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Impacts of Posture on Aging and Neurodegenerative Conditions; Considering Frequency Resonating Insoles for Improved Motor and Cognitive Functions in the Elderly

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Abstract

Objectives: 1) Explore the connections between posture and cognition, 2) examine the measurable changes in posture and motor skills observed with the use of frequency resonating insoles in older adults, as seen in pilot study collaboration with McGill University, 3) discuss relevant research findings of posture in cognitive performance and 4) review potential areas for future study involving these factors.

Methods: Research has been conducted using fMRI to test cognitive functions in supine and upright postures, as well as with dual tasking requiring performance of a postural and cognitive task. In clinic, participants were fitted with 90 Hz frequency postural insoles that they were required to wear in closed shoes during all waking hours, for two weeks.

Results: A study by Meuhlhan et al has shown a difference in cognitive ability in an upright posture versus a supine posture. Outcomes of in clinic studies included: two of eight participants reporting an improvement in their balance due to full time wearing frequency insoles while the remaining participants reported no change, and measurements for the surface area and distance travelled by the COG in the force plate analyses showed significant improvements for the eyes closed conditions, while the other conditions were insignificant.

Conclusions: It has been recommended that the elderly reinforce cognition to improve balance and gait, but will the inverse work as well? The study performed in collaboration with McGill University was the first study to examine the short-term effect of postural insoles on the objective and subjective experiences of postural stability for healthy older adults. Recent research has shown a link between posture and cognitive ability. Further studies of the effectiveness of frequency resonating insoles in improving postural stability, and the impact this change in posture might have on cognition and neurodegenerative conditions would be beneficial.

Keyword

Older adults, Frequency, Cognition, Posture, Neurodegenerative conditions

The Neuro-Core, Implications of Neurologic Intramuscular Dysfunction and Chronic Lumbopelvic Pain with Effects on Cognitive Function

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Abstract

Objective: Low back pain (LBP) and neck pain (NP) are important health problems for adults of all ages, including

both younger and geriatric individuals. Conditions associated with LBP and NP such as impaired strength and flexibility can have serious consequences with regards to individuals' independence and overall health. It can also instigate an increasing difficulty in the avoidance of pain and result in potential disability. LBP is the leading cause of disability worldwide, affecting an estimated 540 million people at any one time. A limited number of studies have estimated that the prevalence of chronic pain ranges from 11% to 40%. In 2016, an estimated 20.4% of US adults had chronic pain and 8.0% of US adults had high-impact chronic pain. More US healthcare dollars are spent treating back and NP than almost any other medical condition. Cognitive impairment is commonly associated with the pain experience. This impairment represents a major obstacle to daily activities and rehabilitation, especially within the chronic pain population. Research has shown that the effects of chronic pain on certain areas of the brain are representative of processes associated with accelerated aging. Therapies that have good evidence of modern efficacy for combating chronic or subacute LBP are cognitive behavioral therapy, exercise, spinal manipulation and interdisciplinary rehabilitation.

Methods: Peripheral neural receptors have afferent fibers ascending to the brain such as thermoreceptors, proprioceptors, interoceptors, exteroceptors mechanoreceptors (MSA) as well as kinesthetic (GTO) receptors. As such, spinal manipulation and exercise therapy is a common treatment for LBP and NP.

Results: With the realization that the spinal cord is 80% afferent, it has been found that improper afferentation from joints, ligaments, viscera, and fascia are affecting the body's core muscles' ability to function properly: "The pelvic bowl" - Piriformis, internal obturator, coccygeus, pubococcygeus, iliococcygeus; "The abdominal core" - Rectus abdominus, internal/external obliques, transverse abdominus, multifidus and "The diaphragm"

Conclusion: Nociceptive, visceral referred and visceroparietal pain as well as autonomic nervous system dysfunction and ligament alterations affecting afferentation mechanoreception and proprioception are factors that contribute to the chronic back pain epidemic.

Keywords

Chronic back pain, core stability, athletic performance, functional fitness, cognitive decline

Effect of High Intensity Neurorehabilitation Training in Stroke Patients

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Abstract

Background: With prevention efforts being moderately successful, stroke prevalence and mortality are still increasing in Central-Eastern Europe. Because the ensuing mobility disability impairs quality of life (QoL), versatility in treatment is needed.

Objective: To examine the hypothesis that twice daily (EX2) compared with once daily high-intensity Exergaming (EX1) or once-daily lower intensity standard care (CON), would produce superior effects on clinical and motor symptoms, blood pressure (BP), and QoL in acute stroke participants.

Methods: In an assessor-blinded, pre-post, pseudo randomized clinical trial (n=641, 55% males, ~3 weeks after an ischemic-only stroke), we compared the effects of 5x/week twice (EX2, 50 sessions, n=286) and once daily (EX1, 25 sessions, n=272) agility Exergaming and low-intensity standard care (CON, 25 sessions, n=86) on clinical, mobility, BP, and QoL outcomes.

Results: During exercise, peak heart rate was 134, 134, and 126 b•min⁻¹ in EX2, EX1, and CON. Modified Rankin Scale (primary outcome) improved similarly in EX2 (-1.8, effect size, d=-4.0) and EX1 (-1.4, d=-2.6) but more than in CON (-0.7, d=-0.6). QoL, Barthel index, Berg balance scale, six-minute walk test, and standing posturography all improved in a pattern of EX2>EX1=CON. No changes occurred in global cognition and depression. Resting systolic and diastolic BP decreased up to ~4 to 6 mm•Hg. The intervention effects did not differ between males (n=349) and females (n=292).

Conclusion: Twice daily compared with once daily high-intensity Exergaming or once-daily lower intensity standard care produced superior effects on clinical and motor symptoms, BP, and QoL in male and female acute ischemic stroke participants.

Keywords

Virtual reality, Acute stroke, Modified ranking scale, Activities of daily living, Exercise frequency

Effect of Neurorehabilitation Treatments on Quality of Life and Clinical Motor Symptoms in Multiple Sclerosis Patients

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Abstract

Objective: Different therapies can improve clinical and motor symptoms of multiple sclerosis (MS) similarly but studies comparing the effects of different exercise therapies on clinical and motor outcomes are scant. We compared the effects of exergaming (EXE), balance (BAL), cycling (CYC), proprioceptive neuromuscular facilitation (PNF), and a standard care wait-listed control group (CON) on clinical and motor symptoms and quality of life (QoL) in people with MS (PwMS).

Methods: PwMS (n=68, 90% females; age: 47.0y, Expanded Disability Status Scale: 5 to 6) were randomized to 5 groups. Before and after the interventions (5x/week for 5 weeks) PwMS were tested for: MS-related clinical and motor symptoms (Multiple Sclerosis Impact Scale-29; MSIS-29, primary outcome), QoL (EQ-5D), symptoms of depression, gait and balance ability (Tinetti Assessment Tool, TAT), static and dynamic balance and fall risk (Berg Balance Scale (BBS), walking capacity (six-minute walk test, 6MWT), and standing posturography on a force platform.

Results: EXE, BAL, and CYC improved MSIS-29 scores similarly. EXE and CYC improved QoL and walking capacity similarly but more than BAL. Only EXE improved gait and balance scores (TAT). EXE and BAL improved fall risk and standing balance similarly but more than CYC. PNF and CON revealed no changes. EQ-5D moderated the exercise effects on MSIS-29 scores only in EXE. Changes in QoL and changes in MSIS-29 scores correlated $R^2=0.73$ only in EXE.

Conclusions: In conclusion, BAL and CYC but EXE, but not PNF, can improve clinical and motor symptoms and QoL in PwMS (EDSS: 5 to 6), expanding the evidence-based exercise options to reduce mobility limitations in PwMS.

Influence of Dance on Embodied Self-Awareness and Well-Being: A Phenomenological Exploration with Interpretative Phenomenological Analysis (IPA)

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Abstract

Objective: Exploration of personal dance experience and influence of dancing on the evolution of the embodied self-awareness, health, and well-being.

Methods: This is qualitative research that studied subjective lived experience in semi-structured interviews and a written account of female and male adult participants according to the IPA methodology rooted in phenomenology, hermeneutics and idiography. Extracted emerging themes were connected, clustered, and written up outlining the meaning.

Results: This research project included insights from neuroscience, dance/movement therapy, Gestalt therapy and anthropology. Common six themes emerged: freedom of expression through dance; perceptions of fun and partner dance vs. dancing alone; flow; sensations, including bodily sensations, body awareness, sensitization, and sexuality; passion for music and rhythm; impact of dance on life and the self. Main findings: renaissance of the embodied mind, increased embodied self-awareness leading to self-expression and transformation, importance of flow as unspoken dialogue, interchangeable influence of dance and life, improvement of health and well-being, expression, and perception of sexuality.

Conclusion: This exploration adds value to critical psychology and qualitative research and provides multiple practice implications contributing to the leveraging of embodied self-awareness, identity shaping, increasing mental and physical health, educating the public in the advantages of dance as a stress coping mechanism and countermeasure to depression and loneliness, and to developing naturalness and destigmatisation of dance and body in society. It is recommended to start with dance classes early at school and to introduce them as the norm along with the major subjects. This would contribute to the release of dance from the flavour of prohibition and oversexualisation, and to the acceptance of the body. It would imply social engagement creating the balance between the extremes of prudishness and depravity and decreasing the danger of assaults in places of social gatherings. It remains a lot to learn about expression of sexuality in dance, its positive impact on the relief of menstrual pain and embodied social practices for leveraging needed societal transformations. It is recommended to learn from instead of performing neo-colonial hubris towards the cultures, where original connectedness to the nature and thus to the body has been kept alive.

Using Technology to Overcome the Mystery of Primary Dystonia

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Abstract

Objective: Primary dystonia is a rare movement disorder characterized by involuntary muscle contractions, spasms and pain. In current, the theory related to primary dystonia is incomplete and treatment is limited. There is research correlating daily practice of movement therapy with reduction in dystonic symptoms, however is not commonly offered due to insufficient evidence. Considering the dissemination of dystonic individuals, with a prevalence of 2-50 per one million globally, it is difficult to research the condition. In 2018, an online platform project for primary dystonia recovery was launched. The purpose of this study is to utilize this technology to access a large population of dystonic individuals, test the hypothesis of how movement therapy can be used in dystonia treatment, alongside, gain further insight about the constellation of symptoms that this movement disorder entails.

Methods: The platform is comprised of 2,700 dystonic individuals from 70 different countries. This study occurred over a one-year period. The platform offers movement therapy for brain rehabilitation comprised of protocols which are adapted with a focus on interhemispheric integration, primitive reflexes and vagal modulation. Each of the protocols are delivered weekly and build in complexity. The treatment protocols incorporate: neurorelaxation (meditation, breathing, music), neuromodulation, neurodifferentiation and neurostimulation exercises (sensory stimulation, eye tracking, dance, Tai chi, juggling, Shaolin, kung fu, drumming). Preliminary data was collected through Big Data/frequency analysis from detailed client logs and feedback comments.

Results: Several novel and common themes amongst primary dystonia were identified: the connection between gut dysbiosis and reproductive disorders; visual and vestibular deficits; sensory-motor integration deficits; inter-hemispheric imbalances. This newly acquired information was utilized to enhance and adapt pre-existing treatment protocols. This assimilation allowed for the creation of a more tailored protocol that met the needs of this community, resulting in better toleration of exercises, reduction of pain and overall symptoms of dystonia.

Conclusion: The use of this technology can foster deeper understanding into mystery of dystonia and allow for optimization of treatment protocols. Alongside, strengthen the ethos of how movement therapy can be utilized as a complementary approach and possibly an alternative treatment for dystonia.

Keywords

Dystonia, Primitive reflexes, Hemispheric integration, Big data processing, Vagal tone

Promoting Health Screening Among Special Olympics Athletes: A Reflection on Principles of Effective Modeling and Feedback

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Abstract

Objective: The Center for Disease Control and American Diabetes Association Prediabetes recommends the Prediabetes Risk Test for self-screening of type-2 diabetes. People with disabilities are even more vulnerable, reporting twice of a risk to diabetes according to CDC in 2016. Research indicates that persons with intellectual disabilities are two to three times more likely to develop diabetes; however, there has been limited focus on diabetes awareness in this population.

Methods: Delegations of South Texas Special Olympics athletes attending Area 1 Bocce and Bowling competitions in October and November of 2019 were invited to an assisted health screening. An invitation to 209 registered athletes was sent through the area Special Olympics office. Presentation, on the assisted prediabetes risk test and associated set up, was made to the heads of the Delegations meeting prior to the start of the season.

