The Use of Robotic Players in Online Games

Jon Guest, Matthew Olczak and Robert Riegler (Aston University)

Friday 3 September, 09:10-10:40 BST

Short in-class games have become an increasingly common way to teach a range of key concepts and theories in economics. These allow students to gain first-hand experience of incentives and the impact on decision making. This makes it easier for tutors to convey underlying economic theory and the implications of the resulting predictions. However, moving to an online environment presents a number of challenges for using this method of interactive teaching. In particular, the widespread adoption of asynchronous activities provides students with greater flexibility over the timing of their studies but also means that students cannot play interactive games against one another.

An alternative is to run games in which students play against robotic players that make decisions according to some pre-programmed rules. This greatly increase the possibility of using online games asynchronously. However, as it stands very little is known about how this affects student learning. The aim of this research was to investigate how student perceptions and behaviour change when robotic players are used. In a series of different treatments, we varied whether students knowingly or unknowingly played an online Prisoner's Dilemma game against other students or robotic players. We then tested how this affected the students' decisions in each round of the game and used pre and post questionnaires to measure their perceptions of the game.

First, we find that perceptions of the game were similar across all treatments. Students typically found the game to be fun to play, helped them to understand economic theories and represented real-world situations. In addition, we asked the students about their perceptions of greed both before and immediately after playing the game. We find that a significant change occurred as a result of playing the game only for students that played against a robot and knew that they were doing so. These students became less averse to greed after the game. This suggests that the in-game experience and perceptions of this may influence student learning outcomes from playing in-class games.

Then, to investigate further, we examined the in-game decision making for each of the treatments across each round of the game. We find that cooperation in a given round of the game was more likely for female students, those that had not studied economics before and students doing a pure economics degree. Furthermore, the likelihood of cooperation was unaffected if students played against a robot but didn't know that this was the case. However, cooperation was significantly less likely when students knew that they were playing against a robot. We then show that this is in-part driven by students in this treatment being more willing

to deviate in the next round having established cooperation with their robot opponent in the previous round.

Overall, our findings indicate that knowingly playing in-class games against robotic players can influence in-game decision making and this in turn can influence learning outcomes from playing the game. This suggests care needs to be taken in using robotic players in online games.