

An axiomatic characterization of the position value for general communication situations

By Anne van den Nouweland (University of Oregon) and Marco Slikker (Technische Universiteit Eindhoven).

Abstract:

Myerson (1977) augmented coalitional games with graphs to model restrictions in communication possibilities between the players. He defined an allocation rule for such games by considering the Shapley value (cf. Shapley 1953) of a game between the players that changed the worths of coalitions to take the communication restrictions into account. This rule has become known as the Myerson value. The idea of using graphs to model bilateral relations between the players in a game was picked up again in Borm, Owen, and Tijs (1992), who defined an allocation rule for graph-augmented coalitional games that focused on the role of the communication links rather than the players. The position value first assigns to each bilateral link its Shapley value in a game that focuses on the role of the links in enabling the players to create value, and then distributes the value of each link equally among the two players who maintain it. Borm, Owen, and Tijs (1992) also set out to try and axiomatize the Myerson and position values along the lines of Shapley's (1953) characterization of the Shapley value. They succeeded for the Myerson value, but needed to restrict themselves to graphs that are free of cycles, so that there is at most one path of communication between every two players, to axiomatize the position value. In the current note, we show that the restriction to cycle-free graphs can be lifted when we consider general communication situations, in which players can obtain potentially different worths if they are connected through different networks of bilateral communication channels. For such communication situations, we provide an axiomatic characterization of the position value along the lines of Shapley's (1953) axiomatization.