First International Conference

**DDCMC 2019**
Dance Data,
Cognition
and Multimodal Communication

September 19-21
Universidade Nova de Lisboa

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# DDCMC'19 Book of Abstracts

## Universidade Nova de Lisboa, Sept. 19–21, 2019

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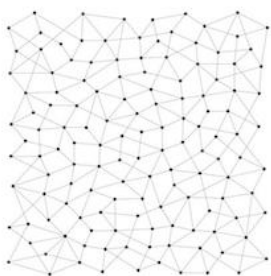
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The International Conference on Dance Data, Cognition and Multimodal Communication aims to provide an interdisciplinary forum (including Humanities, Information Technologies, and Cognitive Science) for those creating and handling data from Performing Arts (with a focus on contemporary dance) interested in issues of multimodality and cognition in human communication and in human-computer interaction: particularly regarding documentation, video annotation tools, collaborative platforms for cultural heritage preservation, and scientific analyses of dance data, such as human behaviour and agency in different types of communication and their cognitive, cultural, narrative, technological, social, textual, or discourse functions.

# Plenary sessions

## Dance Expertise, Memory and the Body in the Brain

### Bettina BLÄSING

Technical University Dortmund

Multidisciplinary research combining theoretical and empirical evidence with knowledge acquired through practice in the performing arts has a high potential to broaden our knowledge and provide new insights into cognitive processes underlying the control, learning and perception of actions. Studies in dance expertise can teach us how cognition works under challenging real-world conditions in individuals with exceptional skills, and to what extent and by what means the performance of the human neurocognitive system is enhanced and modified through specific training. Dancers' skills are based on a multitude of cognitive functions, in particular memory processes that support the learning, adaptation, modification, (re-)creation and improvisation of complex movement material. Embodied memories are closely tied to autobiographical history and constitutive for the sense of a consistent self, and thereby for creative processes in the arts. Dancers often claim to think with the body, and think of the body as an ubiquitous tool for cognitive processing, while cognitive scientists differentiate between the physical body and its representations on different neurocognitive levels. Findings from neurophysiological research support the idea of multiple bodies in the brain, indicating that different brain areas contribute to the perception of one consistent body as basis for an integrated bodily self. Multimodal body representations reflect the properties and functionalities of the physical body, body parts and sensory systems. Dancers (as well as artists and athletes) with special bodily or sensorimotor conditions can therefore be considered experts in their own rights whose individual constraints might yield exceptional solutions to given problems in motor action, social interaction and communication. Including their experiences and perspectives into the research in the field might help to push the limits of our understanding of the adaptive capacity of the human neurocognitive system.

# The embodied neuroaesthetics of dance

## Emily CROSS

University of Glasgow

Perceiving others in action, whether in everyday contexts, such as seeing a commuter run to catch a train, or in highly refined artistic settings, such as watching a skilled dancer perform on stage, evokes automatic affective responses in an observer. The extent to which an observer's prior experience with an observed action shapes his or her affective evaluation remains poorly understood. Better understanding of this relationship is essential for advancing knowledge about aesthetic appraisals of performance art, but also how we perceive and interact with others in a social world more broadly. In this talk, I discuss research that attempts to construct a more complete understanding of the impact of experience on action perception, affective responses, and aesthetic judgements. My team studies the execution and observation of complex, whole-body dance movements, using complementary behavioural and brain-based approaches, such as training interventions, functional neuroimaging and physiological measures of implicit affective responses. Overall, the results of work suggest that experience with a particular movement affects explicit and implicit affective judgments of that movement, as well as significantly modifies brain circuits engaged during action perception.

# Augmented Seeing and Sensing

## Angus FORBES

University of California, Santa Cruz

The first half of this talk presents an overview of hybrid art-science methodologies that incorporate the activities of creative and technical practitioners. Interdisciplinary approaches integrate methods from multiple research communities and must mediate between the goals and practices of disparate disciplines. When successful, this creates opportunities to more effectively contextualize results for a wider range of audiences, and facilitates the generation of entirely new avenues of research. New sensing and surveillance technology enables ever more granular quantifications of human behavior, and provides insight into various aspects of human experience, bridging the social, emotional, kinesthetic, neurological, and biological. The second half of this talk explores contemporary techniques to access, analyze, and augment data, and introduces recent visualization and machine learning projects from the Creative Coding Lab at University of California, Santa Cruz that emphasize expressivity and critical perspectives.

# Oral session

## Schema, frame, metonymy and metaphor in ballet performances

### Olga BLANCO-CARRIÓN

Universidad de Córdoba

This paper aims at describing some of the factors involved in the meaning construal process that takes place in conversation scenes in ballet performances. In them, the speaker's resources (e.g. articulators, motion qualities) to achieve the joint attention of her addressee towards an entity (present or not in the scene), a relationship between entities or a state of affairs will be described. The description of these conversation scenes will be complemented with a brief description of the onset of the dancing scene following them to describe the aspects of meaning kept on stage and profiled in this closure. The genre has a code of its own, i.e. ballet pantomime, which interacts with embodied gestures in the meaning construal process. The analysis of the data will account for this interaction. Embodied gestures are emphasized in this genre as all communication is devoid of speech, which facilitates their identification and analysis. Firstly, the data will be organized to provide a description of schemas evoked by the gestures in terms of their degree of schematization, and classify them into force gestalts (Talmy 1988), image schemas (Johnson 1987) or mimetic schemas (Zlatev 2005). Then, the role of the frame (Fillmore 1982) in the construction of meaning is analysed. For this, the source action (Mittelberg 2014, 2018) representing a salient conceptual entity of a domain to access a domain pragmatically linked with it (metonymy), or (ii) comprehended from/perspectivized by it will be described. Then, the conceptual projection(s) between both domains will be analyzed. Finally, I will provide a description and characterization of the metonymies found (Barcelona 2011, 2018). Aspects such as the hierarchical level, the degrees of prototypicality and conventionality (at the conceptual level/ at the conceptual and constructional level), meaning (prototypical/non-prototypical), function (motivational, referential, inferential), metonymic triggers and their nature (e.g. co-textual, discursive, both), metonymic chaining and patterns of interaction with metaphor (e.g. metonymic motivation of a metaphor or co-occurrence) will be described.

# Dance Scoring and en-action as creative tool for dance documentation

## Bertha BERMUDEZ

Amsterdam University

"There is always a score, in all artistic practices and in all contexts where art is exhibited/performed." (Birringer 2013, p. 8.)

Dance survives through the practice of dance, where movements and words interrelate, passing through to other generations the embodied knowledge collected while dancing. The body creates, performs and safeguards dance through the dance in itself. But in some cases the practice of dance falls within the established practice of knowledge production, where reading and writing are the bases to acquire, produce, maintain and preserve it. In these cases, dance translates its practice into written documents as notations, scores, manuscripts or glossaries in order to create, transmit and document the dance. Such practice follows further the dichotomy of the oral versus the written, the embodied versus the rational and the literate versus the illiterate and, as Taylor proposes, positions dance within the "written = memory/knowledge equation" (Taylor, 2014, p.24).

Dance documents navigate on the edge of the conventional and the subversive, proposing documents that as result re-enact and bring the body back into action after the rationalisation and writing down off dance. Within such documents, the recording of the dance aims for the further dancing of the dance, not the observation of the document as an object of study. Dance scores, belong to such documents. They propose concrete tasks and instructions, through words and drawings, to a reader/performer with the intention of enacting a dance/performance.

When thinking about the dance archives' function and the ways of interacting, we could envisage the use of scores as an interactive path through the archives' documents. This idea proposes creation versus collection. The archive collects documents, but documents can be created especially for the archive. Such documents need to allow embodiment, transmission and performance, as an active manner of safeguarding and inscribing dance for future generations.

Creating scores as documentation tools, mingles creativity with knowledge. Proposing a new function to the archive that of becoming performative. This presentation will be making use of three different case studies based upon traditional dances from Venezuela, the Chimbanguele, Mongolia, the Bi-biyilgee, and Spain, work from choreographer José Lainez. Aiming to expose the potential of scoring as a documentation tool, I wish to presented this paper in an active way, through an interactive installation based upon scores, and CoMo, a web based application for mobile phones developed by IRCAM within their RAPD-MIX European project.

# How cultural influences predict the movement repertoire and movement improvisation – A qualitative movement analysis of German and Japanese student-athletes

## Christian BÜNING

German Sport University

Introduction: Learning processes (e.g., learning complex movement pattern) take place in social contexts, which are always culturally situated (Nasir, Rosebery, Warren, & Lee, 2014). In particular, several studies point to cultural differences between East and West (Dubina & Ramos, 2016; Sawyer, 2012) including considerations of the underlying cultural understanding (e.g., individualism or collectivism). The current study investigated how cultural roots influence the movement repertoire in standardized movement sequences as well as creative processes in movement improvisations. This approach is necessary since recent studies highlight the human body as an essential resource for these cultural situated learning processes (Abrahamson & Lindgren, 2014; Cappuccio, 2015; Kontra, Goldin-Meadow, & Beilock, 2012). Furthermore, movement execution was analyzed during several movement improvisations regarding the movement repertoire (movement spectrum) and movement creativity, elaborating on the concept of creativity as "fluid thought" in analogy to fluid movement execution (Slepian & Ambady, 2012).

Methods: 120 student-athletes (n=60 Japanese; n=60 German) were video recorded while performing a 10-minute two-part movement test (BAST©, Lausberg, 1998), which comprises standardized tasks and improvisation tasks. The participants' movement performance was analyzed independently by two certified raters using the video annotation software ELAN (Slöetjes, 2013). Movement data were matched in terms of age, BMI and dance experience. Results: A complete linkage cluster analysis revealed three clusters which are distinguishing the groups solely based on various aspects of the movement execution qualities. Cluster 1 comprised of Japanese student-athletes only, with mostly stationary, isolated and bound movements. These movement combinations representing a highly controlled movement behavior. Cluster 2 was formed out of Japanese and German, and Cluster 3 was comprised of German student-athletes with movements of maximum strength and accelerated movement execution. Indicating two mostly opposite movement approaches in student-athletes between Cluster 1 and 3.

Discussion: The findings were discussed in the perspective of cultural differences between individualistic and collectivistic cultures and in regards to the underlying manifestations of each movement cluster. Furthermore, implications which enable enhanced learning outcomes in different cultural settings were derived from the movement data as well as the challenges in working with groups of individualistic or collectivistic backgrounds were discussed.

