

20<sup>th</sup>  
**HERBST  
AKADEMIE**

**FRIAS**  
Freiburg Institute  
for Advanced Studies  
Albert-Ludwigs-Universität  
Freiburg

**FEBRUARY 28  
– MARCH 2  
2019**

**SYNCHRONIZATION  
IN EMBODIED INTERACTION**

**PROGRAM**

ORGANIZERS:  
**Wolfgang Tschacher**, Bern  
**Stefan Pfänder**, Freiburg  
**Carl Eduard Scheidt**, Freiburg



ORGANIZERS

**Prof. Dr. Wolfgang Tschacher**

Universitätsklinik für Psychiatrie und Psychotherapie  
Universität Bern

tschacher@upd.unibe.ch

**Prof. Dr. Stefan Pfänder**

Romanisches Seminar  
Universität Freiburg

stefan.pfaender@romanistik.uni-freiburg.de

**Prof. Dr. Carl Eduard Scheidt**

Klinik für Psychosomatische Medizin und Psychotherapie  
Universitätsklinikum Freiburg

carl.eduard.scheidt@uniklinik-freiburg.de

# CONTENTS

Welcome Address . . . . .	5
Overview . . . . .	6
Abstracts – Oral Presentations . . . . .	10
Abstracts – Posters . . . . .	38
Location Plan . . . . .	47

# WELCOME ADDRESS

Dear participants,

We are happy to welcome you to the 20th Herbstakademie in Freiburg, Germany. This conference is organized by the research focus Synchronization in Embodied Interaction of the Freiburg Institute for Advanced Studies (FRIAS), and is part of the series of Herbstakademie meetings dedicated to the topic of complex dynamical systems in psychology, neuroscience and related disciplines. Several previous conferences of the series, initially in Ascona 2000, have specifically focused on embodiment.

This year, we put an emphasis on theoretical and applied questions of embodiment in interaction:

- What is the role of the body in verbal and nonverbal interaction? We bodily resonate and synchronize when we communicate – how can we measure this kind of synchrony? On which levels does it arise?
- How can we link current research work with pre-existing traditions in philosophy and phenomenology?
- Which novel perspectives can the embodiment approach offer to psychotherapy and to creative arts therapies?
- How can clinicians and psychotherapists incorporate embodiment and nonverbal synchrony into their work?

We are happy to convene outstanding researchers from many different disciplines, who will broaden our perspectives on the topic. Participants and presenters work in areas such as philosophy, psychology, linguistics, psychotherapy, neuroscience, creative arts therapy, and dynamical systems research.

We are confident that these three days of the conference will offer new insights and encounters, and leave you richer than before.

A warm welcome to all of you,

Wolfgang Tschacher, Stefan Pfänder and Carl Scheidt

# PROGRAM

THURSDAY FEBRUARY 28, 2019

Kollegiengebäude I, Platz der Universität

9.00– 9.30 Registration and Opening

---

9.30– 10.30 KEYNOTE LECTURE  
**Thomas Fuchs** (Klinik für Allgemeine Psychiatrie, Universität Heidelberg)  
*Intercorporeality and interaffectivity – A phenomenological and enactive account of empathy*

---

10.30– 11.00 COFFEE BREAK

---

11.00– 12.00 KEYNOTE LECTURE  
**Hedda Lausberg** (Neurology, Psychosomatic Medicine, Psychiatry, Köln)  
*Measuring interactional synchrony*

---

Track A

12.00– 13.00 **Michael Buchholz & Florian Dreyer** (Berlin)  
*Displays of affiliation and neutrality*  
**Elisabeth Gülich** (Bielefeld)  
*Silence as synchronization? A data session*  
**Daniel Muz** (Freiburg)  
*After the silence: post-gap synchronizations in collaborative storytelling*

---

POSTER SESSION  
**Altmann; Barone** et al.; **Hinrichs; Huber** et al.; **Körner & Schütz; Maus-Hermes** et al.; **Meier & Tschacher; Miragall** et al.; **Moulder** et al.; **Niccolai** et al.; **K. Reinecke** et al.; **Windlin** et al.)

---

13.00– 14.30 LUNCH BREAK

---

14.30– 15.30 Keynote lecture: **Anna Buchheim** (Clinical Psychology, Innsbruck)  
*The meaning of synchrony in attachment research and its implication for psychotherapy*

---

15.30– 16.00 COFFEE BREAK

---

16.00– 17.15 **Stefan Pfänder & Carl E. Scheidt** (Freiburg/FRIAS)  
*Synchronization in interactional challenges*  
**Carl E. Scheidt & Stefan Pfänder** (Freiburg/FRIAS)  
*Towards a taxonomy of synchronization processes*  
**Wolfgang Tschacher** (Bern/FRIAS)  
*Physiological synchrony in psychotherapy*

---

17.30 KEYNOTE LECTURE  
**Anja Stukenbrock**  
(Conversation Analysis & Interactional Linguistics, Lausanne)  
*Gaze matters – Synchronizing bodies and minds in social interaction*

---

Peterhofkeller

from 19.00 APÉRO RICHE AND JAM SESSION

---

# PROGRAM

## FRIDAY MARCH 1, 2019

9.00–10.00 KEYNOTE LECTURE  
**Lorenza Mondada** (Department of Languages and Literatures, Basel)  
*Embodying participation in «couples» and «withs» – (dis)alignments in interaction*

---

10.00–10.30 COFFEE BREAK

---

Track A

Track B

10.30–12.10 Methodology of synchrony  
(**Waselius; Schoenherr** et al.;  
**Falk** et al.; **Sjobeck & Boker**)

Paris symposium  
(**Laroche** et al.; **Himberg** et al.;  
**Bachrach** et al.; **Hicks** et al.)

---

12.10–13.40 LUNCH BREAK

---

13.40–14.40 KEYNOTE LECTURE  
**Thiemo Breyer** (Philosophy, Köln)  
*The temporality of shared embodied experience*

---

Track A

Track B

14.45–16.00 Social interaction  
(**Vara Sanchez;**  
**Arecchi; Hofstetter**)

Creative therapies  
(**Häfner; Seuberling;**  
**Belorusets & Morozova**)

---

16.00–16.30 COFFEE BREAK

---

16.30–17.45 APPLICATIONS  
(**Barone** et al.; **Göritz & Rennung;**  
**Reinecke**)

PSYCHOPATHOLOGY I  
(**Bizzari; Köhler** et al.;  
**Felsenheimer** et al.)

---

## SATURDAY MARCH 2, 2019

9.00–10.00 KEYNOTE LECTURE  
**Johannes Michalak** (Psychology and Psychotherapy, Witten/Herdecke)  
*Be mindful of your body: Mind-body interaction in depression and its treatment*

---

10.00–10.30 COFFEE BREAK

---

10.30–12.10 WORKSHOPS

---

Track A

Track B

10.30–12.10 PSYCHOTHERAPY  
(**Altmann** et al.; **Körner** et al.;  
**Schoenherr** et al.; **Kykyri** et al)

PSYCHOPATHOLOGY II  
(**Giersch; Bolis** et al.;  
**Köhler** et al.; **Bülow**)

---

12.10–12.30 FAREWELL

---

# ABSTRACTS – ORAL PRESENTATIONS

(in alphabetical order)

**Uwe ALTMANN, Maria BRÜMMEL, Julija MEIER,  
Bernhard STRAUSS**, Jena (Germany)

## **Patient satisfaction and nonverbal synchronization in anamnestic interviews – Effects of mental disorder and synchronized behavior modality**

*Background:* The frequency of synchronization phenomena like imitation of facial expressions or simultaneous body movements is correlated with positive affect and social bond. However, findings about the association between mental disorder and nonverbal synchronization as well as between nonverbal synchronization and psychotherapeutic outcome are heterogeneous. The presented study examined possible effects of mental disorder and synchronized behavior modality. The research questions were: Can the presence of depression predict facial synchrony and/or movement synchrony? Are facial synchrony and/or movement synchrony associated of patient satisfaction?

*Methods:* The sample included N=15 depressive patients and N=15 healthy controls (matched by age and gender). Before the standardized clinical interview for somatoform disorders, socio-demographic variables, degree of depression, anxiety and pain disability of participants were assessed. After the interview, the participants rated positive affect and professional attitude of interviewer. Facial expressions and body movements are coded frame by frame using videos of the interviews and computer vision algorithms. Associations between depression, synchronization measures, and aspects of patient satisfaction examined with correlations and structural equation models.

*Results:* Depressive patients synchronized their movements and facial expressions with the interviewer less often than healthy controls. Post-session rated positive affect was predicted by facial synchrony, but not by movement synchrony. The professional attitude of interviewer was associated with more leading of therapist in terms of participants imitating more often the movements of interviewer than vice versa. Facial synchrony was not significant.

*Conclusions:* The study confirms that nonverbal synchronization and patient satisfaction are associated. However, the underlying conditions are of particular importance. Mental disorder and synchronized behavior modality seem to be moderators.

**F. T. ARECCHI**, Firenze (Italia)

## **A quantum uncertainty entails entangled linguistic sequences**

Synchronization of finite spike sequences is the way two brain regions compare their content and extract the most suitable sequence. This is the core of the linguistic comparison between a word and a previous one retrieved by memory. Classifying the information content of neural spike trains, an uncertainty relation emerges between the bit size of a word and its duration. This uncertainty affects the task of synchronizing spike trains of different duration representing different words, entailing the occurrence of entangled sequences, so that word comparison amounts to a measurement based quantum computation. Entanglement explains the inverse Bayes inference that connects different words in a linguistic search. The behaviour here discussed provides an explanation for other reported evidences of quantum effects in human cognitive processes lacking a plausible framework, since either no assignment of an appropriate quantum constant had been associated, or speculating on microscopic processes dependent on Planck's constant resulted in unrealistic de-coherence times.

**Arseniy BELORUSETS**, Moscow (Russia); **Julia MOROZOVA** (Netherlands)

## **Synchronisation of inner and outer through interaction with symbolic objects in therapeutic journeys**

This presentation is a collaborative reflection of a personologist and a dance/movement therapist on a form of group therapy as a psychotherapeutic journey. Using this form independently from each other in our practice we noticed that moments of synchrony that occur in these journeys have a significant impact on the client's process. That encouraged us to look closely at and contemplate about possible working factors of this form.

Landscape analytics (LA) (Berezin, Isaev, 2009; Beloruset, Konopeltseva, 2017), is the method of group work which uses movement through a specific selected route that crosses a number of landscape objects, which have also a symbolic meaning (e.a river, deep forest, hill) together with the process of inner reflection when the person articulates his/her inner questions, observing sensations, feelings, remembrances and associations.

Symbol is one of the instruments of objectivation of subjective experience, and since Freud's time is used in psychotherapy in an attempt to synchronise the outer and inner experience. Many methods and approaches use symbols in active imagination, where the symbol is a part of inner imaginative experience, which can be later exteriorised in verbal and nonverbal

expression. In some methods (e.a. metaphoric cards) the symbol on the card can serve as a hint to ignite the inner process. In LA symbols are explicitly represented in the outer world, however, unlike the fixed image on the card they are the living process itself and the interaction with them requires active adjustments in the movement informed by multimodal sensory input.

