COST Action IC1205 on Computational Social Choice: STSM Report

- Applicant: Jacob Denolf

- Home institution: Ghent University

- Home country: Belgium

- Host: Ariane Lambert-Mogiliansky

- Host institution: Paris School of Economics

- Host country: France

- Dates: 21/09/2015 to 1/10/2015

My two week stay at the Paris School of Economics concerned the development of two research paths, making up two chapters of my PhD thesis. Ariane Lambert-Mogiliansky, in her role as co-supervisor of my doctorate and as an expert in the field of quantum cognition, guided me on both these topics by asking critical questions and facilitating important discussions.

In a paper I recently presented at Quantum Interaction conference in Filzbach Switzerland, I proposed a novel approach to model the intricate relationship between a player's beliefs and preferences during a prisoner dilemma style game. Here, I used mathematical techniques borrowed from quantum mechanics. However, an orthodox application of these quantum techniques leads to an overparametrization of the model. To solve this problem a more general class of measurements (POVMs) was used. The introduction of these POVMs in this setting, however, leads to new complexities concerning the interpretation of this model. These new subtleties were thoroughly discussed, ironing out any inconsistencies the novel model had.

The introduction of POVMs in this particular setting raised some questions concerning their use in other settings. Plans were made to investigate the use of these POVMs in decision making and game theory in a more general way. First steps in this directions were taken and discussed pointing towards a novel quantumlike framework suitable for discrete measurements where the different possible outcomes have an implicit ordering.

A paper concerning the first research topic about the beliefs and preference model will be submitted to be published in a special issue of Journal of Mathematical Psychology on Quantum Probability and Contextuality in Psychology and Economics. We will also apply to present a paper about our findings concerning the general use of these POVMs on the Quantum Interaction conference in 2016.

I would like to thank the COST Action IC1205 for facilitating my productive stay at the PSE.