

Full-Body Motor Markers of Schizophrenia

Using MoCap to quantify Disembodiment

Lily Martin, Kevin Stein, Katharina Kubera, Niko Troje & Thomas Fuchs



Background. Genuine motor abnormalities (**GMA**) – independent of medical side effects – can be observed in over 50 % of individuals with schizophrenia^{1,2}. The most frequently reported symptom is motor incoordination³. Therefore, the phenomenology-based embodiment approach understands schizophrenia as a form of **disembodiment**⁴. Although motor abnormalities recently became an independent symptom domain in newly developed research frameworks for mental disorders (Rdoc), there is no consistent definition of a motor domain in schizophrenia⁵. Hence, in a standard setting of German clinical care motor symptoms are disregarded as markers of the illness. Psychiatric diagnostics fail to include quantifiable motor variables or ways to objectively assess them. Few assessment tools examine full body movement^{6,8}.

Hypotheses. H1: We will find subtle differences in movement characteristics of SCHZ and CNTRL (**full-body motor markers**). H2: These motor markers will go beyond markers of depression (see ⁹). H3: Motor markers will be **related to symptom severity** and **kind**.

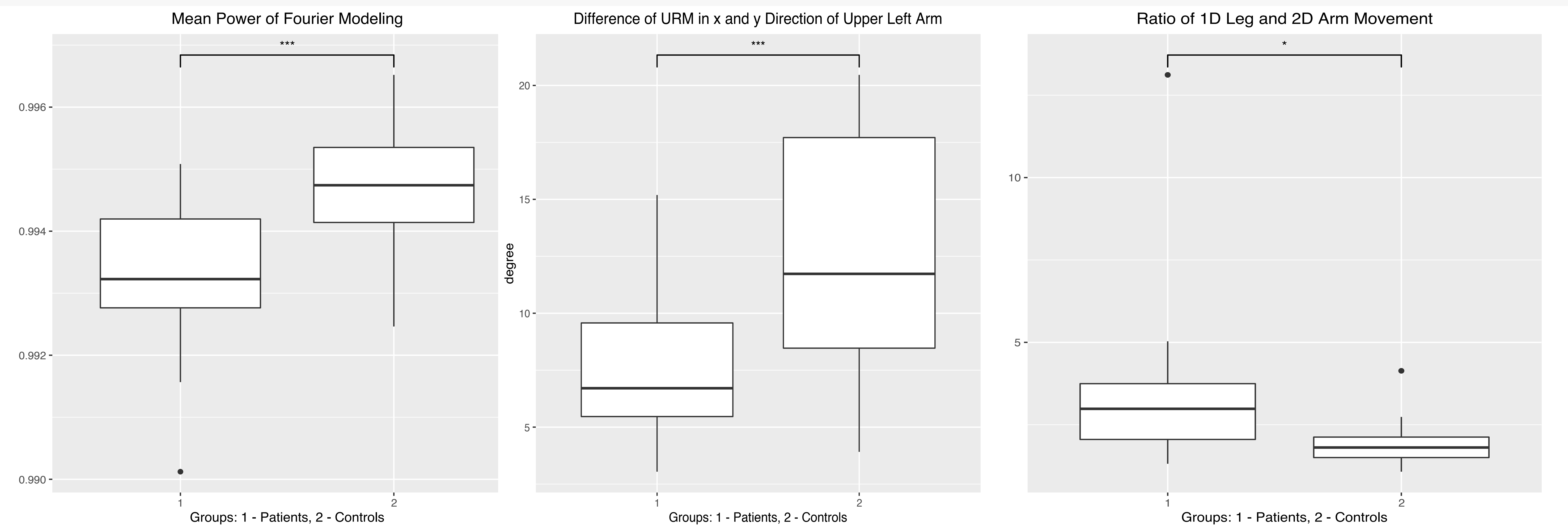


Methodology. 46 participants (20 SCHZ, 26 CTRL) were assessed at HCMR. SCHZ with PANSS, NSS, BPRS and SAS, CTRL with NSS. Participants were recorded while:

- A. Walking on a marked path: simple walk
- B. Walking on a marked path: dual task (walking & counting backwards)
- C. Doing a full-body coordination task: Tandem Walk.

8 MoCap cameras (Qualisys, SA 1mm, TR 150 Hz) captured 49 markers attached to the participants' skin. We applied propensity score matching (PMS) to reduce the influence of confounding variables. In a data-driven analysis (MATLAB, R, SPSS) motion patterns of 40 participants were modeled (Fourier), visualized, exaggerated, quantified and compared between groups (T-tests, ANCOVA).

Results. While walking (simple walk), SCHZ and CNTRL display significant differences in **head posture**, **rhythmicity/periodicity** of gait, **arm** and **elbow sway**, **lateral body sway**, **integration** of arm and knee sway, **goal directedness** of limb movement, **flexibility** of limb movement, **coordination** and **velocity** of limb movement. These motor characteristics remain significant when controlling for medication load (OPZ) and body physicality (BMI, height, mass).



Discussion. We can verify H1 and H2: SCHZ display motor markers of depression as well as further characteristics, which are mainly related to **coordination of body sides**, **different limbs** and **direction of movement**. Due to PMS and covariate control, the motor characteristics can be understood as independent of medication load and physicality. H3: The inter-relation of motor characteristics and symptom scales has yet to be analyzed. Only then, a statement on quantification of disembodiment can be made.

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