According to research on Insight Problem Solving (Gick e.a., 1980; Leontyev e.a., 1981), the objects that can be present in one's environment can serve as hints for problem solving. The same principle is valid for LA with the difference that external objects can serve as the hints for personal issues/tasks.

Some interactive experiential examples from this practice will be presented to the audience.

---

**Valeria BIZZARI**, Heidelberg (Germany)

---

### **The musicality of interaction: intercorporeality in Asperger's syndrome**

Asperger's syndrome or high-functioning autism involves a range of symptoms usually associated with autism (abnormalities in the areas of social development, communicative development and imagination, together with marked repetitive or obsessional behavior or unusual, narrow interests), but with normal development of verbal language skills and a normal or high IQ (APA, 2013). The aim of my talk is to provide a description of Asperger's as a disorder of the "we", that is, a disorder of intercorporeality and inter-affectivity. Understanding AS will therefore allow for a deeper comprehension of the structure and multi-dimensionality of our social life. My goal is to show that bodily, pre-reflective and affective mechanisms play a crucial role, and are those elements that are precisely disrupted in AS. In particular, I will claim that while people with Asperger are able to deal with joint activities, and are provided with a functioning sense of rhythm, their deficit lies in what I labeled "synchronic or musical intentionality": an affective, bodily form of intentionality which involves both self-awareness and world-directness and allows the involved subjects to resonate with one another, in an interaffective relationship through which there is "an intuitive understanding of others' emotion in our embodied engagement with them" (Fuchs, 2016, p. 2). This musical or synchronic intentionality is the means by which the subjects experience a mutual tuning in relationship as a "we" vividly and spontaneously felt. The bodily character of this dimension is central and can be described in terms of "contraction" and "expansion" (Schmitz, 1999) movements that generate the alignment of bodily communication. In my view, the this "embodied co-presence" of the subjects discloses the dialogical structure of the lived body, producing that intermodal resonance that in Asperger subjects is disrupted.

**D. BOLIS, JM. Lahnakoski, D. Seidel, J. Tamm, J. Folz, L. Schilbach**, Munich (Germany)

---

### **It takes two to tango: Two-person psychophysiology for studying interpersonal attunement in social interaction**

Due to conceptual and methodological constraints, neuropsychiatric research has so far largely focused on the individual. However, recent advances in the field suggest that truly interactive paradigms might provide a more suitable framework for probing and monitoring essential processes that go beyond the individual (cf. Schilbach et al., 2013; Bolis and Schilbach, 2017; 2018). In fact, psychiatric conditions have recently been re-viewed as a misattunement between persons, rather than a mere disorder within individual brains (Bolis et al., 2017; Bolis and Schilbach, 2018).

To this end, here, we describe two-person psychophysiology as a paradigm for studying the potentially constitutive role of social interaction in human cognition and behavior, across individual conditions and collective contexts. In these lines, participants in our studies sit opposite each other, working on perceptual decision-making tasks (cf. Bahrami et al., 2010), while crucially being able to interact via gaze through a micro-camera communication system; either online (interacting with the other in real-time) or offline ('interacting' with a recording of the other). Additionally, we manipulate social structure (individualistic vs. collaborative) and social relation of the participants (strangers vs. friends). In a nutshell, we hypothesized stronger impact of social interaction when is real-time, collaborative and attuned over time in real life.

In line to our hypotheses, interpersonal attunement was significantly higher when social interaction was (i) real-time compared to offline, (ii) collaborative compared to individualistic, and (iii) between friends compared to strangers, reflecting differences across multiple levels, from gaze behavior and decision-making to metacognition and phenomenology. More concretely, both interpersonal gaze correlation and decision-making alignment were higher in real-time collaborative interactions. In terms of metacognition and phenomenology, participants also appeared more confident and expressed higher satisfaction of collaboration in real-time as opposed to offline interactions. Importantly, effects were highly enhanced when interacting persons were friends with each other.

### **The Temporality of Shared Embodied Experience**

The talk investigates the temporal structuring of how we experience things together with others. After introducing the basic notions of temporality, sharing, and embodiment from the perspective of philosophy (in particular phenomenology and social ontology), typical lifeworldly situations are evoked in which we experience time in an explicit manner, e.g. in excitement and boredom. These states will be scrutinized with regard to their intersubjective dimensions, ranging from intercorporeal synchronisation to affect regulation to narrative. The last part is devoted to showing that embodied interaction is not only a vehicle for our experience of time, but a transcendental condition for a stable temporal stream of consciousness.

---

### **Anna BUCHHEIM, Innsbruck (Austria) and the FRIAS body-sync-research group**

#### **The meaning of synchrony in attachment research and its implication for psychotherapy**

Following Bowlby's assertions that attachment is shaped by real experience, Mary Ainsworth sought to identify specific characteristics of parenting behaviour, i.e. parental sensitive responsiveness that were relevant for mother-infant attachment. Moreover caregiver-infant interactions recently have been discussed with respect to the concept of synchrony, which describes a wide variety of coordinated behaviors including gaze, affect, vocalization, attention, actions, and also physiological processes (Feldman 2012). Importantly, several studies have found associations between interactional synchrony and attachment in infants with a higher frequency of interactional synchrony being related to attachment security. In sum, plausible candidates beyond parental sensitivity would be protective parenting, synchrony and repair of mismatches in parent-child interactions (van IJzendoorn & Bakermans-Kranenburg 2018).

This talk will summarize the meaning of the concept of synchrony from an attachment perspective and its operationalization in the Adult Attachment Projective Picture System (AAP) measure. Results from a clinical study will show the meaning of synchrony in the AAP by demonstrating the patients' potential resources predictive for increasing interpersonal capacities in the psychotherapeutic process. Moreover we demonstrate data analyses from the FRIAS body-sync-research group by highlighting divergent features of maternal synchrony using an Interactional Linguistic Analysis in the context of a study on the intergenerational transmission of attachment. First results will be shown along two single cases with mothers and their children. Here fine Interactional Linguistic analyses on AAP narratives had predictive quality for behavioral synchrony in the interaction with their children.

### **Displays of affiliation and neutrality – Auswirkungen körpersprachlicher (De-)Synchronisierung auf Frage-Antwort-Sequenzen**

Im psychotherapeutischen Gespräch erkundet der Patient seine Schwierigkeiten, Symptome, und aktuellen Probleme gemeinsam mit dem Therapeuten. Die zugrunde liegende «epistemic imbalance» (Heritage 2012, S. 32), der Therapeut weiß naturgemäß weniger über den Patienten als dieser selbst, wird im Verlauf der Gespräche durch therapeutenseitige Fragen angegangen. Diese Fragen müssen jedoch interaktional vorbereitet werden, um das Gegenüber in die Lage zu versetzen angemessen antworten zu können. Hierbei spielen das konversationelle Umfeld, die sequenzielle Position sowie das Format einer Frage entscheidende Rollen. Zusätzlich sind jedoch auch körpersprachliche Ressourcen bei der Vorbereitung einer Frageaktivität beteiligt. Der vorliegende Beitrag befasst sich mit dem Einfluss affiliativer Marker (Hörersignale und Nicken) im Vorfeld einer Frage auf die Art ihrer Beantwortung. Dabei ist festzustellen, dass ein vorangehendes «display of affiliation» des Fragestellers, es dem Gegenüber erleichtert auf die Frage zu antworten. Körperliche Synchronisationsprozesse tragen zur Beantwortung folgender Fragen bei. Ein vorangehendes «display of neutrality» hingegen führt zu Schwierigkeiten in der subsequenten Beantwortung einer Frage. In anderen Worten: Findet sich keine körpersprachliche Synchronisation mit dem Gegenüber, zeigen sich Schwierigkeiten in nachfolgenden Frage-Antwort-Sequenzen. Dieser Befund ergibt sich aus einer Kombination konversations- und bewegungsanalytischer (Motion Tracking, Face Recognition) Methoden, deren Ergebnisse sich gegenseitig ergänzen. Zudem soll ein Ausblick für die weitere Verwendung softwaregestützter bewegungsanalytischer Methoden in der Interaktionsforschung gegeben werden.

---

### **Frederic BÜLOW, Heidelberg (Germany)**

#### **Intercorporeality and synchronisation: two important aspects for a better understanding of the genesis of depressive symptoms and their reduction during psychotherapy.**

In psychopathology, the role of the body and bodily experiences during depression have been described and discussed extensively. Different experiences of the body and the differences between the lived body (Leib) and the physical body (Körper) have also been subject of research. Furthermore the importance of the phenomenon of interpersonal synchrony and its relevance for psychotherapeutic processes have become much clearer during the last years. I would like to look for a common ground of these different aspects within a therapeutic setting. In this respect it seems useful to take a closer look at the concept of intercorporeality and processes of synchronisation. Firstly I will examine how patients and therapists can perceive their own bodies and the body of the other during therapy. I aim to describe the interdependencies of first, second and third person perspectives on the experience of the body. Concerning synchronisation I would like to discuss if it is plausible to hypothesise that

the therapist (or other group members in group therapy) can induce a shift from the experience of the objective or physical body to an experience of the body as subjective or lived body via their own experience of their bodies as lived bodies. On the basis of these considerations I will explore the nature of the relationship of intercorporeality, processes of synchronisation and the reduction of depressive symptoms during the therapeutic process. Finally I would like to outline possible consequences for diagnosis and treatment of mental disorders as well as for psychotherapy research.

**Patrick FALK, Jamie A. WARD, Marco GILLIES, Antonia HAMILTON**, London

### **Exploring Social Signals – Multimodal Data Capture & Wavelet Analysis**

Human social interaction involves rich and complex behaviours where verbal and nonverbal signals are exchanged in dynamic patterns. To understand these behaviours, it is helpful to have detailed high-resolution data and to analyse this with appropriate methods. Here, we present initial results from a multimodal study of dyadic conversation behaviour in three different contexts: a one-sided information sharing task (i.e. picture description), a co-re-collection task, and a joint planning task. We used high-resolution motion capture to record motion in these dyadic conversations and wavelet coherence analysis to understand the dynamic patterns of head movements and hand movements in these contexts, testing if coherence is seen in different frequencies and if it differs across contexts. In addition, we simultaneously recorded facial expressions, gaze, and speech signals.

We find that in the picture description task, dyads show positive coherence (relative to pseudo-dyads) at low frequencies (0.48 – 0.96 Hz) and show reliable anti-coherence at high frequencies (2.6 – 5.4 Hz), which replicates previous findings in our lab. However, in the other conversational contexts, we find no significant effect of either low-frequency mimicry or an anti-coherence pattern. Further analysis will examine the links between these head motion signals and the gaze and speech signals. Overall, our aim is to explore new ways of modelling coordinated behaviour as it naturally occurs in social interactions, and this talk demonstrates how high-resolution data capture and novel analysis methods can give new insights into social coordination and can be important for studies of the social brain, such as improving the automatic detection and interpretation of social signals, or to create computational models of realistic social behaviour. It can also advance the development of socially realistic virtual characters.