Conclusion: Cultural background significantly predicts differences in movement behavior between Japanese and German student-athletes. The observed movement behaviors provide information that is highly relevant for pedagogical interventions as well as intercultural dance and sport-related collaborations.

# Terpsicore – dance and performing arts database

## Catarina CANELAS, Ana Luísa Valdeira, Daniel Tércio

INET-md, Faculdade de Motricidade Humana

Terpsicore, named after the Greek dance muse, is designed as a stable archive, but in a permanent moving state, in the exact extent of its openness to journalism, essayism and contemporary creation fields. In fact, this database, both in physical and digital form, is shaped as a collection of primary sources, such as dance pieces programs, reviews, flyers, newspaper clippings, iconography and video samples. As a work in progress, this archive provides about 2000 items from dance researchers' personal archives and from systematic research in public entities such as the Portuguese National Library or the Newspaper Library. Most of the documents can be downloaded in a free access website (http://weebox.fmh.ulisboa.pt). We also established partnerships with several dance companies and cultural institutions that are including their own documents in our database, namely Eira, Balleteatro, Companhia de Dança de Almada, Dançando com a Diferença and Cinemateca Portuguesa - Museu do Cinema.

The field of Dance studies involves the challenge of an emerging thinking by the performative body and the feasibility and accountability of the thinking about the body acting. The dance criticism lies in this fold: between an emerging thought of the act (which includes the scenic body presence and the movement) and a thought that befalls over the act (which includes the essays analysis developed on the reception side).

The second issue to highlight shall be the limits of interpretation in the Sontag's terms. Terpsicore shall participate then in the "recovering of our senses": "we must learn to see more, to hear more, to feel more." In this sense, Terpsicore readdresses to the artistic community, questions about the processes of the performative practices' documentation, on the relationship between critical and artistic discourses, and on the very ethics of the criticism practice. Concepts such as living-archive and dialogical-research will be stressed as well as the critics' responsibility.

There are a few Portuguese dance archives available online with a thematic scope such as Portuguese folk dance (ex: Dança Portuguesa a Gostar dela Própria) and Portuguese contemporary dance (ex: TKB). Differently, Terpsicore covers a larger scope, including any dance form from the 20th century onwards, performed in Portugal by Portuguese and foreign choreographers and dancers, and performed abroad by Portuguese choreographers and dancers. Our approach emerges from each specific document related to dance and performance, analysing and describing them under the same template. We use an archival management software based on Dublin Core, a set of controlled vocabulary terms that describe physical and digital resources. Nevertheless, we slightly modified it to better accommodate the particular nature of the dance and performance documents.

Our purpose is to preserve and value the cultural heritage related to dance pieces and performances. We also intend to establish this heritage as an important source for artistic research in order to reach a larger audience, including dance students, researchers, performers, and creators. We want to create connections between academic and artistic points of view, both on a practical and theoretical level.

# Reduction of gesticulation and information patterning strategies in acted speech

## Giorgina CANTALINI[1], Massimo Moneglia[2]

[1]Civica Scuola di Teatro Paolo Grassi; [2]Università di Firenze

The research focuses on the relationship between gesticulation (Kendon 1980; McNeill 2005) and speech, through the comparison between spontaneous speech (in which the ideational process is synchronous with the locutionary one) and acted speech (in which the locutionary process is focused just on the performance). The study relies on the adoption of akin theoretical frameworks: L-AcT (Cresti 2000; Moneglia & Raso 2014) for speech, and Kita et al. (1998) for movements. Our aim is to better define the linguistic correlation between speech and gesture structures and to highlight cognitive implications, emerging from differences eventually resulting in the two varieties. Following L-AcT the verbal stream results composed by two-level units, hierarchically related and prosodically recognizable: Information units (with regards of Chafe 1970), which segment the flow of thought in constituents, and Reference units (Cresti & Moneglia 2005), which structure constituents at a higher level. Information unit and Reference unit express two different aspects of communication: the informative one, given by the Information Structure, and the illocutionary force, given by the performance of the Speech Acts, as a result of two different cognitive patterns: the semantic program (Chafe) and the language action program (Cresti). On the other hand gesticulation shows a linear structure that can be segmented into units aligned at some level with those of the verbal stream (Kendon 1972, 1980) and that can be analysed at three hierarchical levels: Gesture Units, Gesture Phrases and Gesture Phases, which comprise the identification of Strokes or Holds. Similar to L-AcT is the configurational model based on a compulsory root (the Expressive Phase made by at least one Stroke) with optional Gesture Phases eventually collocated before and after it. The adopted methodology correlates gestural units and prosodic units on the basis of a dataset made by two Italian collections of video-recorded sessions:

- three samples of spontaneous interviews to male actors, comparable from a thematic point of view;
- three performances of the same monologue (taken from the Pirandello's play 'Il giuoco delle parti') by the same actors (plus a fourth one).

The annotation of gestures is based on LASG (Bressem et al. 2013). Furthermore prosodic units have been annotated with respect to their Information function, as well as strokes to their semiotic dimension (metaphoric, iconic, etc) (McNeill 2005). Gesture and prosodic layers have been annotated independently the one from the other and then reconciled in ELAN files. The comparison shows strong differences between spontaneous and acted communication:

- at the level of gesture / prosody synchronization;
- regarding the ongoingness of the gestural flow;
- concerning the functionality of the segmentation in both modalities.

We have evidence of a reduction of the Information Structure level in the acted speech, substituted by a segmentation into independent illocutionary activity, and of a parallel strategy of gestural flow reduction, in which Gesture Units tend to coincide with Gesture Phrases and frequent extended rest positions emerge. On the semantic ground we noticed a significant reduction of the metaphoric types.

# WhoLoDance: Whole Body Interaction Learning for Dance Education: Blending Engine and Annotation Tool

## Rosa CISNEROS, Karen Wood, Sarah Whatley

Centre for Dance Research, Coventry University

The Centre for Dance Research, Coventry University, were partners in a large EU-funded H2020 project: WhoLoDance: Whole Body Interaction Learning for Dance Education which involved technology experts, dance scholars and dance professionals drawn from different research centres and dance companies across Europe. The main aim of the project was to build a motion capture repository of dance motions drawn from four different dance genres (contemporary dance, ballet, Flamenco and Greek folk dance) built in a method allowing for similarity search among different compositions, and we experimented with building an immersive and responsive life-size volumetric display for the dancer to dance with, or 'step inside' another body. The aim was for the dancer to have the chance to experiment with different modalities of feedback (audio, visual, audio-visual, verbal, etc.) and also with different avatars, to ask whether this provides interesting opportunities to design adaptive and personalized paths to learning and for dance making.

This presentation will demonstrate two proof-of-concept tools, the Annotation tool and the Segmentation tool, that have emerged from the WhoLoDance project and have been presented to different groups – students, artists and choreographers. The feedback received shows that these tools are useful for enriching the learning and creative process and offer an opportunity to deepen engagement with technique and performance requirements. We will share insights from the research process and outcomes of the evaluation.

Some key questions guided our explorations and they were: How do dancers respond to virtual and immersive environments that feedback information to the dancer about movement 'accuracy' and 'feeling states' as well as the metaphoric imagery that is the source for their dancing? Does inhabiting a virtual avatar/projection space /holographic projection, elicit for the dancer a particular experience of being 'in' the body, the dancer's own body and the body of another? And if so, how might that provide new ways to learn and practice movement, perceive movement from the outside and inside simultaneously, and open up new questions about embodiment?

# What makes dancers extraordinary?
# Insights from a cognitive science perspective

Carla FERNANDES, Vito Evola, Joanna Skubisz

Blackbox, FCSH- Universidade Nova de Lisboa

This paper argues that dancers are ordinary people who, in order to achieve their artistic goals, have developed extraordinary socio-cognitive strategies and communicative skills, which are both exploited in and motivated by their social contexts and performative practices. Their local context offers limitations and affordances for certain communication strategies and cognitive tools to be used, unused, or maximized. To support this claim, we offer dance data from a contemporary dance improvisation and from contemporary ballet rehearsals. We describe results of three studies analyzing multimodal behavioral and interactional data (gaze, speech, vocalizations, touch, gestures) and contrast them with what typically occurs in analogous situations outside of dance: the first study, focusing on the role of dancers' bodies in social cognition for the coordinated collaboration of a group improvisation performance; the second, on how dancers use their bodies as distributed cognition to memorize and rehearse a choreographed solo piece; and the third, on how choreographer-dancer interactions rely on multichannel verbal and nonverbal communication and behavior.

Our first study compares and contrasts behavioral data of an expert group of performers with non-performers sufficiently trained for the task of a speech-absent contemporary dance improvisation exercise. Our results indicate that in "performance mode" expert performers do not revert to common socio-cognitive strategies used in everyday social interactions (i.e. frequent gaze shifts, mutual gaze, communication-focused body movements), exerting more control over their bodies to avoid conveying ambiguous semiotic cues to their co-performers, thus exploiting properties of common communicative strategies for novel usage.

Our second study investigates data of dancers' practice of "marking". We identify which kinematic aspects get reduced when dancers gesture to recall their choreographies, and what motivates the inclusion and exclusion of these parameters in their marking (e.g. affordance, conventionality, imagistic and iconic properties). Our data indicates that the more formally conventional the dance move is, the more reduced it becomes in the marking, as opposed to more unconventional dance steps, which require added information encoded in their gestural forms. We argue that the extraordinary feat of memorizing and rehearsing complex dance movements is offloaded in part via distributed cognition by means of iconic gesture reduction and conventionality.

Our third study examines a choreographer's instructions communicated via vocalization and touch to dancers during rehearsals, analyzing the iconic information about the body and movement qualities. Co-demonstrated and syntactically embedded vocalizations informed dancers about shape, size, and spatio-temporal movement qualities, whereas touch served to express emotions, grab, and mold the dancer's body. Although uncommon in everyday-life situations, vocalizations and touch are regularly integrated into language in the context of dance practice when transmitting specific information about performance.

Dancers and performers perform ordinary socio-cognitive tasks, pervasive in everyday life (social interaction, collaboration, decision-making, attention, representation), when executing their craft; nonetheless their behavior in context indicates an extra-ordinary usage of the expected strategies described by cognitive science. This paper contributes to the literature on expertise studies and highlights the key roles of sociological practice and habitus during the construction of meaning in dance and performing arts.

