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## Timing and motor control in drumming

*Comparing players with and without focal dystonia.*

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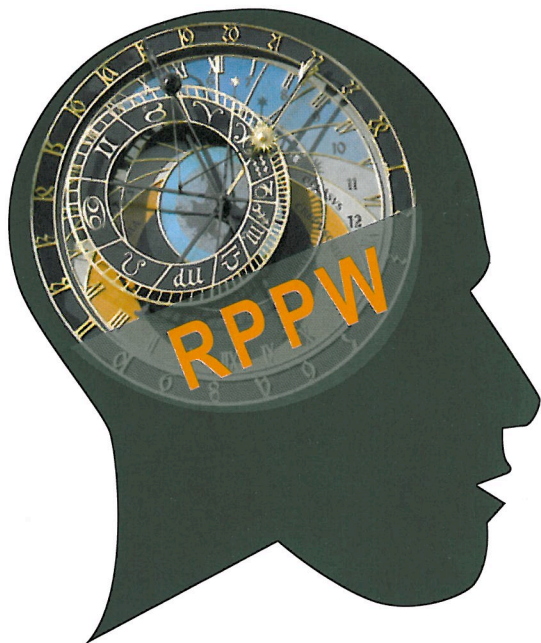
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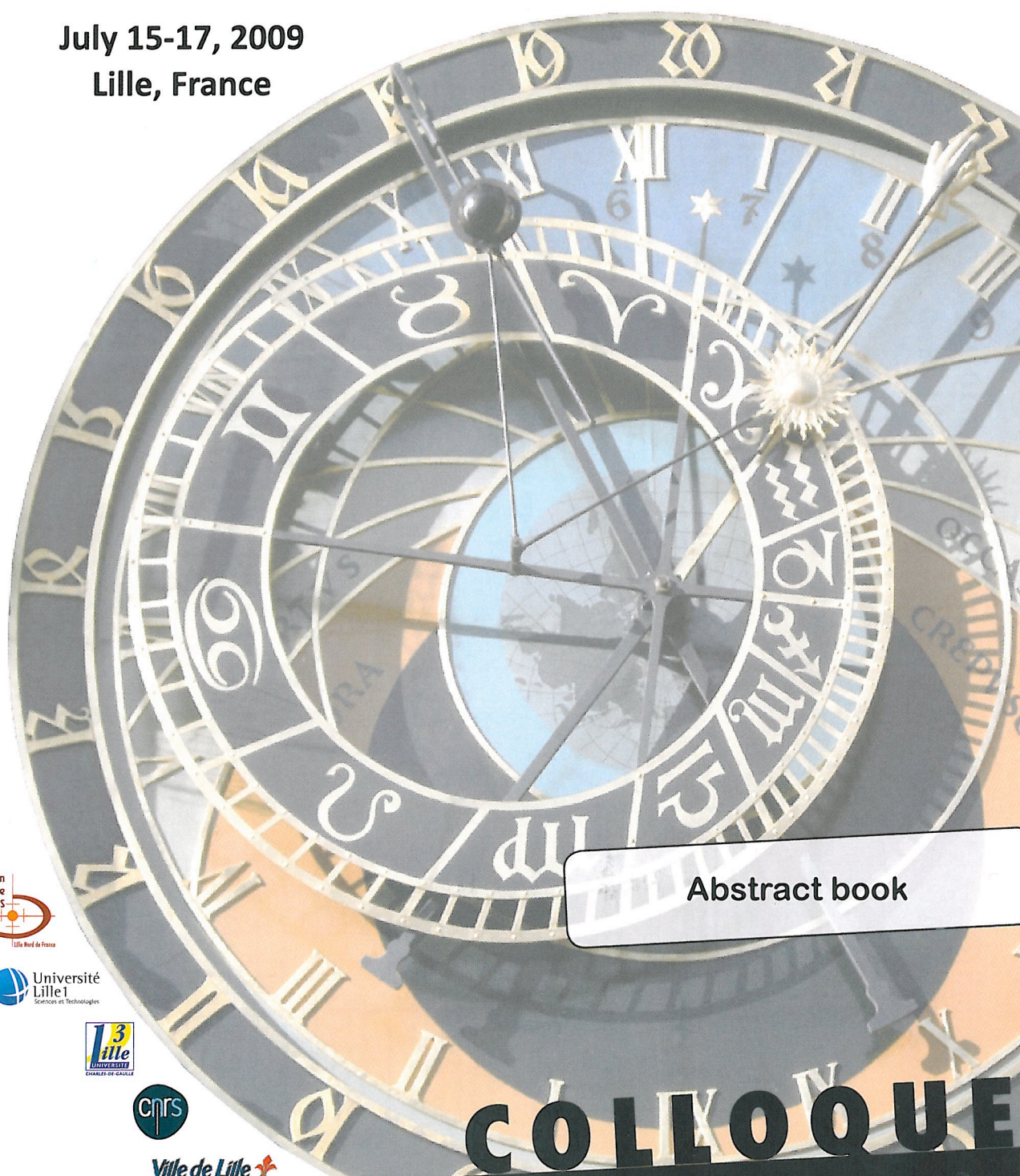