Results: Participation of a trial-run prediabetes risk test was extremely low. Reflection of this surprising result with motor learning principles of effective modeling and feedback justifies the need of progressive education of diabetes related information through different modalities (through visual, tactile, etc.) to the whole Special Olympics community (including coaches, teachers, parents, grandparents, and other caregivers, special Olympics athletes, medical health professionals, etc.). In addition, a training module of all volunteers at the health screening is recommended to ensure effective communication between participants and the volunteers during the assisted health screening.

Conclusions: An inverse correlation is rampant in research focusing on the prevalence, frequency and diabetes effect among persons with intellectual and developmental disabilities when compared to non-disabled individuals. Published studies show that patients with intellectual disabilities are often excluded from educational opportunities with the assumption that they will not benefit from them, however, there is no data to support this. Additional research is crucial for the development of educational opportunities and diabetes services through effective modeling and feedback for individuals affected by intellectual or developmental disabilities.

Keywords

Health screening, Pre-diabetes risk, Special olympics athletes, Effective modeling, Effective feedback

Do You Have the Gut- To Breath? The Sophia (Somatic Movement and the Art of Pilates) Approach to Breathing as an Important Tool in Adjusting and Coordinating the Brain-Gut Axis

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Abstract

Objective: Breath is life. When we breathe deeply and fully the body relaxes and begin to release tension, allowing for greater absorption of oxygen into every cell improving functionality of all bodily systems, in particular the circulatory, immune, muscular, endocrine, digestive, nervous and cardiovascular systems. The nervous system is balanced by the stimulation of the parasympathetic branch. This branch often referred to as the 'rest and digest' system, Deep breathing methods and related bodily movement adjust the parasympathetic nervous system in a manner that no medication can. Medicine is moving towards a more holistic approach to treating patients, and there is growing interest in finding non-medication treatment options. Stress and a variety of negative emotions such as anxiety, sadness, depression, fear, and anger can all affect the GI system due to the strong brain-gut connection.

Methods: With deep breathing, you can reverse these symptoms instantly and create a sense of calm in your mind and body. In addition, with deep breathing, you engage the abdominal muscles and diaphragm instead of the muscles in the upper chest and neck. This conditioning of the respiratory muscles results in improved efficiency of oxygen exchange with every breath by allowing more air exchange to occur in the lower lungs. It also reduces strain on the muscles of the neck and upper chest, allowing these muscles to relax. In short, deep breathing is more relaxing and efficient, allowing higher volumes of oxygen to reach the body's cells and tissues. The lesson will be divided into two parts: lecture and laboratory. In the lecture part, basic concepts of anatomy, and body mechanics will be discussed. The images used in the laboratory part of class are based upon this discussion. In the laboratory part of the class, we will learn the art of deeper breathing, the "diaphragmatic breathing" and 4 more deep breathing Technique: Complete Belly Breath; Alternate Nostril Breathing; Ocean's Breath; Energizing Breath. As well as related somatic movement patterns and somatic Pilates exercises. Deep breathing patterns including spine articulation and mobility seems to have a quieting effect on the gut and has been shown to directly influence gut motility, gut secretions, and pain sensitivity.

Results: My intention is to provide everybody, including movement teachers, trainers and practitioners, tools to use breath exercises and related somatic movement patterns and somatic Pilates exercises to regulate stress response and reprogram the brain to tune out unwanted pain signals from the gut.

Keywords

Brain-gut connection, Breathing, Valgus nerve, Stress, Diaphragm, Mindful movement, Embodiment, Neuroplasticity, Cognition, Somatic movement, Pilates

Unveiling Early Signs from Pantomime in a Newly Emergent Sign Language: Insights for Body And Language Cognition

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Abstract

Objective: In recent years I have had the opportunity to study a newly emerging sign language in São Tomé and Príncipe. Through this research, I have been able to observe as the use of the hands, face, and body for language gradually leads to conventionalization and grammaticalization, systematicity, and complexity of linguistic form disentangling it from first pantomime proposals of communication.

Methods: 100 deaf people met for sign sessions in a common space in Sao Tome, every day and over time, from February 2013 until January 2015. The deaf participants were aged 4 to 25 years, 80% were female and 20% were male. All the participants enrolled in the programme were severely or profoundly deaf. The deaf children from our sample (34%) were excluded from schools due to their deafness condition and they were living in as they were born in a rising tide of a certain degree of social deprivation and lack of communication. All families of the deaf participants signed the consent form to be enrolled in the study. The sessions were all video recorded, totaling about 400 videos with around 60 minutes each. The researcher of our team elicited new signs through cards with drawings of simple objects (e.g. animals, everyday items). As she showed the cards, the boldest in the group would provide

a sign and were then followed by the other timider classmates, sometimes through the process of imitation, other times with common or nearly coinciding signs between them. As time went by, the task became more complex and instead of simple objects the researcher showed cards with drawings of more complex and abstract referents (concepts, emotions) and short stories reproduced in drawings that the participants could sign to each other.

Results: For this study, we observed 1000 signs and pantomimic gestures and over the three stages of data collection only 512 are established signs (signs or classifiers). The 488 gestures we observed are pantomime gestures which 71% evolved with modifications into stabilized signs. In the early phase of our data collection, we found 89 % of pantomimic gestures and 11 % of other gestures and signs. In the intermediate phase we found 46 % of pantomimic gestures and 54% of other gestures and signs and in the final phase of the data collection we found 33 % of pantomimic gestures and 66% of other gestures and signs. This can reveal a deep body cognition as in such a short time signs evolved for simple forms.

Conclusion: The evolution of pantomime communication into conventionalized and grammatical signs can reveal a deep body cognition as in such a short time signs evolved for simpler forms.

Keywords

Body movement, Sign, Gesture, Body cognition

Spiritual Factors in Decision Making Processes

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Abstract

Objective: The contribution is focused on the identification and description of spiritual factors among decision makers with regard to human movement and cognition of spiritual intelligence.

Methods: The contribution begins with the definition of spirituality and takes into account current academic discussions and reflection of the concept of spirituality as a starting point for development of spiritual intelligence today in decision-making process. The applied part of the contribution considers identification and proof of spiritual factors in a group of 20 selected leading persons with a special responsibilities in organizations. The qualitative study identifies the spiritual factors, describes them and interprets in personal and cultural contexts of participants-respondents during semi-structural interviews combined with a special questionnaire. The main methodology used comes from Meezenbroek, Garsen, Berg, Dierendonck, Visser and Schaufeli (2012): Measuring spirituality as a universal human experience. It was necessary to adapt the general concept for measuring of spiritual factor of personalities in special organizations. The investigation provides a basis for the final assessment of new original learning and cognitive discoveries, which are important for the general development of value orientation. The investigation provides the identification of spiritual cognitive functions or biases and development of movement synergies, personal or social interactions. The critical valuation distinguishes between positive and negative spiritual factors in active daily decision-making process.

Results: Identification and interpretation of crucial spiritual factors in a group of interviewed personalities, comparison of key definitions of spirituality with other research, assessment in the context of concrete framework of society, applicability of new self-reflexive learning and cognition regarding practical challenges, personal development, education, pastoral treatment and solutions of daily challenges.

Conclusion: The investigation indicates that the original identification of spiritual factors in human thinking enables to specify general “non-religious spirituality” among personalities challenged by social responsibilities. In the past, there were neglected the spiritual factors for the development of complex human intelligence for decision-making proves and behavior, which the investigation identifies, such as the cognition of meaning of life, work, values, and long-term orientation, as well as the learning to overcome personal crises in the turbulent world today.

Keywords

Spirituality, Values, Meaning of life and work, Education, Decision-making process

Improving Athletic Performance in Youth and Young Adult Adaptive Sports Athletes Through Somatic Movement Re-Education and Therapy

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Abstract

Objective: Our objective was to employ somatic movement re-education therapy with athletes under the age of 27 diagnosed with cerebral palsy or other forms of trauma-related motor impairment to effectively increase balance, strength, mobility and improve overall athletic coordination.

Methods: Each subject was initially observed and video-recorded performing movement gestures in order to establish a baseline and subjectively determine restriction in range of motion (ROM) and mobility. With subjects supported either on a massage table, seated, or on the floor, movement patterns and boundaries (eg. ROM, subjective comfort level, mobility) were further explored by manual evaluative procedures. Verbal feedback of the subjects' sensory experience was invited throughout. Investigation was conducted of an array of characteristics of connective tissue including, but not limited to: weight, tonus, density, tension, among other variables. When restrictions to ROM and mobility were encountered, alternative avenues to limb mobilization were explored. Post-treatment video-recording provided visual feedback to subjects to assist them in integration and coordination of alternative movement patterns via sensory; visual; verbal; imagery pathways.

Results: Preliminary results indicated significantly greater, pain-free ROM; observable gait and posture changes; significantly greater reported limb and movement perception; significantly enhanced sport performance.

Conclusion: Feedback from touch, movement and sensation effectively offer alternatives to the treatment of motorically impaired athletes by providing enhanced awareness of their bodies. Somatic movement reeducation therapy can contribute a unique, harmless, and effective approach to enhanced sport performance in the special athlete.

Keywords

Neuroplasticity, Somatic education, Disabled athletes

Voluntarily Harnessing the Innate Power of Pandiculation for Neuromuscular Recalibration: An Introduction to a Novel Clinical Somatic Technique

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Abstract

Hanna somatic education (HSE) was developed as a clinical form of somatic education, based upon theories and techniques of the Feldenkrais Method and Alexander Technique. One innovation of HSE is the voluntary and deliberate use of the pandicular response. The pandicular response is understood to be a reflexive movement, a modal action pattern, unique to each species. Human pandiculation is typified as the stretch-yawn syndrome. Studies on pandiculation point to effects on the transition between alert versus resting physical and mental states. Additionally, pandiculation is thought to support myofascial recalibration and injury recovery while preparing the body for optimal movement. HSE practitioners utilize pandiculation voluntarily both with verbal instruction and hands-on techniques. The voluntary pandicular technique is used to address and relieve musculoskeletal pain, stuck patterns of movement, and unresolved injury. Both hands-on, assisted pandiculations and verbally guided pandiculations will be taught with specific details as to their application and utility. The intended mechanism of the voluntary pandicular response is using the motor cortex to inhibit spindle cell activation of the myotatic stretch reflex, thereby resetting resting tone of chronically hypertonic muscles. Voluntary pandicular movements are functional and integrative. For

example, the person pandiculating directly experiences and therefore may become more aware of how their limbs connect with their trunk and how their whole body is involved in movement. Along with a presentation of relevant research, attendees will learn basic steps of how, when, and where to apply the technique and will experience giving and receiving both versions of the voluntary pandicular technique. Learning this technique in a workshop might be of interest to somatic movement educators, physical therapists, body workers, somatic therapists, kinesiologists, and cognitive scientists.

Keywords

Pandiculation, Somatic, Neuromuscular, Recalibration

Activate to Motivate: The Six Basic Neurological Movements and Self-Motivation

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Abstract

Man moves in order to satisfy a need. He aims his movement at something of value to him...It is easy to perceive the aim of a person's movement if it is directed to some tangible object. Yet there also exist intangible values that inspire movement.

Rudolf Laban

As babies, we've all communicated our needs through sequences of 'Fundamental Movements' such as yielding, pushing, reaching, grasping, pulling, and releasing movements. These movements, which are reflex-based and develop from one another, form what is called in Body Mind Centering (BMC), "the satisfaction cycle". This cycle integrates core movement patterns, referred to as the 6 Basic Neurological Actions, that are reflective of the intuitive developmental stages we've all moved through in the first year or two of life. In our infancy, these movements were relatively simple in form, and during our growing-up they have progressed into increasingly complex movements throughout our patterns of bodily organization, enabling our adult complex movements.

The developmental movement approach proposes that our early experience of movement patterns influences our sense of who we are in the world, e.g., our sense of safety in exploring our environment and our inner belief in our ability to reach out for our desires and the knowing that we can achieve them. This embodied knowing provides us with a sense of accomplishment and self-gratification.

On the other hand, movement patterns that have not been sufficiently embodied, can create disruptions in our physical development as well as in other areas of life, e.g., emotional and social aspects, the ability to learn and the capacity for self-motivation. Thus, these 'actions' influence our self-development, functioning, willingness to move ourselves into the world and act in and upon it.

