process establishes a dynamic, bidirectional relationship in which both the organism and the environment influence one another in a continuous feedback loop.

This phenomenon parallels the idea of "emerging autopoiesis," which refers to the self-generating processes that enhance an organism's self-awareness and enable goal-directed behaviors. In this framework, the

organism's capacity to adapt and evolve is catalyzed through various forms of developmental pathways that arise in response to environmental stimuli.

From this theoretical perspective, the continuous interaction between Embodiment and Enaction is highlighted as critically important. This interplay contributes to the formation of "a new understanding of the nature of human cognition," as articulated by Hutchins (2010: 428). In this dynamic and interconnected framework, the significance of embodied action takes precedence over passive forms of information reception. It posits that these intricate interconnections fundamentally shape and structure cognitive processes.

As a result, the central tenet of Enaction serves as a foundational pillar supporting the notion of the Embodied Mind. This concept operates not only as an experiential antecedent to cognitive functioning but also as a conceptual precursor, as noted by Stewart et al. (2010: vii).

This nuanced understanding effectively challenges traditional cognitive paradigms, emphasizing the active participation of individuals in the co-creation of their own cognitive realities. By acknowledging the active role that organisms play in constructing their experiences and understanding of the world, this framework offers a richer, more integrative perspective on the nature of human cognition and its development.

Tai Chi can be viewed as a profound practice of embodiment that intricately weaves together multiple modes of representation within the physical realm. This concept of embodiment emphasizes the essential formal qualities linked to our biological and physical existence, highlighting how deeply our bodies are intertwined with our identities.

Through the practice of Tai Chi, individuals can access and consolidate their sense of self and awareness from a phenomenological perspective, which emphasizes direct experiences before any psychological interpretations or analyses. Moreover, the embodiment experienced during Tai Chi goes beyond simple sensorimotor engagement; it infuses the physical self with meaning within broader social and cultural contexts.

This creates a dynamic interplay between individual experience and collective identity. This experiential and cognitive framework makes it possible to recognize the essence of Tai Chi—namely, its nature as a multidimensional intervention that skillfully integrates physical movement, cognitive processes, and ritual elements (Wayne and Kaptchuk, 2008:95–102).

Research Perspectives

An internal and intersubjective path towards an interconnected community

This comprehensive approach to well-being transcends physical health, delving into the intricate layers of personal identity shaped by cultural narratives and the communities in which individuals live. Through the practice of Tai Chi, participants embark on a transformative journey that not only

enhances their physical capabilities but also nurtures a profound connection with their internal selves. This practice encourages individuals to engage in self-reflection and mindfulness, enabling them to explore their emotions, thoughts, and aspirations.

As practitioners immerse themselves in the flowing movements and meditative rhythms of Tai Chi, they cultivate a sense of balance and harmony within themselves. This internal awareness fosters a greater understanding of how their personal experiences relate to the broader social contexts they inhabit. Consequently, individuals can better appreciate their unique identities while recognizing the influence of collective narratives and values.

Moreover, this dual engagement—personal growth paralleled with an awareness of communal dynamics—fuels a sense of social responsibility and connectedness. As individuals develop their own sense of purpose and well-being, they also become more attuned to the needs and experiences of those around them. This growing empathy encourages active participation in their communities, ultimately contributing to a social fabric that supports overall well-being.

As the bodily sense of self develops into emergent sensory, perceptual, and cognitive awareness, diverse physical activations and gestural engagements, which constitute core components of the Tai Chi practice, become pivotal (Wayne & Kaptchuk, 2008, pp. 95-102). Tai Chi practice represents a progressive organization of neuromotor skills, encouraging perception of the body as a unified whole across time and space, rather than as isolated functional components (Cfr. Kohut, 1977; Stern, 1985; Sander, 2007).

By weaving together personal development with social awareness, Tai Chi offers a holistic path that not only enhances individual lives but also fosters a supportive and interconnected community. This balance of growth catalyzes positive change, enriching both personal journeys and the communal landscape, and leading to a more harmonious existence for all.