**Anne K. FELSENHEIMER**, Tübingen (Germany),

**Carolin KIECKHÄFER**, Düsseldorf (Germany), **Alexander M. RAPP**, Tübingen (Germany)

### **Splitting at its Core: Figurative Language in Borderline Personality Disorder.**

Language inheres the synchronic coupling of meaning and words, grounds in embodied interaction and is perceived by implicit intersubjectivity (Fuchs, 2016). At a point where this coupling of meaning is split, ambiguity occurs - as it happens in figurative language. Still, the ontology of ambiguity depends on where exactly the incision is placed. This becomes particularly evident in the contrasting nature of metaphor and verbal irony. Being both nonliteral, they differ in the (in)congruence of words and meaning: In metaphors, they relate. In irony, they diverge, making the intention as such that constitutes ambiguity (Rapp, 2013). Within this incongruence, language can no longer be perceived implicitly and explicit, higher forms of intersubjectivity need to be applied (Fuchs, 2013; 2015). Referring to epistemic mistrust (Fonagy, 2015), we assumed that such explicit forms of intersubjectivity are altered in Borderline Personality Disorder (BPD). But, although being deeply situated in the interpersonal sphere, there are no studies on nonliteral language in BPD so far. Those addressing mentalistic approaches to social cognition remain inconsistent. In order to resolve these inconsistencies, this study investigated primary and higher forms of intersubjectivity as comprehension of different forms of written nonliteral language. Twenty patients with BPD and twenty matched, healthy adults were assigned to a video-based irony detection task and metaphor task with written stimuli. In BPD, performance was significantly lower on the irony, but not the metaphor task (Rapp et al., 2018). In sum, this study was the first to examine figurative language in BPD. It highlights that it is not ambiguity per se, but more specifically the ambiguity of the intention as such causing difficulties in BPD. Mapping these findings onto embodied language, we suggest that they rather arise from differing, explicit self-other metaperspectives than a mere loss of primary intersubjectivity.

**Thomas FUCHS**, Heidelberg (Germany)

### **Intercorporeality and Interaffectivity A phenomenological and enactive account of empathy**

According to phenomenological and enactive approaches, human sociality does not start from isolated individuals and their hidden inner states, but from intercorporeality and interaffectivity. To elaborate this concept, the paper introduces

- (1) a general concept of embodied affectivity: it conceives emotions as a circular interaction of the embodied subject and the respective situation with its affective affordances.
- (2) This leads to a concept of embodied interaffectivity as a process of coordinated interaction, bodily resonance, and 'mutual incorporation' which provides the basis for a primary empathic understanding.

(3) Finally, developmental accounts point out that these empathic capacities are also based on an intercorporeal memory that is acquired in early childhood. It conveys a basic sense of social attunement or a 'social musicality' and also manifests itself in an individual's habitus. Basic empathy as mediated by embodied interaction may subsequently be extended by higher-level cognitive capacities such as perspective-taking and imaginary transposition. Nevertheless, intercorporeality and interaffectivity remain the basis of social understanding.

**Anne GIERSCH**, Strasbourg (France)

### **A disruption of the passage of time at the millisecond-level in schizophrenia: a mechanism for altered immersion in the world?**

The feeling of being one continuous individual in time is a natural evidence, which is disturbed in patients with schizophrenia, who feel disconnected from the environment. We recently related bodily self disorders with time expectation. A visual target was displayed at various delays (500 to 1500 ms) after a fixation point. Expectation increases with time, leading to shorter reaction times. This advantage disappeared in patients with bodily self disorders. Our hypothesis is that patients experience a breakdown of their experience from moment to moment, this leading to a fragmented passage of time and altered expectation. We reasoned that if this hypothesis is true, the disturbance should be observed at the level of milliseconds. We checked this possibility by analyzing sequential effects in a simultaneity/asynchrony discrimination task. Two squares were displayed right and left on a computer screen, with an asynchrony between 0 and 96 ms. 29 patients with schizophrenia and 27 controls pressed on a left or right response key for simultaneous vs. asynchronous squares respectively. Sequential effects consisted in analyzing response times and percent correct responses as a function of the asynchrony on the trial before: e.g. we compared performance when the asynchrony was 48 ms longer vs. equal on trial  $t$  vs.  $t-1$  (for the same asynchronies). Healthy controls were faster when the asynchrony was 48 ms longer on trial  $t$  than  $t-1$ , as if benefiting from the passage of time at the millisecond level. This effect was not observed in patients with schizophrenia. On the contrary patients were more accurate when the asynchrony was identical on successive trials. The results show that patients are sensitive to duration and can be conditioned to short asynchronies, but are impaired when time expectation requires continuous updating. We will discuss how this may explain that patients feel disconnected from the environment.

**Antoni GOMILA, Pamela BARONE, Manuel BEDIA**, Zaragoza (Spain)

### **A minimal Turing test: reciprocal sensorimotor contingencies for interaction detection**

In the classical Turing test, participants are challenged to tell whether they are interacting with another human being or with a machine (Turing, 1950). Turing thought of this test to dissolve the bias that machines cannot exhibit intelligence. If we cannot tell apart a machine from a human being, he reasoned, it must be because the machine exhibits intelligence. The way the interaction took place was as a distant conversation, taking place through screen messages. This is a rather sophisticated form of interaction. Basic forms of interaction are face-to-face and embodied, context-dependent and based on the detection of reciprocal sensorimotor contingencies (Gomila, 2002). The idea is that interaction detection requires embodiment, the integration of proprioceptive and interoceptive patterns with sensorimotor patterns, within quite short time lapses, so that they appear as mutually contingent, as reciprocal. In other words, the experience of interaction takes place when sensorimotor patterns are contingent upon one's own movements, and viceversa. I react to your movement, you react to mine. When I notice both components, I come to experience an interaction. Therefore, we designed a "minimal" Turing test to investigate what is the minimal amount of information required to detect an interaction in this way, and whether we resort to interaction detection to tell apart human from machine agents.

Using a new version of the perceptual crossing paradigm (Bedia et al. 2014), we tried to clarify how much information is required to detect reciprocal sensorimotor contingencies, and tested whether participants employ them to recognize the nature of the agent they are interacting with in repeated encounters. In our minimal Turing test, we presented participants with movements of a human agent, either online or offline, and movements of a computerized oscillatory agent in three different blocks. In each block, either auditory or audiovisual feedback was provided along each trial. We analyzed, on the one hand, participants' explicit responses about the nature of the other agent and, on the other hand, the implicit information subsumed in the dynamics of each participant's series, like the correlations between the series of two interactors, the time between two collisions, the window of collisions (density of crossings), and fractal indices.

Results of study 1 show that although participants differentiated the human agents from the oscillatory bot and correctly identified the bot as a non-person, they judged both the online and the offline agents as persons, and their performance did not improve in the audiovisual condition. Analysis of the implicit measures of the interaction revealed no specific pattern for each type of agent. According to these results, participants may use the periodicity of the other's movements to base their response instead of detecting the interaction.

In study 2, then, we just displayed movements of the online and offline agents along the same conditions. As this new configuration could produce the “illusion of interaction” due to the human nature of both agents, we analyzed the performance of those participants who were completely sure of their explicit reply. Results indicate that they correctly identified both the online and the offline agents only in audiovisual condition, therefore recurring to the strategy of detecting the interaction to base their response. This finding is grounded in one implicit, dynamic measure: correlations between the two series are higher when interacting with the online agent in the audiovisual condition exclusively.

In conclusion, participants are able to use reciprocal sensorimotor contingencies of the interaction in richer scenarios, i.e. when both auditory and visual cues are provided, to determine the type of agent they are interacting with. This strategy is only elicited when we get rid of the periodic, deterministic agent; thus prompting participants to focus in the interaction with the other agent.

---

**Anja S. GÖRITZ and Miriam RENNUNG**, Freiburg (Germany)

---

### **Interpersonal synchrony increases social cohesion, reduces work-related stress and prevents sickdays: A longitudinal field experiment**

This longitudinal field experiment examines synchrony to facilitate collaboration in organizations. Specifically, we tested if

- (1) the known cohesion-enhancing effect of synchronous movement replicates in an organizational setting and
- (2) synchronous movement reduces stress on the level of the individual.

Employees of a publishing company who underwent a physical exercise intervention that involved synchronous movement for 9 weeks were compared with a treated (asynchronous movement) and a nontreated control group (no movement). Data were obtained at three measurement points. Synchronous movement enhanced social closeness, reduced work-related stress and diminished sickdays immediately following the intervention. The longer-term effects were either smaller than the short-term effects or not discernible at all. As the synchrony intervention was short, simple, and well accepted among employees, it is a potentially useful component of workplace health or team development initiatives.

---

**Elisabeth GÜLICH** (Bielefeld) & **Daniel MUZ** (Freiburg)

---

### **Silence as synchronisation – A data session**

Prior research in the Conversation Analysis Paradigm has successfully laid out a taxonomy of silences-in-interaction, distinguishing between pauses, gaps, and lapses.

Pauses are rather short halts in the flow of speech that mainly pass unnoticed. Gaps are longer silences that are noticed by participants and that occur when the participant that is supposed to speak next does not do so.

Lapses are (often even longer) silences where participants temporarily ignore who is to speak next. Now, does this clear cut classification that has proved useful for ordinary conversation in everyday encounters prove useful for therapeutical interactions as well? This question will be addressed during an interactive data session (German data).

---

**Michael HÄFNER**, Berlin (Germany)

---

### **In synch with art: On the moderating role of (the) body (-awareness) in aesthetic emotions**

While there seems to be broad agreement on the fact that aesthetic emotions are a general phenomenon, it is less clear which role the body plays in the process of eliciting and/or moderating them. I propose a model conceiving of the body as a body of resonance that – through domain-specific somatosensory synchronization – is a necessary precondition for the subject to be able to experience aesthetic pleasure.

In addition to these theoretical considerations along the lines of modern grounded cognition models, I will present initial evidence from two studies in line with this model. Specifically, I will first present data speaking to the notion that different aesthetic stimuli (i.e. music versus theater versus fine arts) trigger different and specific somatosensory processes (i.e., bodily sensations and signals in specific parts of the body). Second, I will present data showing that the ability to sense and express such somatosensory processes is crucial in experiencing aesthetic pleasure across different art domains. In an outlook, I will then finally discuss further experimental work that is currently being conducted in my lab and in the field.

### A plea for embodied research

The question of embodiment, especially in the context of interaction, has been subject to ever increasing theorization and research over the last decade. In its most literal understanding, embodiment 're-inserts' the physical body, its affordances (for oneself and for others) and its potential-for-action, into our investigation of cognition (understood either at the individual level, the social level or both). Despite this "corporeal turn" (Sheets-Johnstone 2015) in the cognitive sciences, much less attention or consideration has been given to the place of the researcher's body in the scientific activity itself.

