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Disorders of Social Motor Coordination in Schizophrenia

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Abstract

Even if schizophrenia is known to affect social interaction, reasons of such impairment remain unclear. Social motor coordination has been suggested as being an important embodiment of healthy social exchanges. Therefore, we examined whether social motor coordination is affected by schizophrenia. Investigating patients unintentionally and intentionally coordinated with control participants, we found that schizophrenia decreased intentional but not unintentional coordination. A model is proposed to describe and understand such impairments.

1. Introduction

Schizophrenia is considered as a neurodevelopmental disorder. It manifests itself through a variety of behavioral and cognitive impairments [1] as well as social interaction deficits [2]. Although many studies have investigated this disorder's cognitive impairments, little research has been performed on its interpersonal interaction impairments. To fill this gap, we have begun to investigate whether interpersonal motor coordination is impaired in schizophrenia. Several studies have shown that social exchanges are facilitated when interpersonal coordination between people is enhanced [3]. Therefore, interpersonal motor coordination manipulation could help in understanding the social deficits observed in patients suffering from schizophrenia. To do so, we investigated unintentional and intentional motor coordination using the well-etablished paradigm in which participants swing hand-held pendulum [4]. Because research has shown that schizophrenics have attentional deficits [1], we expected a decrease of interpersonal coordination for patients when motor coordination situations imply greater attentional resources.

2. Method

Participants. Eighty persons were randomly assigned to two different groups. The experimental group was made of 20 patients suffering from schizophrenia (DSM-IV-TR criteria) paired with 20 healthy participants. The control group consisted of 20 pairs of two healthy participants. Local ethics committee approved this experiment.

Experimental Setup. Participants were seated on chairs and leaned back to prevent shoulder movements. They swung a hand-held pendulum about the wrist joint (radial-ulnar abduction-adduction) parallel to the sagittal plane (see Fig. 1).

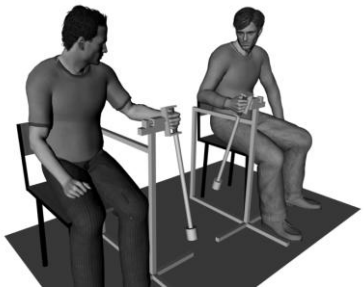

Fig. 1. Experimental setup

The mass of pendulums was adjusted to create two different conditions (P1: weight at the bottom, P2: weight on top), which modify pendulums' eigenfrequencies.

Procedure. Upon arrival, participants performed few trials with each pendulum to familiarize themselves with the task. Then the unintentional condition was

performed in which each participant oscillated their pendulum for 30 s while looking away from the other participant, then oscillate their pendulum for 30 s while looking at the other participant and finally oscillate their pendulum while looking away from each other again for the last 30 s. Three trials were performed one for each of three pendulum combinations (participant 1 and participant 2: P1-P1, P1-P2, and P2-P1). Thereafter, the intentional condition was performed. The task was similar to the unintentional one but participants had to voluntarily swing the pendulums in in-phase or anti-phase coordination for 60 s. To analyze the stability of the coordination, we computed the circular variance of the relative phase angles between the two times series of participants giving an index of synchronization between 0 and 1 (0: no synchronization and 1: perfect synchronization). Lastly, psychopathological questionnaires were administered to the participants.

3. Results

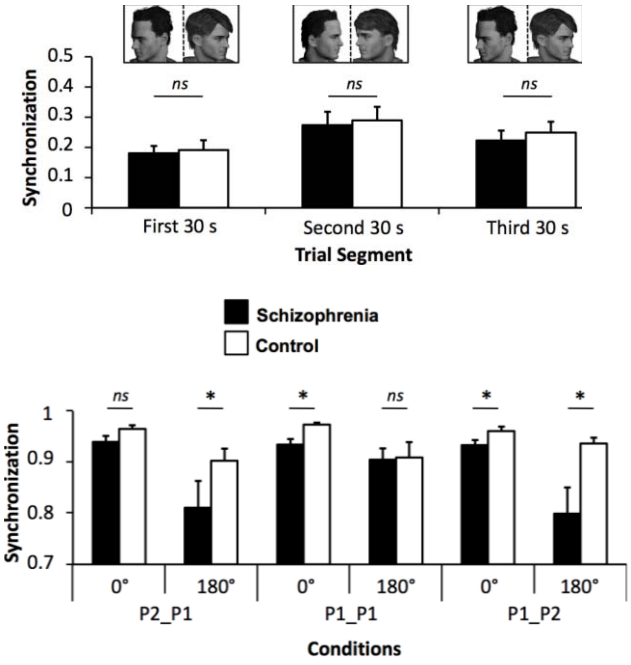

Fig. 2. Degrees of synchronization as a function of the trial segments for Unintentional coordination condition (top panel), and as a function of the pendulum combinations and instructed pattern of coordination (in-phase (0°) or anti-phase (180°)) for Intentional coordination condition (bottom panel).

As expected the results in the Unintentional condition showed that the synchronization was higher when participants were watching each other than when they were watching away from each other; however, they demonstrated also that the synchronization of the schizophrenic group was equivalent to that of the control group (see Fig. 2). Quite different picture was observed for the Intentional condition: The synchronization was impaired for the schizophrenic group compared to the control group. Patients exhibited both a lower stability and were lagging the control participant.

4. Discussion

Attentional deficits and perceptual-motor delays are reported as strong symptoms in literature for schizophrenia. We therefore developed a dynamical model dedicated to account for the role these might play in rhythmic coordination. This model suggests that such the pattern of coordination impairment observed might be due to two intertwines processes: a decrease in the information exchange, and a delay in the information incoming from confederate movements. Our study encourages further explorations of interpersonal motor coordination in schizophrenia and suggests new perspectives in characterizing and improving social interactions of patients suffering from social impairments.

5. References

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