# Unpeeling meaning: Analogy and metaphor analysis methodologies for Modern and Post-Modern dance

## Vicky FISHER

Max Planck Institute for Psycholinguistics, Radboud University

Dance as an art form is rich in metaphorical representation (Katan, 2016), yet there is no well-established framework for identification and analysis of metaphors in dance, which, in some forms, is built around the exploration of meaning through movement. Understanding how metaphors work in performance oriented dance has value beyond artistic appreciation in that it can help us to unravel the role of embodiment in how we think.

The connection between concrete bodily experiences and metaphor is subject to extensive ongoing investigation, growing in part out of Lakoff and Johnson's Conceptual Metaphor Theory (Lakoff & Johnson, 2003 (1980)). CMT proposes that metaphors arise from the human capacity to explore and communicate ideas through the body. As babies, we learn about the world around us through our interactions with it; we see, hear, taste, smell and both touch and physically manipulate our environment. We move and are moved by it. This principle is at the root of grounded and embodied cognition (Barsalou, 2008; Brunel, Vallet, Riou, Rey, & Rémy, 2015; Jung & Sparenberg, 2012; Kimmel, 2013) but although bodily experience is seen to be fundamental to these fields, dance has been largely ignored as a tool or subject for research.

This talk presents a framework for analysis of metaphors in dance that is based on existing theories and practices within metaphor research across diverse modalities including the primarily non-linguistic realm of visual images (El Refaie, 2003; Forceville & Urios-Aparisi, 2009). The framework is shaped primarily by Cienki's Metaphor Identification Guidelines – Gesture (Cienki, 2017), which incorporates ideas such as iconicity and modes of representation (Müller, 1998, 2014). This is integrated with analogy structure mapping (Gentner, 1983) and expanded to reflect dance specific features, such as performative presentation (informed by Trujillo, Simanova, Bekkering, & Ozyurek, 2018), and the potential for multi-layered meaning and metaphor.

To investigate the utility of the proposed framework, it is applied to 'A most contagious dance' – an online educational and choreographic resource from Shobana Jeyasingh Dance (Ayuso, n.d.) - using ELAN. This data-set includes isolated units of dance vocabulary and choreographed sequencing, informed by themes of war and disease. The analysis reveals a range of characteristics of metaphor use in dance, including the coexistence of various levels of meaning and the roles of both iconicity and context. Suggestions will be made for the potential of this approach for research into embodied cognition.

# "I see something, and I like it": unveiling a choreographer's decision-making process using quantitative and qualitative methods

Ana Rita FONSECA, Rodrigo Abril-de-Abreu, Carla Fernandes

Blackbox, FCSH- Universidade Nova de Lisboa

Dance-making is a multi-layered phenomenon that involves the interaction between cultural, social, technological and biological forces. From the perspective of the brain, creating a dance piece is a complex cognitive task: generating new movement phrases, remembering sequences of movement phrases, choosing between movement phrases that are to be improved or not. Nevertheless, very few studies have characterized the process of dance-making from this perspective and most of them have focused solely on the metaphors or aesthetics conveyed.

Our study proposes to see the process of creating a dance piece as a decision-making problem. Here, the choreographer is a decision-maker that observes movements generated by the dancer and chooses to see a repetition of the same movement or to see other movements. This approach allowed us to develop a quantitative methodology to characterize the choice patterns of the choreographer throughout her creative process. More specifically, we video recorded the creation of a dance piece by the choreographer Sylvia Rijmer (Portugal) while working individually with four dancers. We hand-scored each movement phrase elicited by each dancer, according to its order of introduction into the creative process. Subsequently, we characterized the choice patterns of the choreographer, finding evidence that there was a preference to spend more time working in sequences of movement phrases than working in repetitions, across the four dancers. Nevertheless, we found that certain movements phrases were way more repeated than all the others. Additionally, we analysed the behavior of the choreographer during this process, and we classified it into three main behaviours: demonstration (when enacting a specific movement phrase in the field view of the dancer); complete simulation (when mirroring the movement phrase that the dancer was doing but not in the field view of the dancer); and incomplete simulation (when making a stereotyped body movement with the upper body part and the head while observing the dancer).

From these findings, we generated questions for an interview, together with selected video clip excerpts from the dance composition process, with the aim of confronting the choreographer with our analysis. Firstly, we wanted to understand to what extent the choreographer was consciously aware of the structure of her own creation process, her decision-making and the function/influence of her own behaviors into the decision-making process. Secondly, whether new insights could be generated from the confrontation between subjective self-report and third-party quantitative observation of the process.

Our study shows that decision-making processes in the performing arts can be revealed by using quantitative methodologies. These can potentially be generalized to other choreographic styles, leading to a better understanding of these artistic practices. Moreover, it also opens the window into the possibility that the experience of the choreographer can be framed by quantitative analysis on a case-study basis, leveraging the understanding of the dance-making process that can be so particular and specific. We believe that our study creates a shared ground for discussion and future collaboration between cognition scientists, social scientists and artists.

# Dance | Data | Storytelling

## Stephan JÜRGENS

Blackbox, FCSH- Universidade Nova de Lisboa; Madeira Interactive Technologies Institute (M-ITI)

The starting point for this paper is a critical review of existing notions of what constitutes contemporary dance in the twenty-first century, and subsequently what aspects of artistic creation and production might fall under which type of "dance data" categories.

Drawing on three long term case studies realised in the framework of the BlackBox Arts & Cognition Project, the author discusses how the individual choreographer's artistic ideas and compositional strategies provide a rich source for collaborative development of a unique and custom-tailored research design to inquire the work of each artist. Amongst the research methods employed by the BlackBox team, media-practice-as-research approaches have proven to be particularly useful in both the exploration of the respective dance data during the research process in each case study, and in developing information visualisation strategies for the dissemination of the research outcomes.

The three BlackBox case studies have been designed and carried out in collaboration with João Fiadeiro and Atelier Re.al, João Penalva and Rui Lopes Graça with the National Ballet Company of Portugal, and with Sylvia Rijmer. Each research project has resulted in the creation of unique media productions, aiming at providing embodied and corresponding forms of access to the artists' creative universes. For the first case study on João Fiadeiro, an infographic approach to visualising aspects of his Composition in Real Time method led to the production of four animated films, which re-create his choreographic studio digitally. The second case study on Penalva and Lopes Graça's ballet Fifteen Dancers and Changeable Tempo has been presented by means of an online 360° video platform, which allows the user to explore and experience two key scenes of the work in a virtual rich media environment. Finally, the last case study on Sylvia Rijmer's choreographic process has led to the development of a game-inspired virtual environment in Unity 3D, where the user can navigate a series of rehearsal studios, in which the dancer's work with graphical elements from a musical score by Cornelius Cardew that can be explored interactively.

While the BlackBox research methods were consolidated early on and continuously refined during the course of the project, the media productions for each case study ventured into uncharted territory regarding artistic and scientific information visualisation of dance data. The second main section of this paper consequently discusses the key strategies in (interactive) data storytelling employed by the BlackBox team in the context of recent literature. Central to this discussion is the notion of embodied filmmaking, which best describes the continued effort to create media objects and experiences that invite the interested lay person as much as the dance professional to immerse on several sensorial planes in the creative process of the selected choreographers.

As the work presented here is situated in a very recently emerging field, the author concludes with a brief reflection upon the potential revealed through these media objects for future research from an art-and-science perspective.

# Lines of Experience: Imagined, Bodily, Perceived.

## Mike O'CONNOR[1], Alan Cienki[2]

[1]Amsterdam University of the Arts; [2]Vrije Universiteit Amsterdam

Lines appear as important dynamic data generated from the body in a variety of research fields outside of dance. Major theoretical strands of research that incorporate an aspect of line include: Image schema theory (Lakoff & Johnson-cognitive semantics), Linear movement (Sheets-Johnstone-phenomenology/anthropology), Sound Symbolism (Linguistics), Vitality Affects (Stern- developmental psychology), Affordance Theory (Gibson), Material Engagement Theory (Malafouris/Renfrew-Philosophy of mind/cognitive science). We could think of experience as a layering of lines of different modalities; lines that we imagine, lines that we make with our body, and lines that we perceive sensually. The field of Lineology, introduced by Tim Ingold (2007), proposes a way of looking at the world through lines. Ingold proposes categories of lines as 1. threads, 2. traces and 3. ghost lines. Ingold's categorization looks at how lines are made. The current project is interested in exploring where they are made, as a re-categorization through the body.

If the spatio-temporal-energetic nature of lines (Sheets-Johnstone) creates dynamics in our thoughts, in our bodily traces and in how we perceive the environment, how can movement be a method to investigate connections between fields where these dynamics resonate within a common framework across three distinct areas of our experience? As a dancer, my research investigates what movement reveals when used to approach the embodied topic of lines. I will present different dance practices that confront existing social science and humanities theories through the incorporation of movement. Practices involve translating sound to shape, movement to metaphor, sensation to drawing, and metaphor to material. Lines guide these practices as well as lines are produced from these practices. It could be said that this confrontation is non-consequential or too broad. However, within an artistic research mode, new knowledge is sought by openings. Placing different practices and fields near each other under the frame of lines and their dynamics asks the audience to actively engage in the topic and create bridges between research topics. Fuchs suggests much of our experience is ordered by the body's animacy (2018). Therefore using animate movement as a method to explore experience, and find an ontology that blurs the mind-body-environment paradigm is how an artistic mode of research can directly dialogue with contemporary philosophy of mind and neuroscience. Ultimately, gaining a better understanding of lines as forms that we create, and that, in turn, provide structure to how we think, could widen how we operate and what we consider a body as a place of research and experimentation.

# Understanding Non-Verbal Metaphor:
# A Cognitive Approach to Metaphor in Dance

## Lacey OKONSKI

University of California, Santa Cruz; Universidade Federal de Minas Gerais

Dance choreographies often use the physical movement of the dancer to communicate a variety of abstract concepts to the audience. A dancer can convey through movement sorrow, passion, struggle, and grief, all without the use of words. Conceptual Metaphor Theory asserts that embodied, physical source domains (like upward trajectories or downward trajectories) figuratively shape thought about abstract domains (like happiness and sadness). Linguistic metaphors are reflective of these underlying thought patterns. These conceptual metaphors underlying speech are the metaphors that we live by (Lakoff & Johnson, 1980). When a speaker says, "I've been down in the dumps lately" they are figuratively expressing a sense of the abstract concept sadness by using a spatially oriented description. But can we intuitively understand non-linguistic expressions of sadness in the same way when there are no linguistic elements?