In this practical workshop we will encounter and explore in movement the 6 Basic Neurological Actions and their psycho-physical aspects and will examine their significance to child education. We will learn simple ways to observe, identify experience and practice weak and/or over-used actions to re-pattern in-effective habitual sequences. We will locate this practice within the context of teaching physical education and neuroeducation in the schools.

Keywords

Neuroeducation, Motivation, Somatic movement, Embodiment, Physical education, Learning

Diamine Oxidase Variants in Autism Spectrum Disorder and the Unexplored Causal Role of Histamine Intolerance

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Abstract

Objective: Autism spectrum disorder (ASD) is a neurodevelopmental disorder with an estimated frequency of 1 in 59 children. ASD is characterized by social impairment, repetitive behavior and impaired communication. The condition is highly heterogeneous with risk conferred by many genetic and environmental factors. Many of these factors appear to be shared by other neurodegenerative disorders due to shared up-regulation in neuroinflammation, increased microglia activation and/or abnormalities in language processing related to frontal/basal ganglia circuit dysfunction. Recently, the potential involvement of histamine intolerance (HI) has been implicated, a result of the imbalance between accumulated histamine and the degradation of dietary histamine. The histaminergic system mediates neuroinflammation, and diamine oxidase (DAO) is the key enzyme responsible for histamine homeostasis. Previous studies have demonstrated the risk potential for reduced DAO activity caused by the minor allele at rs2052129, rs2268999, rs10156191 and rs1049742. To examine the role of HI in ASD, we analyzed the allele frequencies, distribution, functional and clinical impact of previously investigated histamine-related polymorphisms.

Methods: A cohort of 395 patients suspected for histamine intolerance was genotyped for the above mentioned polymorphisms using Sanger sequencing. 309 of the patients were referred with various stages of ASD. The second group included subjects with no signs of ASD, who were referred for suspected histamine intolerance and/or gastrointestinal complaints. Subsequent data analysis was performed using SPSS v26.0.0.0.

Results: Thirty-three percent (132 out of 395 patients) showed alterations in the tested polymorphisms, 31% in the ASD group and 41.8% in the second group. No correlation was observed when using an additive model for the minor alleles of the selected variants. Patients with ASD did not demonstrate a statistically significant increased risk for HI when compared to the second group.

Conclusions: Our findings suggest that DAO genotypes and allelic variants leading to impaired metabolism of circulating histamine may have an important effect in the development of ASD. Neuroinflammation due to histamine intolerance can impose an effect on the development of ASD, although this interaction is still not well understood.

Keywords

Autism, DAO, Histamine intolerance

Writing An Effective Case Report

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Abstract

Objective: This workshop illustrates the importance of medical writing, shows new and reluctant authors, in particular, how to write effectively, and how to use global health case reports to advocate for better health and improved access to health care for their patients.

Methods: Published BMJ Case Reports will be used as examples to illustrate the importance of the patient at the centre of medical education, what may be learned from common conditions with unusual presentations, clinical dilemmas, the role and limitations of established clinical protocols, near misses, adverse events and initial cases of

novel treatment regimens. Using BMJ Case Reports templates, participants will practise writing their own clinical case reports. In addition to describing the treatment of pathology, participants will be shown how to identify the determinants of health and disease in their patients and write global health case reports.

Results: By the end of the workshop, participants should be able to identify the learning value of their own clinical encounters and how to share this learning through the publication of a case report. Participants should be able to appreciate the role of global health case reports as tools to advocate for the resources they need to treat their patients and influence the conditions in which their patients live and work.

Conclusions: Case reports form an excellent first step in learning to prepare a manuscript. Learning from patients is essential to improving clinical care. The determinants of health are the causes of the causes of disease; influencing these determinants mitigates the health risks not only of individual patients but also of communities and populations. Analysis of global health issues in the preparation of global health case reports serves both to educate and advocate for improvement in the determinants of health.

Keywords

Patient-based learning, Global health

Long-Term Intermittent Intensive Functional Neurological Rehabilitation in a Case of Severe Traumatic Brain Injury with Resultant Unilateral Hemiparesis, Aphasia, Cognitive Impairment and Perseveration

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Abstract

Objective: Severe traumatic brain injury (TBI) causes over 50,000 deaths in the United States every year and 250,000 hospitalizations every year. This study of a young military Veteran seen approximately 2.5 years post-motor vehicle accident (MVA) with severe TBI seeks to demonstrate the need for continued, specific multi-modal functional neurological rehabilitation in cases of severe TBI.

Methods: This single subject case study is reflective of the 'typical' population of severe TBI cases seen at our clinic (penetrating head injury, diffuse axonal injury, anoxic brain injury, stroke, aneurysm rupture, encephalitis, etc.). Given limited subject ability at the time of initial evaluation, diagnostic testing was limited to standard bedside neurological testing (muscle and reflex testing, primitive/pathological reflexes, observation, autonomic evaluation, etc.); as well as tests of motor timing with the Interactive Metronome (IM), oculomotor function with video oculography (VOG), and brainwave regulation with quantitative EEG (qEEG). As of this writing, the patient has undergone two 5-day neurological immersive rehabilitation programs with approximately twelve hours of one-to-one functional neurological rehabilitation in the areas noted above delivered per program.

Results: Over 60% improvement in motor timing and temporal processing abilities with enhanced impulse control, rapid decision-making, and response accuracy as measured with the IM. Enhanced gaze stability, smooth pursuit mechanisms, and optokinetic responses as measured by VOG. Greater ability to engage with neurofeedback and ability to produce sensorimotor rhythm (12-15 Hz brainwave activity) on demand; as assessed via ongoing EEG analysis and qEEG. Subjective reporting (ongoing) includes: decreased muscle spasticity/limb angulation and greater engagement of his left (esp. upper) extremities, decreased perseveration, improved gait (less caregiver assistance needed), greater social engagement, improved affect, and increased independence (moving himself places in his wheelchair instead of relying on assistance).

Conclusion: Eye movements, motor timing, complex motor skills, somatosensory integration, brainwave activity and more are inextricably linked to our higher physical cognitive abilities; and nearly all are impaired post-TBI. Quantification of improvement in key performance indicators in these areas is directly related to objective and subjective gains observed and reported; demonstrating the efficacy of functional neurological approaches in those

with severe TBI that are largely underserved from a conventional medical standpoint. Further study in this area is needed and strongly indicated by these promising outcomes.

Keywords

Functional neurology, TBI, Brain

Effects of Working Memory Training and Physical Exercise on Cognitive Performance in Pediatric Cancer Survivors: A Randomized Controlled Trial

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Abstract

Objective: Due to improved diagnosis and treatment, survival rates for pediatric cancer have increased to over 80%. Nonetheless, pediatric cancer survivors bear a high risk for late effects in cognitive domains such as executive functions. To remediate potential late effects, interventions are needed. Therefore, the aim of this study was to compare the effects of two trainings, namely a physical exercise training and a working memory training to a wait-list control group, on cognitive functions in pediatric cancer survivors.

Methods: In a randomized clinical trial, 69 pediatric cancer survivors between 7-16 years ($M = 11.35$; $SD = 3.53$) were randomly assigned either to a physical exercise training, a working memory training, or a wait-list control group. Participants in the experimental conditions were instructed to train for 8-weeks (3 x 45 min per week). The primary outcome variables were the core executive functions (inhibition, switching, visual working memory), and the secondary outcomes included nonverbal intelligence, planning, verbal working memory, verbal memory, selective attention, processing speed and motor abilities. Measurements were taken for each outcome before, immediately after intervention termination and at three-months follow-up.

Results: Linear mixed models showed that children in the working memory training group improved over time in visual working memory compared to the physical exercise training and the control group. No additional intervention effects on secondary outcomes were detected.

Conclusion: This study shows that the physical exercise training did not improve cognitive performance in pediatric cancer survivors. The working memory training, however, did improve visual working memory, which is a domain where deficits occur frequently in pediatric cancer survivors. This finding is in line with previous empirical evidence and shows that only near transfer effects are to be expected from a working memory training. It thus might be that combining a physical and cognitive training increases transfer effects. In future, this could be achieved using customized exergame (active video game) trainings to provide a physical and cognitive training tailored on the individual cognitive profile.

Keywords

Executive functions, Physical activity

Evaluating Neuropsychiatric Disease Prognosis Through a Novel Clinical Tool Called "Level of health"

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Abstract

Background: 'Levels of health theory' was proposed by Professor George Vithoulkas as an attempt to scientifically make sense of the wide spectrum of response in patients with same pathology undergoing the same treatment. The theory proposes that apart from the pathological diagnosis, there are few other parameters that decide the depth and seriousness of a disease. The result of this theory is a clinical assessment tool that considers - the hereditary load, the past diseases and their treatment and the psychological state of the person along with present diagnosis - in order to assess the depth and seriousness of the disease. Implementation of this process yields a fair prognosis of whether a patient will respond easily or will require a prolonged treatment or may even be incurable. Though the tool was originally designed to assess homeopathic therapeutic prognosis and response, it serves for conventional treatment as well.

Objective: To present the "Level of health" as a clinical assessment tool to analyze the prognosis of neuropsychiatric diseases.

Methods: Explanation on how to decide the level of health clinically and its significance for prognosis will be provided. Case examples of different levels and of different pathologies will be presented to exhibit the decision-making process and the usefulness of the novel tool. The audience will be trained in the process and provided with the tool to work with in their own clinical setting. A network will be created with the willing participants in order to collect the data from them at intervals for further evidence-based development of the tool.

Results: The clinical cases demonstrate a distinct pattern of prognosis and treatment response depending on the 'Level of health' designated as per the assessment tool.

Keywords

Evaluation tool, Neuropsychiatric, Level of health, prognosis

Movement Patterning Discoveries in Work with Wheelchair Athletes and Dancers: Mobilizing the Pelvis With Framework For Integration (FMI)

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Abstract

Objective: This workshop shares how work with military veteran wheelchair athletes and a mixed ability dance company informed a movement analysis system called Framework for Integration (FMI). FMI includes interwoven lenses from the Alexander Technique, developmental movement (Dart, Bartenieff, Bainbridge-Cohen, etc.), Laban Movement Analysis, and dance. Expert movers in wheelchairs facilitated the authors' understanding of the use of the pelvis and spine; certain movement patterns were more functional in the chair while others hindered functionality. These collaborations paradoxically clarified the use of the pelvis (often compromised in wheelchairs) as well as

confirmed the dynamic nature of the lower spine and its relationship to upper spine health.

Methods: FMI has evolved from a simple model that initially looks at primary and secondary spinal curves as building blocks. The work now includes a sophisticated model where the curves relate to spiraled musculature throughout the body, as well as an integrated model that recognizes the interplay of the curves and spirals and elucidates further “engagements” as well as “resets” from various actions. For example, if we look to see something in front of us, that intent might stimulate overall bodily extension; a change in intent releases extension. An activity that requires strength might use forcible flexion; leaving that activity might naturally release into extension. These simple concepts provide tools to see whether movement intention aligns with movement patterning. Incongruence can be construed as interference; often what we intend does not match how we move—neuromuscular habits interfere.

Results: Guided in small groups, with props (physioballs), light touch, and video feedback, participants will specifically identify inefficient movement patterns in the pelvis’ relationship to the head, neck, spine and limb activity. Once identified, patterns and whole body intention and coordination can be clearly redirected.

Conclusion: Through tools available in the framework, movers take charge of their embodied learning and bring movement choices into conscious awareness. The system’s structure is highly accessible. We owe a debt of gratitude to our wheelchair collaborators; their capacity for adaptation guided a unique understanding of the pelvis’ and spine’s dynamic relationship in bodies of all abilities.

Keywords

Functional movement, Movement analysis, Somatics, Developmental movement, Dance

Laser Applications to Improve Cerebellar and Cognitive Function

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Abstract

Objective: Our objective is to demonstrate the effectiveness of pulsed light to generate an effective neurodynamic change within the cerebellum and resultant cognitive networks. We will present objective data demonstrating that these changes do in fact take place and are measurable. These data sets suggest that we should consider a shift in the mainstream approach to cerebellar and cognitive training.