Conclusions

The Tao of Tai Chi is deeply rooted in the paradigm of "hic et nunc" (here and now). This principle emphasizes the profound significance of the present moment in shaping our experiences.

Each individual's engagement with Tai Chi allows them to construct a unique perception of the world, further defining their reality through this physical practice. Such an engagement actively influences their intentions and actions, fostering the development of neural maps. These maps are formed through a complex and systematic integration of motor actions, as outlined by Jeannerod (1991), indicating how our physical movements can sculpt our cognitive processes and behavioral responses.

Human movement, inherently a social phenomenon, serves as a fundamental mechanism for sense-making, wherein individuals exploit various modes of mirroring—such as alternation, complementarity, symmetry, and

integration. This notion is further explored by Sheets-Johnstone (1999, 2011), emphasizing the importance of movement in social contexts.

The context of Tai Chi epitomizes a formative environment wherein sense-making is inherently bioconnected and participatory. This milieu fosters opportunities for meaningful, creative, and inventive learning experiences that may remain elusive outside the bounds of such shared interactions (De Jaegher & Di Paolo, 2007; McGann & De Jaegher, 2009).

Adopting an experiential perspective, embodiment emerges as a distinctive operational quality of Tai Chi, underscoring both the lived experience of the body (Leib) and the functional and expressive attributes of the physical body (Körper). These complementary and inseparable dimensions—whether examined within the broader framework of bioconnectivity or within the specificities of personal growth and transformation—are essential for reconceptualizing care as a process of transformative change.

References

- Aziz-Zadeh, L., and Damasio, A. (2008). Embodied semantics for actions: findings from functional brain imaging. *Journal of Physiology-Paris*, 102, 35–39. <https://doi.org/10.1016/j.jphysparis.2008.03.012>
- Armor, D., Taylor, S. (2003). The Effects of Mindset on Behavior: Self-Regulation in Deliberative and Implemental Frames of Mind. *Personality and Social Psychology Bulletin*, 29(1):86-95. <https://doi.org/10.1177/0146167202238374>
- Calvo-Merino, B., Grèzes, J., Glaser, D.E., Passingham, R.E., Haggard, P. (2006). Seeing or Doing? Influence of Visual and Motor Familiarity in Action Observation, *Current Biology*, 16, 1905-1910. <https://doi.org/10.1016/j.cub.2006.07.065>
- Carboni, M. (2015). The Care of Person in Tai Chi as Educative Mutuality. *Yang-Sheng (Nurturing Life)*. Vol. 6, N.3, 24-27. ISSN: 2326-277X
- Carboni, M. (2013b). Evolutionary Growth and Embodied Learning in Taiji. *Yang-Sheng (Nurturing Life)*. Vol. 3, N.5, 30-37. ISSN: 2326-277X
- Carboni, M. (2013a). Taiji as Shared Bodily Experience. *Yang-Sheng (Nurturing Life)*. Vol. 3, N.2, 26-33. ISSN: 2326-277X
- Chan, S.P., Luk, T.C., Hong, Y. (2003). Kinematic and electromyographic analysis of the push movement in tai chi. *British Journal of Sports Medicine*, 37(4):339-44. <https://doi.org/10.1136/bjism.37.4.339>
- Crooks, K.R. & Sanjayan, M. -eds.- (2006). *Connectivity Conservation*, Cambridge University Press.
- Cui, L., Tao, S., Yin, H.C., Shen, Q.Q., Wang, Y., Zhu, L.N., Li, X.J., 2021. Tai Chi Chuan alters brain functional network plasticity and promotes cognitive flexibility. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.665419>
- De Jaegher, H., & Di Paolo, E. (2007). Participatory sense-making: An enactive approach to social cognition. *Phenomenology and the Cognitive Sciences*, 6(4), 485–507. <https://doi.org/10.1007/s11097-007-9076-9>
- Fuchs, T. (2002). The Challenge of Neuroscience: Psychiatry and Phenomenology Today. *Psychopathology*, 35, 319-326. <https://doi.org/10.1159/000068593>
- Fuchs, T., De Jaegher, H. (2009). Enactive intersubjectivity: Participatory sense-making and mutual incorporation. *Phenomenology and the Cognitive Sciences*. 8:465–486. Springer. <https://doi.org/10.1007/s11097-009-9136-4>