An experiment is an interaction, between the experimenter and her subject of research, but also between the researcher and her instruments, colleagues and, before all else, her own body. Though throughout the last century philosophers and phenomenological psychologists have pointed out the 'embodiedness' of research (e.g. Straus 1963, Fluser 2014, Varela 1996), this has remained largely a blind spot in contemporary research, including research into the question of embodiment.

Dance improvisation is a field of (artistic) research where the body of the researcher is foregrounded as, at the same time, the tool, the object, the site, and agent of investigation. In our research project ICI (from joint improvisation to interaction) we bring together dance improvisation and cognitive science research to study how moving bodies interact. In the ICI project, our laboratory is a dance studio, and dancers and scientists are co-researchers. In this session/workshop, we propose to physically share our experience with embodied research. In particular, we will demonstrate creating conditions that facilitate embodied research, how to collect such data and how to combine it with 3rd person 'disembodied' research protocols. Our primary goal, however, is to bring to the fore the inherent embodiedness of any research practice and incite researchers in our field to be actively aware of this reality.

### One step at a time – exploring group affective tuning in joint action

#### *Introduction*

Group emotion consists of a multiplicity of processes of attunement (Stern 1984), through which the individual affective states are aligned. We investigate these processes using group improvisation games. We use both objective, psychophysiological measures, and subjective ratings to investigate group experiences.

In the "linedance" protocol, participants form a line at one end of the room, and then move to the other side, one step at a time. If two people move at the same time, the group goes back to the starting line and starts again. Participants thus need to "tune in" together to achieve a joint goal.

#### *Methods*

6 groups of 10–14 participants performed the linedance protocol, first eyes open, and then eyes closed. Participants wore wireless heart-rate monitors, accelerometers, and skin conductance rings, giving us indices of their level of arousal. Before and after the linedance, participants provided tablet-based ratings of 7 categorical emotions, and levels of arousal and valence of themselves and the group.

#### *Results*

Preliminary results from the ongoing analysis indicate that the linedance increases especially the basic emotions of surprise and happiness. Participants rate feeling higher arousal and more positive valence after the linedance compared to before. There is large variance in participants' emotion ratings before the linedance, but very little after it, indicating a major mutual attunement of the group's affective state. Interestingly, participants' perceptions of the group's emotional state change much less from pre to post.

Comparing two successful efforts in the game, in the eyes-open condition, participants' average HR levels slightly increased as they got closer to the goal, but in the eyes-closed condition, HR dropped slightly towards the end. This could indicate that listening to each other increased focus and lowered their arousal levels, even countering the rising "pressure" of getting close to the goal.

### 'Thinking' with the body and voice during game turns

'Thinking' has traditionally been considered an internal, individual phenomenon, one that is separate from the body. In this paper, I demonstrate how board game players 'do thinking', and through embodied displays of thinking achieve game-relevant action. I present an understanding of thinking as organized through players' practices for local sense-making. In particular, I focus on two questions: how do players synchronize 'thinking' displays with their turns, and how do players synchronize vocal and embodied practices.

The game turn-taking system is intertwined with the temporal relevance of displays of thinking, as players are accountable to play a move immediately upon it becoming their turn. The central way to account for non-play, and to further delay, is to display 'thinking'. 'Thinking' is achieved through a myriad of practices, including manipulating tokens, hovering the body or hands over the board, self-talk, and non-lexical vocalizations. These practices forestall calls to account from other players. When players do not synchronize their displays to the start of their turn, other players question their engagement and/or express upset. The bodily and vocal displays are coordinated to build a crescendo of action, so that one or the other is continually indexing ongoing 'thought'.

This paper analyzes a data corpus of 19 hours of video-recorded game play using multimodal conversation analysis (11 games, 734 turns at play). This method attempts to uncover an emic understanding of what behaviours achieve, by analyzing members' own unfolding understandings of action (Auer, 2009). The method also emphasizes the importance of the temporal alignment of behaviours for achieving gestalts of action (Mondada, 2018).

Jana KÖHLER, Munich (Germany), Johanna WEISKE, Munich (Germany),  
Moritz SPANGEMACHER, Munich (Germany), Lana BURGHOF, Cologne (Germany),  
Wolfgang TSCHACHER, Bern (Switzerland), Kai VOGLEY, Cologne (Germany),  
Alexandra GEORGESCU, London (England), Christine FALTER-WAGNER, Munich,  
Cologne (Germany)

### Interpersonal Synchrony in Autism Spectrum Disorders in relation to underlying motor and empathy impairments

Background: Fundamental deficits in social interaction and communication are characteristic for people on the autism spectrum. These deficits are visible in a reduced motor coordination of autistic children with other individuals (u.a. Marsh et al., 2013). Yet, an investigation of underlying mechanisms of these coordination deficits and their potential use in diagnostics is currently lacking. This study focuses especially on impairments in empathy and motor skills characteristic for ASD. Associations with interpersonal synchrony could hint at underlying impaired embodiment processes in ASD.

Method: High-functioning adults and typically developing (TD) controls were filmed during diagnostic (mock-)interviews. Both groups were matched in age and IQ. Interpersonal synchrony between patient and diagnostician was measured using Motion Energy Analysis (MEA; Ramseyer & Tschacher, 2011). Additionally, measures of autism symptom severity (autism quotient, empathy quotient, adult dyspraxia checklist) were collected.

Results: Preliminary analyses show significant group differences in interpersonal synchrony, with reduced synchrony in the ASD group. Simultaneously, there are no differences in absolute movement between groups. Motor impairments are significantly more pronounced within ASD compared to TD controls. Within the ASD group, a positive association between the extent of synchrony and empathy was found.

Conclusion: Reduced interpersonal synchrony seems to be a distinguishing feature between ASD patients and TD controls, independent of absolute movement. Associations with symptom severity, underlying motor impairments and empathy deficits are discussed.

Robert KÖRNER, Bamberg (Germany), Lars-Eric PETERSEN, Halle/Saale (Germany),  
Astrid SCHÜTZ, Bamberg (Germany)

### Interactive Musical Sonification for Balance Training

What is the effect of certain postures on self-esteem? In recent years, the topic of "power posing" became very popular in social psychological and embodiment research. High power posing (HPP) is understood as the nonverbal expression of power through open, expansive body postures. In initial studies, HPP was linked to changes in hormones, behaviour and self-perception. However, the research became a typical case in the replication crisis because hormonal and behavioural changes could not be replicated. By contrast, effects regarding psychological processes were repeatedly found. However, so far, no self-esteem elevating effects have been reported yet. To investigate the influence of power posing on state self-esteem, three experiments were conducted using different designs: pre-post-measurement design via online experiment and in the laboratory, independent-groups post-test study in the laboratory. There were 40 to 49 participants per condition (high power posing, low power posing, controls). Participants engaged in two body postures for two minutes each. During that time they performed in an impression formation task. Self-esteem was measured with the Heatherton State Self-Esteem Scale and the Multidimensional Self-Concept Scale. In the pre-post-measurement designs self-esteem scores usually increased after HPP whereas low power posing showed no effects. Likewise, in the independent-groups post-test-design high power posers showed significant higher self-esteem than low power posers even after controlling for perceived awareness of the research hypothesis. The results are discussed with regard to possible demand characteristics and self-fulfilling processes. Findings are connected with power theories and questions about possible moderators and underlying mechanisms will be addressed.

**Virpi-Liisa KYKYRI**, Jyväskylä, Tampere (Finland), **Anu TOURUNEN**, Jyväskylä (Finland), **Petra NYMAN-SALONEN**, Jyväskylä (Finland), **Katja KURRI**, Helsinki (Finland), **Jari WAHLSTRÖM**, Jyväskylä (Finland), **Jukka KAARTINEN**, Jyväskylä (Finland), **Markku PENTTONEN**, Jyväskylä (Finland), **Jaakko SEIKKULA**, Jyväskylä (Finland),

---

### **Alliance Formations in Couple Therapy – a Multi-Modal and Multi-Method Study**

The embodied nature of the alliance formations in multi-actor settings has been an under-charted area in alliance research. In this study, to focus on underlying processes of alliance formation, a detailed multi-method and multi-modal research procedure was developed and applied to one couple therapy session. This study was a part of the Relational Mind research project (Seikkula et al, 2015; 2018). The participants were a couple and two male co-therapists. The entire session was analyzed at the levels of the conversational exchange, bodily postures and movements, and Autonomic Nervous System responses. A detailed analysis was applied to a six-minute episode of the session. Data were also obtained from Stimulated Recall Interviews and an alliance measure.

When there were clear markers of alliance in a dyad's conversation, markers of nonverbal synchrony (such as posture or movement mirroring, or sympathetic nervous system synchrony), were also observed in one or several modalities. In some instances, nonverbal synchrony preceded or even emerged independently of the verbal markers of the alliance. Nonverbal synchrony was often observed, not only between those who participated actively on the conversational level, but also between listeners. These markers of nonverbal alliance served important balancing functions by providing support and maintaining the connection to a client. Thus, verbal and nonverbal markers of alliance were often, but not always in congruence. Implicit nonverbal attunement between clients and therapists may be even more relevant in the formation of the therapeutic alliance than previously assumed.

**Julien LAROCHE**, Paris (France), **Tommi HIMBERG**, Paris (France), Helsinki (Finland), **Matthieu GAUDEAU**, Paris (France), **Clint LUTES**, Paris (France), **Leonardo LANCIA**, Sorbonne-Nouvelle (France), **Asaf BACHRACH**, Paris (France)

---

### **Art-therapy: Healing the Embodied Self through playing and creativity**

When individuals interact, they move each other: they affect each other's activities, sensations, feelings, attention and cognition, making possible collective creativity and learning. The dynamics that emerge from interaction processes can self-organize and modulate individuals behaviors. Yet, the study of the role of interaction dynamics in collective learning and creativity has been overshadowed by a focus on verbal, cognitive and individual-centered processes. However, motor and affective dimensions of interpersonal dynamics are both key factors in the discovery and the acquisition of new patterns of thoughts and behaviors.

Researchers started to study interpersonal coordination more extensively during the last decade but the coupling between persons is generally gauged by the degree of synchronized mirroring, which hinders the possibility of creating novel patterns. Yet, most of the forms of coupling between interacting individuals involve asymmetry, phases of de-coordination complementarity or more complex forms of coupling. Moreover, coordination phenomena are investigated through the lens of their measurements. Looking at group dynamics from a third person perspective is not sufficient. It is necessary to interrogate the inner experience of involved partners of an interaction in order to probe the felt, affective experiences that motivate their behavioral choices and tendencies. Such data can either guide the interpretation of external observations or even explain them.

To study affective and motor coordination attunement processes during group creativity, we present a group improvisation score (the finger dance) where groups of 4 to 6 participants interact freely through improvised movements of their index finger, along a methodological framework that combine qualitative reports of lived experiences and quantitative analysis of observed movements. Reports are collected through a custom app where participants can review their own performances and annotate it. Motion capture devices allowed us to extract movements' trajectories, whose coupling was gauged by non-linear mathematical tools.