Three studies, of original work, will be presented to reveal the ways in which we understand non-verbal metaphor. The first study is structured around audience interpretation. Participants viewed a highly conceptual performance. Comparisons between participants selected for their experience with movement (dance majors), their experience with verbal metaphor (literature majors) or a control group without such a specialization. This work is discussed in terms of conceptual metaphor theory and mapping dynamics.

A second study followed the director of a San Francisco Latin Dance Company, Mambo Romero, and recorded his instructions during dance rehearsal. This data is analyzed to reveal the metaphors and guidance he communicated via vocal gestures as his intonation rose and fell during different kinds of messages. The teacher's use of prosody in dance instruction was revealing. Results suggest that prosody is regularly incorporated into dance instruction as an iconic expression of various bodily movements through space. Discussion includes implications for speech communication, embodied cognition, and dance pedagogy.

A third study was conducted to explore non-verbal metaphor from the choreographer's perspective. Dance majors who participated in this experiment were asked to create 4 short choreographies based on 4 key themes that I provided to them. Choreographers were given 4 key themes that were selected due to their relevance to conceptual metaphor theory and were asked to incorporate them in their piece as much as possible. Each choreography was required to be 8 bars of music in length and to be choreographed to a song without lyrics. Choreographers were then recorded performing their own pieces to create a video corpus. Participants were subsequently interviewed using an interactive method so they could watch their dance video and play and pause while they explained how they incorporated each key theme. These three studies, taken together provide insights, not only about how we understand non-verbal metaphor, but also how we understand the world around us in dynamic and embodied ways.

# Enabling multimodal interaction: creative teaching tools for mixed-abled dance

## Susanne QUINTEN, Mia Sophia Bilitza, Bettina Bläsing

Technical University Dortmund

Mixed-abled dance provides a fascinating field of research. Dancers whose bodies, sensorimotor systems, minds and biographies are shaped by their specific bodily and neurocognitive conditions open new insights into processes of problem-solving, interaction and communication. The ways in which they communicate and solve complex tasks in everyday life and even more in dance, their creativity and competence shed new light on the adaptive capacities of the human neurocognitive system. Dancers with special bodily and cognitive conditions can be regarded as experts in their own rights: the absence or reduced functionality of a limb or of a sensory modality as well as a special cognitive condition might afford new solutions for given tasks and novel modes of interaction and communication. In mixed-abled dance, communication can be challenged, but also enriched by the fact that members might differ strongly in the way they move, act, perceive, think, feel, communicate and understand the world. In the same way, this variety of conditions can give impetus to the creative process. On an interdisciplinary level, intermodal transformations are often used to enable interaction and communication in a multimodal (non-verbal) way.

Due to these conditions, teaching heterogeneous dance groups becomes a challenge. Many guidelines, methods and tools for teaching inclusive dance classes exist (e.g. Kaufmann, 2006). Research studies show the importance of accessibility and appropriate methods (e.g. Cheesman, 2010; Whatley 2007). Thus, the modification of methods in regard to the particular requirements plays a crucial role in the teaching process. Our paper enters the debate at this point and takes its findings from an ongoing international, interdisciplinary and inclusive research project. In this project we aim to develop a toolbox of creative methods furthering social participation in cultural education while questioning, how the known cultural methods could be modified in order to be equally accessible for all people with or without disabilities. The research design combines artistic practice-based, qualitative and quantitative empirical approaches. It considers itself as a participatory research approach, where professional artists and teachers with and without disabilities are involved as researchers with equal rights and values. Starting in summer 2018, a template for the documentation of teaching tools, creative methods and their modifications in view of special bodily or cognitive conditions has been developed and methods have been successfully collected by the professional artists. These creative methods and their modifications will be explored and validated in February 2019 when we will combine artistic with qualitative research in form of interviews during a laboratory. In the final phase selected methods will be tried out with non-professionals to evaluate the capacity for social participation.

# Challenge of capturing and visualizing 3D dance data

## Cláudia RIBEIRO, Rafael Kuffner

Blackbox, FCSH- Universidade Nova de Lisboa

Current practices for documentation and preservation of contemporary dance are mostly focused on the development of an archive that in itself holds a structure that mirrors a choreographer's life work. In particular, it takes into account the best practices in photo and video digitalisation and the development of appropriate metadata standards to catalog each component of the archive material.

Recent development in 3D data capture and Virtual Reality has allowed to rethink how to approach this problem and develop novel solutions that allow to take advantage of both space and time to better express and document creative processes.

In this paper, we describe how we used motion capture and virtual reality technology to document creative processes in the context of the Blackbox research project. Specifically we will describe the work we have developed with three Portuguese choreographers throughout the period of four years. Based on the experiences, we propose a framework that interrelates data capture, data visualisation and data annotation.

Conclusions will show current limitations of the proposed framework and future directions as well as advantages and limitations of using this type of data to document creative processes in contemporary dance.

# Negotiating Deliberate Choice–Making:
# Insights from an interdisciplinary and multimodal encounter during the making of a New Contemporary Dance

## Sylvia RIJMER

Independent Researcher and Choreographer

To evaluate the ingrained habitual movement patterns of today's contemporary dance practitioners, heavily biased by their own heritage (Charmatz & Launay, 2011), is to either undisputedly accept them or to consider alternative modes and causes for corporeal practice and presentation. The need for current choreographic systems to contemplate the tension between hereditary gestures of the past and the continuing appreciation of the dancer as a subjective co-creative agent poses a necessary theoretical and practical challenge. In light of the unavoidable historicity of dance, and the highly politicised context under which dances are traditionally made and (re)presented (Charmatz & Launay, 2011), there is the need to seek new instances of singularities (as defined by Lepecki, 2016) as potentials for individuated artistic expression. This paper proposes a method addressing these concerns to make a "new" contemporary dance, which focuses on the dancers as co-negotiators of the choreographic process and which encourages deliberate choice making in the generation of personalised movements according to their own "Body Logic". The motivation for the Body Logic Method (BLM), which engages choreographers and dancers as co-creative agent in the making of such a dance, is inspired by the need to reevaluate learned movement habits commonly found in contemporary studio work. This method fosters dancers to actively and deliberately participate within an artistic practice using an approach to movement research which is cognitively grounded in focused attention. Using improvisation as a neutralising platform which highlights (self-)exploration and personal responsibility, the BLM is designed to encourage subjective creativity and idiosyncratic ipseity in the generation of novel artistic movement patterns.

This paper will describe the method and its application in a three-week Arts and Science encounter of an interdisciplinary team of researchers (neuro-cognitive scientists, computer scientists, and performance studies researchers) and a contemporary dance choreographer with three professionally trained contemporary dancers. Four improvisational and multimodal approaches were used to elicit alternative movement patterns: Dodging, Scanning, Virtual Reality (VR), and a graphic notation of a musical score. Through these experiences, dancers were cognitively and physically presented with self-inflicted choice-making possibilities to re-evaluate their own habitual movement patterns. The method inherently encourages the reevaluation of the Dancing-Thinking Body as a transformative subject/object (cfr. Louppe, 2010), which is further enticed by alternative perspectives in relation to it. In other words, the method first provides the body with a movement typology (through Dodging and Scanning), after which, the body is stimulated to experience unfamiliar, multimodal, and alternative territories for gesture and spatial performativity using VR and a graphic musical score. This exploratory and interdisciplinary research project awakened the importance of a dance process over its final performance as product. By emboldening the highly motivated and engaged dancers to find their own personal "Body Logic" by openly questioning and exploring these new improvisational tools and concepts through collaborative interdisciplinary dialogue, their cognitively enhanced embodiments (rather than copying/cloning traditional movements) brought them to re-appreciate the choice-making process within a new contemporary dance(ing).

# Recording 'Effect': A case study in technical, practical and critical perspectives on dance data creation

David RITTERSHAUS[1], Anton Koch[1], Florian Jenett[1], Scott Delahunta[2]

[1]Motion Bank, Mainz University of Applied Sciences; [2]Motion Bank, Centre for Dance Research, Coventry University

In 2018, an interdisciplinary research team carried out a unique digital recording of a choreography: The 60-minute piece "Effect" by up-and-coming Finish choreographer Taneli Törmä, a new creation of the Tanzmainz dance company of the state theatre Mainz (Germany), was recorded with a portable real-time motion capture system in the actual performance space, shot in one take and with all five dancers simultaneously. Although the recording of the choreography was already planned before its creation, the choreography was an autonomous artistic work, not specially developed for the recording or adapted to the technical possibilities of the capturing apparatus. In addition to the recording with 12 video cameras from which the motion capture system calculates the skeleton data of the dancers, stereoscopic 3D images, four channel sound and conventional multi-camera video documentation were captured. The overall project sought to not only ensure a single-take motion capture recording of the one hour choreography, but to also yield an almost complete documentation of the six-week process of creating the choreography.

This process documentation was carried out by a dance scholar in collaboration with the dance company. It involved recording video and making annotations in parallel ('live annotations') to the rehearsals in the dance studio supported by a specialized software, and supplementing ('post-annotation') these through interviews with the choreographer and dancers. The final motion capture recording of the finished choreography was also fully annotated, drawing on the insights and vocabularies developed during the six week process documentation. Together, these recordings (annotated video from the process documentation and annotated video and motion capture of the realised performance) result in a rich dance data set of unprecedented scope and dimension that is openly available for researchers, artists and other interested parties. It combines qualitative and quantitative perspectives, responding to the challenge "[...] to make digital renderings of dance data accessible and intelligible." (Karreman, 2017, p. 83). This paper will report and reflect on the technical realisation of the project and the collected data, as well as the implications and possibilities for the study of the dance piece. It will consider the divide between the numerical complexity of motion capture data and the need for visual representation of this data to be read and understood by human agents and how this remediation relies on cultural-historical paradigms (Karreman, 2017). In addition, the role of annotation as part of the data will be assessed with regard to the potential for supporting the development of an analytic eye and deepening understanding of the dance, as well as supporting the creation of meaningful visual representations of the data (Stancliffe, 2018). Nonformalized text annotations are also considered as a possibility to prevent the numeric recordings of dancing bodies from being locked in an "asignifying semiotic apparatus" that can only produce "operational sense" and surrenders them to "economic accumulation" (Lazzarato, 2014) which aims at the quantification and calculability of all facets of being.

