COST Action IC1205 on Computational Social Choice: STSM Report
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Dates: 07/07/2014 to 22/07/2014

During my visit to United Kingdom I have worked on the joint paper "Convergence to Equilibria in Strategic Candidacy" (submitted to WINE-2014) with Dr. Polukarov.

We have studied equilibrium dynamics in candidacy games, in which candidates may strategically decide to enter the election or withdraw their candidacy, following their own preferences over possible outcomes. Focusing on games under Plurality, we have extended the standard model to allow for situations where voters may refuse to return their votes to those candidates who had previously left the election, should they decide to run again. We have shown that if each time that a candidate withdraws his candidacy, there is some positive probability for at least one of the voters to take this candidate out of his future consideration, the process converges to a stable state with probability 1. This is in sharp contrast with the original model where the very existence of a Nash equilibrium is not guaranteed. We have, in particular, considered the two extreme cases of this setting, where each voter may reject a withdrawn candidate with probabilities 1 or 0. In the former case, the candidates have no incentive to enter the election more than once, while the latter coincides with the original model. In these scenarios, we have studied the computational complexity of: a) reaching a stable state from a given initial point; b) converging to a state with a predermined winner; or c) to a state with a given set of running candidates. Except for one easy case, we have shown that these problems are NP-complete, even when the initial point is fixed to a natural—truthful—state where all potential candidates stand for election.

We have made the following contributions:

1. Introduction of a *dynamic candidacy game* model *with refusing voters*, where, with probability p, a voter rejects a candidate who withdraws his candidacy. We have shown that these games converge with probability 1, for any $p > 0$.

2. Definition of three principal decision problems, termed STATE, WINNER and SET, which, given a profile of preferences and an initial state, decide whether there exists an improvement path leading to a stable state, to a state with a predetermined winner or with a given set of running candidates, respectively.

3. For each of the three problems above, we have considered its computational complexity in two variants, indexed 1 and 0, that correspond to refusing probabilities $p = 1$ and $p = 0$. Except for the case of STATE1 where convergence is trivial, we have shown that these problems are NP-complete.