

How much would you pay to change a game before playing it?

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When most people think of a "game," they might imagine checkers or hopscotch. But in game theory, a game is defined as any type of scenario where there's an interaction between different decision-makers, or players, each of whom has well-defined preferences. Oftentimes, players have the option to pay to change the rules before the game is played, like bribing an umpire in baseball.

Game theorists study these decisions, but previous analyses assume the decision-makers always do what is best for them—they are fully rational—which is not always realistic.

So SFI Professor David Wolpert and economist Justin Grana, a former SFI postdoctoral scholar, wanted to inject some humanity into the [players](#). They analyzed games with players who were subject to error, or "boundedly rational." The resulting framework was published in July in the paper "How Much Would You Pay to Change a Game before Playing It?" in *Entropy*.

To help understand their analysis, take the baseball example: Imagine you manage a baseball team and have the opportunity to pay the umpires to favor your team. Game theory says that how much you are willing to pay depends on whether your opponent can see that you have paid to change the rules of the [game](#).

Wolpert and Grana's paper focuses on comparing and contrasting two scenarios. In one, the opposing team's manager observes you paying the umpires; in the other, the opposing manager knows you have the opportunity to pay but does not know whether you actually did.

Unlike standard [game theory](#) analyses, however, players in Wolpert and Grana's framework do not always choose the best action after the decision has been made. The knowledge that both players are not fully rational factors into their decision-making process.

"When considering whether or not to change the parameters of the game," says Grana, "[players] will consider how difficult their future decisions will be." In other words, a player's willingness to pay now also takes into account how irrational they anticipate they will be in the future.

"Potentially, these results apply to an extremely broad range of scenarios ranging from games in which the rules govern the flow of information among the players to games in which the rules are more prosaic, like [tax rates](#)," says Wolpert, "Our analysis shows that in many of these

situations, a player will be their own worst enemy; if they were less greedy, they would have made a lot more money."

More information: David Wolpert et al. How Much Would You Pay to Change a Game before Playing It?, *Entropy* (2019). [DOI: 10.3390/e21070686](https://doi.org/10.3390/e21070686)

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