# Dance Like an Observer is Watching:
# Exploring the Relationship Between Visual Attention
# and Affect Recognition from Complex Whole–Body Movements

## Rebecca SMITH, Emily Cross, Frank Pollick

University of Glasgow

Until we develop a clear understanding of how affective information is conveyed through whole-body movements our appreciation of human social-signalling will remain incomplete. As dance involves the performance of abstract whole-body movements designed to induce an emotional state in the observer, it is an ideal tool for exploring how the human body in motion can transmit affective-valence information. Research shows that dancers demonstrate superior accuracy in recognising emotion from the body (Christensen et al., 2016) and that dancers' expertise-driven visual-fixation patterns differ from non-experts (Stevens et al., 2010). These outcomes may be related but this has never been empirically tested. Our 3-year project aims to bridge this gap by exploring how dance experience influences visual attention and emotion recognition abilities when observing human movement, and to investigate how different body-regions communicate expressed emotionality to an observer.

A pilot study examined the relationship between emotion recognition and visual fixation patterns in 3 groups: professional dancers, amateur dancers, and non-dancer controls. Participants watched a series of 5-6s whole-body dance movement sequences and completed an affective-valence decision task while eye-movement data was collected; for fixation on four body-regions of interest (head, arms, torso, legs). Expert dancer participants were significantly more accurate in identifying movements with a positive affective valence compared to the non-dancer group. However, eye-movement results did indicate that group-specific visual-fixation patterns contribute to this difference. The pilot also examined the relationship between perceived affect and different quantitative features of movement. Movement profiles for each stimulus item (comprising of velocity, directness, heaviness and fluidity scores from Laban Movement Analysis) were explored in relation to the participants' perceived valence ratings. It was found that faster, stronger, and more direct movements evoked perceptions of positive affective-valence.

Methodological issues may have constrained this pilot study. It is likely that the short movement clips did not provide enough data for group-difference in visual-fixation to emerge. Additionally, as the video clips were recorded in authentic performance settings, a number of visual confounds (costumes, backdrops) may have detracted visual attention from the body movements. To ensure affective-decisions are based on characteristics of motion, the next stage of our project involves the creation of a new Point-Light Display movement library. A professional ballerina will choreograph a series of 12s movement sequences that contain neutral choreography (i.e. no movements known to be indicative of/related to a particular emotional state or narrative). These sequences will then be performed in five different contexts, with each performance aiming to induce different feelings within an observer (sad, happy, neutral, angry, fearful). Later, these movement clips will then be categorised by dance-naïve subjects into specific emotion categories; to validate the movement library and explore whether the intended emotion portrayal is perceived by naïve observers. Results for this project will be available in June 2019. Following the creation and validation of this affective movement library, these movement clips will be used in a replication of the pilot study. It is hoped that updates to the pilot project will yield clearer results, particularly for the eye-movement data.

# R&D into the Use of Motion Capture Suit Technologies in Devising and Producing Contemporary Dance Performance

## Daniel STRUTT

Goldsmiths, University of London

In July 2018 our group of collaborators presented a live digital-dance performance in Malta for Valetta European Capital of Culture. Throughout a three-year creation process we used the new Rokoko Smartsuit Pro motion capture system in an embedded way throughout the development of the piece from concept through to final delivery.

This R&D process sought to understand the potential impact of real-time, camera-less and wireless motion capture technology on the way contemporary dance works could be devised and produced, to enhance both the expressive possibilities of digital dance, and to experiment with the potential of this new digital technology as a creative tool. The project brought together choreographer Mavin Khoo, ZfinMalta Dance Ensemble, London digital visual artists Prickimage and Studio Aszyk, and students from Goldsmiths and UCL, in order to better understand the new modes of collaboration and creation brought about by these new forms of real-time, camera-less and wireless motion capture interaction.

This project was contextualised by my own research in the area of philosophy of technology, where I am specifically interested in the potential of the new generation of accessible and affordable motion capture systems in generating new and emergent feelings of embodiment, kinaesthetic synaesthesia, and proprioceptive awareness in both real and virtual spaces. Through the use of mo-cap data the essential gestural motion of the body can be altered and extended into pure qualities of movement expressed in virtualised forms on screens or in immersive VR and AR, and this has aesthetic significance for both choreographic practice and for audiences.

The makers of the Rokoko Smartsuit have created a motion capture system as an unobtrusive black bodysuit that functions without a camera or studio, such that movement data can be captured in any indoor or outdoor location, and even within the performance. Due to its inherent flexibility when compared to existing methods of motion capture, this technology has the capacity to transform the way digital dance is devised, produced and performed. However, new use cases featuring the technology are critical to the generation of the knowledge and expertise required for the technology's future integration into contemporary dance practice.

Many see this hardware primarily as efficient tool for the documentation, cataloguing and archiving of generic dance movement for use in pedagogical applications. However, we use the tech to capture dance movement in a way that pertains to more aesthetic, phenomenological, empathetic, and even therapeutic realms of engagement and practice – using the mo-cap data in the Unity game-engine to generate abstracted non-corporeal images. Since these processes can be achieved in real-time interactive scenarios with live performance, we have been working towards producing real-time generative content within a performance, with reactive gestural control of a digital avatar.

I this talk I have an opportunity to present our collaborative process as a case study of use of the new technology in an experimental performance context, but also to bring this experience together with some more philosophical insights about its meaning and potentials within a dance context.

# Digital-born artworks and interactive experience: documentation and archiving

## Paula VARANDA

Middlesex University; Instituto de História da Arte, Universidade Nova de Lisboa

On the course of intensive research since 2009 a corpus of artworks that instantiate dance performance in cyberspace have been identified and analyzed in order to understand how expert-practitioners used new technologies for production as well as the new means of public dissemination that they enabled. This meant focusing on 'data-based' movement and its composition in order to articulate the artworks in their a-priori technological structure and aesthetic form (i.e., before they initiate audience transactions) and in their interactive modes of becoming 'live'.

In depth examination of creative processes and audience interaction was undertook with three case studies: a) the web works of Company Mulleras (96 Details, France 2006-2009) that expand the potential of kinaesthetic play; b) the I-phone piece micro-dances by n+n Corsino (Soi Moi, France 2010) that promotes poetic and somaesthetic encounters; and c) the telematic installation that connects four remote locations into a common 'cyberstage' by Joseph Hyde in Me and My Shadow (UK 2012), which stimulates creative embodied interactions.

The proposal for this conference is to present research on the theme of documentation and preservation of digital-born artworks, which Paul defines as consisting majorly of software-based work that "utilizes the digital medium's inherent characteristics, such as its participatory and generative features" (Paul, 2016, p. 2). I have discussed elsewhere the implications of the above case studies for themes like the ontology of performance (2012 and 2016), the body-mind split debate 2013, the development of the dance medium (2014 and 2016), and social experience with digital embodiment (2014).

Dance Studies have always carried the task to preserve the knowledge about an ephemeral expression that relies on the body and movement as primary materials (Carter, 1998); the evanescent and corporeal nature of dance has also significantly affected its recognition and dissemination (Thomas, 1995). This has informed a resourceful number of practices and studies in this millennium (as in DeLahunta & Shaw, 2008; Fernandes, 2013; Whatley, 2013), that contribute to the subject of this conference and the Black Box Art and Cognition Project (FCSH_Nova. Lisbon).

Although based on code computing and electronic display, the born-digital artworks are also vulnerable to fast disappearance because the digital storage methods that they rely on change and develop very quickly, and thus we are at risk of losing a whole period of the art history of our time (Grau, 2016). Furthermore, how do we report and document the audience experience of interactive artworks that is constituent to their identity?

Attempting to safeguard the place of such practices in the history of contemporary dance and new media art is paramount to increase public recognition and visibility in the future; this contribution to knowledge allows rendering the artworks as subjects for arts and humanities research. I shall present referential ideas and documentation methods that have been developed in the new millennium, in order to avoid the redundancy that looms over the creative endeavors that make use of commercial technologies, because in only a few years they may became something of the past.

# A Longitudinal Study of William Forsythe's Choreography "Duo" (1996–2016)

## Elizabeth WATERHOUSE[1], Florian Jenett[2], Bettina Bläsing[3], Monika Hagar[4]

[1]University of Bern/HKB; [2]Motion Bank; [3]Technical University Dortmund; [4]University of Bern

Within the projects "Motion Together" (Free University of Berlin/Bielefeld University/Hochschule Mainz) and "Dancing Together" (University of Bern/Hochschule der Künste Bern) focusing upon the case study of William Forsythe's choreography Duo, one aspect was exploring how digital video archives of performances could contribute understanding of the performers' interpretative practice and the structure of the choreographic piece longitudinally. The case study Duo was chosen because of the rich number of documentation videos within Forsythe's private archive, the work's interesting history as a duet made in 1996 which Forsythe has continued to revise until the present day, and the quality of nuanced interaction between dance partners.

Duo, a duet for either two women or two men, is a duet without touch, in which the partners synchronize and rhythmically relate movement and breath to different musical scores by Thom Willems. While based on a choreographic sequence of interactions, over the course of its history Duo has changed to include more task-based improvisation. Key to the project was usage of ethnographic methodology, including extensive interviews with the performers, to learn about their experience and knowledge of Duo.

In this presentation we will focus on the team's research with digital sources to visualize the choreography longitudinally. Based upon interviews with the dancers, terminology was refined and extended from the previous interdisciplinary research project studying Forsythe's choreography (Synchronous Objects for One Flat Thing, reproduced) to define attributes: movement themes, modes of movement alignment and modulators of movement alignment. Annotations for seven key-performances were made by a Forsythe dancer/expert to profile a cross-section of the piece's history. These were error checked and uploaded into Piecemaker 2 software for review.

Visualization of these markings give an unprecedented view of choreography history—showing changes in the movement themes and shifting aspects of the synchronization and interaction between partners. In the case of Duo, communication between dancers to stay in-sync takes place through multiple modes (sound, movement, breath, eye contact) simultaneously. As in paradigm of Conversation Analysis, here communication in Duo is studied in relation to the precise context of each performance and the turn-taking sequence prescribed in the choreography. Dancing Duo is shown to depend on entrainment (Waterhouse, Watts and Bläsing 2014), a holistic process through which the dancers maintain alignment in time. The research illustrates that modes of communication and entrainment are central to Duo, in fact part of the choreography itself.