**Julien LAROCHE**, Paris (France), **Tommi HIMBERG**, Paris (France), Helsinki (Finland), **Matthieu GAUDEAU**, Paris (France), **Asaf BACHRACH**, Paris (France)

---

### **Tapping into the collective domain : enacting time together**

In the traditional synchronisation-continuation finger tapping task, precision and variability of performances are taken as indices of the motor and cognitive skills that underlie body synchronisation. This relies on the assumptions that there is an objective, measurable unfolding of time whose shape is regular, and that the subjective mind should aim at grasping and reproducing such a regular timing. From this perspective, rhythmical interactions with others are a trivial extension of this, with just the other participant's variability as an added, separable component. Thus most studies to date have investigated isolated individuals. Yet, rhythmic activities are collective in nature (music, dance, ...) and infant-mother communication, our first encounter with rhythms, is interactive. We suggest that our ability to synchronize with a stable regularity emerges from our fluctuating, embodied interactions others, rather than the other way around. Therefore, we study synchronization processes in collective settings where the interaction process itself can play a role in behavioral coordination.

To clarify the role of the dynamics of interpersonal interactions in behavioral synchrony, we conducted a series of dyadic tapping tasks. Population ranged from neurotypical adults to children with brain damages. Groups of 2 to 3 participants tapped on tablets. They were hearing a metronome through headphones, sometimes indicating they had to stop tapping, allowing us to test entrainment effects in inhibition on top of rhythmic activities. Collective movement improvisation interventions took place in between blocks of testing, allowing us to probe the effect of the history of interactions. In general, interactions had the effect of attracting participants' taps toward each other and some interventions stabilized the participants' rhythmic performances. We will present and discuss the results in the context of recent dynamical and enactive views of behavioral coordination.

---

**Hedda LAUSBERG**, Köln (Germany)

### **Measuring interactional synchrony**

Starting with a short review of methods of registering interactional synchrony, the paper outlines the relevance of differentiating between different behavioural entities when analyzing synchronization. Given that different types of body movements such as gestures, self-touch, or position shifts differ in their function with regards to mental processes, interactional synchrony has a different impact when it occurs in one type of body movement as compared to another one. Furthermore, methodologically, since different types of body movements are characterized by different movement structures, they require different points of reference for measuring synchrony. Finally, the laterality of the synchronous limb movements, i.e., autocentric vs. altercentric, appears to be psychologically relevant.

---

**Johannes MICHALAK**, Witten/Herdecke (Germany)

### **Be mindful of your body: Mind-body interaction in depression and its treatment**

Mindfulness-Based Cognitive Therapy (MBCT) has been developed for relapse prevention in depression and has proven its efficacy in a number of clinical trials. Mindfulness means paying attention to the present moment in a non-judgmental and compassionate way. Most mindfulness exercises taught during MBCT are based on the development of a heightened awareness of one's body. The important role of the body is also stressed in the basis research in mind-body interactions. However, research on the role of the body in depression and in MBCT is relatively sparse. In this presentation an overview of the background and empirical foundation of MBCT will be given. Moreover, studies about the role of the body and mindful body awareness in dysfunctional states of mind in depression will be presented. Finally, the concept of vital energy that is seen as a link between the body and the mind and as an essential basis for contemplative and meditative practice in different traditions (e.g., Qi in the Chinese Daoist and Buddhist tradition, Prana in the Indian Yoga tradition, Lüng in the Tibetan Tradition, Ruah in the Hebrew tradition and Spiritus Sanctus in the Christian tradition) will be discussed.

---

**Sally OLDERBAK**, Ulm (Germany), **W. Jake JACOBS**, Arizona (USA),  
**Aurelio José FIGUEREDO**, Arizona (USA)

### **Male attachment predicts nonverbal behavioral synchrony with romantic partner**

First tests of Bowlby's (1969) Attachment Theory were based on coding the nonverbal behavior of infants participating in the Strange Situation experimental paradigm. This paradigm has been extended to adults, with researchers coding how the verbal and nonverbal behavior between romantic partners changes when one or both partners are stressed, and how this relates to the attachment. We extended those studies by further identifying non-verbal behavioral indicators of attachment style; specifically, we examined nonverbal behavioral synchrony as it was predicted by male and female anxious and avoidant attachment. To this end, we developed an adaptation of Eshkol-Wachmann Movement Notation (EWMN; Eshkol & Wachmann, 1958), called the Spatial Position with Movement Interpolation Coding System, which adapted EWMN to work efficiently and effectively with many participants and observations and make the data amenable to more sophisticated quantitative analyses. Applying Windowed Cross Correlation and Peak Picking (Boker, Xu, Rotondo, & King, 2002) we estimated synchrony in total amount of movement between both romantic partners both before and after a stress manipulation, specifically targeting the female partner. We found couples showed significant levels of synchrony in all conditions. We also found that immediately following the stressor, male avoidant attachment predicted decreases in synchrony and male anxious attachment predicted increases in synchrony, with both effects gone five minutes later. There was no effect of female attachment.

---

**Stefan PFÄNDER & Carl Eduard SCHEIDT**, Freiburg (Germany)

### **Synchronization in interactional challenges**

Synchronization can be defined as "the dynamic and reciprocal alignment of modes of expression between interactants". A major premise of the FRIAS Research Focus is that synchronization dynamics are indispensable for successful communication, where participants in interaction add the activation of affective body-energetic dispositions to the semantic, especially referential, aspects of understanding each other. In particular, synchronisation is central for creating resonance and what may be called "resonance spaces" between the people involved in interactional challenges. We will present two case studies of collaborative storytelling of romantic relationships in order to shed light on questions such as: How are epistemic and affective stances displayed, negotiated and re-adjusted in interactional challenges? How do verbal and bodily resources interact in successfully getting back to 'business-as-usual' after the interactional challenge?

**Robert REINECKE**, Basel (Switzerland)

---

### **Creativity in Interaction – The role of embodiment in the creative industry**

Although there is a scientific and socio-political consensus that creativity plays a decisive role in shaping today's knowledge-based society (Organisation für wirtschaftliche Zusammenarbeit und Entwicklung [OECD], 2000, S. 3), empirical approaches to examine the interactive day-to-day production, negotiation, and the fostering of creativity are still lacking (Carter, 2004, S. 212; Reckwitz, 2016; Sawyer, 2012).

In order to fill this gap and to investigate the day-to-day negotiation of creative products, 383 hours of video data of interactions in creative spaces at leading Swiss advertising agencies were collected. These creative spaces were structures created specifically to foster creativity. The interactions taking place in these spaces are analyzed using multimodal interaction analysis (Hausendorf, Mondada & Schmitt, 2012) with special consideration of the spatial component (Mondada, 2016).

Based on the preliminary analytical results, it can be stated the interactive production of creativity and joint development of ideas can be described through a systematic model of five distinct interactively constituted, multimodal realized jobs (Hausendorf & Quasthoff, 2005). The oral presentation will illustrate this model by highlighting how the participants systematically use bodily, scenic presentation to incorporate their ideas – and how these spatial (Hausendorf 2010, 2012), gestural (Fricke 2012; Stukenbrock 2015), embodied (Mondada 2011; Stukenbrock 2012) and collectively imagined (Ehmer 2011) resources are used by other interaction participants as an evaluating and enhancing platform. The presentation covers the participant's multimodal activities during their joint development of creativity and places a special focus of attention on the transformation of the original creative idea through that multimodal process.

**Carlos Vara SÁNCHEZ**, Venezia (Italy)

---

### **Bodily rhythms and entrainment on social interactions**

Rhythmicity is regarded as a fundamental feature of both brain and bodily functions, and rhythm is increasingly considered as a potential organizer coupling body and cognition. This conditioning is believed to take place not only between brain oscillations (Peter Lakato's "oscillatory hierarchy hypothesis"), but also between body and brain oscillations (Wolfgang Klimesch's "binary hierarchy brain body oscillation theory"). Phase-amplitude locking and other mechanisms could play a role in the shared rhythmicity observed in different social interactions (musical improvisation, choir singing, dyadic conversational interactions, problem solving, etc.).

The central idea of the presentation is to defend, from a strongly embodied standpoint, the radical importance of bodily rhythms in social interaction. Bodily rhythms would play a role as sensorimotor coordinators able to entrain perception and action intra and interindividually. By bodily rhythm it is considered a perceivable evolving pattern of oscillations with the ability to entrain other oscillations within and/or between individuals. Bodily rhythms – e.g. respiration, heart rate, gestures – will be considered, thus, from an embodied and enacted point of view combining philosophy and recent research on cognitive sciences; that is, they will be addressed as constituent parts of cognitive processes and as dynamic, time-extended, open interactions between agents and environment. Philosophically, the concept of rhythm is a naturalist approach grounded on John Dewey, for whom "each rhythm, major or minor, interacts with all the others to engage different systems of organic energy", but also taking into account recent theories such as Anthony Chemero's "sensorimotor empathy". The cognitive aspects will be based on recent literature produced by Ivana Konvalinka, Peter E. Keller, and Viktor Müller, among others.

In conclusion, it is proposed a presentation, based on an original concept of rhythm, defending the importance of bodily rhythms on social interactions for their capacity as sensorimotor coordinators to entrain other oscillations.

**Carl Eduard SCHEIDT & Stefan PFÄNDER**, Freiburg (Germany)

---

### **Towards a Taxonomy of Synchronization Processes**

Processes of behavioral synchrony occur in an impressive phenomenological diversity. They may be rather obvious but sometimes they are also difficult to detect in empirical observation. In our paper we will discuss some basic dimensions of synchrony focusing on the non-orchestrated forms of interactional synchrony and their rather diverse functions. A sound taxonomy of dimensions and criteria allowing to identify and to describe the various phenomena of interactive synchrony therefore is urgently needed. Furthermore we will point out that although interactional synchrony can be considered as an observable empirical phenomenon a meaningful definition of the concept has to be based in a more comprehensive theory of human interaction.

**Désirée SCHOENHERR**, Jena (Germany), **Bernhard STRAUSS**, Jena (Germany), **Jane PAULICK**, Trier (Germany), **Anne-Katharina DEISENHOFER**, Trier (Germany), **Brian SCHWARTZ**, Trier (Germany), **Julian RUBEL**, Trier (Germany), **Wolfgang LUTZ**, Trier (Germany), **Kaitlyn BOYLE**, Trier (Germany), **Ulrich STANGIER**, Frankfurt (Germany), **Uwe ALTMANN**, Jena (Germany)

---

### **Movement synchrony predicts reduction of attachment anxiety but not change of social anxiety in social anxiety disorder**

Adult attachment influences the individual's ability to self-regulate within interpersonal interactions, making it an important variable in psychotherapy. Research has shown that movement synchrony assesses how people's movements are associated and is related to interpersonal variables such as therapeutic alliance and interpersonal problems. Additionally, therapeutic outcome seems to be positively associated with movement synchrony. This study examines the association between adult attachment, social anxiety, social avoidance and movement synchrony of patient and therapist.