Methods: Laser and light therapy have proven to be quite an effective healing modality for various applications within healthcare. Many studies have demonstrated improvements in the brain during and after transcranial photobiomodulation. Such benefits that have been noted in the literature. Transcranial photobiomodulation is rapidly gaining popularity and grounds with many different conditions. Most notably we are seeing applications and use for the following conditions: sudden onset stroke, TBI, ischemia, neurodegenerative conditions like Alzheimer’s; Parkinson’s; and dementia, psychiatric disorders like depression; anxiety, and post-traumatic stress disorder. However, nobody has conclusively investigated how laser therapy applied directly over the cerebellum can alter the health and measurements of objective cerebellar function. We will use the Balance Tracking System to demonstrate objective changes. This system measures balance in the form of perturbation of one’s center of gravity. Normative data sets do exist for this system and are in excess of 20,000 different data points. Measurements will be obtained before treatment as a baseline; then we will apply the Avant Laser with ShedLight’s proprietary cerebellar frequencies pulsing at the midline cerebellum for 120 seconds. The wavelength used is 637nm at a power of 1000mW. We will then administer the same test via the Balance Tracking System.

Results: Our data indicates that you can, in fact, evoke a direct and positive change of cerebellar function with the use of transcranial laser therapy.

Conclusions: These findings are exciting and the need for further investigations are warranted. The safety and efficacy of neurophotobiomodulation and photobiomodulation in general is practically unrivaled by no other

modality on the market and it is time for practitioners to realize this fact and begin to effectively be utilizing laser and light therapy in their day-to-day practices.

Keywords

Photobiomodulation, Neurophotobiomodulation, Transcranial photobiomodulation, Laser therapy, Cerebellum

Key Neuroplasticity Concepts Relating to Movement and Learning

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Abstract

Objective: Highlight key concepts of neuroplasticity which might shape the output of professionals involved in learning and those involved in movement-based programmes.

Method: Literature review of key concepts of neuroplasticity which appear to relate to learning and movement.

Results: There are more than ten key concepts from neuroplasticity which relate to learning and movement.

Conclusions: Advances in our understanding of neuroplasticity could have an impact on how learning and movement are perceived and delivered. Acknowledgement and use of the key concepts of neuroplasticity could be used by professionals working at all levels within the fields of education and movement to bring improved results for their various stakeholders. Understanding the relationship between body and brain, and the correlation with neuroplasticity would be a key part of this.

Keywords

Neuroplasticity, Learning, Movement, Brain, Education

Systemic Health Through Movement

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Abstract

Objectives: To introduce the concept of systemic health across scales, with a focus on the individual, the social, and the environmental, to guide participants to become more familiar with nonverbal feedback and response through experiential movement-based practice. Embodied information, the range of what we can feel and access through the body, can include kinesthesia, proprioception, interoception, exteroception, graviception, memory, imagination, and emotion, to tune into embodied feedback to help identify healthy and non-healthy patterns, relationships, or ecologies. For example: How do individual patterns influence other relationships? Does being aware of these patterns and making conscious choices (i.e., accept, concede, yield, wait, resist, shape, invent, invite, counter propose) carry over into other aspects of our lives? To practice integrating embodied information consciously into cycles of feedback-response and to explore emergence, or creative response, experientially.

Methods: This movement-based workshop and discussion will focus primarily on exploring relationships through guided movement practice. These relationships include connection to self, to space-time, to the larger environment, the shared space, and with each other.

Results: Participants will understand the concept of systemic health as we are using it, be more familiar with

nonverbal feedback and response, identify for oneself individual healthy and non-healthy patterns; and explore emergence physically.

Conclusions: Movement improvisation is an embodied, transformative practice that allows participants access to an array of information that is often unconscious. Embodied practice can help identify new patterns of awareness, understanding, behavior and possibility beyond those accessible through traditional western thought processes. While a stress response often arises when confronted with the unknown, practicing meeting the unforeseen in ways that feel relatively safe can help introduce and establish new patterns of response, and creative engagement, both individually and in relation to others. Our bodies offer important information to help guide us as we navigate a rapidly changing world. Practicing movement improvisation together offers the opportunity to meet the unforeseen and unforeseeable in ways that can be accessible, constructive, creative, playful, and collaborative.

Keywords

Creativity, Emergence, Feedback, Movement improvisation, Systemic health

Experiential Somatic Interventions to Restore/Enhance Motor Functioning in Children and Adults: Case Studies of Physical Re-Awakening

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Abstract

Objective: In severe cases of motor dysfunction, adults and children often must start their motor learning from the beginning when the muscular system is inert and unresponsive. We postulate that experiential learning is crucial in this phase of physical intervention. In this presentation, I hope to demonstrate how experientially based somatic methods can help foster muscular awareness, activation and initiation. The data in this presentation is drawn from case studies of three different demographic populations: 1) children with CP and genetic disorders; 2) adults with degenerative nerves due to auto-immune disease; (3) athletes and dancers.

Methods: Physical interventions for children with disabilities often fail because they do not focus on establishing a foundation of awareness and movement initiation. For children with CP and genetic disorders, creating rehabilitative strategies which focus on expanding the movement experiences of children can greatly enhance their subsequent assimilation of movement skills. These experiential techniques are a mixture of awareness activities, bodywork, and movement patterning. More advanced protocols were used with adults with severe auto-immune disease. In this group of four patients' infection which lead to a degeneration of the nervous system. As all of the cases were undiagnosed and medical options exhausted, this group was eager to attempt a more internally based somatic interventions which consisted of meditation, bodywork, flow patterning, and experiential movement exercises. The techniques rely heavily on modulating temporal, energetic and spatial parameters of movement in the same way modern dancers learn movement. In our final demographic population, we used highly sophisticated experiential techniques to demonstrate that somatic learning can be used for mastering high level physical challenges.

Results and Conclusion: Through video documentation and case history analysis, we will show how many of these children and adults were able to regain motor functioning in different ways. Although it is clear that more research needs to be done, the results potentially indicate that experiential somatic activities can complement and magnify the results of traditional physical intervention, both in provinces of physical healing as well as in physical mastery.

Keywords

Somatics, Rehabilitation, Disabilities, Genetic disorder, Auto-immune disease

Adult Attachment and Somatic Patterns of Relationship

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Abstract

Early tension flow attributes and shape flow breathing rhythms form patterns that promote mother and infant mutuality. These rhythms, conduits of intergenerational information passed on from mother to child, form the early foundation of an infant's sense of self and perception of the supportive quality of the space in which that self exists. Relational holding patterns display throughout the lifespan. Discovery and reorganization of early movement patterning can be a key to defining safe space, a building block of intimacy. By exploring the supportive and expansive nature of space, both internal and external, and developing awareness of the three-dimensional volume of the physical body, a new embodied sense of relationship can emerge into consciousness.

This workshop is, in the main, experiential with some teaching of the research and theories of attachment defense processes. Included are explanation and practice from the perspective of developmental movement and muscles that activate in parallel with psychological growth as the resulting attachment strategies evolve across the lifespan.

Adult relationships are frequently addressed from an observational viewpoint. We "see" what is and is not there based on our expectations. Talking about what one envisions and the obstacles to connection that arise in the reality of actual human interaction often clash. Rarely are we given the space to examine the psychophysical origins of the nature of relationships, those developmental cues of touch and mutual movement that set the stage for what Attachment Theory calls the average expected environment. Much information is available when we move into the non-verbal realms of movement and listen to the language of the body and the space available for the support of transformation.

Keywords

Psychophysical, Embodiment, Adult attachment, Somatic, Relationship

Applied Neuropedagogy in Movement Teaching

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Abstract

Objective: To offer health and movement professionals practical applications of neuroscience knowledge, central neural system responses and motor learning strategies in movement teaching and to be able to answer these very frequent questions:

Why do my patients/clients/students do the exercise/movement wrong, even though they have been instructed and explained the procedure?

How come they seem to understand and comprehend the exercise/movement taught, but 15 minutes later... they do it wrong again?

Why so few people do the exercises/movements at home ... and even the ones who do them, mostly not the way they were taught or instructed?

Methods: There are, at least, 25 pedagogical tools (neuroscience based), to teach movement in a way the patient fully understands instructions, actions and goals. In the oral and/or workshop we will go through the most important, useful, and effective ones to help movement professionals to apply them in daily work. We will understand why some of the things we have been doing for years, do not work that well.

Results: Optimizing results in a movement session.

Teaching movement so the patient/client/student can understand and use it efficiently.

Achieve our movement aims and make the intervention last.

Knowing what to do... and what not to do in movement education.

Conclusions: There are several strategies to teach movement. But all should include the cortex activation (which is the one responsible for the conscious stage) prior to automatizing and integrating stages. Patients and students of a movement session could have a much more positive experience if the professional in charge knew real effective ways to communicate their knowledge and movement goals.

Keywords

Neuropedagogy, Movement teaching, Pedagogical strategies, Movement for health, Movement coach

Understanding One's Body and Movements from the Perspective of Young Adults with Autism

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Abstract

Objective: The purpose of this study was to explore the experiences of body and movements in young adults with autism from a first-hand account, aiming at tailoring individually designed interventions to enhance bodily resources.

Methods: Eleven young adults (16-22 years) with autism were individually interviewed. Prior to the interview, each participant was presented with the structure of it, and picture-support was offered during the interview, to meet their communicative needs. The interviews were deductively analyzed, based on theories of Basic Body Awareness Therapy (BBAT) and motor control.

Results: The participants experienced that they lacked owning control of one's body and actions, thoughts and feelings. They described how movements were not automated but were needed to be guided by supporting thoughts. Several participants described how coordination of movements were difficult or the breathing restrained. Experiencing positive feelings about body and movement and having better movement quality related to having access to more functional daily strategies. Experiencing conflicting feelings about the body or movements, led to low understanding of oneself. The possibility to feel comfortable, be active or rest in one's body was affected.

Conclusions: Development of body awareness is difficult in persons with autism. To understand their body and movement experiences is important in order to create individually tailored interventions in the health care clinic, in order to support everyday life. This may lead to increased body awareness and activity, enhancing quality of life.

Keywords

Autism, Body awareness, Movement

New Movement: Tools for a Polyvagal Approach in Holistic Trauma-Therapy, Pedagogies, Bodywork and Crisis-Intervention

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Abstract

Objective: People experience stress, fainting and loneliness in the fast modern and potentially increasingly overwhelming world. Over time, all of this could lead to cognitive, but also physical limitations, which often correlate with the nervous system or with how the nervous system is functioning. This has an impact on how people perceive and orientate in their own inner space as well as in the outer space and how they align their movements accordingly. Some even decide based on conscious or unconscious fear to withdraw and to freeze mentally, emotionally, and physically.

Methods: Self-exploration/Demonstration (Tuning-Board™/SOMA-Embodiment®/TRE®/ SmovyMED) and/or Videos presentation.

Results: The aim of this impulse is therefore to a) give a brief overview of the polyvagal approach according to Steven Porges and b) provide an insight into new possibilities from the field of somatic trauma work, which can serve to regulate the nervous system in a mindful manner and specifically involve the bottom-up processes of the body in the personality development with clients like presented in the approaches of Peter Levine, Darrel Sanchez, Sonia Gomes and Laurence Heller.

Conclusion: Therapists, psychologists, doctors and educators in particular need a much broader understanding of polyvagal theory and its implications for the nervous system and the psyche, as well as the ability to move, orient and contact in connection with overwhelming experiences. From this understanding arises awareness of the need for a holistic view of the whole organism, including body, nervous system, senses of orientation, haptics, straightening, movement, gravitation and of course meaning. It sets the basis for a broader understanding of how the human mind-body-system copes traumatic stress and what it needs to get back to balance - in terms of a ventral-vagal middle mode in the "window of tolerance" (Dan Siegel). Co-regulation and rapport are essential basics for this processes, of course.

Keywords

Polyvagal-theory, Trauma, Embodiment, Stress, Vagus nerve

Neurotrophins Evaluation in Movement Meditation Practise

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Abstract

Objective: Aim of the present study was to investigate mechanism underlying the possibility that dance, in the context of movement practise involving specific features such as ecstatic dance, voice work and psychotherapeutic elements, may somehow favour those plastic processes in the central nervous system closely related to the emotional experience-based behavioural changes, which accompany and drive our life. Method of body awareness that combines movement and coaching can be used in developing creative processes for individuals, groups and communities, respecting ethical values and opening to new, sustainable, alternative ways of stress coping in challenging contexts.

Methods: Saliva samples were self-collected by the experimental subjects (using Salivette kits (Sarstedt, Aktiengesellschaft & Co., D-51588 Nümbrecht, Germany) before, and after a pre and post three different short- (2 hrs) and long-term (full day) dancing sessions. Saliva was collected by chewing on a cotton rolls for 2-3 min and returned to transport vial. Samples were centrifuged (3,000 rpm, 10 minutes) and stored frozen at -80°C until assay. Saliva was assayed (ELISA or EIA) for nerve growth factor (NGF), brain derived neurotrophic factor (BDNF), oxytocin (Oxt), and cortisol (CORT) levels.

