

## How You Play the Game

by Jared Wade

In all competitive games, there are certain principles that govern successful strategies. Although it may not be a game, business can be considered the most competitive of ventures, and traditionally, cutthroat tactics designed to squash out the competition have been handed down as the most effective.

However, depending on the number and the nature of the players competing for the goal, the winning strategy may not always be the most logical. Especially in group competition, sometimes using a conventional strategy to best a rival can actually be detrimental to the group as a whole and, thus, to the individual.

This point, while difficult to grasp at first, is best illustrated by a scene from *A Beautiful Mind* where Princeton mathematician John Nash, played by Russell Crowe, and his fellow students are sitting around a table, boasting about which of them a pretty blonde girl will talk to. "If we all go for the blonde and block each other, not a single one of us is going to get her," Nash explains. "So then we go for her friends, but they will all give us the cold shoulder because no one likes to be second choice. But what if none of us goes for the blonde? We won't get in each other's way and we won't insult the other girls. It's the only way to win."

Here, Nash reasons out a counterintuitive solution based upon the likely social interactions of the others involved in the equation. For work related to this very concept, Nash later won the Nobel Prize in Economic Sciences for his efforts in the development of game theory, which conceptually and mathematically defines the dynamics of competitive interaction. Through the work of Nash and many others, game theory concepts can help to analyze the necessary course of action for individual gain in competition. As these theories increasingly make their way into the business world, risk managers can use them to cultivate a broader perspective on risk and foster the strategic instincts that can improve decision-making for all future corporate action.

### Understanding Game Theory

The most famous example illustrating game theory concepts is a hypothetical situation referred to as the Prisoner's Dilemma. In this scenario, two men known to have committed armed robbery have been arrested, but the police do not have enough evidence to render an ironclad guilty verdict in court, along with which would come a 10-year jail term. The criminals were also pulled over in a stolen getaway car, however, and for this crime, each man would serve two years in prison. At the station, the criminals are interrogated in separate rooms and each is given an equal opportunity to have all charges against them dropped if they confess to the crime and implicate the other man. If both men confess, however, each will serve a reduced five-year sentence.

Each man now has two choices (referred to in game theory as "actions") which could result in any of three possible outcomes—either both will confess, neither will confess, or one man will confess and other man will not. Obviously, the greatest payoff for each criminal is the shortest possible prison sentence, and this individual preference is referred to as each man's "utility," which can be ranked by numerical values. Outcomes are ranked as "utility functions" and in this case, numbers are assigned as shown in the Prisoner's Dilemma chart.

The best action for each criminal can then be evaluated by contrasting the payoffs from each column depending on what the other man chooses. If Criminal A decides to confess, then the payoff for Criminal B will be 2 if he confesses, or 0 if he refuses to confess. If Criminal A refuses, then the payoff for Criminal B will be 4 if he confesses and 3 if he refuses. In both cases, Criminal B has a higher utility if he confesses, and inversely, the same logic holds true for Criminal A. Thus, the only rational outcome is that both men will confess and go to jail for five years.

Because each man has one action that is superior for all possible actions made by the other man, it is said that the first action (confessing) strictly dominates the other action (refusing). Both men know this is true for their own choice and that of the other man, so logically each man must confess or risk facing 10 years in prison knowing that the other man got off scot-free.

### **The Real World**

In reality, business situations rarely boil down to strictly dominated actions such as in the Prisoner's Dilemma, but this scenario is helpful to illustrate the conceptual way in which evaluating all possible actions against those of the competition can be used to determine which action should—or must—be taken to arrive at the highest utility.

When corporate decisions are made with a single vision of the future, however, the company is subject to great risk if these assumptions turn out to be invalid. On the other hand, if a decision is made that is in the company's best interest across a wide range of outcomes, risk is drastically reduced while the company's exposure to growth opportunities is maximized.

When IBM was at the top of the computer market, its future vision of the industry turned out to be a near-fatal mistake. It saw developing PCs as the most profitable aspect of the computer revolution, so this is where IBM invested most of its resources. Rather than provide adequate competition against Microsoft or Intel for what would become the most lucrative side of the computer industry—namely, software and processing chips—it let the two companies acquire a virtual stranglehold on these markets and was left as one of many similar players manufacturing PCs.