The sample consists of N=100 patients with social anxiety disorder, of which 57 were treated with cognitive-behavioral therapy (CBT) and 43 with psychodynamic-oriented therapy. Symptoms were assessed with the Liebowitz Social Anxiety Scale; attachment anxiety and avoidance with the Experiences in Close Relationships Questionnaire. Movement synchrony was determined by motion energy analysis and time series analysis. Statistical analyses were performed using correlations and mixed linear models.

Results show that synchrony could not predict initial attachment pattern. However, higher synchrony led by the therapist was associated with reduced attachment anxiety of the patient at the end of therapy. The effect was especially present in CBT. Higher attachment avoidance was associated with a larger time lag in establishing synchrony at the beginning and the end of therapy. There was no direct link of movement synchrony and symptom severity. The results indicate that high synchrony between therapist and patient predicts change of attachment anxiety. This might indicate that it is beneficial if the therapist gives the patient the feeling of a safe base. On the other hand, if the patient is following frequently, this might be an indicator of his/her therapy commitment. Since there was no connection between synchrony and change of anxiety symptoms, it can be assumed that synchrony is rather a proximal variable to interpersonal constructs.

**Désirée SCHOENHERR**, Jena (Germany), **Jane PAULICK**, Trier (Germany), **Susanne WORRACK**, Jena (Germany), **Bernhard STRAUSS**, Jena (Germany), **Julian RUBEL**, Trier (Germany), **Brian SCHWARTZ**, Trier (Germany), **Anne-Katharina DEISENHOFER**, Trier (Germany), **Wolfgang LUTZ**, Trier (Germany), **Ulrich STANGIER**, Frankfurt (Germany), **Uwe ALTMANN**, Jena (Germany)

---

### **Using linear time series analysis methods: Lack of convergent validity and evidence of different facets of movement synchrony**

Investigating nonverbal synchrony is a growing field in psychotherapy and social sciences. It offers the opportunity to capture the coordination of two interacting persons by a nonverbal and thereby implicit measure. However, no gold standard exists with respect to the assessment of movement synchrony. Differences of the linear time series analysis methods are for example the usage of overlapping vs. non-overlapping windows or the incorporation of a time lag vs. no time lag. To date, different synchrony scores were not compared to ensure their convergent validity.

In this study, we used N = 84 time series of psychotherapy sessions as stimulus material. We applied seven different linear time series methods (e.g., cross-lagged correlation and windowed cross-lagged correlation) with 16 different global synchrony scores (e.g., average correlation, maximum correlation, frequency of synchrony). Convergent validity was tested using correlations and exploratory factor analysis. Additionally, we compared the synchrony scores with two external criteria. We examined the predictive validity by predicting the improvement of interpersonal problems assessed with the inventory of interpersonal problems at the beginning and end of therapy and the concurrent validity by contrasting the scores with a non-linear method (cross recurrence quantification analysis) that can be viewed as generalization.

We found that all synchrony scores only partly correlate with each other. A one-factor model did not fit the data. However, for eight of the scores a three-factor model with a second-order synchrony variable was found. Only some scores correlated with the non-linear score and some predicted improvement of interpersonal problems. To conclude, the considered synchrony scores did not measure the same construct, rather different facets of synchrony: the strength of synchrony of a total interaction, the strength of synchrony during synchronization intervals, and the frequency of synchrony.

Lilian SEUBERLING, Berlin (Germany)

---

### Witnessing, resonance and risk

The empathic resonance experience between therapist and client is mentioned as a significant healing factor in therapy by several authors. The therapist or/and the group members in a grouptherapy act as witnesses with their bodies. The role exchange in Psychodrama, the use of the empty chair method in Gestaltherapy or working with representatives in family constellations make moments of synchronicity and resonance visible. These practices use resonance as a tool, often without naming it explicitly and they are also brought forth by embodiment and the practice of drawing the attention to body sensations. What forms of witnessing evolve when the body is more involved in therapy? What elements resonate especially when synchronicity happens? What is it that resonates in rather theatre-close therapy forms? And what are the chances and risks of these kinds of embodied practices? On the base of phenomenological field research that I conducted as part of my PhD thesis "Embodied Relations" within the context of the ERC project „The Aesthetics of Applied Theatre"/ part project „Theatre as Therapy" at the Freie Universität Berlin, these are some questions I will discuss.

Gustav R. SJOBECK & Steven M. BOKER, Charlottesville (USA)

---

### Segmentation of Time Series Based on Symmetric Behavior

The coexistence of simultaneous behavior, whether between dyads or within an individual, necessarily involves some level of similarity of structure. This similarity corresponds to the notion of symmetry, a more general form of synchrony. Unlike synchrony, symmetry allows for conclusions to be drawn about moments in time that are similar across time lag and that exhibit differences in the magnitude of similarity. Symmetry is theorized to exist in human behaviors like dance (Boker, Covey, Tiberio, & Deboeck, 2005), conversation (Ashenfelter, Boker, Waddell, & Vitanov, 2009), and attachment (Evans & Porter, 2008), among others. The current method seeks to quantify the symmetry that exists between two measured signals corresponding to the behaviors of interacting individuals. This symmetry is theorized to exhibit both spatial and temporal similarity, and so the current method should account for both. One method used to capture the similarity in time series is the windowed cross-correlation (WCC) procedure (Boker, Xu, Rotondo, & King, 2002). This procedure measures the correlational similarity of windowed segments between two time series which are lag-offset to account for delayed influences. While the resulting WCC matrix contains information relevant to both spatial and temporal similarity, the latter is not represented in condensed form usable for drawing conclusions. The current study suggests a method that accomplishes this task, by first correlating these lagged correlations in the WCC matrix that correspond to a given reference time point with a given number of prospective time points, and then by determining which time points are most unlike future time points using Mahalanobis Distance (Mahalanobis, 1936). This method has been tested on three simulated examples: simulated noise, sine curves, and

segmented noise and sine curves. Likewise, this method has been tested on an empirical example involving attachment and heart rate. A proportion of symmetry has been given as a value reflective of the symmetry present in the system. The values in each data example reflect what would be expected for that data example, and meaningful cross-over periods, from symmetry to non-symmetry, are demonstrated to exist.

Anja STUKENBROCK, Lausanne (Switzerland)

---

### Gaze Matters – Synchronizing Bodies and Minds in Social Interaction

Numerous species in the animal world display an amazing capacity for synchronization. Just as the origins of this behavioral timing are manifold, so are its functions (protection against predators, courtship, social cohesion, etc.). In the course of human evolution, our conspecifics have developed embodied and linguistic practices of coordinating bodies and minds for various purposes, notably for co-orientation and co-operation.

While the term synchronization is closely related to measurable time and mostly applied to quantifiable phenomena evaluated by external measurements (Tschacher, Ramseyer & Koole 2018), multimodal conversation analysis has shown that different temporalities contribute to the reciprocal fine-tuning of resources mobilized by participants in social interaction (Hausendorf 2007; Deppermann & Günthner 2015; Deppermann & Streeck 2018; Meyer, Streeck & Jordan 2017).

In face-to-face interaction, the interpersonal timing of verbal and embodied resources (e.g. speaker and addressee gaze in utterance construction and turn-taking, cf. Kendon 1967; Goodwin 1980, 1981; Rossano 2012; Auer & Weiß 2016; speaker gesture and addressee gaze in pointing, cf. Stukenbrock 2015, 2018a, b) is largely based on the reciprocity of perception. Although it is a sine qua non-feature of focused interaction (Goffman 1963, 1964) and more or less taken for granted, reciprocity of perception is, moreover, also an interactional achievement: It is locally accomplished by practices of mutual monitoring that become socially visible and scientifically analyzable at the moment of execution. Situated within the framework of multimodal conversation analysis, my paper explores specific gaze practices deployed by participants concurrently with speech and gesture when they mutually orient to one another, jointly attend to phenomena in the surroundings, coordinate their minds and bodies, and display understanding to each other. It focuses on how the micro-temporal coordination of the participants' gaze in the ongoing interaction serves to interactionally project, anticipate, and create perceptually grounded moments of heightened intersubjectivity. The analyses are based on video data and mobile eye tracking recordings of naturally occurring social interaction in a range of different settings.

Wolfgang TSCHACHER, Bern (Switzerland)

---

### Physiological synchrony in psychotherapy

The therapist-client alliance is a foundational factor common to all psychotherapy approaches, and accordingly has attracted much attention in psychotherapy process research. In this presentation, I will analyze psychotherapeutic interactions addressing a possibly significant aspect of alliance – therapist-client synchrony regarding physiology. Different physiological signals are available, which have different psychological links: Cardiac parameters, electrodermal activity, respiration, and central nervous signals. I will present some findings of a sample of 55 dyadic psychotherapy sessions, where the synchrony of client's and therapist's heart rate, heart rate variability and respiration was analyzed. Results support the existence of physiological synchrony in psychotherapy, which speaks for the sympathetic and parasympathetic coupling between therapist and client. In several ways, physiological synchrony was associated to self-reports on the quality of the sessions.

Tomi WASELIUS, Jyväskylä (Finland)

---

### Rapid changes in bodily states affect learning

Declarative memories consist of the past events and factual information that can be recalled. Hippocampus is the most crucial brain region when these memories are encoded to cortex. It is interesting that neural events in hippocampus and some rapidly changing bodily states like cardiac cycle and respiration pattern have rhythmical coupling. Our studies have demonstrated that neural processing of the external stimuli and behavioral learning is affected when the conditioned stimulus is presented during different phases of bodily rhythms. We showed that processing of responses evoked by an external stimulus is modulated differently in cortex and in the hippocampus when the conditioned stimulus is presented either at the diastolic or systolic phase of the cardiac cycle. Furthermore, learning is enhanced if the conditioned stimulus is presented during the diastolic phase. Finally, we have shown that timing the whole conditioning trial to expiration phase is optimal for learning. The findings of these studies are novel and suggest that not only the rapid changes in neural states but also bodily states are connected and have an impact on learning and neural processing of the external world perceived. The aforementioned effects of bi-directional coupling of bodily states and the limbic system, and thus, the modulation of stimulus processing should be considered in experimental psychology. Further, timing the presentation of significant stimulus to noninvasively monitored specific bodily states could be used to facilitate learning in cognitively demanding tasks. In future, these findings can be elaborated to study other mental processes as well.

# POSTER – ABSTRACTS

(in alphabetical order)

Uwe ALTMANN, Jena (Germany)

---

### Measuring movement synchronization using motion energy time series, windowed cross-lagged correlation and a peak-picking algorithm

In interpersonal interactions we can observe short sequences in which the nonverbal behavior of a person seems to be highly coordinated, attuned, or synchronized with the nonverbal behavior of the interaction partner. Meta-analyses suggest a relationship between such nonverbal synchronization and higher social bonding, social attitudes and social behavior. In this paper a method is presented which identifies intervals of movement synchronization. Furthermore, possible statistics of resulting output and examples of applications are introduced. The input of the presented algorithm is a pair of motion energy time series which describe the time course of movement behavior of two interacting persons. The dependence structure of time series is quantified with windowed cross-lagged correlation. The resulting matrix of squared correlation coefficients is the input of a peak-pick algorithm which locates synchronization intervals defined as set of neighbored correlation coefficient maxima which have an equal time-lag. The output is a list of synchronization intervals (LOSI) incorporating beginning, end, time-lag, and average R2 of each identified synchronization interval. Based on the LOSI, several statistics can be computed, e.g. frequency of movement synchrony, a leading score, average time lag of synchronization intervals, or range of time lags (so called attunement). At last, these scores can be correlated with prevailing circumstances of interpersonal interaction, e.g. presence of mental disorder, relationship of interacting persons, type of situation, or later success of psychotherapy.

