



Book The Right Decision

A Mathematician Reveals How the Secrets of Decision Theory Can Help You Make the Right Decision Every Time

James Stein
McGraw-Hill, 2009

Recommendation

Making decisions is hard, and understanding new theoretical approaches to decision making can be even harder. Mathematics professor James Stein does a fine job of explaining these theoretical frameworks, converting abstract theory to applicable tools and illustrating his explanations with numerous examples. Stein offers many case studies, so readers can apply their understanding of the theoretical tools. But he doesn’t always provide sufficient explanation of the factors involved or the reasoning behind how the decision makers in the scenarios weigh their choices. That aside, this is a useful introduction to a complex subject. *BooksInShort* recommends Stein’s methods to planners, managers, strategists and anyone who wants to make better decisions.

Take-Aways

- Making decisions is incredibly important: “You are what you decide.”
- Decision making has three stages: identifying the need for a decision, determining the “menu” of options and making a choice.
- When making your mind up, identify the “payoff”: What is important to you?
- Eliminate the options that don’t offer your core payoff.
- Minimize the risk or loss.
- Maximize the long-term benefit.
- In some cases, the best option is to make the most of your profits during the limited time that an opportunity exists. “Make hay while the sun shines” is good advice.
- To make better choices, get more information, even if it is costly.
- When multiple payoff systems are at play, you must compromise.
- When other people – and their values and interests – are involved, decisions get riskier and more complex.

Summary

Decision Theory

At some point in your life, you’ll have to make a tough decision. You might have to choose between two risky and complicated medical treatments, for instance, or you may have to select between diverging career paths. The first decision might determine if you live or die. The second might set your future happiness and prosperity. For the best outcome, apply the “branch of mathematics known as decision theory.”

“You are what you decide – and there’s a really good way to make those decisions.”

Decision theory derives from mathematics, and its principles rest on sound and tested foundations. You don’t have to know much math to apply decision theory. You simply have to assign numerical values to a few options, and – most of the time – estimate how likely various outcomes might be. The rest involves reasoning based on applying a few core principles.

Three Stages

A decision has three main stages: First, you face a situation that requires a decision. This can range from having to select a restaurant to deciding which way to jump when a tiger leaps at you. Second, you “lay out a bunch of alternatives,” and, third, you “choose among the alternatives.” That third step involves action: You go eat at your restaurant of choice, or you jump left, not right, to dodge the tiger. You can improve your decision making by reviewing past choices, either yours or judgments made by others – anyone from acquaintances to historical figures – and examining what happened at each step.

“Decision theory is a collection of tools for structuring and choosing among a finite number of qualitatively different alternatives.”

As you study these verdicts, look for the “payoff factor,” the single most important element in the decision. Your options will be stronger or weaker depending on whether you “maximize the payoffs associated with that factor.” Assign specific weights to your various alternatives and judge among them according to the payoff factor. Discovering the payoff factor in a specific decision is a crucial step, allowing you to identify the units by which to measure your payoff – for instance, the amount of money you’ll make or the hours of free time you’ll gain.

“Who you become depends to a great extent on what you decide – but who you are and what you value frequently determine what the best decision is.”

The values that determine your payoff factor may be personal and emotional. The rules you use to make the judgment are logical, and the process applies to anyone.

Evaluating Payoffs

Focus on how you identify your alternatives. Decision theory applies only to realistic choices, paths you can actually take. For example, if you are trying to decide whom to date, Angelina Jolie is not an option for most people. Limit your “menu” of alternatives to a few choices to make the framework more useful and to make choosing easier.

“Thinking is hard work, and most people simply don’t want to do it.”

Rather than, say, selecting among all kinds of wine, pick a type of wine, then a price category, and buy from this more limited menu. Three possibilities is a good target: That way, you have two extremes and a middle option. To construct your menu, “figure out what the extreme alternatives of the decision are.” Then find or create a compromise as a middle choice. When you identify the centrist choice, weigh the results for everyone involved: Will the increased payoff for those who like the middle choice outweigh the decreased payoffs for those who don’t? When assessing these trade-offs, identify the proper parameter to measure results. Assessments are simpler when you only have one parameter to track – such as how risky an option is or how much money you can earn. With multiple parameters, certainty becomes more elusive. You have to juggle multiple “payoff systems,” all using different units to measure value.