Results: A clear increase was evident in salivary NGF levels (after a full day dance session; $z=-2,97$; $p<0.05$), in the absence of evident changes in stress hormone levels and with a slight, though not statistically significant decrease in BDNF.

Data indicate that body-based movement meditation practice may induce neuroplastic phenomena which might parallel salubrious social and emotional coping. Dance art should be further exploited to develop and validate therapeutical strategies promoting wellbeing and/or addressing health issues in a supportive, positive, cost-effective and in non-clinical environment, encouraging resilience, and facilitating empowerment, stress management and recovery through accessible creative programmes.

Keywords

Movement, Neurotrophins, Neuroplasticity, Mindfulness

Primordial Yogic Movement: Experiencing Evolutionary Biomechanics

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Abstract

This (two-session) workshop will explore movement that defines life forms and their evolutionary history. From single cells to vertebrates, amphibians to mammals, primates to hominins -- the workshop will examine the evolutionary heritage of other species leading to how we move and what we are as a species. Lecture(s) will with earth history and the development of organisms, their forms and movements; followed by a co-creative experiential praxis of different apex species. Through somatic emulation of species in evolution we revisit bio-archetypal forms and movements to appreciate our connection to the various life forms that influence how we move and sense how we are intertwined with other species on earth. Short lectures with participant somatic movement practice on the mat focuses on visualization and emulation. Limit participants to 15 at a time; please bring a yoga mat, chairs also available.

Workshop can be in two separate sessions or experienced together:

Single cell to Reptiles

Life on earth as we know it began with the first protocells, non-nucleated cells not much different from the environment around them. We will explore the way single cells move and evolved in a fluid environment, the locomotive motions of multi-cell invertebrates, and the vertebrate pioneers adapting to life on land. How their evolutionary adaptations for locomotion mirror how human infants first explore in movement.

Birds and Mammals to Hominins

Amphibians and reptiles bridged evolutionary demands in transitioning from the ocean to land. Then extinction events almost wiped out quadrupedal locomotion. When life was re-established again, it ushered in the Mammalian Age. Our quick primate cousins were cognitively agile in adapting to complex environments of their origin. Hominins have made their arboreal departure complete evolving a more upright posture to embrace a hunter-gatherer lifestyle on the savannah. In this session we will work top down, discuss our species cognitive abilities as different from our ancestors, and in celebration of evolution - what we have gained.

Objectives: Introduce various species' body plans, biomechanics and movements. Explore evolution as patterning infant movement. Augment evolution's role in human body awareness, species awareness and collective awareness. Connect and encourage imagination through participation and discussion.

Keywords

Movement, Biomechanics

If Light Could Help: The Use of Transcranial Photobiomodulation in Parkinson Disease. A Controlled Clinical Study

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Abstract

Objective: The aim of this study is to investigate whether a 4-week physiotherapeutic rehabilitation combined with transcranial photobiomodulation treatment is more effective than the only motor rehabilitation and if the improvement persists at 1-month follow-up.

Methods: We investigated 40 Parkinson disease (PD) patients, divided into two different groups: a control group that underwent physiotherapeutic rehabilitation only and the experimental one that underwent physiotherapeutic rehabilitation combined with photobiomodulation treatment. Outcome measures were UPDRS Part I, Part II and Part III. Patients were evaluated at admission, at the end of 4-week treatment and at 1 month follow up.

Results: All outcome measures improved for each group but improved significantly at the end of treatment for the experimental group not only related to motor symptoms but also to everyday struggle.

Conclusion: Our results demonstrate that the combination of photobiomodulation treatment with physiotherapeutic rehabilitation was effective in improving motor symptoms in PD patients and the improvement in balance, gait and tremor were partially maintained after 1 month.

Keywords

Parkinson's Disease, Photobiomodulation, Rehabilitation, Physiotherapy

A Case Result of Natural Compounds Intervention for Toxic Heavy Metal Detoxification

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Abstract

Objective: Presentation of a case result by utilizing natural compounds for removing toxic heavy metals from human body, safely and effectively.

Methods: A 34-year-old male patient presented for clinical evaluation and health prevention. He described his conditions as having indigestion, bloating, and occasional sleep disturbances. Patient lives in a densely crowded and polluted-urbanized city. Further investigation revealed he works in a stressful environment as marketing personnel, with most of the time outside in the field.

Patient was referred to pathological laboratory for blood testing of nutrient and toxic elements. His test report showed elevated heavy metals. He was then prescribed with food supplement named TMEC 1 & TMEC 2, which consist of natural compounds chlorella vulgaris, cilantro powder, citrus pectin, dietary fiber, selenium, and zinc to be taken twice daily on empty stomach for a period of three months.

Results: Blood test results from 3rd month follow up were presented as follows:

Toxic Elements: Toxic metals tested over normal range and results obtained:

1) Mercury: 32% reduction, 2) Lead: 26% reduction, 3) Nickel: 30% reduction, 4) Antimony: 25% reduction, 5) Tin:

95% reduction, 6) Beryllium: No change. Nutrient elements: Key nutrients obtained at the beginning and end of 3rd month: 1) Calcium: Unaffected, 2) Magnesium: Unaffected, 3) Potassium: 18% reduction, 4) Ferritin (Iron): Unaffected, 5) Selenium: Unaffected, 6) Manganese: 17% reduction, 7) Chromium: 10% increased, 8) Molybdenum: 12% reduction, 9) Copper: 19.8% increased, and 10) Zinc: 19% increased.

All nutrients elements are within healthy range at the end of third month.

Conclusions: The result obtained indicated patient's heavy metals toxicity were gradually reduced, while his essential nutrients were unaffected during the entire process. The patient also reported improvement in his well-being. This single case study suggests that toxic heavy metals can be safely and effectively excreted from human body using natural food supplements, without having to compromise on body essential minerals, which is a critical concern if using drug chelation therapy.

Keywords

Safety, Toxic heavy metal, Detoxification

The Interplay of Kinesthesia, Affectivity, and Aesthetics in the Argentine Tango Dance Experience

Robin Conrad

Independent Researcher

Abstract

Objective: Through an exploration of the social dance of Argentine Tango, this presentation examines three concepts that transpire in practice; namely, kinesthesia, or our “direct sensitivity to movement” affectivity, what motivates us to move, which includes our social environment and material objects, encompassing emotions and moods and aesthetics, conceptualized here as “the study of everything that goes into the human capacity to make and experience meaning”. A synthesis of these concepts is proposed to reveal innovative considerations in relation to cognition and movement.

Methods: This study utilized an ethnographic methodology rooted in phenomenological principles. It took place at a specific community tango center (Oxygen Tango) in the United States (Los Angeles, CA). Over a six-month period, the researcher collected field data through participation, observation, and informal and semi-structured interviews. The findings are discussed within frameworks of existing scholarship from 4E cognition.

Results: The results demonstrate how these concepts (kinesthesia, affectivity, aesthetics) are interwoven in the dancers' phenomenological experience of the social dance of Argentine Tango both within the coupled interaction and as they resonate in the broader dance space.

Conclusions: This research describes how the dancers feel into kinesthesia to feel with each other. Affectivity plays a key role shaping the interaction, as does aesthetics, which is discussed as a shared creative sensitivity that undergirds the dance's improvisational unfolding. These implications are grounded in and expand upon existing scholarship on human interaction.

Keywords

Dance, Kinesthesia, Affectivity, Aesthetics, 4E cognition

Movement Practices as Thought Experiments: Can Creative Dance Work Help Us Think Through 4e Cognition?

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Abstract

The project develops a series of movement experiments based on the idea of philosophical thought experiments but put into practice through creative contemporary dance contexts. The aim is to observe thinking in movement and see how dance can not only illustrate and help understanding in depth, but indeed embody some of the major questions relating to 4E cognition through particularly designed tasks.

Throughout a series of studio practices, the project developed three different experiments-in-movement which allow for observation and questioning in relation to embodied, extended, enactive, and embedded cognition. Tasks include:

A situation in which a dancer is allowed a notebook while creating a solo and at the beginning of rehearsal/setting period; another dancer is allowed a notebook in the process of creation but not in the rehearsal process; and another dancer is not allowed a notebook at any point. A fourth dancer is allowed to use a notebook in response to a task, but not to move or watch any movement in the process, then they have to present the solo in movement directly.

A situation in which the dancer is limited as to what parts of the body can move in responding to a particular task.

A series of set and improvisational tasks in which dancers are asked to solve problems together (sometimes given the same set of rules, sometimes different sets) but they are not allowed to talk or gesture in order to communicate.

The presentation aims to demonstrate different situated, social, distributed, embodied, extended, and enactive cognitive processes in the practice of dance, allowing for deep reflection. Since tasks are danced, the embodiment aspect of cognition should be clear, but the extent to which dance can demonstrate movement-as-thinking is illustrated through the examples and scenarios.

Keywords

Thought experiment, Movement, Dance, 4E cognition

Bekoakt (Motional Exercises for Cognitive Activation): A Research and Application Project

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Abstract

Objective: The connection of motional exercises and cognitive capacity has been frequently explored in the last years. However, there are hardly any reliable findings for the setting “High Schools”. That is why this study examined the influence of a short, neurologically oriented exercise unit during the classroom on the executive cognitive functions such as concentration or perceptual abilities in adolescents.

Methods: Due to this question, a concept of motoric exercises based on neuroscientific research results has been developed in this study. These exercises have demonstrably a positive impact on the working memory. These have been implemented at high schools in Bavaria in the days when no physical education was on the timetable. In a pre-post-design the corresponding parameter were measured by using the d2-R-concentration test and the number connection test (ZVT) at the beginning, after six weeks and at the end of the 12-week intervention term. At the post-test, an additional measurement took place each one and two hours after the carried exercises.

Results: 1) The growth rate of the intervention group compared to the control group was recognizable but not

significant, 2) The intervention group quickly achieved a higher degree of concentration compared to the control group and 3) These high results were clearly present in the intervention group one and two hours after the exercises, too.

Conclusion: Future research will have to investigate the efficiency of certain neurologically orientated exercises even stronger to make validated and reliable statements about the effect on the executive abilities in the setting of High Schools.

Keywords

Coordination, School, Ability to concentrate, Perception

Alzheimer Communities in Se Europe - The New Vision

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Abstract

Background: Due to demographic changes in SE Europe ageing has accelerated in pace. Until 2030, the percentage of older adults will be 30% of the total population. That is twice as big as the average world percentage and almost twice more than 2010. At the same time life expectancy will be 78 years and it is 17 years more than 1991. Until 2030 SE Europe will lose 15% of the population due to migration and deaths.

Method: The research will compare organisation and opportunities for life of people living with dementia (PwD) versus possibilities by the system in regard to recommendations by the WHO (Global strategy on Ageing and Health 2016-2020.). We shall compare current level of services and offers versus needs of PwD that will be satisfied through self-sustainable system, the system that will be functional for the time of emergency conditions, on base of non-pharmacological approach and in accordance with needs of elderly.

Results: Today the systems does not provide the essential services in accordance with principles of good health, well-being for PwD and do not reduce inequalities with other groups. The new housing solution present opportunities for PwD, deliver person centred integrated care as well as long-term care and offer solutions that the current systems cannot.

Conclusion: Considered new housing system offer new hope for PwD in accordance with the recommendations of the WHO. The solution will be implemented for the first time in Sarajevo as a pilot project that will help decision makers and politicians make decisions.

Keywords

Dementia, Newhousingolutions

2Balance: Cognitive-Motor Dual-Tasking in Persons with Vestibular Dysfunction

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Abstract

Objective: Aside from primary vestibular symptoms such as vertigo and dizziness, persons with vestibular dysfunction frequently complain of problems in the motor and cognitive domain. These symptoms have mainly been assessed in single task setting, which might not be representative of activities of daily living. Therefore, the 2BALANCE dual-task protocol was developed. This protocol assesses cognitive and motor performance in general and cognitive-motor interference in specific. The 2BALANCE protocol and its feasibility in persons with vestibular hypofunction will be presented. Additionally, the preliminary results of a pilot study in persons with bilateral vestibulopathy will be briefly discussed.