In sum, digital performance archives show great potential for revealing how choreography and choreographic interpretation changes over time—in the case of Duo, how the aesthetics of the piece (the movement, interaction, vocal attributes, sonic layer, costumes etc.) transform. Though it is difficult to know why these transformations take place and what the dancers are doing and experiencing as they dance, annotation of video helps to reconstruct this information. In this example, annotation of Duo videos has shown how the dancers' attention to referencing sequence, negotiating timing as well as relating to one's partner are important parts of the choreography—underpinning and influencing the aesthetic.

# Poster/Demo session

# Imagined worldview's in John Lennon's "Imagine": a multimodal re-performance

## Maria Clotilde ALMEIDA, Rui Geirinhas.

Faculdade de Letras, Universidade de Lisboa

The present paper on multimodal metaphor scenarios targets a cognitive-oriented analysis of John Lennon´s song lyrics Imagine issued by Edicare in 2018 in a bilingual English-Portuguese edition, which is a multimodal re-performance of the original song, since the written mode is pictorially illustrated by Jean Jullien, and reinforced with a preface by Yoko Ono and an epilogue by Amnesty International , the sponsor of the 2017 original publication in English. Moreover, interaction with readers is encouraged by visiting https://imaginepeacebook.com, i.e. promoting metacognitive reflections on it. Drawing on Forceville's approach to multimodal metaphor and metonymy (2009, 2017, among others), which builds both on conceptual metaphors( and metonymies) as cognitive tools for human reasoning about world experiences, (Lakoff/Johnson 1980, among others) and on operative methodological concept of Metaphor Scenario, defined as " a set of assumptions made by competent members of a discourse community about "typical" aspects of a source situation" (Musolff 2006), the multimodal analysis unveils metaphorical and metonymical mappings between the re-elaborated text mode (lyrics+preface+epilogue) and the pictorial mode crafted by Jean Jullien's powerful illustrations. The imagined worldviews in Lennon's re-performed Imagine build on meaning-making scenarios anchored upon the abolishment of conflict scenarios of FORCE-COUNTERFORCE struggles among humans, who are imaginarily united by brotherhood LINKAGE bonds, of a CONTAINERwise country demarcation worldwide and even of SOURCE-PATH-GOAL individual mind-setting for the sake of accumulating richness. No wonder that all these imagined scenarios unfold under the attentive supervision, in the pictorial mode, of a brown dove either perched on something or hovering around but, in any case, always carrying an olive branch on its beak , in fact, playing the role of the "gate-keeper" of unbounded territories inhabited by peaceful and brotherly networked individuals.

# Pythagoras 360° Movement Analysis

## Christian BÜNING[1], Mike Baumgart[2]

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Video analysis technology that enables specific movement detection has long been implemented in various sports as a tool for professionalization. The motion analysis system Pythagoras allows precise visualization of the surrounding space and to capture 360-degree movement information (Büning, Baumgart, Grawunder, & Temme, 2017). These data can be computed and analyzed in real-time using parallel computing algorithms especially developed for this method. Pythagoras has central importance in at least two areas: (1) the context of movement learning as well as (2) the clinical dance therapy. For both settings, the software-supported three-dimensional video recording method Pythagoras offers various application possibilities. Through the implementation of deep learning algorithms which can be trained identifying specific movement patterns or detecting key features of dominant movement qualities (e.g., flow, acceleration), Pythagoras functions as a supervision tool in learning contexts. Also, enables the visualization of interactive 360-degree tutorials in pedagogical settings, allowing the recipient to take different perspectives to get the most appropriate view of the movement material. Thus, the system can make self-organized, observational learning possible, in that the learner can view the given movement not only repeatedly but also from self-chosen perspectives. Pythagoras allows the recording and analysis of high-resolution three-dimensional movement information. The motion information is stored in the form of point clouds, enabling a marker-free motion analysis. Precise software-based testing room measuring enables 360° real-time visualization, which allows scientific analysis based on algorithms especially developed for this process. The movement analysis encompasses a combination of parameters that capture the use of the body, the shape variations, the position in space and the level, the tempo, and the dynamics of the movements. Furthermore, effort qualities such as space, time, movement flow and weight use are evaluated (Bouchard & Badler, 2007). The current pilot project includes the implementation of additional algorithms which can be trained to detect specific movement patterns. This new approach of machine learning based movement pattern recognition can also be used for comparing new data sets with existing records at any time. Records are stored on a secured institution's internal server. Designed intending to supporting sustainable software developments based on Big Data infrastructures. In detail: Data will be collected with four high-speed cameras in high-resolution covering a full 360° angle. The high quality of the recorded data allows for an exact measurement of movement speed and thus enables to create velocity profiles. The data will be collected using point clouds which provide several million points for motion detection and tracking every second. The amount of body movement data that can be collected is up to 4 GigaBytes per minute and will be stored on high speed physical hard drives. In contrast to the movement analysis systems based on optical marker systems, the recorded point cloud allows exact measurements of the body form and movement behavior (e.g., upper extremities) without any modifications or biases caused by the limitations of common marker systems. The implemented data storage system can be scaled up to 1.6 petabytes, thus allowing a sustainable and economic data storage.

# TEPe – Technologically Expanded Performance

## João CARRILHO[1], Daniel Tércio[2], Bruno Pedro[2], Cecília Lima Carrilho[2]

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TEPe is an exploratory project crossing different fields and convening theoretical contributions from several approaches, where location is imagined as an itinerary instead of a fixed point. As Dwight Conquergood, we consider that performance studies struggle to open the space between analysis and action, and to pull the pin on binary opposition between theory and practice.

TEPe forges interdisciplinarity in a terrain shared by performance studies, sound studies and urban studies. Interdisciplinarity, as we conceive it, is radical on the extent that it is challenging the edges between art and techno-science. The research started with a sensitive process: from the body as sound producer to the sound of the moving body. The target was a quest for the sound signature of the body. Somehow, we followed an approach similar for instance to that one that Yolande Harris, highlighting the contrasts between a bodily experience of a physical environment and technologies of invisibility and intangibility.

Being an extension of our previous project (Technologically Expanded Dance), TEPe is also breaking with it. Instead of dance, we are considering performance, and in the place of the body, we are convening the city as the engendering of sonorities. Actually, we overlap the concept of soundscape with that one of bodyscape - both are embedded by Embodiment (a keyword in the interdisciplinary research on performing arts).

TEPe explores two research vectors. One convenes the following issues: how do the most recent technologies interfere with the body experience? To what extent is the body an archive? How can haptic atmospheres be generated with motion capture signals? Do digital technologies raise new tools for improvisation in performance? What are the aural trails in contemporary bodyscapes?

The concept of bodyscape seems crucial. Mirzoeff recalls that the body in art must be distinguished from the flesh and blood it seeks to imitate. In representation the body appears not as itself, but as a sign. Bodyscape is therefore the complex of signs that the body encompasses, but those signs live in social and political contexts. Derrida drew attention to the structural nonsaturation of a context. The fact of being never absolutely determinable and nonsaturated lays the context in a state of porosity where things flow, collide, merge and split.

Furthermore, one has to address the following question: is it possible to develop a paradigm of sounds for urban environments? What happens when we begin to listen to the sonic atmosphere of the contemporary world? Sound is an opening process to urban atmospheres, as a medium, a mode of resonance of the sensitive, of resonance as a way of making the world vibrate, of performance as an endless gesture of animation.

TEPe aims to generate environments in the urban space through performative sonorities. In the path of Thibaud, three articulated processes will be identified: (a) the existent ambiance comes from resonating places and bodies, (b) the modulated ambiance calls for a change in places according to the individual and collective behaviours, (c) the transformed ambiance derives from putting in place social practices.

# Intersubjectivity of sensorimotor metaphors: A ballet lesson

## Elaine CHEN

University of California, Santa Cruz

Describing the indescribable, relaying the idiosyncratic, verbal metaphors of sensorimotor experience are at once ubiquitous in our daily activities (especially when it comes to motor tasks), yet hardly investigated in cognitive psychology. This is the first ever study that explored how people without any expertise or knowledge in a given bodily practice (e.g., ballet) learn dance poses, and specifically how metaphorical instruction immediately influences the learning outcome. We revealed that people benefit from instructions with metaphorical imagery more than either literal instructions or modeling movements without any verbal instructions. We examined if the presence or the absence of a mirror would impact people's performance along with the different instructions, and found metaphorically instructed people tend to learn better without a mirror. We also explored potential affinities between people's performance and their imaging styles and abilities, but observed highly varied relationships. Our findings offer novel insights into metaphor, imagery and movement research. Finally, we suggest the implication of the current study to communication of subjective experience in general.

# Dance as embodied analogy research project: Watching Dance, a forced choice experiment

## Vicky FISHER

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This study is designed to establish whether or not observers of dance, interpret (comprehend) movements as being 'like' the imagery (concepts) that a dancer intentionally embodies and if differing levels of observer expertise influences the extent of agreement (in line with findings by Calvo-Merino et al., 2006, 2005). Research in the related field of co-speech gesture, has suggested that some types of gesture can be understood in terms of embodied analogy, in that they are 'like' the concepts to which they refer, in fundamental ways (Cooperrider and Goldin-Meadow, 2017; Emmorey, 2014). Limited empirical research has been undertaken to investigate if this principle carries over to the full-body movements that characterise embodiment in modern dance practices. This study has implications for research into embodied cognition, advancing our understanding of how we, as humans, can use bodily movement to explore and communicate information about our environment.

I hypothesised that concepts are embodied in perceivable ways that correspond or map to recognisably similar categories in the minds of the observers. I employed a forced choice paradigm to test if observers consistently perceive a difference between embodied imagery conditions, in particular, associating specific embodied imagery with its assigned descriptive label. I also measured whether dancers (that is, experienced embodiers) were more sensitive to differences than non-dancers and if 'accurate' responses are coincident with a stronger sense/degree of association.

