

The Science of Decision-Making

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Introduction

The success of any entity depends significantly on good decision-making. Decision-making is a science that can be taught, and every decision represents a problem that can be solved. Problems can be categorized as either rational or "irrational." For rational problems, it is common practice to formulate the decision as a mathematical problem that can be solved logically.

The Role of Mathematics in Decision-Making

Mathematics encompasses numerous fields, each offering different types of problems and approaches to solving them. While most everyday problems are simple, the complexity often lies hidden within seemingly straightforward scenarios. A good decision-maker should develop a foundational understanding of mathematical logic, which is built through consistent practice over time. Engaging with problems from diverse areas, such as algebra, pre-calculus, calculus, linear algebra, probabilities, statistics, and abstract algebra, strengthens this logic.

One does not need to become a mathematician but should solve problems to gain insight. Critics argue that mathematics has limited real-life applications, questioning when the quadratic formula was last used in daily life. However, mathematics enhances logical reasoning. It serves as the science of logic and underpins various disciplines, including physics, computer science, engineering, chemistry, and economics. Without adequate mathematical skills, advancing in these fields is nearly impossible. Even in fields where mathematics is less prominent, such as medicine, biology, and business, a basic understanding remains essential.

The Contribution of Computer Science

Computer science has significantly improved decision-making skills. Every computer program is designed to solve a problem. While the choice of programming language depends on individual needs, the primary focus should be on the problem-solving process. Initially challenging, programming becomes liberating once the foundational concepts are understood.

Both mathematics and computer science converge on algorithms as one progresses. Algorithms play a pivotal role in technological advancements across all domains. They emphasize solving problems effectively, often focusing on optimizing time and storage in computer science. This emphasis on efficiency is crucial for becoming a serious problem solver.

For example, when solving a mathematical problem, if the solution appears overly complex or disorganized, one should pause to reconsider the problem. Data science, a subset of computer science, further refines decision-making by analyzing data to reveal patterns and behaviors. Probabilities are fundamental to mathematics, computer science, data science, and machine learning. Understanding probabilities is essential for grasping the probabilistic nature of our world. Failing to do so can lead to flawed problem analysis.

Understanding Instinctive Decision-Making

Not every problem can be efficiently translated into mathematical terms. The human mind possesses the remarkable ability to make decisions without explicit data analysis or formulaic calculations. The

brain operates as an advanced algorithm, processing vast amounts of data to make decisions aimed at survival.

Consider a scenario where a dog is chasing someone on a rooftop. One option is to jump off the roof, avoiding the dog but risking death. Rational thought suggests this is a poor decision, as survival is the primary goal. Familiarity with dogs and their behavior influences the solution. If prior experiences involve wild dogs, appearing friendly might not be the best course of action. Here, instincts and the unconscious mind excel. The brain analyzes the dog's body language, scans the environment for resources, and identifies potential solutions, often without conscious effort.

The brain's strength lies in its ability to approximate indicators based on existing information. Even in subtle situations where something feels "off," the brain processes minimal yet significant data inconsistencies, triggering a gut feeling. This demonstrates the brain's unparalleled problem-solving capability.

Limitations and Complementary Tools

Despite its strengths, the brain acknowledges its limitations. Complex operations and large numbers often exceed its capacity. Recognizing these constraints led to the development of computers. Analytical thinking is prone to biases, such as priming bias, confirmation bias, affinity bias, and self-serving bias.

In academia and science, there is often an over-reliance on mathematical rigor, sidelining the power of raw logic. While mathematics is invaluable, some problems, particularly in philosophy, are better addressed without empirical testing. Philosophy thrives on abstract ideas, making it fascinating and uniquely suited to non-mathematical reasoning.

The Importance of Decisions

Decisions are omnipresent and serve as the primary factor in achieving goals. The butterfly effect and chaos theory illustrate how small actions can have profound impacts. Consider the hypothetical scenario of meeting one's younger self. Any minor piece of advice could significantly alter their development. Similarly, current decisions shape our future. Understanding the weight of our choices emphasizes their profound role in defining our lives.