- 1 Giovine, V. (2021). Embodying Daoist Internal Arts: Walking the Line between the
2 Reification and the Instrumental Use of Cognition. *SAGE Open* 56(3). <https://doi.org/10.1177/00380385211044319>
3
- 4 Gu, M., Kang, J., Zhou, Y., Lin, L., Li, C., Wu, M., Fan, Q., Tang, M. (2026). Mind-body
5 exercise as epigenetic modulators: Rewiring neural circuits for stress resilience and
6 cognitive aging, *IBRO Neuroscience Reports*, vol.20, pages 673-687. <https://doi.org/10.1016/j.ibneur.2026.04.010>
7
- 8 Harbourne, R.T., Berger, S.E. (2019). Embodied Cognition in Practice: Exploring Effects
9 of a Motor-Based Problem-Solving Intervention. *Physical Therapy & Rehabilitation*
10 *Journal*, Volume 99, Issue 6, Pages 786–796. <https://doi.org/10.1093/ptj/pzz031>
11
- 12 Hjortborg, S. K. & Ravn, S. (2019). Practicing bodily attention, cultivating bodily
13 awareness – a phenomenological exploration of tai chi practices. *Qualitative*
14 *Research in Sport*, 12(5), pp. 683-696. <https://doi.org/10.1080/2159676X.2019.1662475>
15
- 16 Hutchins, E. (2010). Enaction, Imagination, and Insight, in Stewart et. Al. 2010, 15, 425-
17 450, The MIT Press, Cambridge.
- 18 Jeannerod M. (2001). Neural simulation of action: A unifying mechanism for motor
19 cognition, *Neuroimage*, 14(1 Pt 2): S103–9. <https://doi.org/10.1006/nimg.2001.0832>
20
- 21 Knoblich, G., Butterfill, S., and Sebanz, N. (2011). Psychological Research on Joint
22 Action: Theory and Data. *Psychology of Learning and Motivation-Advances in*
23 *Research and Theory* 54, 59. <https://doi.org/10.1016/B978-0-12-385527-5.00003-6>
24
- 25 Lehnertz K, Bröhl T and Rings T (2020). The Human Organism as an Integrated
26 Interaction Network: Recent Conceptual and Methodological Challenges. *Frontiers*
27 *in Physiology*, 11:598694. <https://doi.org/10.3389/fphys.2020.598694>
28
- 29 Li, F., Harmer, P., Chaumeton, N.R., Duncan, T.E., Duncan, S.C. (2002). Tai Chi as a
30 Means to Enhance Self-Esteem: A Randomized Controlled Trial. *Journal of Applied*
31 *Gerontology*, 21(1), 70-89. <https://doi.org/10.1177/07334648020100105>
32
- 33 Li, Y., Hu, Y. (2026). Relationship between Tai Chi and the mood states, self-esteem, and
34 subjective well-being of middle-aged and older adults: a cross-sectional study from
35 China. *Frontiers in Public Health*, 14:1686008. <https://doi.org/10.3389/fpubh.2026.1686008>
36
- 37 Liu, D., Zhou, B., Wen, Z., Zhang, Y. (2025). From healing and martial roots to global
38 health practice: reimagining Tai Chi (Taijiquan) in the modern public fitness movement.
39 *Frontiers in Public Health*, 13:1677470. <https://doi.org/10.3389/fpubh.2025.1677470>
40
- 41 McGann, M., De Jaegher, H. (2009). Self–other contingencies: Enacting social perception.
42 *Phenomenology and the Cognitive Sciences*, 8:417–437. <https://doi.org/10.1007/s1097-009-9141-7>
43
- 44 Osypiuk, K., Thompson, E. & Wayne, P. M. (2018). Can Tai Chi and Qigong Postures
45 Shape Our Mood? Toward an Embodied Cognition Framework for Mind-Body
46 Research. *Frontiers in Human Neuroscience* 12. <https://doi.org/10.3389/fnhum.2018.00174>
47
- 48 Rizzolatti, G., Fogassi, L., and Gallese, V. (2001). Neurophysiological mechanisms
49 underlying the understanding and imitation of action, *Neuroscience*, Vol. 2,
50 September 2001, Macmillan Magazines Ltd. <https://doi.org/10.1038/35090060>
51
- 52 Sheets-Johnstone, M. (1999). The primacy of movement. Amsterdam: John Benjamins.
53
- 54 Sheets-Johnstone, M. (2011). Embodied minds or mindful bodies? A question of
55 fundamental, inherently interrelated aspects of animation. *Subjectivity* 4.
56 <https://doi.org/10.1057/sub.2011.21>
57
- 58 Shpak, G. (2026). Neurophysiological mechanisms of embodied empathy in martial arts.
59 *Frontiers in Psychology*, 17:1782703. [doi: 10.3389/fpsyg.2026.1782703](https://doi.org/10.3389/fpsyg.2026.1782703)
60