The method is illustrated using simulated time series pairs and real world data. Furthermore, the algorithms are discussed regarding the conceptualization of movement synchronization and application restrictions.

**Pamela BARONE**, Palma de Mallorca (Spain), **Manuel BEDIA**, Zaragoza (Spain),  
**Antoni GOMILA**, Palma de Mallorca (Spain)

---

### **A minimal Turing test: reciprocal sensorimotor contingencies for interaction detection**

(this poster presentation accompanies the oral presentation of Gomila, Barone and Bedia (abstract see above))

**Nicolás Araneda HINRICHS**, Santiago (Chile)

---

### **New Materialism on Social Cognition**

Low-level descriptions of individual or group interactions are performed in current cognitive neuroscience through state of the art techniques and methodologies. These observations can be defined as being close to the material niveau of the structure and functioning of our organism as a body. Goals, emotions, actions and thoughts that motivate human behaviour transcend the reach of this lense, nonetheless (i.e. psycholinguistics used to be quite English based and postulated general principles of which later turned to be proven that they were not replicable with other languages); thus, the general claims made about these –cultural– constructs as a whole, should be more qualified. Theory of embodiment has informed for the last decades about the relevance of both sensorimotor information and the experiential context of their perception, so as to model cognition, but has failed regarding the study on the conveyance of socially shared meaning and individual/group identity. This paper will pursue the conveyance of a New Materialism based on a crossbreed between neuroscience and anthropology –which has long made the effort to posit the exploration of Otherness into the scope of the cognitive sciences–, so as to guide the spotlight of the research agenda on social cognition and interaction to occur at a level that comprises both cultural constructs and constraints that can be measured with current neurophysiological analysis. The purpose of this guidance is to act as a bridge between the referred gap, that is, the results of investigations of elementary biological mechanisms of human bodies and the discoveries of experimental psychologists. Whereas so called neuroanthropology places the brain at the centre of discussions about human nature, following that the nervous system is our most cultural organ, New Materialism focuses on the deconstruction of the dynamic interaction between the socio-cultural milieu and its contingent sensory environment at the material level, in order to comprehend the relation between the formation of self and group identity in terms of brain percepts.

**Stefan E. HUBER**, **Markus CANAZEI**, **Josef MARKSTEINER**,  
**Andreas MAURACHER**, **Wilfried POHL**, **Pierre SACHSE**,  
**Elisabeth WEISS**, Innsbruck, Aldrans, Hall, Graz (Austria)

---

### **Fractal analysis of locomotor activity data of geriatric in-patients with dementia**

Signals emerging from the highly-interacting coordinative functioning of multi-component systems with feedback give rise to fractal characteristics like scale-invariance or self-similarity (Kello et al., 2010). The control mechanisms underlying the regulation of human motor activity represent a pivotal example of such a system. Fractal scaling of motoric signals appears as a hallmark of (mental) health, indicating the ability of an organism to maintain optimal levels of adaptability and flexibility under variable external conditions (West, 2010). In contrast, changes of scale-invariant signal properties have been associated with impaired health and/or cognitive function (Nakamura et al., 2016; Li et al., 2018). Being grounded in a framework of interrelated mind, body and situated behavior, fractal analyses, which explore the mentioned signal characteristics, are conceptually central to situated embodied cognition research (Van Orden, Holden & Turvey, 2003). Here, we report results of a fractal analysis of locomotor activity data obtained by wrist-actigraphy from 42 geriatric in-patients diagnosed with dementia (Huber et al., in preparation). In particular, the properties of distributions of low-activity periods are assessed (Nakamura et al., 2016) and compared to results obtained with detrended fluctuation analysis (Li et al., 2018). We also discuss potentials and limitations of this method concerning diagnosis and monitoring of dementia (Huber et al., in preparation). Finally, we critically assess several methodological issues such as the dependence of the results on the used time resolution.

**Robert KÖRNER & Astrid SCHÜTZ**, Bamberg (Germany)

---

### **Current directions in power posing research: Rise and fall of a concept**

In 2010, the expression “power posing” emerged. Dana Carney, Amy Cuddy and Andy Yap showed in a very popular experiment that two poses, so called ‘high power poses’ which were held for one minute each, led to increased feelings of power and risk-taking, elevated levels of testosterone and decreases in cortisol. High power poses are characterized by expansion whereas low power poses are characterized by contraction and taking little space. The finding evoked a lot of attention in academia and the public and stimulated research about the effects of body postures. Power posing seemed to be a new tool to improve one’s life. However, seven years later, a preregistered research project aimed at replicating previous findings. Hormonal and behavioral changes through power posing were not replicated. Moreover, a p-curve analysis had shown that the distribution of p-values from power posing studies is indistinguishable from an expected effect size of zero. The concept became an example of the replication crisis. By contrast, in 2018, Amy Cuddy published several p-curve analyses, which showed moderate to strong evidential value for postural feedback on subjective feelings of power, emotion, affect and self-evaluation. The poster aims at drawing a conclusion from

these controversial findings. We conclude that evidence for behavioral outcomes is weak and there is no evidence for hormonal changes through high power posing. Psychological effects seem replicable though. We will discuss possible moderators like gender or openness to experience as well as possible underlying mechanisms – and the possibility of demand characteristics and self-fulfilling processes.

**Susanne MAUS-HERMES, Gunnar JÄHNICHEN,  
Constanze SCHULZE-STAMPA**, Ottersberg, Delmenhorst (Germany)

### **Preliminary results of “bopain.t” – an art therapeutic approach to embodiment in multimodal pain therapy**

#### *Background*

Chronic pain leads to changes of body perception. Actual concepts of multimodal pain therapy consist of activating therapies. The potential for stimulation of body perception by art therapy, and the opportunity to use the concepts of embodiment was not focused in the current literature. A new art therapeutic intervention, called “bopain.t” was adapted from “messpainting” to the needs of multimodal pain therapy.

#### *Methods*

In a prospective pilot study 20 patients (12 men/ 8 women) were included in the study. Patients were hospitalized for 3 weeks in a department for multimodal pain therapy. The intervention was performed twice weekly. During each intervention of 60 minutes the patients painted in an upright position with 8 brushes and 8 colors within 2 minutes per picture. Painting was focused on the process and not on the results. Patients were asked before and after the whole period to answer the “Frankfurter Körperkonzept Skalen (FKKS)” questionnaire. Before and after each intervention patients had to additionally answer Scale 1 of the FKKS to examine the influence on body perception. A special questionnaire was developed to study the acceptance of the intervention.

#### *Results*

The intervention was successfully introduced in the concept of multimodal pain therapy and was highly accepted by the patients. In the FKKS Scale 1 the ratio of negative orientations was reduced, and the ratio of neutral orientations was slightly increased. Overall there was a tendency for improving body perception without being statistically significant. Patients complained of less pain after the intervention in comparison to pain perception before.

#### *Discussion*

“bopain.t” showed positive effects on the self-concept, pain- and body perception. Due to the small number of participants the results were not statistically significant. The questionnaire and the FKKS seems to be suitable for examination of this intervention. Further studies with a higher number of participants should be carried out.

**Deborah MEIER & Wolfgang TSCHACHER**, Bern (Switzerland)

### **Physiological Synchrony in Psychotherapy**

Current quantitative research increasingly shows that therapeutic interaction is grounded in therapists’ and patients’ posture, body motion, gesture, prosody, and physiology – in short, in their bodies. Nonverbal behavior is still widely uncharted territory in psychotherapy research. This is particularly true for the latter phenomenon, physiological synchrony. Recent studies found that patients and therapists as well as couples spontaneously synchronize their physiological responses during interaction. Such physiological synchrony has been linked to better therapeutic alliance in psychotherapy and, in couples, to higher relational empathy.

This paper will discuss methods by which physiological synchrony can be quantified, especially the approach based on cross-correlations (SUSY – Surrogate Synchrony) and the approach based on cross-correlations of piecewise slopes (Concordance Index). The methods were applied to a dataset of four dyadic psychotherapy courses where hand movement, respiratory behavior and cardiac activity were monitored throughout all sessions. Session reports were provided by the therapist and the clients after sessions. The study is explorative given that no previous research on this methodological synchrony approach applied to respiration and cardiac activity is available.

We analyzed the effect sizes of physiological synchrony of the physiological measures finding that they were significantly given for the respiratory coupling of therapist and client and for cardiac activity, especially heart rate. We describe the relationships between the two synchrony methods, and the association between physiological synchrony and movement synchrony.

**Marta MIRAGALL**, Valencia, Madrid (Spain), **Diana BURYCHKA**, Valencia (Spain),  
**Jéssica NAVARRO-SIURANA**, Valencia (Spain), **Ausiàs CEBOLLA**, Valencia,  
Madrid (Spain), **Adrián BORREGO**, **Roberto LLORENS**, Valencia (Spain),  
**Javier FERNÁNDEZ-ÁLVAREZ**, Bochum, (Germany),  
**Simon BLACKWELL & Rosa M. BAÑOS**, Valencia, Madrid (Spain),

### **Exploring the effect of an upright (vs. stooped) posture during a cognitive bias modification**

Positive Imagery Cognitive Bias Modification (PI-CBM) consist of imagining repeatedly positive resolutions for ambiguous situations in order to modify the interpretation biases involved in the onset and maintenance of depressive symptoms. Positive outcomes after PI-CBM interventions have been found, but further development is needed to enhance their effects. A previous study carried by the authors, framed within the embodied cognition theories, showed that adopting an upright (vs. stooped) posture led to more positive interpretations of ambiguous information. Nevertheless, no studies have included the manipulation of the posture during a PI-CBM. Objective: The aim of this study was to analyze the effect of adopting

an upright posture (vs. stooped) during a PI-CBM on interpretation bias. Method: The sample consisted of 50 women with mild or moderate depressive symptomatology according to the BDI-II (Beck et al., 1996) ( $M = 17.82$ ,  $SD = 4.75$ , range: 10 to 29). Participants were randomly assigned to the upright ( $n = 25$ ) or the stooped ( $n = 25$ ) condition. The allocated posture was adopted during one session of PI-CBM. Participants answered a self-report measure of interpretation bias (AST-D-II, Rohrbacher & Reinecke, 2014), before and after the PI-CBM. Results: Repeated measures ANOVA showed that there was a main effect of time on AST-D-II, but there were no significant interaction effects. Effect sizes for upright and stooped condition were  $d = 0.73$ , 95%CI [-0.33,-1.13], and  $d = 0.42$ , 95%CI [-0.09,-0.76], respectively. Discussion: Although participants in both conditions improved interpretation bias after the PI-CBM, the exploration of the effect sizes revealed that this effect was larger for the upright than for the stooped condition. Considering that postures maintained for long periods of time may cause habituation, it is possible that, with shorter bouts of time adopting the posture during the PI-CBM interventions, larger differences may emerge.

