

1. INTRODUCTION

The following essay is going to focus on discussing three main deception mechanisms used by self-interest agents in negotiation interactions: hidden utilities, hidden actions and phantom actions. The examination will derive from a specified scenario with slightly different variations in each mechanism to illustrate how they are incorporated in a single-game encounter and monotonic concession problem.

2. GENERAL SCENARIO

Consider a scenario where two employees (self-interested agents) must deliver a set of publicity pamphlets in a precise set of locations. Each of the employees wants to do as little effort as possible. They do so by employing deception mechanisms.

3. DECEPTION MECHANISMS

Deception mechanisms are implicated when a self-interest agent wants to increase its personal gain, by misleading or hiding the truth. These strategies exist solely in a competitive setting such as the one described, therefore following game theory paradigms.

Since the object of discussion are rational agents, their decisions follow the strategy given by a Nash equilibrium, that is, for the choice where each agent has no incentive to unilaterally deviate from. This choice might not be optimal, by not following the notion of Pareto optimality, that states that an outcome is optimal if no other outcome improves an agent's utility without making another worse off. These considerations are important for the following subsections.

The tables in the attachment highlight both the Nash equilibrium (orange) and a Pareto choice (green) and will be referenced to exemplify the observations.

3.1 Hidden Utilities

3.1.1 Definition

An agent does not share his beliefs on the personal relevance of pursuing specific actions.

3.1.2 Negotiation analysis

The scenario is visually represented in **Figure 1**. Agent 2 would need to deliver pamphlets to locations C and E, whilst agent 1 would only need to go to location C. By convincing agent 1 that the amount of pamphlets he needs to distribute is much larger than the amount of work needed to be made in location E – therefore changing the utility of the task - agent 2 would convince agent 1 to make the task in location C. Consequently, agent 2 would only need to go to location E.

3.1.3 Single- game encounter analysis

In **Table 1** we can observe that the rational choice made by the agents, without the mechanism, is for the agents to make decision pair (E,C), since that table entry is the Nash equilibrium.

Once the hidden utilities action mechanism is used, the rational decision shifts for action pair (E,E), the new Nash

equilibrium (**Table 2**). This choice does not harm the gain of agent 1 but would benefit agent 2.

The Nash and Pareto outcomes do not match, proving this mechanism doesn't guarantee a Pareto outcome.

3.2 Hidden Actions

3.2.1 Definition

An agent pretends he is not capable to perform a certain action.

3.2.2 Negotiation analysis

In the scenario, agent 2 would need to deliver the pamphlets to locations B, C and E, whilst agent 1 would only need to go to location E (**Figure 2**). Agent 2 could, by hiding his necessity to go to E, convince agent 1 that it would be best if he could deliver the pamphlets to location B and C (as they are closest to each other), hence deviating their initial deal. Agent 2 would go to the nearest location, saving him the effort to go to the farthest ones, and agent 1 would continue his needed effort to go to location C, whilst also being able to pass by location B.

3.2.3 Single- game encounter analysis

In **Table 3** the rational choice made by the agent would be for pair (C,C), the Nash equilibrium.

By hiding the need to go to location C, agent 2 benefits from a shift in the negotiation: the revised action pair would be (C,E), the updated Nash equilibrium – **Table 4**. The replacement benefits agent 2, whilst not damaging agent 1's gains.

Furthermore, the Nash and Pareto outcomes don't match, that is, the optimal outcome exists and it is not the one chosen by the agents, proving this mechanism doesn't guarantee an optimal outcome.

3.3 Phantom and Decoy Actions

3.3.1 Definition

An agent pretends he has another action to perform.

3.3.2 Negotiation analysis

In the scenario, agent 2 would claim to have another location C to give the pamphlets that is on the same route as the location with the highest utility (**Figure 3**). The agents would logically reconsider their previous negotiation decision, consequently benefiting agent 2, who would only need to go the nearest location.

3.3.3 Single- game encounter analysis

In **Table 5** we can observe that the rational choice made by the agents, without the mechanism, is for the agents to make decision pair (B,A), since that table entry is the Nash equilibrium.

Once the phantom action deception is used, the rational decision shifts to the new Nash equilibrium, decision pair (A,C), as it can be seen in **Table 6**. This choice does not harm the gain of agent 1 but would benefit agent 2.

