

**ARAB ACADEMY FOR SCIENCE, TECHNOLOGY AND MARITIME TRANSPORT (AASTMT)**

**College of Engineering and Technology**

**Computer Engineering**

**Modeling And Simulation Term Report**

**Risk Management**

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**Introduction**

Risk management is an agent-based model for simulating the actions and interactions of two agents, who are against each other. Simply the idea is if there’s an accident at work is about to happen, should they report it or not?

Based on that the one who did report will earn a reward but it would cost him a little because he left his task and the one who didn’t report will earn that reward too, but if none of them reported they won’t get anything, and if they both reported they will get rewarded subtracting the cost of their task.

We have 3 cases for their cost

* Case 1 (Reward =10, Cost =3)
* Case 2 (Reward =10, Cost = U (8->12))
* Case 3 (Reward =10, Cost = U (-3->-1))

After running 100 simulations with 3 different sample sizes, we are going to discuss the following:

1. the impact of repeating a game between the same players or random players.
2. highlight how the number of players impact the outcome.
3. how different learning behaviors fit the problem and impact the outcome.

**PSO Social Learning**

There’s an impact here of repeating a game between random players or the same players because if the player is locked up with the same person and he’s not satisfied with his results his opponent will most likely stick to his strategy so he better learn from someone with better results but in the random players case the player doesn’t know his next opponent strategy so he will be uncertain what he should do.

**1-Random player**

**Case 1**(Reward =10, Cost =3)

the impact of the number of players was huge on this case with 10 players, the number of reporters was increasing in fact with increasing the number of steps (sample size), they reached 7 people out of 10 will report. On the other hand, with 50 or 100 people was decreasing. Which make sense because every one of them will depend on the other to report while getting the reward without any fees.

10 people

50 people

**Case 2**(Reward =10, Cost = U (8->12))

The number of players didn’t matter because in all cases the majority choose not to report because the cost was too high maybe sometimes it’s higher than the reward so most of them choose not to risk leaving their task and wait for someone else to report

10 players

100 players

**Case 3** (Reward =10, Cost = U (-2->2))

In this case the number of people didn’t impact either because no matter their number they will report because sometimes they earn more when their cost = a negative number (in case they haven’t any tasks and they were on their free time) and even if they had task it only cost a few.

10 people

100 people

**1-Same player**

**Case 1**(Reward =10, Cost =3)

The number of players didn’t impact here because they face each other each time and if they choose to report the next time he will choose not to because his opponent gets more than so he will decide to change his strategy

10 players

100 players

**Case 2**(Reward =10, Cost = U (8->12))

The number of people had an impact here because in the 10 people case they tended all to not reporting because they might have a negative value but in the 100 people case a small group of people would report because they have a chance to have a smaller cost and actually get a reward better than nothing

10 players

100 players

**Case 3** (Reward =10, Cost = U (-2->2))

There’s no impact of number of people here because the majority will report hoping they get a bonus and they will risk having a small cost but the minor will depends on the ones who will report and stay in the safe side

10 players

100 players

Roth-Erev Individual Learning

There is no impact of repeating a game between random players or the same players and there is also no impact of the number of people here because anyone who’s going to get any reward will be satisfied with it and will gain confident and won’t change his action.

**1-Random player**

**Case 1**(Reward =10, Cost =3)

10 people

100 players

**Case 2**(Reward =10, Cost = U (8->12) )

There’re always some players who kept losing multiple times so they will decide to change their action until they start winning and get their confident while the other win from their beginning so they already gain confidence and they won’t change their action

10 players

100 players

**Case 3** (Reward =10, Cost = U (-2->2) )

10 players

100 players

**1-Same player**

**Case 1**(Reward =10, Cost =3)

10 players

100 players

**Case 2**(Reward =10, Cost = U (8->12) )

10 players

100 players

**Case 3** (Reward =10, Cost = U (-2->2) )

10 players

100 players

**Conclusion**

It’s obvious now that the less cost we have the less likely for workers to report specially if there’s a lot of them but with higher cost they will tend to not report and waiting for anyone else to take the risk. Either if they were learning socially or individually, the two strategies were so close in indication the action of the majority.