

## SF Community Medicine and Health

# Neuroscience and Game Theory Can Support COVID-19 Pandemic Response by Predicting Social Decision-Making

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Dear Editor,

COVID-19 is a global pandemic virus that represents a massive health crisis. While efforts to develop pharmaceutical interventions for it are underway, the social and behavioral sciences can provide useful insights for managing the pandemic and its impacts [1]. Therefore, it is necessary for health officials and legislators to be aware of the people's behavior and the decisions they make in a crisis. It allows them to make better decisions to control the virus pandemic.

Researchers argued that decisions are shaped by three factors: situational recognition, one's identity, and the application of rules [2]. According to this argument, if we recognize how people perceive social situations, we can set laws appropriate to the identity of individuals in a society and we can direct people's decision-making. Especially in the current context of the COVID-19, the need to address this issue has become more apparent. In this regard, we would like to focus on understanding people's behavior in the face of global crises like COVID-19 pandemic, given the successful efforts that have been made so far to understand the decision-making process, especially in a social context [3].

Game Theory is a powerful set of mathematical modeling. It weighs the different strategies that players adopt in their decision-making to calculate the optimal payoff for each player in a game [4]. Researchers have used games to understand, predict and guide human behavior in various fields, especially in the fields of economics and international negotiations [5]. Game Theory has also been used in neuroscience to understand the neural mechanism of social decision-making in the brain [6]. We have reviewed past research and found that the most efforts have focused on the economic aspects of social decision making, such as the impact of punishment, reward, ability to control partner behavior, fear of loss, leadership, beliefs, and so on [3].

On the other hand, given the importance of recognizing the people's behavior in a crisis, especially for us in the context of COVID-19 pandemic, we propose to use Game Theory to understand the neural basis of social decision-making specifically in a crisis. This strategy helps us to set better rules for directing social decisions. We believe that although the results of past researches are useful to understand the people's decision-making in a crisis, more research is needed [3]. Therefore, we suggest four issues that have not been studied in neuroscience yet, to be followed in the future:

1. Examining the impact of fears that lead to frustration. When people feel incapable of solving a problem, they make worse decisions instead of following the rules.
2. The optimistic bias, which is an unconscious defense mechanism to overcome problems, on the other hand, leads to ignoring health warnings, rules and underestimating the risk of a disease outbreak.
3. Following social norms, when people think their perceptions are inaccurate, they usually decide to follow the behavior of the majority of the society.
4. How thoughts related to conspiracy theories emerge. That is, when people believe in the existence of a great conspiracy, in order to justify the great event, they try to find guilty persons, instead of cooperating to solve that problem [1].

We hope that considering these four issues in neuroscience researches and using Game Theory to design these researches, as well as to examine the impact of each issue, could be an effective step to take control of COVID-19 pandemic and to explain future applications to overcome any crises that may occur in the future.

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