**Robert MOULDER**, Charlottesville (USA), **Louis PENNER**, Detroit (USA),  
**Steven BOKER**, Charlottesville (USA), **Terrance ALBRECHT**, Detroit (USA), **Susan EG-GLY**, Detroit (USA), **Lauren HAMEL**, Detroit (USA),

---

### **Differences in Nonverbal Synchrony Between Racially Concordant and Racially Discordant Physician and Oncology Patient Dyads**

Racial disparity exists in mortality rates between black and white oncology patients (Bach et al., 2002). In the United States, cancer related deaths for black patients are 20% higher than for white patients. A portion of this disparity may be explained by subtle differences in non-verbal communication patterns between racially concordant and racially discordant patient/physician dyads (Greenwald et al, 1998). When two individuals engage in communication, they tend to share body motions and move in time with one another. These motions tend to be automatic and occur with little conscious effort. This nonverbal synchrony is indicative of a number of qualities shared between members in a given communication dyad, such as feelings of affiliation, trust, and perceptions of team dynamics (Boker et al., 2009; Ramseyer & Tschacher, 2011; Wiltshire, Steffensen, & Fiore, 2018). Using Motion Energy Analysis (MEA) and surrogate data testing methods, we compared aspects nonverbal synchrony between pairs of racially concordant and racially discordant oncology patient/physician dyads (Moulder et al., 2018; Ramseyer & Tschacher, 2011). We found racially discordant dyads to have higher estimates of nonverbal synchrony than racially concordant dyads, show more variation in amount of nonverbal synchrony than racially concordant dyads, and show more variation in timing of nonverbal synchrony than racially concordant dyads (all  $p < .001$ ). These findings allow for a more nuanced understanding of the interplay between racially discordant dyads in high-stress situations and may lead to new interventions and/or physician training initiatives focused on facilitation of a comfortable equilibrium in body language between physicians and patients. Such interventions and training initiatives may then lead to lower overall mortality rates through a decrease in mortality rates between blacks and whites.

**Valentina NICCOLAI**, Duesseldorf (Germany), **Anne KLEPP**, Duesseldorf (Germany),  
**Hanneke VAN DIJK**, Duesseldorf (Germany), Nijmegen (Netherlands),  
**Alfons SCHNITZLER**, Duesseldorf (Germany),  
**Katja BIERMANN-RUBEN**, Duesseldorf (Germany)

---

### **Auditory cortex sensitivity to the loudness attribute of body-related verbs**

Within the framework of embodied cognition, sensory and motor systems are proposed to be engaged not only in perception and motor execution, respectively, but also in language processing. In particular, there is some evidence that the auditory cortex is activated during the processing of words describing actions with acoustic features. The present study further examines whether processing words characterized by different levels of loudness when executed, i.e. "loud" (to shout) and "quiet" actions (to whisper), differentially activate the auditory cortex. Twenty healthy participants were measured with magnetoencephalography (MEG) while semantically processing visually presented inflected verbs (1st or 3rd person), followed by a short tone. To determine loudness-related oscillatory patterns and the specific brain regions of the temporal area involved in loudness processing, a separate task requiring the processing of loud and quiet tones was used. The resulting loudness sensitive temporal Brodmann areas A22, A41/42, and posterior superior temporal sulcus, which showed stronger alpha suppression following loud compared to quiet tones, were inspected in the word paradigm. Also here, action loudness modulated power suppression, though in the beta range, with significantly stronger beta suppression following loud compared to quiet actions in the left hemisphere. We further examined the auditory cortex sensitivity after it had been modulated by the aforementioned action words, by focusing on the N1 in response to the tones presented after each verb. In line with oscillatory results, the N1 showed a smaller amplitude after loud than quiet actions in the left but not in the right hemisphere. Differential auditory cortex recruitment depending on action loudness points to possible selective auditory simulation mechanisms involved in verb processing. Additional analyses related to movement amount implied by the verb showed an effect in the right V5/MT+ and no effect in the auditory areas thus suggesting at least partial independence between loudness and movement amount parameters.

**Katharina C. H. REINECKE, Niklas NEUMANN, Hedda LAUSBERG**, Köln (Germany)

### **Increased nonverbal synchrony towards the end of psychotherapy is associated with symptom stagnation**

**Aim:** Nonverbal synchrony (NVS) in psychotherapy is considered an indicator for positive therapeutic rapport and therapeutic success. Thus far, researchers focused on the investigation of NVS at the beginning of psychotherapy. The present study aims to clarify how NVS at the beginning and at the end of psychotherapy is associated with symptom improvement. **Methods:** 42 video recordings of first and next-to-last psychotherapy sessions from the Social Phobia Psychotherapy Research Network Project were analyzed. Using the Liebowitz Social Anxiety Scale (LSAS), patients were grouped according to improved symptoms ( $n = 10$ ) and stagnated symptoms ( $n = 11$ ). Two independent certified raters analyzed hand movements with NEUROGES-ELAN. Synchrony between patients' and therapists' conceptual movements was assessed. **Results:** In the stagnated group, synchronous movements were displayed longer (duration, proportion of time) than in the improved group. In comparison to the beginning of psychotherapy, at the end of psychotherapy nonverbal synchrony frequency was higher for the stagnated group. **Conclusion:** Increased synchrony durations and proportions of time are associated with outcome stagnation, comparable to research in vocal synchrony. Long NVS durations indicate difficulties with nonverbal attunement. This could indicate stagnation in development towards more autonomy. NVS is not always positively associated with therapy outcomes. It depends on its development in time and on the measurement parameters of the synchronous movements.

**Charles WINDLIN**, Stockholm (Sweden), **Javier FERNÁNDEZ-ÁLVAREZ**, Milan (Italy), **Giuseppe RIVA**, Milan (Italy), **Kristina HÖÖK**, Stockholm (Sweden)

### **Bridging Human Computer Interaction and Psychology for wellbeing: The case of synchrony as an interpersonal emotion regulation strategy**

Both Human Computer Interaction and Psychology are scientific disciplines that aim to provide better solutions to people, after all and despite the differences, with the aim of increasing their quality of life. The crossing between technology and psychology for the enhancement of wellbeing has recently been conceptualized as Positive Technology (Riva et al., 2012; Botella et al., 2012). Despite counting with mounting evidence, there is still missing a theoretical framework that can truly integrate HCI and Psychology. With that aim, we particularly take into account the somaaesthetics perspective (Shusterman 2018) and the embodied cognition paradigm (Fuchs, 2013) as two manifestations that may particularly foster the integration of these two fields.

In this exploratory study, apart from providing the first theoretical insights after a whole year of work within AffectTech, a European ITN project that gathers computer scientists, engineers, HCI designers and clinical psychologists, we aim to present a series of ongoing examples of

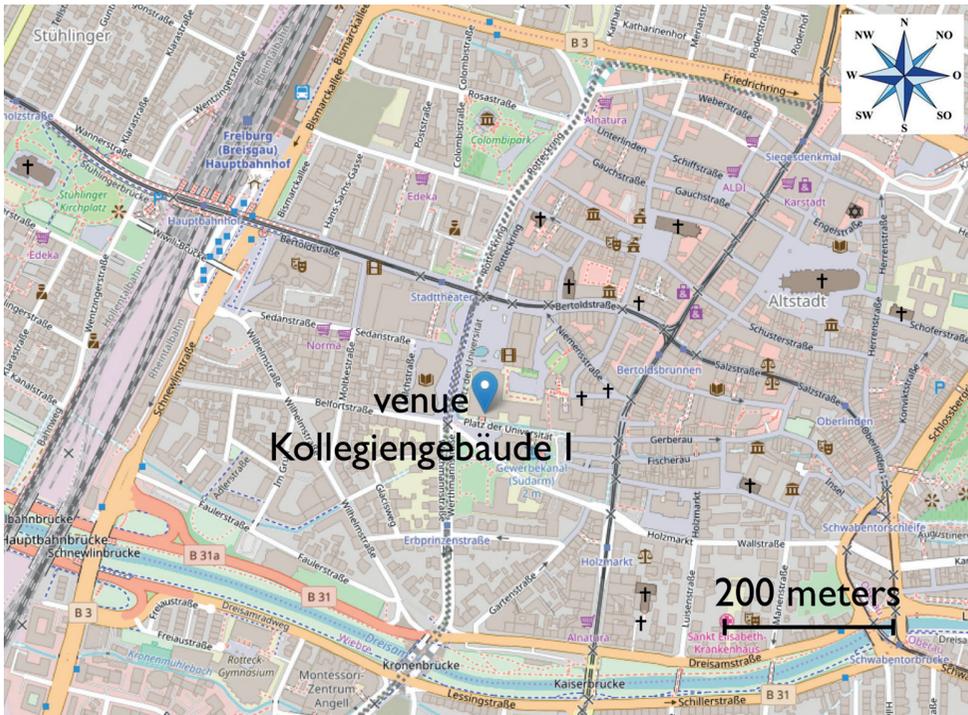
technologies designed within this framework which aim particularly to increase the synchrony between people. Synchrony has emerged as a key construct in the embodiment literature, given the existing association of the process with a vast array of relevant constructs in psychology, such as prosociality, secure attachment, effective interpersonal emotion regulation or good therapeutic alliance.

Soma Interaction Design (Höök 2018), inspired by somaesthetics, is completely conceivable from an embodied perspective as this innovative approach seeks to replace the classical symbolic, language-oriented, and predominantly visual interactions of users with technologies for shape-changing interfaces or movement-tracking apps from a first-person perspective (Höök et al., 2018). The integrative framework provided by Koole and Tschacher (2016) can be smoothly incorporated in new HCI practices, rituals, routines and artifacts that may enhance physiological and movement synchrony, consequently the aforementioned constructs and thus increasing well-being.

At this current stage we are conceiving concepts and building prototypes that are rooted in the above-mentioned perspective. The goal is to present artefact concepts as provocations for further discussions, like a interactive system that will allow two persons to breath together and nudged by the system to reach synchrony. In the same line of work, we are conceiving and building a modular toolkit comprised of several artefacts that have the ability to sense bio signals, use the generated data to design and orchestrate an experience with actuating artefacts like vibration, heat and shape-changing capabilities. The purpose of this system is to provide explorable technology artefacts to psychologists which can explore new treatments for and with the patient together.

This is an exploratory study that will aim to trigger hypotheses for concrete research questions in the near future.

# LOCATION PLAN



Map of venue



SYNCHRONIZATION  
IN EMBODIED INTERACTION

FEBRUARY 28–MARCH 2  
2019

