

The uses and limitations of game theory in psychology

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Literature and research

Finding relevant game theory articles linked towards psychology proved to be difficult. Searching with simple queries, such as 'game theory' or 'game+theory+ psychology', proved to give poor results. This implies that research into the field of game theory in psychology must be a diverse field, or a very sparse one.

By taking the few articles that resulted from the search the impression of the research field begins to form. Based on the Paul A. Wagner (2013) [1], the impression of the field becomes wide. Wagner writes about game theory as a means of investigation. He describes a wide area where game theory is used, and elaborates on the basics of it. Wagner states that "Together game theory and psychology excavated into mental life more than previous behavioral stipulations and methodologies would have ever allowed." [1].

For social scientists game theory can be a new tool to look at human motivations for decision making. More specifically weighting of wanted goals and risks, and a wider range of mechanisms are provided by game theory in a psychology context. As game theory provides wider possibilities for research it is likely that the use of game theory in psychology will emerge in new ways over time. Per now it looks like it will take some time for all parts of the community to embrace game theory, but some already have. Rather game theory lacks momentum today, and would benefit from more use.

Game Theory

Game theory is shortly described as strategic decision making. It is in essence interactive decision making. Zero-sum games, such games where one persons winnings equals the other players net losses, was addressed early by game theory. Developing game theory from zero-sum games it is now used in wide range of behavioral contexts. Game theory has evolved into a umbrella term that today consists mostly of the logical aspects of decision making.[3]

Three assumptions was proposed by von Neumann and Morgenstern. Game theory builds on these three basic facts as a foundation for further assumptions. The three assumptions are: humans are self-interested, humans are rational, and humans are self-determining consumers.[1]

To the basic assumptions there were added five more. These are: 1: All outcomes can be known to varying degrees of certainty, 2: Player information is often incomplete, 3: Utilities(measures of one's relative gain) can be measured, 4: The utilities of all outcomes when the other assumptions are met can be discounted and summarised in a single quantity, 5: Some games are competitive, some are constant sum games, and some constant sum games and non-zero sum games often favor dominant strategies whose equilibrium invites cooperation as an attractive strategy [1].

PD, the prisoners dilemma, is a classic example of a game theory. It describes the scenario

where two prisoners are interrogated in separate rooms without contact. And they shall try to get the best deal with the police. Either can give up the other, or be silent. This gives four outcomes. Prisoner A tells on prisoner B, prisoner B tells on prisoner A, both tells on each other, and none of them tell. By applying rewards, or in this years in prison, to the option we have that if only one of them tells on the other, the one that tells gets 0 years in prison, the other one gets 10. If both tell they get 5 years each, but if none of them tell they get 2 years each.[1]

The described PD scenario bottoms out in a paradox when we look at the assumptions of game theory. Both prisoners are self-interested and will probably choose to tell on the other prisoner, resulting in a 5 year sentence for each. But this means that the 2 year for each option is unreachable, which is the paradox.

By adding assumptions about the context of the game, such as that the prisoners know each other, then the game have changed and other options open up. Now it seems that securing the best decisions is no longer a simple mathematical problem, but rather more complex problem involving psychology. When this was presented a new direction opened up for science to explore.[1]

Nash and other found out that, given a zero-sum or constant-sum game, there was a set of actions that would result in an equilibrium for the expected value for all players. This happens when every player has found an acceptable expected value in a common strategy. Such a strategy will dominate all other strategies. If such a strategy would be found in society, world peace and social problems would be reduced to simple puzzles. But that is hardly the case in the real world. [1]

Game theory has a wide range of application. "Not only is game theory used in economics, international trade, military strategizing, and business operations at every level it is now also used to illuminate various evolutionary models in biology, anthropology, sociology, and psychology all in addition to economic theory." [1]. As an example it is observed that wealthy people find cost of lottery tickets a poor buy, while the risk reward picture looks totally different for the poor.

An aspect to risk vs reward problem, or maximization of reward is the 'Beauty Game'. The beauty game is a problem where every man wants the pretties girl in the group, but no one can have her. If every one goes for the pretties girl, only one can be successful, but if everyone goes for a different girl in the same group the chances are increased for everyone. Another approach to this problem would be to remove oneself from the first round, and aim for the greater expected value in a discrete second round.[1]

On the contrary an experiment found that strangers who were offered money to help move a couch was less likely to help than strangers not offered a reward. The experiment shows that rewards can dampen the response form people. People seem to value money in a way

that increases possibilities in life, while it is weighted against some value assigned to labour, or personal dignity.[1]

As for cooperation, which is a central aspect of game theory and reward maximization, Scharlemann et al. (2001) looked at how people perceive the value of smiles. This is good example of how game theory has elaborated on the social sciences. The article talks about how smiles effect the cooperativeness of people. Participants score pictures of varying smiling degree. The main variable Scharlemann et al. (2001) are interested in is the ability to identify cooperative partners. They do this by examining the value of a smile in a simple bargaining context.[2]

Two research questions are stated by the paper, 1: 'Does smiling elicit trust among strangers?', 2: 'Is there a difference between the sexes in assessing trust?'. As signalers, people who smile, always benefit from smiling, there has to be some way for the receiver to verify the authenticity of the smile. This results in a handicap, or cost, for signaling false information. Non-smiling individuals may be discriminated by receivers due to hidden bad qualities about that individual.[2]

Scharlemann et al. (2001) conclude the article by answering the research questions, and briefly presenting the results. The experiments find that both men and women are more trusting towards the opposite sex, Smiling positively affects trust, and that facial features can affect cooperation regardless of smiling. Smiling then serves as an informative stimulus which promotes trusting behaviour. While smiles are increasing trust, then genuine smiles should have a greater effect than false ones. Face-to-face interactions are also found to be better than anonymous interactions.[2]

Based on the three base assumptions, stated earlier, there are a few things that limits game theory. Humans are not always rational, and humans are not always self-interested.

To take these statements a bit further. Humans are often steered and influenced by emotions. Hunger makes people eat. Such feeling based necessities are rational acts in a way, but thoroughly anchored in underlying feelings beyond the rationale. The use of game theory in social settings will for most people prove difficult. Game theory states that the strategies used are rational, but people performing them might be incapable of executing them over time, thereby acting irrational.

Self-interest is the focus on the desires and need of oneself. A simple argument that people does not act in self-interest all the time are mothers. Mothers in vary many cases acts in the interest of her children. The whole concept of family to some degree disregards the self-interest that is required by game theory. In a family context the members of the group works for the betterment of the group, and not necessarily itself.

Conclusion

This essay has covered the basics of game theory, the prisoner dilemma, Nash equilibrium, and an example of modern use of game theory. Literature search and the state of game theory has been touched. And some limitations of the base assumptions of game theory has been discussed.

The applications of game theory are more numerous now than ever, but the diversity has made it difficult to narrow the field of search for game theory. Meaning that while game theory is being used more, the use of it is also more hidden, and maybe of a more inspirational influence rather than of a direct influence.

Concluding statement that Game theory is more important than ever, but it is hard to find articles relating directly to game theory. Although it might be a lot easier to find new, and relevant, research if a more specialised field under the umbrella term that game theory has become. Another thing to do would be to do an extensive literature review of game theory and its sub fields of research.

References

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