“One of the most important factors in improving one’s decision-making abilities is the acquisition and use of information.”

Your identity, your situation and your values determine your payoff. A highly competitive athlete might intentionally lose a game to her son, for example. Judge the quality of a decision only in its context, never in the abstract. Understand what is at stake and how to measure your payoffs. You must clearly perceive the substance of a decision.

Applying Decision-Making Criteria

Decision theory provides “four major decision criteria.” The first is the “admissibility criterion.” To apply this standard, examine the alternatives and eliminate any that don’t deliver a big enough payoff. If you are sorting through health insurance plans and want to keep your current doctor, apply this principle by eliminating all insurance options that don’t underwrite seeing this doctor.

“Other people’s decisions sometimes appear inexplicable – often because your payoffs are different from theirs.”

In some cases, the availability of certain options isn’t always clear. Think through the situation to see how your current choices will work. For example, are your preferences viable in the long run or only in the short term? To apply this principle, be clear about your payoffs: If you don’t know what you’ll gain, you can’t eliminate bad alternatives. To sharpen your ability to use the admissibility criterion, examine past decisions to determine which choices were inadmissible.

“The key to many successful decisions is to recognize that there is one quantifiable factor of paramount importance and that the decision succeeds or fails based on maximizing the payoffs associated with that factor.”

The second widely applicable qualifier, the “minimax criterion,” stems directly from decision theory. It calls for settling on one “alternative that minimizes the maximum danger” – that is, the choice that identifies and prevents the worst outcomes possible. You can also reverse this principle: If you are likely to lose, you might take a big risk to maximize the possible benefit from your actions, like throwing a long pass when your team is behind late in a football game.

“Game theory, probably the most famous branch of decision theory, is the study of decisions involving strategic interactions with other parties.”

The third of the four principles is the “Bayes’ Criterion,” named after Thomas Bayes, an 18th-century British mathematician who did important work in probability theory. It involves choosing the alternative that creates “the greatest long-term gain.” Estimate the “expected value” of your choice. You can measure expected value in different units: In a business deal, project potential profits; in a military campaign, judge according to lives saved; to clarify a confusing assessment, emphasize or de-emphasize some single quality for long-range advantage.

“Maximizing long-term payoffs can be done not only by maximizing the quantity of payoffs but the quality of payoffs as well.”

When evaluating expected value, draw on other decisions or a body of other cases. When you’re placing bets at a casino, the likelihood of a desired result is a matter of probability. The choices have a calculated, finite number of possibilities with set likelihoods. Unfortunately, in the larger world, matters aren’t that simple. When you

lack a statistical reference, you must estimate the expected value. You can apply this principle to seeking the maximum quality payoff rather than seeking a maximum quantity of units of reward. Because businesses emphasize short-term returns, this principle can be hard to apply, even when it leads to better outcomes.

“Sometimes an apparently muddled decision gets clarified by realizing that there is a single quantity that you are looking to either maximize or minimize.”

The fourth qualifier is the “maximax criterion.” This applies when you can maximize returns on a good situation, but only for a finite period of time. This principle says, essentially, “Make hay while the sun shines.” You have a limited time to gather the most benefit, profit or return on a particular investment. This principle is difficult to apply, because resisting immediate return is very hard. Another tough dilemma arises if a situation offers a lesser quality but immediate payoff – like a college football player who has the skills and desire to play quarterback but must determine how to answer the coach who offers a short-term chance to start in another position. The player could participate and contribute – and even shine – but he wouldn’t be quarterback.

“Vindictive solutions always have the potential for blowback.”