Methods: The 2BALANCE protocol consists of the simultaneous performance of several motor and cognitive tasks. Two motor tasks were included. The static motor task consists of balancing on a foam pad (AirEx) on the GymPlate force platform (Techno Concepts) and the dynamic motor task consists of walking at a self-selected speed on the GAITRite Walkway. Both motor tasks were performed in combination with five different cognitive tasks; the backward digit recall test, the mental rotation task, the coding task, the Corsi block, and the Stroop task. These cognitive tasks assess different cognitive domains which are suspected to be impaired in persons with vestibular dysfunction such as visuospatial cognition, processing speed, working memory, and response inhibition.

Discussion and Conclusions: The 2BALANCE project aims to elucidate the impact of vestibular dysfunction on cognitive and motor performance in single as well as dual-task setting. This protocol represents everyday situations better than single task protocols, as dual-tasking is often encountered during daily activities such as talking on the phone while walking. Ultimately, this project could enable individualised and holistic clinical care in these patients.

Keywords

Vestibular impairment, Dual-task, Cognition, Posture, Gait

2Balance: Test-Retest Reliability of a Cognitive-Motor Dual-Task Protocol

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Abstract

Objective: Cognitive-motor interference can be assessed using dual-tasks. Such protocols have often been implemented in populations such as persons with Parkinson's disease, Alzheimer's disease, and multiple sclerosis. Given the similar symptomatology in persons with vestibular dysfunction (i.e. balance, gait, and posture problems as well as cognitive impairment), cognitive-motor interference has been observed in this population as well. However, a standardized test protocol was missing. Therefore, the 2BALANCE protocol was developed. Before implementing this protocol in persons with vestibular dysfunction, the test-retest reliability was verified in a group of healthy young adults.

Methods: The 2BALANCE dual-task protocol comprises two different motor tasks (static and dynamic) in combination with five different cognitive tasks. The test-retest reliability of this protocol was assessed in a group of healthy adults ranging from 18 to 28 years old (n=20) with an in-between test interval of two weeks. The intraclass

correlation coefficient (ICC), standard error of measurement (SEM), and smallest detectable change (SDC) were calculated. These measures will be discussed for the single as well as dual-task condition for all cognitive and motor tasks.

Results: The dynamic motor task showed substantial reliability values in all conditions ($0.67 \leq \text{ICC} \leq 0.98$). The static motor task indicated similar results during dual-tasking ($0.50 \leq \text{ICC} \leq 0.92$) but were slightly lower in single-task condition ($-0.26 \leq \text{ICC} \leq 0.75$). All cognitive tasks, with the exception for several subcomponents of the mental rotation task, had favorable reliability results ($0.26 \leq \text{ICC} \leq 0.91$) in single and dual-task condition.

Discussion and Conclusions: The 2-balance protocol was overall consistent across trials for the cognitive and the motor tasks in single and dual-task setting. However, the mental rotation task showed lowest reliability values.

Keywords

Vestibular impairment, Dual-task, Cognition, Posture, Gait, Test-retest reliability

The Impact of Virtual Reality Training on Movement and Cognition

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Abstract

Objective: To demonstrate the effectiveness of using Video Games (3D and Virtual Reality) to increase brain function in individuals with neurological deficiencies such as strokes and those participating in cognitive rehabilitation.

Methods: Playing video games has become a very popular form of entertainment. Virtual Reality has emerged as a new approach to treatment in stroke rehabilitation. Virtual Reality has been shown to reduce the perception of pain. The use of different frequencies has been shown time and time again to induce a parasympathetic state. This is beneficial for a range of disease processes from chronic pain, traumatic brain injuries, to decreasing the effects of involuntary movements and neurodegeneration.

Can a video game designed with specific frequencies of light and sound have a targeted effect on functions like balance, coordination, and cognition? We know that certain frequencies of light and sound produce different therapeutic effects on the nervous system, and we know that video games can produce positive change in brain function. Combining video games with virtual hands, 3D images, light and sound therapy specific to certain conditions such as improving balance, coordination, cognition, and movement is what this method will discuss.

Results: There is research that shows many positive effects Virtual Reality training has on different areas in the brain. It has been shown to activate areas in the brain that deal with executive and visual-spatial abilities, speech, attention, and memory skill. In some studies, therapists have manipulated the image onscreen to make the patient's limb appear to be moving more accurately than it was in real life. Doing this increased the patient's confidence to use their affected limb more. The usage of 3D video games has also been shown to activate areas related to attention, executive function, and memory. In addition to this, gaming has been found to increase gray matter in the hippocampus.

Conclusion: Playing video games has a widespread effect on the brain and creates neuroplastic change in different areas. Virtual Reality can be used to enhance the effects of conventional therapies, promote longer therapy time and optimize results.

Keywords

Functional neurology, Digital therapy, Movement, Video games

Dancer-Music Communication Processes and Narration in Classical Ballet Variations

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Abstract

Objective: This work aims at building a multi-perspective theory of how dancers interact with music in classical ballet variations in view of communicating a dance-music narrative. The objective is to use this theory in the future empirical analysis of ballet dances.

Methods: The method combines video observation with a literature study. In particular, we observed several dance rehearsals' videos from the Royal Ballet and New York City ballet companies available at YouTube. In addition, we observed various live recorded video (and motion capture with infrared cameras) males and females' solo dances from Don Quixote, Sleeping Beauty, The Nutcracker and Swan Lake. These videos were analysed from several theoretical perspectives, including communication models, relevance theory, information processing theory, embodiment theory and predictive coding theory. The goal was to find out how sensorimotor synchronisation and the dance-music narrative can be understood within a common framework.

Results: The results suggest that dancer-music communication is embedded within a complex dynamic system in which the interplay between various processing layers and mechanisms is decisive. Nevertheless, several layers can be distinguished, ranging from sensorimotor interaction and prediction, basic gestures from action repertoires, codified gestures refined by cultural development to the sequential order of gestures and the narrative, involving expression arcs that bind these components to tension and release of tension over larger time scales, including affective and emotional layers. Dancers integrated these narratives with music and theatrical elements in front of the audience and created a new narrative that differs from every single component. This study's outcome is a conceptual model that includes the primary factors and processes in dancer-music communication.

Conclusion: We intended to gain insight into the dancers' communication with music in classical ballet variations. Our findings have resulted in a multi-perspective conceptual framework that can be linked to several methodological approaches such as motion capture and movement-music synchronization analysis. We thereby contribute to the theory of chore musicology, and we support dancers in understanding and thus fine-tuning their interactions with music.

Keywords

Dance; Music, Communication, Movement narration, Classical ballet

Prevention of Communication Problems in Healthy Older Adults: A Scoping Review

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Abstract

Objective: The ability to communicate verbally is essential for social participation and independence well into old age. The aim of this review was to give an overview about the available evidence regarding interventions which have the potential to prevent communication problems in healthy elderly.

Methods: A scoping review of literature published between 2010 and 2021 was conducted. Four electronic databases (PubMed, Cochrane Library, Academic Search Elite, Science Direct) were searched for studies addressing the maintenance of communication abilities of healthy older adults above 65 years. To identify additional articles relevant journals and reference lists were searched by hand. The synthesis of the findings was achieved using a descriptive narrative approach.

Results: The results showed that a variety of methodological approaches have been used to identify interventions

that help maintain communication skills into old age. Complex influencing factors, little long-term research, and the heterogeneous research situation make it difficult to draw conclusions. It is nevertheless assumed that healthy older adults and those around them can adapt to age-specific changes. The results provide evidence that preventive measures can optimize the health, well-being and competence of older people and contribute to increased effectiveness of communication and lifelong maintenance of verbal communication abilities.

Five categories of possible interventions and activities to advance communicative skills among seniors were identified: (1) direct and indirect interventions targeting linguistic and cognitive abilities; (2) cognitively stimulating activities; (3) management of age-related physiological changes; (4) technological aids; and (5) support from the environment.

Conclusion: The results indicate that the development of communication disorders is not only dependent on age, but that, on the one hand, modifiable risk factors can be identified, and, on the other hand, training supports the maintenance of cognitive and linguistic performance. Preventive measures can help to maintain the ability to communicate effectively for as long as possible and to increase the compensatory ability of the human brain.

Keywords

Healthy aging, Older adults, Verbal communication, Prevention, Maintenance

The Shape of Space: The Ways we Shape and are Being Shaped by the Space in which we Move

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Abstract

Objective: The conception of space as a locality in which changes take place can be helpful. However, we must not look at the locality simply as an empty room, separated from movement, nor at movement as an occasional happening only, for movement is a continuous flux within the locality itself, this being the fundamental aspect of space. Space is a hidden feature of movement and movement is a visible aspect of space (Rudolf Laban).

We constantly move throughout our life. Our movement takes place in 'Space' and at the same time our movement reveals the forms and patterns of that space.

In Laban Bartenieff Movement Analysis (LBMA), the movement component of 'Space' refers to what is being called the General Space in which we move and the Personal Space (Kinesphere) which contains parameters such as direction, level, size and pathway of our movement. In general, Space is considered the 'cognitive' aspect of movement. But 'Space' "speaks to us" in more ways. It is the matrix where our relationships with the world outside of our-selves 'take-place'; it is Where we experience our-self; it is the volume that contains the whole of 'me'. In our use of space, we express our being through movement patterns that 'shape' the space around us, and in return – we are being 'shaped' by these same patterns of spatial use. Our use of space reflects significant aspects of our life and creates them at the same time.

In this workshop we will explore meanings embedded in Spatial aspects of our movement and the effect these have on our ways of thinking, feeling, and relating. We will look at what is called in LBMA "Space in the Body and the Body in the Space" and how embodiment of these can reveal our relationships to and with objects, people, and ideas.

Keywords

Cognition, Space, Movement, Body, Relationships

Movement in Dysphasic Children and Children with Normal Speech and Language Development

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Abstract

Objective: To examine the links between movement and speech development, by testing the ability to maintain balance (AMB) in dysphasic children and children with normal speech and language development.

Methods: The research instrument was a set of five standardized tests for the assessment of AMB that have been applied to a sample of 40 children aged 5 to 6 years, divided into two groups. Experimental (E) group consisted of 20 children diagnosed with developmental dysphasia (DD) who are undergoing treatment at the Institute for Experimental Phonetics and Speech Pathology in Belgrade, and the control group (C) consisted of 20 children with normal speech and language development (NSLD) from kindergarten "Roe" in Belgrade.

Results: The obtained results indicated that children with NSLD have significantly better AMB in relation to children with DD in all examined tasks: without visual control, in a standing position, during walking in a straight line, during standing on one leg, as well as in a precision of touching fingertip ($t = 3,03$ and $p < 0.01$; $t = 4,31$ and $p < 0.01$; $t = 3,24$ and $p < 0.01$; $t = 4,69$ and $p < 0.01$; $t = 4,62$ and $p < 0.01$ respectively). Balance skills in different tasks that are more developed in children with NSLD are also more developed in children with DD, i.e., balance reactions, that are the least expressed in children with DD are also the least expressed in children with NSLD ($R_o = +0.875$).

Conclusion: The AMB is significantly better developed in children with NSLD compared to children with DD at the age of 5 to 6 years. In children with NSLD, there is more homogeneity regarding proper balance functioning, while in children with DD, greater individual differences in development of balance performance are presented. The development of balance skills in dysphasic children follows the development pattern of the same balance reactions in children with NSLD, even though the AMB of children with dysphasia is in significant developmental delay. The study results open the discussion about the necessity of introducing a new approach to the treatment of children with DD, which involves stimulating exercise program for improving balance skills, movement, and motor planning. Therapy aimed to improve the AMB could also result in improved language development.

Keywords

Movement, Speech and language, Development, Dysphasia, Child

Words and Movement Connected in the Brain: Electrophysiological Evidence for Conceptual and Motoric Neural Coupling

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Abstract

Objective: Several studies have charted reciprocal links between movement and action words. However, few studies have examined the neurophysiological bases of this phenomenon, and none has done in tasks that do not force attention to mean. Measuring event-related potentials (ERPs) during a lexical decision task, we explored whether the coupling of hand movements with processing of manual action verbs (MaVs) modulates two key markers of conceptual and motoric processes: N400 and motor-related cortical potentials (MRCPs).

