Awareness in Games, Awareness in Logic

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Standard game theory models implicitly assume that all significant aspects of a game (payoffs, moves available, etc.) are common knowledge among the players. There are well-known techniques going back to Harsanyi [4] for transforming a game where some aspects are not common knowledge to one where they are common knowledge. However, these techniques assume that players are at least *aware* of all possible moves in the game. But this is not always a reasonable assumption. For example, sleazy companies assume that consumers are not aware that they can lodge complaints if there are problems; in a war setting, having technology that an enemy is unaware of (and thus being able to make moves that the enemy is unaware of) can be critical; in financial markets, some investors may not be aware of certain investment strategies (complicated hedging strategies, for example, or tax-avoidance strategies).

In the first part of this talk, I discuss an approach for modeling lack of awareness in games, and what the appropriate solution concepts are in the presence of lack of awareness. In the second part of the talk, I consider logics for reasoning about awareness, and awareness of unawareness. This is done in a standard Kripke-style possible-worlds structure, using ideas that go back to [1]. However, there are new subtleties that arise; in particular, it turns out that we need to allow for different languages to be associated with different states of the world. Both parts of the talk are based on joint work with Leandro Rêgo [2,3].

There has been a great deal of work in the economics literature and computer science literature both on modeling awareness in games and on logics for reasoning about awareness. An excellent bibliography can be found at <http://www.econ.ucdavis.edu/faculty/schipper/unaw.htm>.

References

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