- 1 Stewart, J., Gapenne, O., Di Paolo, E. A. (Eds.) (2010). *Enaction: Toward a new paradigm*
2 *for cognitive science*. The MIT Press, Cambridge.
- 3 Strauch, R. (1986). T'ai Chi and the Feldenkrais Method®: Different windows on a
4 common vision, *The Feldenkrais Journal*, Issue 2, Fall 1986.
- 5 Tao, J., Chen, X., Egorova, N., Liu, J., Xue, X., Wang, Q., Kong, J., 2017. Tai Chi Chuan
6 and Baduanjin practice modulates functional connectivity of the cognitive control
7 network in older adults. *Sci. Rep.* 7 (1), 41581. [https://doi.org/10.3389/fnhum.2017.](https://doi.org/10.3389/fnhum.2017.00514)
8 [00514](https://doi.org/10.3389/fnhum.2017.00514)
- 9 Taren, A.A., Gianaros, P.J., Greco, C.M., Lindsay, E.K., Fairgrieve, A., Brown, K.W.,
10 Creswell, J.D., 2017. Mindfulness meditation training and executive control network
11 resting state functional connectivity: a randomized controlled trial. *Biopsychosoc.*
12 *Sci. Med.* 79 (6), 674–683. <https://doi.org/10.1097/PSY.0000000000000466>
- 13 Taylor-Piliae, R.E., Haskell, W.L., Waters, C.M., Froelicher, E.S. (2006). Change in
14 perceived psychosocial status following a 12-week Tai Chi exercise program.
15 *Journal of Advanced Nursing*, May; 54 (3): 313-329. [https://doi.org/10.1111/j.1365-](https://doi.org/10.1111/j.1365-2648.2006.03809.x)
16 [2648.2006.03809.x](https://doi.org/10.1111/j.1365-2648.2006.03809.x)
- 17 Wang, C., Bannuru, R., Ramel, J., Kupelnick, B., Scott, T., Schmid, C.H. (2010). Tai Chi on
18 psychological well-being: systematic review and meta-analysis. *BMC Complementary*
19 *and Alternative Medicine*, 10, 23. <https://doi.org/10.1186/1472-6882-10-23>
- 20 Yang, J.-M. (2006). *Neidan. Qigong Meditation Small Circulation*. YMAA Publication
21 Center Boston, Massachusetts, USA. ISBN-13: 978-1-59439-67-8
22