Methods: Nineteen subjects performed a lexical decision task involving MaVs (e.g., *grasp*), non-manual action verbs (nMaVs, e.g., *walk*), non-action verbs (nAVs, e.g. *desire*), and pseudoverbs (e.g., *grisp*). Subjects had to press a key to indicate whether each stimulus was a real word or not. High-density electroencephalographic signals were recorded during the task on a 128-channels Biosemi device. ERPs were observed in a 1.5-second window around stimulus presentation and response execution, over canonical centro-posterior electrodes for N400 and frontal electrodes for MRCPs. Accuracy and reaction times were compared among categories through repeated measures ANOVAs and Tukey tests for post-hoc analyses. Permutation tests were performed to detect differential ERP modulations across real-word categories.

Results: No significant behavioral differences were observed among real-word categories. However, relative to both nMaVs and nAVs, MaVs involved reduced ($p < .05$) N400 amplitude over a time window between ~380 and ~440 ms. Also, MaVs elicited greater ($p < .05$) modulations than nMaVs (from ~250 to ~84 ms before response onset) and nAVs (from ~250 before to 70 ms after response execution).

Conclusion: Our findings extend current models of motor-language coupling by revealing the electrophysiological foundations of its conceptual and motoric stages. The detection of these dynamics during lexical decision suggests that the phenomenon occurs even under implicit processing conditions (i.e., in the absence of explicit semantic processing). Moreover, we showed that such a coupling involves both fine-grained effector specific dynamics (MaVs vs. nMaVs) as well as coarse-grained effects motor-resonance effects (MaVs vs. nAVs). Finally, by detecting when both ERPs yield overlapping effector-specific effects, we shed light on possible timespan in which both semantic and motoric processes reach maximal convergence during motor-language coupling.

Keywords

Embodied cognition, motor-language coupling, N400, motor-related cortical potentials

“They Created it!” Theatre and Embodiment Practices Supporting Science Learning in Urban Schools

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Abstract

Objectives: 1) Explore how dramatizing with whole-body movement affords science learning in urban schools educating predominantly children of color and from various ethnolinguistic heritages. 2) Investigate how embodiment

supports students' engagement with science by leveraging their funds of knowledge.

Methods: An interdisciplinary team of school- and university- based educators and researchers in Chicago formed Project STAGE (Science Theater Advancing Generative Engagement). One sixth-grade lesson is analyzed in this case study. During the lesson, class members (students, teachers, and teaching artists) collaborated to create a scene for a larger play, enacting a science-story about Flint, Michigan's water crisis that resulted in citywide unsafe drinking water. In this lesson, students revised their movements to construct and represent their understandings of the chemical processes taking place inside the lead pipes. We analyzed class members' words and movements using open coding techniques in Atlas.ti to capture how embodiment practices supported students' science learning.

Results: The students developed the science-story by iteratively (a) moving and narrating scientific processes in their roles in which they portrayed chemical elements and compounds in the pipes, and (b) reflecting on the embodied science to revise their movement choices. As children embodied flowing water, corrosive chlorine, flaking scale, and leaching lead, the enactment revealed gaps in the science-story that students had to fill by clarifying ideas amongst themselves and teachers. As they moved, narrated, and discussed these concepts, their movements became better aligned with science ideas, crystalizing their scientific thinking and storytelling for an audience. The specific theatre embodiment practices we uncovered included: adaptation, developing role playing exercises; perspective-taking, imagining and moving in ways that may support audience understanding; whole-body action, amplifying gestures through postural support, and moving into and through space to reveal the main action; science action/process, investigating science processes through actions to form and communicate new understandings; revision and rehearsal; and changing scale between molecular and macroscopic levels.

Conclusion: Embodied practices build on children's strengths, such as imagination, questioning, and joyful movement, widening participation and engagement in science particularly for students whose racial, ethnic, and linguistic heritages have been historically minoritized in science.

Keywords

Embodiment practices, Science learning, Theatre, Movement, Embodied cognition

Neuroactivation and Special Practices for Elderly: Champion Age Intervention

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Abstract

Objective: Champion Age maintains the promptness of mind and body through the execution of patterns of exercises targeted to the case, even with severe situation. It constitutes an intensive professional practice for adults in general but above all it is very useful for elderly with the aim to increase their general level of cognitive-motor fitness improving their quality of life: memory, attention and self-esteem.

The most important aims are: Acceleration of starting an action, reaction time, fluid and motor coordination, space – time organization, procedural memory and balance.

Methods: Participants will be introduced to Champion Age with practical exercises, in particular the training will be supported by music and materials (different sizes of balls, circles) in a progressive cognitive-motor activation and videos. The presenters will assume the role of a modeling showing the training and sharing all materials with the participants.

Results: During the workshop the participants will achieve knowledge of Champion Age, how to apply and what material and music could be used during the training.

Keywords

Cognitive fitness, Dance and rotator patterns, Fluency, Balance, Cerebellar function

A Case Study of Baby's Movements to Music and Interaction with Musical Toy Robot

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Abstract

Objective: Research of musical development of babies is often focused on the development of singing ability, leaving out the analysis of movements as an intentional reaction to music (attempts to dance). Accordingly to the baby's overall bodily development, gaining voluntary control over the movements of limbs and moving around independently precedes the ability to control the voice. We could therefore look the first signs of musical development in the form of movements and emphasize this field of research more. Motherese/parenthese, a special mode of talking and singing to babies is emphasized as a beneficial development support mechanism. Studies have shown that similarly to preference to the infant-directed speech mode, infants also prefer special mode in visual cues (motionese) that include sharper changes in trajectory, large sweeping motions, repetitions etc.

Methods: This is a qualitative observational case study of one baby's development of dance moves and interaction with a musical toy robot, from the age of 9 to 24 months. Home videos from interaction/dancing sessions with the robot were carefully analysed and discussed within the framework of developmental theories of musical abilities.

Results: Baby's willingness to dance was motivated by the presence of the interactive toy robot. Observation revealed the variety of dance moves in a very young age and attempts to imitate robot's movements and synchronise with them.

Conclusions: Interactive musical toy robots can have a beneficial effect on child's musical development as they provide repetitive, safe and critique free space. Human-like features of the toy robot (happy face, arms and legs) catch babies' attention and allow them to interact with the toy similarly to a real dance partner. Robot's clumsy moves fit the concept of motionese and support the child's development.

Keywords

Case study, Musical development, Dance, Interaction, Toys

The Relationship of Capoeira Classes with and without a Specifically Anti-Racist, Social Justice-Focused Curriculum to Students' Empathy Over the Course of a Semester

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Abstract

Capoeira involves components of exercise, acrobatics, dance, playing music, and singing, as well as moving in harmony and synchrony with a partner while responding to nonverbal social cues. Particularly interesting for both individual and interpersonal wellbeing, preliminary research suggests its broad value for psychological health.

Objective: This study investigated whether participating in a semester of capoeira with a specifically antiracist, social justice-focused curriculum corresponded with higher affective and cognitive empathy scores postsemester than participating in a semester of capoeira with curriculum focused primarily on its physical movements and the history of its institutionalization.

Methods: University students (n=205) in the area of Rio de Janeiro, Brazil completed standardized empathy questionnaires pre- and post-semester within the experimental condition (n = 60), control condition (n = 83), and a mixed condition comprised of half a semester of the control condition followed by half a semester of the experimental condition (n = 62). Pre-post changes were analyzed and compared for the intervention, mixed and control conditions using mixed design ANOVAs.

Results: Although there was no evidence of a significant interaction of timepoint (pre-post) and condition (intervention, mixed, and control) in overall empathy, $F(2,186) = 1.850$, $P = .160$, nor for affective empathy, $F(2,186) = 1.949$, $P = .145$, there was a significant interaction of timepoint and condition for cognitive empathy, $F(2,186) = 3.075$, $P = .049$. Specifically, while there was no difference between participants' cognitive empathy scores at the presemester timepoint, intervention participants scored significantly higher than did control participants postsemester ($P = .037$).

Conclusion: While acknowledging limitations, particularly fieldwork challenges in Brazil due to environmental and political factors amidst university closures, these results suggest that — in a particularly divisive year for Brazil on both social and political fronts — antiracist, culturally sensitive, and social justice-oriented education on top of standard coursework could have a preservative effect on cognitive empathy. Empathic benefits of similar interventions should continue to be investigated in capoeira settings, but more broadly, could be of interest in classroom instruction at the university level, and within broader communities.

Keywords

Capoeira, Empathy, Trainings, Anti-racism, Leadership

Age Effects on Visual Cue Processing, Orientation Behavior, and Navigation Performance in Urban Environments

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Abstract

Objective: Healthy aging induces perceptual, motor, and cognitive disturbances, leading to changes in everyday behavior. A primary age-affected cognitive faculty is spatial navigation, a multisensory capacity underlying autonomy and mobility, and a strong determinant of the quality of life. A key issue raised by the population “graying” concerns the characterization of age-related perceptual and behavioral changes during real-world navigation. This work studies how age affects visual cue processing, navigation performance, and their interactions in urban environments.

Methods: Spatial behavior of young and older participants was tested in two behavioral studies. The first study was conducted in a controlled laboratory setting simulating a city street (Bécu et al. 2020, *Nat Hum Behav* 1(4):88-89), and the second in a real-world train station (Gare de Lyon, Paris). The participants, equipped with sensors to record spatial, oculomotor, and postural behavior, had to navigate to either a hidden goal (study 1) or a specific railway platform (study 2). Navigation was assessed using standard metrics (e.g., path length, trajectory optimality, and walking speed), while fixated visual cues were extracted from gaze dynamics, using eye and head recordings. Deep convolutional neural networks (CNN) were used to model vision-based navigation behavior. A CNN was trained to distinguish between the behavior of the two age groups, using emulated visual input of the navigators, obtained from either their 3D Avatar model (study 1) or the eye-tracker world camera (study 2). By analyzing visuomotor sequences and receptive fields of trained CNN units, we studied how postural and visual cues determined behavioral performance during wayfinding.

Results and Conclusions: We found that CNN units tuned to older participants preferentially targeted large-scale structural properties of the environment (i.e., straight lines such as wall corners and floor-wall intersections), whereas those tuned to younger participants mainly targeted landmarks. These differences in spatial cue preferences explained the consequent use of suboptimal navigation strategies in older participants as compared to young ones. Postural constraints in the real environment affected the behavior in older, but not younger, participants. Combining

multivariate tracking techniques and deep learning provides valuable insights into behavioural Changes in different age groups during ecological navigation.

Keywords

Spatial navigation, Aging, Real-world conditions, Deep learning, Human avatar

A Neurodiversity Approach to Family-Centred Tele-Dance Movement Psychotherapy with Children with Autism: A Pilot Study

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Abstract

Objective: Exploring the effects of a neurodiversity approach on the communication and relationship between parents and children with autism in family-centred tele-Dance Movement Psychotherapy.

Methods: Five families with children with autism were recruited from a Special Educational Needs school in London. During lockdown, they took part in six sessions of Dance Movement Psychotherapy (DMP). These were held online, screen-to-screen, due to the lockdown during the COVID-19 pandemic. The sessions were delivered by the researcher, a registered dance movement psychotherapist. Before and after the intervention, the parents were interviewed. Parents who dropped out of therapy were also interviewed after they ceased therapy to better understand their reasons for doing so. These interview transcripts were assessed using Thematic Analysis. Alongside this, video-recorded sessions of therapy were analysed using Laban Movement Analysis. This arts-based data was used to better understand the qualitative data.

Results: Although there were issues arising from tele-DMP, the family-centred interventions yielded a range of benefits for the participants who completed the programme, including improved non-verbal communication through movement and sound between the parents and children. Closer relationships were also reported.

Conclusion: The positive outcomes for parent, child, and the parent-child dyads highlight the usefulness of applying a neurodiversity approach in family-centred Dance Movement Psychotherapy with children with autism. There may be advantages to carrying out this intervention in person, rather than online.

Keywords

Autism, Dance movement therapy, Family, Neurodiversity, Telehealth

Visual Scanning During Street Crossing in Hemianopia: Preliminary Results

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Abstract

Objective: Street crossing is a vital component of walking to a destination, yet people with homonymous hemianopia (HH) experience considerable difficulties when performing this task. To overcome these difficulties, people with HH can use effective scanning behaviour that compensates for their visual field defect. However, what is the most

effective scanning behaviour during street crossing for people is still unknown. Here, we conducted a preliminary study on scanning behaviour and safety of street crossing in people with HH. The outcomes will be used for a future study into effective scanning behaviour in people with HH during street crossing.