18 dance and 17 non-dance undergraduates of mixed genders were asked to select one of three repeated descriptors, presented in a randomised order, in response to twelve videoed dance phrases. The videos used a four by three design with four similarly structured dance sequences performed by one dancer under three conditions of embodied imagery: NEUTRAL (no specific imagery), WATER, INSECT. The stimuli were repeated in three quasi-randomised blocks resulting in 36 trials. Participants were also asked to rate the strength of the association between the movement phrase and the selected using a 5-point Likert-type scale, selecting options between 'very weak' to 'very strong' (see Fisher, 2017 for more details)

The study found overall, accurate responses occurred at a level significantly above chance, at 59%. Significant differences arose between responses by dancers with 64.2% accuracy (SD = .48), compared to non-dancers at 50.5% (SD = .5) However, this difference is accounted for wholly by responses to NEUTRAL stimuli. The 'types' of errors that the two subject groups made also differed significantly. The association ratings did not produce any significant results either within or across groups.

The results support the hypothesis that concepts are embodied in perceivable ways that correspond or map to recognisably similar categories in the minds of the observers. The level of non-'accurate' responses, draws attention to the complex nature of meaning-making in dance and its relationship to observer interpretation. Dancers were more sensitive to qualitative differences in performance, suggesting that greater experience of embodiment leads to greater differentiation when observing it in others.

# Foraging for movement patterns: a case-study in dance creation

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Very few studies have characterized the creative process of a choreographer while working with a dancer to create a dance piece and most of them have focused on the metaphors, emotions or aesthetics. Consequently, this type of human creative behavior is still excluded from a wider, generalizable understanding from animal cognition.

Our study proposes a new approach where the process of creation of a dance piece is seen as a decision-making problem. Specifically, the choreographer is a decision-maker that observes movements generated by the dancer and chooses whether he wants to see a repetition of the same movement (exploitation) or to see other movements (exploration). This approach allowed the development of a quantitative methodology to characterize the choice pattern of the choreographer throughout the creation process framing it, specifically, as a foraging problem.

We video recorded the creation of a dance piece by the choreographer Rui Lopes Graça (Portugal) while working individually with two dancers. We hand-scored each movement pattern elicited by the dancer according to its order of introduction in the creative process and classified it as exploitation or exploration in relation to previously elicited movement pattern. We characterized the choice pattern of the choreographer, finding evidence that he switched between exploitation and exploration at different rates depending on the stage of the process, consistently while working with both dancers. Our work brings a quantitative approach to the study of dance creation, more importantly, it points at the biological origins of such process framing it as a foraging problem.

# A Manual to inadequate behaviors on gyms and health centers: Tele-training for average humans

## Sylvia JAIMES

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During the month of February in 2018, the XXIII version of the Olympic Winter Games was held on PyeongChang (South Korea). At some point during the 16 days of competition, there was a gala night where the most important figure skaters presented an artistic and non-competitive number.

The young Japanese athlete, Yuzuru Hanyu, who has been several times awarded the golden medal, performed an artistic number imprinted by his "elegance".

As part of his intervention he developed a series of twists where his body obeyed the principles of a perfect geometry.

Perhaps the most hypnotic part was an ongoing spin that somehow proved his capacity of behaving as a human compass.

The former bird eye image showed Hanyu spinning among the axe of one of his legs, while he maintained his trunk in a perfect 90-degree angle from the floor. The complementary leg drew a regular triangle among the base leg allowing him to endlessly rotate.

To execute such a pirouette, he positioned himself on the precise center of one of the five rings (imprinted below the transparent ice floor) that constitute the Olympic Games logotype. The five interconnected circles that still represent a unity, through sports, of the participating continents.

Hanyu's body spun infinitely fixed on a unique axis while the camera breathlessly observed… The action (image) was interrupted by a commercial pause from the announcers.

Three years after the presumed existence of Mirror Neurons was announced (1996), the first movie from the trilogy of The Matrix was released (1999).

In consonance with the film's apocalyptic cut, the main character learned martial arts in a lucid dream lying on a modified dentist chair. His body (better to say, the image of his body) learned movements of high complexity taught by a KungFu Master through a virtual platform. His virtual body became rapidly enhanced by the virtual training program. His physical body shacked softly while his eyes remained closed.

This cinematographic enforcement of the power behind Mirror Neurons (their plastic possibilities on learning complex motor skills) insists on the fact that trough an interaction with our own image, we could somehow shape the physical characteristics of our material body. This belief somehow strengthens the ancient idea of a division between body and soul, represented by the power that images (imago) inside ourselves have over the matters that constitute our physical body. This time the spiritual body has a concrete virtual materiality (the appearance of the regent 3D visual technology). It may be accessed by plugging oneself to a greater brain.

The assumed effort to codify our bodies into several manifestations of language, is supported by the neuro-scientific architectural modeling that suggests a correspondence between regions of the cortex and areas of our physical body. The presumed mechanism that would help us functionally move, might as well be reintroducing (or continuously introducing) our innermost experiences into language again.

How is this language approach modifying the way we train our own bodies at the gym?

# Foot Gestures in the Expression of Certainty

## Isabel GALHANO-RODRIGUES

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Semiotic properties of visible actions (above all hand gestures) have been described according to their relation to speech and as part of the utterance (Müller et al. 2013). Some gestures have been identified as the building blocks of stable units of form and meaning, and therefore been called recurrent gestures (Ladewig 2014). In order to describe the motivation for their emergence, recurrent kinesic units have been decomposed into meaningful segments and described according to parameters such as hand shape, palm orientation, motion properties and position in gesture space (Kendon 2013). Kendon was among the first scholars to recognise the recurrent forms of gestures which share the same semantic core and grouped them and all their variants into families, as, for instance, the Open-Hand-Prone family and the Open-Hand-Supine family (Kendon 2004). The bodily experience in the physical world is considered as the basis for the motivation of these gestures. Thus, movements resulting from the action of pushing something unwanted away from one's body, or cutting the line of action, are then used to express rejection, negation or assertiveness; and the movements performed to grasp or collect something that is wanted or needed, are performed together with the expression of offering or receiving, or openness to the interaction partner.

What happens, then, when an individual has no upper limbs? The speaker of the analysed interaction has no upper limbs. As an alternative to manual gesticulation, he uses his right foot, coordinating its movements with speech. Among a variety of movement configurations, there are some foot-actions that consist of lateral or upward-downward movements of the raised foot, which are performed at moments of the utterance where gestures of the Open-Hand-Prone, or Open-Hand-Supine families (Kendon 2004) would be expected. These two situations were considered by Poggi (2007) in a subgroup of the Mind Markers, responsible for the expression of various degrees of certainty. This kind of foot actions whose semiotic properties could be interpreted as conveying different degrees of certainty have been micro-analysed, and the results shall be presented.

# An interactive software tool for analyzing multimodal data over dance video

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The movement can be studied from multiple perspectives, including psychology, motor control (Rosenbaum, 2010), dance science, and art (Waterhouse, Watts & Bläsing, 2014). The goal of the software project presented here is to provide a tool that allows users from different disciplines and backgrounds to generate videos of dance scenarios with various relevant annotations representing multimodal information. The software reads project-specific data and overlays it on dance-related video material, with various drawing options.

We developed a media tool, for merging data from different modalities and measures, and overlaying these data on the stimulus video in customized ways, to support visualization and analysis. The project was divided into three parts. As the first and basic task, the software is capable of drawing selected data from supplied data files on the video, based on chosen drawing attributes. The second part allows the dynamic properties of movement by generating additional pose data and displaying summarized data points from a moving analysis window of last n-frames. The third part draws bounding boxes around the human actors detected in the video scene. This serves as a rectangular annotation equivalent of Region of Interests (ROI's). The software contains these analysis functions as utilities to enable additional plotting and visualization of data, as well as writing of processed files, all combined in one generic software application.

In dance-related research, video annotation plays a major role, and annotation tools are generally asked for, but there is only little discussion about which data structure can support a generic annotation format. For example, in the case study presented here (Waterhouse, Watts & Bläsing, 2014), eye-tracking data were collected from participants of three different expertise levels (25 novices, 8 experts, 7 super-experts) watching two different video-recorded performances of William Forsythe's choreography Duo (Weimar, 2013 and London, 2015; dancers: Riley Watts and Brigel Gjoka). Eye-tracking data and body key-point (KP) data generated by a pose detection library is essentially (x, y) point data on a 2-dimensional plane. From such data, dynamic regions of interest (ROI), movement analysis etc. can be defined by appropriate mathematical functions and plotted on the stimulus video together with hand annotated bounding boxes. For the given scenario, the software allows, for example, grouping of selected participants for analysis and display of their individual eye-tracking data over the video. These functions serve experts from various fields by supporting visual and numerical analysis and the generation of annotated video material for research, demonstration or archiving. Future work will involve automatic parsing of human bodies into grids that can be used to precisely determine the positions of plotted data on the scene, both visually and statistically.

# Latent Step: Generative Bodily Animations from a Collection of Human Drawings and Physiological Data Interaction

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Over the last two decades, data visualisation has been implemented into numerous dance performances, often with the intention of reappropriating particular movement qualities or developing a narrative. These performance environments can be made interactive with the use of wearable sensor technology, capable of capturing the expressive traits of the performer in real-time.

Latent Step is an interactive system for dance performance which merges two machine learning models to generate 3D animations using a pre-existing image corpus and physiological data input. The intention is to expose the physical sensations of the dancer as they revisit a sequence of movements.

The image generation model is trained on a collection of 100 bodily map illustrations provided by 10 dancers, who were asked to colour areas of muscular activation and balance during movement. Each drawing correlates to a physical gesture assigned to one of the following semantic descriptors: *Difficult, Aesthetic Form, Indifferent, Open, and Closed*. When trained, it's possible to generate new animations from two or more drawings by predicting the interpolated frames in latent space. The frames are converted into a UV texture that is projected onto a 3D mesh to highlight particular areas of the body.

The input model, responsible for monitoring the user's physical activity feeds two parameters to the autoencoder to complete the interaction loop. When a sequence is reperformed, the system will attempt to recognize what pre-defined gesture is being displayed whilst reporting the relative speed of the movement. The result enables users to determine the style of images being generated whilst influencing the time-dynamics of the animation.