From this, it can be learned that while it is important to base decision-making on the company's own growth strategy, risk managers need to be aware that no operations take place in a vacuum. "What you're able to achieve is not solely in your hands. It depends on other players—competitors, the government and regulatory bodies," says Tom Mitchell, president and CEO of Open Options Corporation in Waterloo, Ontario. "It's essential to get an idea of what other players are going to do to determine what moves a company should make. This way, you get the most out of any circumstance and a clear indication of what, perhaps, counterintuitive moves

might be taken by the company to get a better outcome than the natural one it may be headed toward.”

This is precisely what game theory can bring to the boardroom. With conceptual and mathematical evaluation, a hazy future can become much clearer and in this manner, risk can be minimized. By using game theory to analyze the company’s possible actions against those that will most likely be made by the competition, the actions with the smallest payoff can be eliminated. “The objective of game theory is really answering three questions: Who are we up against? What can each of the players do? And, what does each of the players want?” says Mitchell.

In some cases, like the Prisoner’s Dilemma, the payoff incentives may all point to one action, giving management a higher level of certainty that it is moving forward in the right direction. But many times, a market is ultra-saturated and evaluating the competition is not something that can be properly accomplished by just holding a meeting. “A circumstance with five players where each can only take four actions to advance their interest can give rise to a million possible outcomes,” says Mitchell. “You can’t deal with that off the top of your head or on the back of an envelope, so it helps to have tools to be able to deal with it.”

Utilizing basic game theory models provides a valuable analytical tool, however, Mitchell and Open Options advise taking the process even further. Open Options has put together unique consulting and software operations that can elevate game theory evaluation by using company and industry information and plugging this data through a series of algorithms. The algorithms produce numerical utility figures that act as indicators of future action such as those formulated in the Prisoner’s Dilemma, which can later be analyzed and discussed to develop a company’s future strategy.

“In most organizations, everybody doesn’t have the knowledge about the issue and about the other players they’re up against,” says Mitchell. “The first step is really getting that knowledge in one place where everyone can see it a nice clear form, challenge it and have some guided discussion to reach some agreement about what most accurately captures the issue about who they’re up against.”

### **Friend or Foe?**

A major part of this discussion and assessment is deciding what strategy to take towards the competition. Traditional business strategy often relates operations to war, saying that all competition should be overcome, killed and buried. But as counterintuitive as it may seem, game theory sometimes dictates that the best course of action is that which benefits the competition as well as yourself.

One practical flaw in the Prisoner’s Dilemma that people often notice is that both criminals would actually fare best if neither had confessed. Had both men been absolutely certain that they could trust the other man not to confess, then they could have each kept silent and gotten away with only two years in prison. Game theorists note that the more times this game is repeated, the more likely it is that neither man will confess. This is because in such a case—which often translates to business—what is best for the group can also be best for the individual competing members.

For example, the Holland Sweetener Company quickly found out that old-style

business tactics are not always best when it decided to expand into the American artificial-sweetener market, which is effectively monopolized by Nutrasweet. Both Coca-Cola and Pepsi considered switching to Holland, but after realizing that the name Nutrasweet had its own added value, they were able to get lower prices in a new deal with Nutrasweet because of the added competition. In this way, Holland Sweetener essentially lowered the overall value of both its own and Nutrasweet's product by giving leverage to the buyers.

Continental and American Airlines are essentially direct competitors, but they too have found that all-out war is not always the best policy. When it comes to marketing, setting ticket prices, customer service and booking passengers, both companies, along with the other major airlines are vying against each other. But when it comes to contracting with Boeing or Airbus to make new aircraft, however, the rival airlines are the closest of allies. Here they band together, as they know that the larger the demand for a new type of plane, the more willing the manufacturer is to spend the money on development costs, which ultimately results in lower prices across the market.

In both cases, it would be nice to think that the symbols and numbers scribbled on the glass windows of the Princeton library by John Nash could provide a solution to these business uncertainties. Ultimately, all the matrices, algorithms or any other game theory analysis cannot provide definitive answers to what the best competition strategy for any company is.

The best strategy for competing with rivals is something that must be learned over time by examining the tactics of other corporations. But by utilizing game theory tools to evaluate all possible actions versus what the others in the market are likely to do, a company can rest assured that the risk it is about to embark on has its basis in math and science, rather than simply in an executive's gut feeling.

*Jared Wade is RM's associate editor.*

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