Methods: Two people with HH, four people with normal vision (NV) and three people with simulated hemianopia (SH) participated in the experiment. Scanning behaviour was tested in a virtual environment and recorded by means of eye- and head-trackers. The scanning parameters that we determined were saccadic amplitude, fixations per minute, number of head movements per minute, and number of gaze shifts per minute. The safety of street crossing was defined by time to collision at the end of crossing. In addition, the time to start crossing was calculated.

Results: There was a difference in safety of street crossing between groups. The time to start crossing was larger in people with HH (25.6s) compared to NV (18.5s) and SH (17.7s). Moreover, the time-to-collision by the end of crossing in people with HH (3.0s) was almost twice as long as NV (1.6s) and SH (1.6s). The scanning parameters also differed between the three groups. People with HH and SH made more fixations per minute (HH: 70.0; SH: 72.0, NV: 60.4) and gaze shifts per minute (HH: 79.3; SH: 68.3; NV: 41.9), but shorter saccades (HH: 1.6°; SH: 1.5°; NV: 2.5°) and less head movements per minute (HH: 12.9; SH: 15.1; NV: 29.3) than people with NV.

Conclusions: People with HH seem to wait longer before crossing, presumably because they are very careful when crossing a street. They also explore the environment more with their eyes but make fewer head movements to shift between scanning the right and left side of the street.

Keywords

Visual rehabilitation, Scanning behaviour, Hemianopia, Street crossing, Virtual reality

Sensitive Pen: An Inertial Measurement Unit Based Digital Pen for the Measurement of Graphomotor Gesture

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Abstract

Objective: Handwriting is a perceptual-motor task, one of the most complex in the human motor repertoire. It is an essential skill to acquire for the personal and professional development of an individual. Handwriting tends to be studied only by quantifying the product (the written trace). Our work aims to quantify and analyze the process, i.e., the graphomotor gesture. However, there is a lack of tools to measure this process. Hence, the objective of this work is to describe Sensitive Pen. It is a multi-functional and non-invasive digital pen for the measurement of the graphomotor gesture. This digital pen aims to be used easily and without any other equipment, outside the lab, in the individuals' ecological environment.

Methods: We created an Inertial Measurement Unit (IMU) based digital pen. The IMU allows us to measure the inclination of the pen and kinematics parameters. We are also working on the development of pressure measurements: the pressure of the tip of the pen and the pressure and location of the fingers on the body of the pen.

Results: We validated the inclination of the pen measurement by comparing its performance with a drawing tablet (Wacom) and some external measurements (videotaping). Then, we used our tool with several case-of-study experiments: children, adults, and elderly people.

Conclusions: the digital pen provides new measurements possibilities with a state-of-the art accuracy. To our knowledge, such a tool was not existing in the literature. The Sensitive Pen will provide researchers and clinicians to have a better understanding of handwriting gesture, allowing for example, earlier and better diagnosis for dysgraphia.

Keywords

Handwriting, Graphomotor gesture, Motion sensors, Initial Measurement Unit

An Individualized Intervention, Based on The Feldenkrais Method, for Multiple Sclerosis Symptoms: The Neuroplasticity Scale Assessment

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Abstract

Objective: Although numerous multiple sclerosis (MS) patients display decreased motor performance and cognitive deficits of varying severity, little is known about rehabilitative methods and assessment strategies that are based on the brain's ability to learn through motor-cognitive patterns. Methods, such as the Expanded Disability Status Scale (EDSS) and the Berg Balance Scale (BBS), are commonly used for the evaluation of MS symptoms, but also in studies pertaining to the Feldenkrais Method (FM) and motor-cognitive rehabilitation following neurological insult. However, these methods offer limited possibilities of unraveling new information on individual motor-cognitive experiencing and the capacity to change this through brain learning. Therefore, we set out to design an effective and easy-to-use tool, in order to be able to simultaneously assess multiple parameters in MS patients: a new, inductive rehabilitation methodology, based on FM movement protocols.

Methods: The proposed tool, which we call Neuroplasticity Scale (NS), was devised in order to enable both practitioners and patients to assess the changes in sensory-motor and cognitive processes during action. Here, our assessment was performed during a six-week period on a single MS patient with severe instability and spasticity, who was carefully selected as a proof-of-concept case study. Our methodology included NS evaluation both before and after the intervention, as well as home training. Home training was guided by auditory cues for perception, movement patterns, spatial orientation, movement timing, changes of attention and daily life functionality, and was recorded during execution, in order to help identify any missing cognitive links and guide subsequent practice.

Results: We found that, with our methodology, our case study patient was prompted to actively engage in the process and, consequently, showed significant balance improvement and reduction of spasticity.

Conclusions: The NS is a novel tool for evaluating multiple parameters that define the current clinical image of an MS patient and may therefore be used to establish a structured rehabilitative intervention and a home training programme based on an individual's specific functional needs. It is a useful clinical –and potentially research– tool, which, upon further testing in terms of reliability and reproducibility, can also be used to formulate improved individualized questionnaires for MS patients.

Keywords

Multiple sclerosis, Feldenkrais method, Motor-cognitive intervention, Neuroplasticity, Rehabilitation

Motor Learning in Young Adults with Down Syndrome

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Abstract

Objective: Individuals with Down syndrome (DS) have impaired general motor skills compared to typically developed individuals (TD). Knowledge about how young adults with DS learn and retain new motor skills could improve the lives of this population.

Methods: A group of young adults with DS (mean age = 23.4 ± 3 years, $N = 12$) and a group of age-matched TD adults (mean age 22.8 ± 1.8 , $N = 14$), were recruited. The participants were exposed to a computer-based dynamic visuomotor accuracy tracking task (VATT), previously used in our lab. Participants were instructed track visual targets by applying pinch force to a scissor handle with their dominant hand. Performance was assessed as percent

time on target (TOT), in both a random and a sequenced task at baseline, immediate retention and 7-day retention. Participants practiced the task for 10.5 minutes in seven blocks between baseline and immediate retention. A linear mixed model was used to investigate differences between the groups.

Results: Both groups improved their performance on the VATT from baseline to immediate and 7-day retention in the sequenced and random task (all $P < 0.001$). The TD-group spent ~30% more time on targets than the DS-group on all blocks (all $P < 0.001$). Both groups maintained their performance between immediate retention and 7-day retention on the random blocks ($P > 0.05$). On the sequenced blocks, the DS-group maintained their performance, while the TD-groups' performance decreased by -6.1% TOT ($P < 0.001$). This led to a between-group difference in the relative change in performance from immediate to 7-day retention in the sequenced task as a -5.7% TOT between the TD and the DS group ($P = 0.03$).

Conclusion: Absolute performance of young adults with DS on a novel visuomotor task is reduced compared to an age-matched control group. However, the relative improvements in performance between the groups from baseline to retention tests was equal, indicating identical learning rates. A difference was observed in the relative change in performance from immediate to 7-day retention. This could point to differences between the groups, either during the online learning of the motor sequence or during offline consolidation of the task.

Keywords

Down syndrome, Motor learning

Spatial Embodiment of Time and Emotion During a Movement Along the Sagittal Axis

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Abstract

Objective: Several authors used push button responses to evidence the spatial embodiment of time or emotional valence along either the sagittal or frontal axes. However, none of these studies used hand movements along a given axis of response. Therefore, we tested if hand movements would be facilitated or impaired in response to verbs either congruent or incongruent with respect to the spatial metaphor of abstract concepts.

Methods: Thirty-five participants were instructed to indicate either the tense (past or future) or the emotional valence (positive or negative) of verbs using a hand movement (about 15 cm) toward a response button. This button was located along either the frontal or sagittal axis, depending on group. Each participant performed two blocks of trials: 80 trials for which the movement was congruent with the spatial metaphor of concepts (rightward/forward: future or positive; leftward/backward: past or negative), and 80 incongruent trials (rightward/forward: past or negative; leftward/backward: future or positive). As a consequence, half of the stimuli were compatible with the Stimulus-Response (S-R) mapping, namely future-positive and past-negative verbs, whereas the other half corresponded to an incompatible S-R mapping (i.e., future-negative and past-positive verbs). In order to control for the fact that leftward/rightward or forward/backward movements may be asymmetric, in a preliminary control participants performed each possible movement in response to an arrow. We then subtracted these times to the reaction times in response to the verbs in order to compute a processing time (PT).

Result: We conducted a RM-ANOVA on PTs with Spatial Metaphor mapping and S-R compatibility as within-subject factors, and Axis of response as between-subjects. Both Axis of response groups showed a S-R compatibility effect. However, the spatial embodiment of concepts was evidenced only in the sagittal axis group, when the S-R mapping was compatible ($M_{\text{congruent}} = 386$ ms ; $M_{\text{incongruent}} = 556$ ms), $p = 0.049$, $d = 0.54$, $BF_{10} = 2.08 > BF_{01} = 0.48$.

Conclusion: The present study provides evidence of an influence on hand movement of abstract concepts such as time and emotional valence.

Keywords

Time, Emotional valence, Embodiment cognition, Spatial metaphor, Stimulus-response compatibility effect

The Shape of Self: The Ways, We Shape Ourselves and are Being Shaped by the Space, we Move in

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Abstract

Objective: Movement is the life of space ... Empty space does not exist. On the contrary, space is a superabundance of simultaneous movements ... there is neither space without movement nor movement without space...Movement is, so to speak, living architecture – living in the sense of changing emplacements as well as changing cohesion (Rudolf Laban).

We constantly move and are being moved throughout our life. Our movements take place in 'space'. In fact, 'space', both the space within the body and that which is outside it, is the 'matrix' where our lives – actions, emotions, thoughts, relationships – are being embodied and realized. It is the 'Where' in which one experiences oneself and it is the locale where our self meets other selves.

Our individual use of space emerges through developmental movement stages and reflects movement preferences which have been shaped by primal reflexes, initial movement patterns, later movement experiences and personal history, as well as cultural, social, religious and personal beliefs and norms. Parts of our-selves are being embodied, experienced and expressed through individual patterns of using what Rudolf Laban called 'general' and 'personal' space.

As we move, we do that in a shared, general space, a physical entity that has universal features and parameters such as size and volume. In LBMS (Laban Bartenieff Movement System) we look at spatial patterns that have distinct harmonic characteristics and carry meaning for both the mover and the observer. Moving through these patterns shapes the body, mind and soul.

In this workshop we will explore meanings embedded in individual and group spatial patterns and the effect these have on ways of thinking, feeling, and relating. We will examine how embodiment of these patterns informs our understanding of relationships to, and with, objects, people and ideas, and how changes of spatial patterns create new possibilities of being and making sense of the world.

Keywords

Cognition, Space, Movement, Body, Relationships

Imagine! Imagined Movement and Moving to Imagine

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Abstract

Notwithstanding an astonishing assortment of scientific findings enhancing our understanding of the human body, we still know significantly little about the brain in general, and of consciousness in particular. Besides much debate over what constitutes a conscious mind, we are only now struggling with how our brains generate conscious awareness. The goal of this address is to attempt to identify a variety of neural signatures that can effectively indicate

the presence of consciousness that could allow us to differentiate conscious and unconscious patients suffering from brain injuries in cases where individuals are unable to communicate. In the process of doing so, we have examined mental imagery of movement in patients in persistent vegetative and minimally conscious states.

While we do not know how it is that brain electrical activity is associated with consciousness, we are aware of the differences between conscious and unconscious brains. What we do know is that there exist consistent changes in the electroencephalographic output associated with various states of consciousness with attentive states having higher frequencies and lower amplitudes than progressively fewer conscious states. We also know that the brain-activity patterns in comatose and vegetative state individual's brains differ from those of the healthy individuals. Healthy, conscious brains demonstrate "rich and diversely connected networks," that are not found in the brain of comatose and vegetative state individuals.

The address will review what we know about the electrophysiology of consciousness and its disorders, the nature of inter-regional communication and the effects on the brain of the mental imagery of movement and its effect on both the motor system, cognition, and conscious awareness in individuals in persistent vegetative and minimally conscious states.

We will reference individuals who, despite being diagnosed as minimally conscious, with no capacity to perform voluntary physical movements in response to commands, when instructed to imagine performing a physical activity, such as playing tennis or kicking a football, the area of the brain responsible for controlling movement, becomes active. The minimally conscious patients demonstrate signs of hidden awareness have significantly well-preserved movement networks similar to those healthy adults. In addition, motor action words produce network motor system activations in language consistent for the individual as compared to arm or face related words.

The new findings could help us identify patients who have some awareness, as well as improve their clinical assessment.

Keywords

Movement, Imagery, Consciousness, Development

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