# Video clip as dance art and performance in digital cultural heritage

## Paulo QUADROS

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This work aims at understanding how multimodal performative artists develop video clip strategies in order to incorporate multiple expressive dimensions of communication through dance as a social gesture of art. For instance, artists such as David Bowie and Madonna, among others, create a dance style and performance in video clips, with the establishment of new aesthetical conceptions of dynamic audiovisual art, in terms of meaningful multimodal references. Elisabeth Fraser of Cocteau Twins develops an ethereal style video dance, which is used for supporting female empowerment performances in terms of transcendence, wordless, inaudibility, and silence gesture. In the other hand, Kraftwerk invests in a robotic hypnotic musical dance, with digital performances, human computer interactions, choreographic avatars and visual posthuman atmospheres with allegorical and metaphorical dance images. The Brazilian rock group Titãs performs several meaningful movements on the stage as mimetic social gestures for questioning a reproductive social system of inequality and injustice. Other relevant Brazilian artists have even more other different aspects to add in relation to the performance concepts and gesture interpretations of dance representation in video clip art, such as: Caetano Veloso, Marisa Monte, Arnaldo Antunes and André Abujamra. The spirit of this work will be supported by the following theoretical frameworks: The Poetic of Interpretation and the Sign of Relationship (Cremilda Medina), Female Metaphors (Gilbert Durand, Michel Maffesoli), The Gesture of Art and The Sign of Event (Maria Teresa Cruz), The Logic of Sense (Gilles Deleuze), Posthuman Aesthetics (Katherine Hayles, Arthur Kroker), Performance and Political Consciousness (Hanna Arendt), Artistic and Cultural Performances (Richard Schechner), Media Culture (David Kellner), The Dimension of Ethereal (Walter Trinca). The goal of these reflective support frameworks is, in some sense, to deepen issues related to the dance data available on several digital popular social networks, such as: YouTube and Vimeo, for understanding video clip narratives as a mixture of dance, music and contemporary performatic acts for enriching the learning of the sense of art and social gestures.

# Suspension of the Self and Embodied Creativity –
# How the use of Metaphor enables a more embodied creative process

## David SANTOS

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How can performing arts in relation with other sciences like cognitive science and neuroscience create a new understanding about metaphor in embodied creativity? The article discussed here is "Neuroscience and creativity in the rehearsal process" of John Lutterbie (Co-director of The Center for Embodied Cognition at Stony Brook University) employs neuroscience and cognitive science to tackle the process of the actor in the rehearsal. What strategies are played to frame the performer creative exploration and decisions? My main focus is to grasp if the embodied aspects of the perception of the performance artist are indeed a relevant case study and strategy that deserve further study when thinking about the phenomenon of creativity and embodied epistemology.

Lutterbie (2006) intention with this article is to study how two actors from very different backgrounds use a similar metaphor to describe their work in rehearsal. This metaphor the "self as a container" represents the will of the actors to suspend certain aspects of the self so they can enter some state of surprise and enhanced state of discovery in their rehearsal process. Lutterbie gives relevance to Lakoff and Johnson´s work on conceptual metaphors. Lutterbie surely investigates how does the repeated motif of the self "emptied" of thought and judgement actually allows the actors to experience a free flow of feelings. The actors believe that having present this metaphor in their minds allows them to have some kind of control over the modes of their mental processing and with the use of this metaphor they can maneuver the split between intellect and emotion. To see if this corresponds to neuro biology and cognition, Lutterbie adds to the discussion the research of the Neuroscientist António Damásio that suggest that even if that absolute rational control over modes of mental processing is very likely impossible it can be somehow possible due instead to an intensified form of general cognitive capacity that are a consequence of "lateralization across zones of convergence" known as synesthesia. Lutterbie also summon up the studies on cross-modality cognition in which concentrated neural activity reaches across the senses, allowing humans to create or recall unexpected associations.

All together the works of Damasio, Lakoff and Johnson, and Ramachandran and Hubbard point to a convergence of evidence that are "underlining the centrality of associative cognition to an understanding of the acting process" (Lutterbie, 2006, p.150). In the book introduction Mcconahie & Hart affirm that ["what is at stake here is not whether an actor´s process is metaphorical or, for that matter, the fact that actors must use metaphors to describe their process. Rather, what matters is that "metaphors current in the culture best describe the creative process" (Mcconachie & Hart, p.163)"]. I would argue that what is at stakes here goes beyond that, it is the value of metaphor as a technique that allows the actor (creator) to have a more sharply focused attention that can helps them to have some sense of autonomy and control over the simultaneous cognitive feedback of intellect and emotion.

# Speaking during rhythmic motions of the feet vs. the hands: how do speech and limb movement affect each other?

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In speech science, speech production is often investigated when speakers are seated in front of a microphone in a sound-proof room. However, in everyday life we generally produce speech while we are doing some other activity, and therefore it is common to move our bodies while speaking. For example, we speak while washing the dishes or biking with a friend. This can be seen as a dual-task activity, resulting in mutual interference between the two tasks. Most of the time, both activities must compete for a common physiological resource, namely the use of the lungs. Recent studies on the link between breathing and speech show that the two are finely coordinated with one another. However, limb motion has rarely been considered together with speech and breathing. It has been suggested (Pouw, Harrison et Dixon, 2018) that speech and limb movement are coordinated via breathing through biomechanical principles: limb movements and speech can place variable pressure on the lungs. The muscles involved in limb motion can have an effect on the configuration of the lungs thus impacting speech. For example, if someone performs a large movement with both arms and says something at the same time, the audio signal is louder than it would be without movement: the pressure of the movement of the arms pushes the air out faster (Pouw et al., 2018). In this work, we assess how speech, breathing and limb cycles influence each other by examining spoken language as it occurs in the contexts of common limb movements. To do so we compare time series parameters of spontaneous speech, breathing and rhythmic motions of the limbs in different conditions: biking with the feet vs. with the hands, and speaking while biking with the feet vs. the hands. The data were collected in a laboratory setting from 16 native speakers of German. Speech, breathing and limb motion data were recorded using a microphone, a respiratory inductance plethysmography system and a motion capture device, respectively. Speech was elicited in a spontaneous production task. Each system was characterized with time series parameters that wer3e compared across the different experimental conditions. Preliminary analysis suggests that people adapt their limb motion when they speak at the same time as far as duration of cycles and their variation in time are concerned.

# The imagery–cognitive discursive argumentation of aspects of environmental sustainability in cartoons: critical humor strategies through conceptual metaphors

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The discursive genre cartoon contemplates in essence verbal and imaginary elements for the bias of a critical humor. Because they are linked to the media field, this genre is surrounded by intentionality and motivated by a role of revealing social beliefs, public opinion, political criticism beyond the cartoonist's own vision. For this, the discursive plan is marked by linguistic-discursive strategies that guide the discourse towards possible effects of meaning. The objective of this study is to investigate how the imagery-cognitive discursive argumentation of cartoons is constructed under the character of sustainability. Because it is a genre that involving verbal and nonverbal texts, linguistic and imagery aspects will be analyzed in an argumentative dimension of cognition. This implies studying how argumentation can be understood by cognition, considering linguistic and imagery aspects. It aims to demonstrate how the argument can be understood from the cognitive point of view and how the metaphors can be part of the argumentative of this type of genre. For this, the theoretical bias of Lakoff (1987; 2006) will be used to explain the metaphor in the cognitive plane, as a natural process of the human mind, that is, a form of thought. In addition, Grady's (1997) postulates on the complexity of metaphors will also be relevant in explaining why some metaphors are more difficult to interpret. In the imaginary part of the studied genre, the analysis will be performed from Peircean semiotics to understand the functioning of the image. In the argumentative context, Perelman's theory (1996) to explain the author's conception of argumentation as a form of persuasion and evaluate the common values of the audience and the speaker, to the type of discourse directed to the collective. Observe, in the cartoons argument under the theme of sustainability, the epistemic discourses as those that make appeals to socially shared values, that is, how environmental sustainability is conceptualized and understood. As a methodological approach, corpus linguistics will be carried out based on an analysis of databases with textual data of discourses in cartoons, published in the journalistic media for the composition of a corpus of analysis focused on environmental sustainability. Discourse analysis will be used to understand the argumentative scope of this discursive genre.

# CORPO SANTO – a ritual on stage

## Rita VILHENA

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"Corpo Santo" is a contemporary dance piece that was choreographed by myself, and it premiered in April 2018 in Portugal followed by a national tour and an upcoming international one.

Through choreographing a ritual for the stage, "Corpo Santo" (Holy Body) rehearses the dramaturgical line that goes from the corporeal to the ethereal.

This performance is a result of three questions: 1- will the difference potential of a particular event, a performance, consist in intensifying the experience in the life of the human being?; 2- what level of participation is necessary for this to happen?; 3- how to translate a "magical" ritual to a theatre context, keeping some features that give the affected intensity?

Joseph Roach argues that the nature of ritual is prior to language, but it is part of it. Rituals are interpreted as symbolic activity and a way of thinking in itself "they include standardized movements made and remembered by bodies, residual movements implicitly stored in images or words." In the 1960s and 1970s, Victor Turner says that performance is a way in which populations can apprehend and understand one another by their creations under a subjective perspective. Performance is an experience that is consumed, in which the past and the present meet. Turner, in accordance with Durkheim's classical theory, advocated ritual as "own society in act," as "the place par excellence of a kind of experience in which the transforming and creative power of representations is in the consciousness of the subjects." And the philosopher Kevin Schilbrack argues that ritual action and ritual knowledge within the existentialist universe are of a more basic intentionality than the linguistic one, which regards the body as an object of consciousness. It is by the body that I feel the world and that the world exists for me.

I started a field investigation on rituals in 2014 with the Brazilian Daime religion. Shortly thereafter, I experience the Candomblé public feasts and the spiritual social rituals of the Yawanawá tribe in the Amazon. These experiences, and diary notes, were essential for the construction of the "Corpo Santo" imaginary. It allowed me to visit the past and the origins, mythical and historical, of these communities and groups.

My participation in ancestral rituals was a non-accomplished act, because according to Renato Ferracini "the choreographic nature of ritual inhabits a virtual field as well as any 'attempt' to repeat a performance", therefore the original is always updated by this same virtual field. In the Deleuzian universe, it could be said that the files of memory do not accumulate in a specific place of the human body, or of the brain, but they are added to a memory-body in ever-present duration in a virtual way. From my analysis, I have concluded that a ritual, no matter how choreographed it may be, as in Daime, is subject to different interpretations both by the complexity of the different symbolic systems and by the logic of interpretation of these that is bound to the intention of the subject.