# **DISTORTED TIME AND MOTOR CONTROL**

**International workshop**

**July 15-17, 2009  
Lille, France**



**Abstract book**



# **COLLOQUE**



## SESSION 5: Pathology for time

### TIMING AND MOTOR CONTROL IN DRUMMING: COMPARING PLAYERS WITH AND WITHOUT FOCAL DYSTONIA



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The ability to keep a steady tempo is influenced by individual prerequisites as well as the playing conditions at hand. Percussionists have to acquire playing techniques that allow them to perform at the required tempi and dynamic levels.

For more extreme tempi and dynamic levels controlling the stick movement becomes increasingly difficult, sometimes resulting in irregularities in timing and/or striking force. Timing irregularities can also be a revealing sign of motor control problems, such as focal dystonia (Jabusch, Vauth & Altenmüller, 2004). The "breakdown" in motor control can therefore be expected to result in more pronounced changes in timing and movement pattern of the affected arm for these patients.

This paper presents ongoing research utilizing movement analysis and perceptual ratings with the objective to characterize performances of healthy percussionists and those suffering from focal dystonia.

The arm, hand, and stick movements of four professional percussionists were recorded using a motion capture system. Two of the players are focal dystonia patients with their left arm affected. For each player and arm, 25 s of single strokes at different tempi (50, 120, 300 bpm) and dynamic levels (p, mf, f) were recorded. The motion data was analyzed with respect to general movement pattern, variability in timing and striking force.

Preliminary results confirm deterioration in movement patterns for the faster tempi, typically displaying stiffened joints and lack of timing control. As expected, the patients' affected arms displayed more disturbed movement patterns compared to the non-affected and the healthy players. Detailed analysis and perceptual ratings of timing performance is under way and will be reported.

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### DISSOCIATION BETWEEN FAST AND SLOW TEMPI IN SCHIZOPHRENIA.



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**Background:** Deficits in the processing of time information have recurrently been reported in schizophrenia. However, due to the high variety in the time intervals and methodologies used, no general conclusions have yet been drawn from the various manifestations of the temporal disorder observed in these patients. In a previous study, we showed that irregularity detection in isochronous auditory sequences of moderate tempo (500 ms Inter-Onset Interval, IOI) was significantly poorer in schizophrenic patients as compared to healthy controls. In the present study, we wanted to evaluate temporal abilities using a single method of measures for a larger window of time intervals.

**Methods:** To this aim, we measured the same perceptual performances using a broad time scale ranging from fast (153 ms IOI) to slow (1166 ms IOI) auditory sequences in 21 patients and 14 controls.

**Results:** Time detection performance was relatively preserved in fast sequences in schizophrenics (< 500 ms) but poorer in slow ones (> 500 ms).

**Conclusion:** This perceptual dissociation between short and long time intervals parallels the two cerebral systems which have been proposed to underlie timing processes in healthy adults. Moreover, this pattern of results corresponds to children-like performances and could be explained by a maturation defect in top-down processes underlying cognitively-control timing (i.e. slow tempi / long intervals) in patients with schizophrenia. As most cognitive activities rely on efficient time processing, the interpretation of many of the deficits reported in the literature on schizophrenia should be revisited in the light of the hypothesis of such a primary temporal deficit.