As golfers have to select the right club situation by situation, so, too, must you use the right decision-making tool to render the best choices. How will you know which criterion to apply? Disqualifying options that don’t offer the right payoff is “always valid,” so start with admissibility. This criterion works best in simple scenarios with a clear payoff. However, its utility fades when faced with two or more payoff systems. Instead, you’ll need to trade off and compromise, weighing a higher payoff in one system against a lower payoff in another. Clearly, many decisions don’t fit a straightforward admissibility criterion. They call for applying one of the other three criteria. For instance, if you’re making a decision about a situation that recurs frequently, apply Bayes’ Criterion.

“It’s important to make hay while the sun shines because for most of us, the sun doesn’t shine too often.”

Ideally, disasters happen rarely, but that’s when you should apply the minimax principle. Minimax decisions are essentially conservative. They guide you to act cautiously and reduce risk. The minimax principle applies when you’re well established, as an individual or a firm. Mature entities have more at stake to protect and preserve. By contrast, start-up companies or adolescent workers have little invested, so they rarely apply minimax to their judgments.

Gathering Information

To reach better conclusions, get more data. The quality of your information is correlated with the quality of your decision making. Gathering data can change your relationship with the people involved. Information costs effort and emotion, and its value is time specific. An insider tip on how a horse is running matters a lot more before the race than after it. You can take data gathering too far, to a point of diminishing returns. Then you’re no longer improving your assessments by amassing more data; you may be stalling. Such delays impede good decisions or even damage them. On the other hand, sometimes you can usefully delay an evaluation and gather more data in the process. Consider a college student who decides to take her required courses first. She has to take them anyway, so she’s not wasting time, and she learns more about her talents and preferences.

“Strategic Interactions”

Often you don’t reach verdicts in isolation. In the business world and in other arenas, your decisions interact with other parties’ circumstances and choices. These strategic interactions shape your results, so take them into account. Game theory cautions that other players might be allies or enemies, so tipping a decision one way or the other might affect the “balance of power” or the “equilibrium solution.” In such situations, like an extended friendship, conditions are stable and only a large disagreement could shift the relationship. This is the setting for win-win solutions, or resolutions both parties find beneficial. The equilibrium solution need not be positive: You may have reached a stable negative situation, as in a long-term feud or war. If you are in equilibrium with other parties whose interests differ from yours, their actions shape the outcome of your decisions. Before deciding, anticipate their reactions to your choices and consider how those reactions will affect your overall payoff.

“You can’t make a winning decision if that winning alternative is not on the table.”

If your equilibrium solution involves parties whose interests clash or compete, take their viewpoints into account. In the most extreme version of this situation, some people might choose “vindictive solutions” – choices in which other people allow themselves to be hurt so that you will get hurt even more. Know enough about the emotions on all sides to remain aware of this option. If you are tempted to choose a vindictive solution, take care. History shows that while negotiating parties can accept serious punishment, going too far can produce backlash.

“Coalitions and Cooperative Solutions”

Other evaluations must involve addressing the circumstances at hand through coalitions and cooperative solutions. When facing a decision requiring cooperation, ask, “Do you really need people?” Every coalition necessarily requires compromise, so the payoffs have to be larger for the solution to be worth it. Coalition decision making is complicated; the more people involved, the higher the risk of something going wrong. The most common complication is that parties seek different payoffs. Your values may clash, and your decisions might not make sense to the others involved. Consider whether the added risk and complication are worth it.

On the other hand, some coalitions are synergistic: They produce better results through cooperation than the individuals produce on their own. The better sense you have of the interpersonal “chemistry” among the parties involved, the more likely you are to make good choices. Have a specific purpose when you form an alliance: Organizing for the sake of organizing wastes time. When you’re responsible for a group, recognize that the payoffs for that group – be it a company or your family – differ from your independent payoffs. Look beyond immediate self-interest to make good decisions for your organization.

Be realistic about the relative power of the parties involved. If other participants have much more power than you do, they have little to gain by allying with you. If you are more powerful than others, you don’t have to form an alliance; you can dictate terms. However, take care: Anytime you beat someone in a competition or determine their outcome, they may resent you.

About the Author

James Stein is a professor of mathematics at California State University and the author of *How Math Explains the World*.