The Nash and Pareto outcomes do not match, proving this mechanism doesn't guarantee a Pareto outcome.

APPENDIX

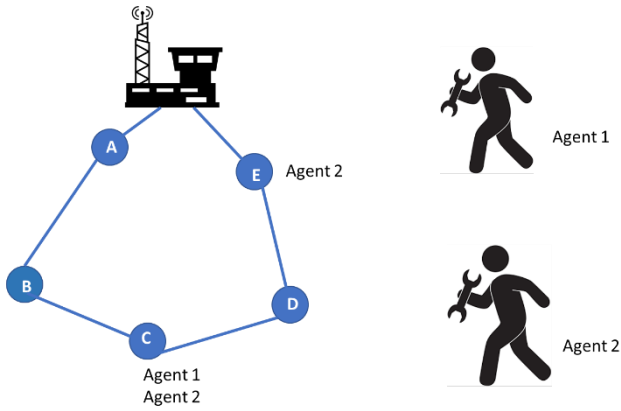


Figure 1: Hidden utilities negotiation scenario

		A2		
A1		C	B	E
	C	3,8	2,1	2,2
	B	3,10	9,8	1,1
	E	9,6	2,1	9,5

Table 1: Decision without the Hidden action mechanism

		A2		
A1		C	B	E
	C	3,8	2,1	2,2
	B	3,10	9,8	1,1
	E	9,6	2,1	9,?

Table 2: Hidden utilities mechanism decision

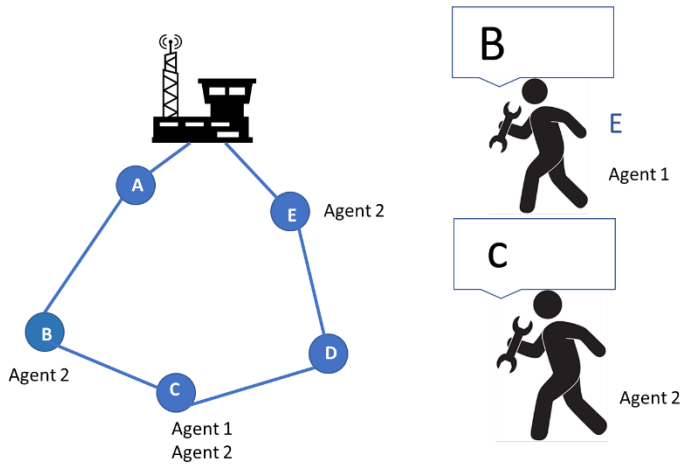


Figure 2: Hidden action negotiation scenario

		A2		
A1		B	E	C
	C	8,3	4,3	9,5
	B	10,6	5,7	3,3
	E	5,4	9,6	3,8

Table 3: Decision without the Hidden action mechanism

		A2		
A1		B	E	
	B	8,3	4,3	
	E	10,6	5,7	
	C	5,4	9,6	

Table 4: Hidden action mechanism decision

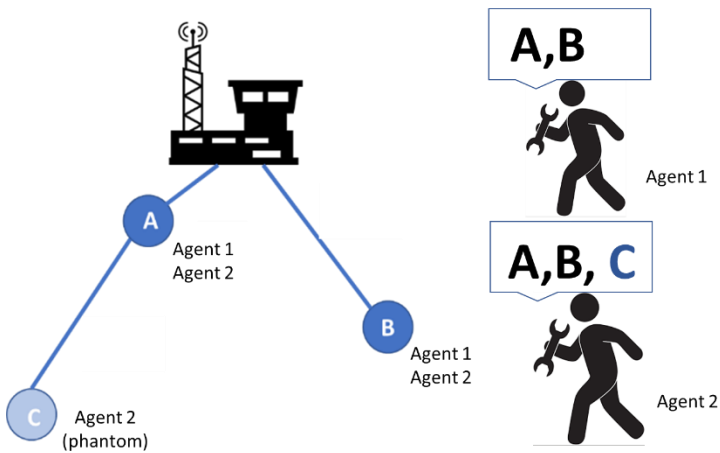


Figure 3: Phantom action negotiation scenario

		A2	
A1		A	B
	A	1,5	7,6
	B	5,5	8,4

Table 5: Decision without the phantom action mechanism

		A2		
A1		A	B	C
	A	1,5	7,6	5,6
	B	5,5	8,4	3,6

Table 8: Phantom action mechanism decision