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Problem Solving and Decision Making

Scientifically based methods for effective thinking

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The Psychology of Problem Solving

Definition (Newell & Simon)

Problem solving is a cognitive process in which we move from an initial state to a target state through a series of steps that are not obvious when the problem is first posed.

Types of problem-solving thinking

Algorithmic

A step-by-step method that provides a guaranteed solution

Heuristic

A method based on rules of thumb, fast but not guaranteed

Polya's 4-step model

1. Understanding:
2. Planning:
3. Implementation:
4. Evaluation:

Practice

Task: Choose a specific problem from your life and apply the 4-step model to it!

Structured Problem-Solving Methods

5 Whys method

Exploring cause-and-effect relationships to get to the root cause. We ask another "why?" question for each answer.

Example: Why was I late for work?

1. There was traffic → 2. Wrong route → 3. I didn't plan
4. I don't have a routine → 5. I don't consider it important

Root cause: Attitude towards punctuality

SWOT Matrix

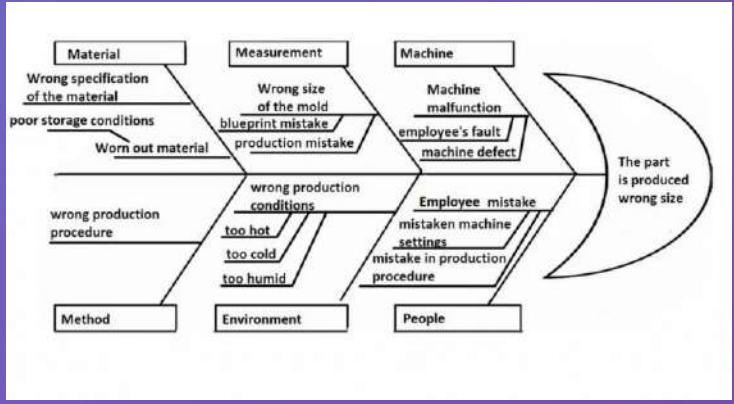
Analysis of Strengths, Weaknesses, Opportunities and Threats.

Application: Internal factors (S, W) vs External factors (O, T)

Fishbone (Ishikawa) diagram

Kaoru Ishikawa's (1968) method for systematically categorising possible causes. The "spine" represents the main problem, while the "branches" represent the causes.

The 6M categories: Man, Method, Machine, Material, Milieu, Measurement



Creative Problem-Solving Techniques

Brainstorming and Brainwriting

Generating ideas without restrictions, where every idea is valuable. Quantity is more important than quality in the first phase.

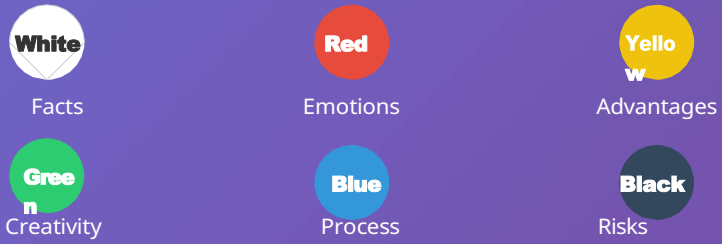
Rules: No criticism • Wild ideas are welcome • Aim for quantity • Build on others' ideas

SCAMPER Method

Further development of existing ideas using heuristics:
Substitute • Combine • Adapt • Modify • Put to other use • Eliminate • Reverse

Six Thinking Hats

Edward de Bono's method for approaching problems from multiple perspectives. Each hat represents a different thinking style.

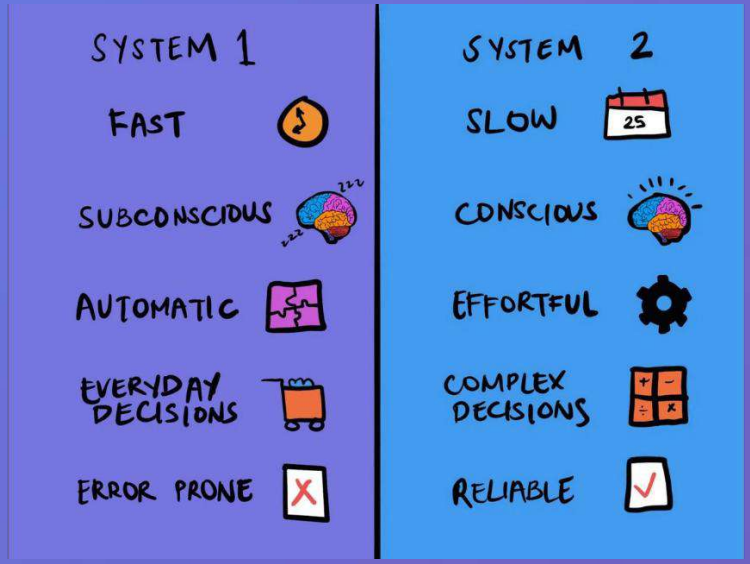


Exercise: Choose a problem and apply the Six Thinking Hats method to it, examining it from every perspective.

Dual Process Theory

Daniel Kahneman: "Thinking, Fast and Slow" (2011)

Two systems of thinking: the intuitive, fast System 1 and the slow, analytical System 2. Both systems play an important role in problem solving and decision making.



System 1: Fast

- Automatic No effort
- Emotional
- Pattern Recognition
- Instant Responses

System 2: Slow

- Requires conscious
- effort Logical
- Rule following
- Deep analysis

Rational Decision-Making Model

The rational decision-making model is a systematic, step-by-step process that helps you choose the best alternative based on objective criteria.

1 Problem definition

Precisely define the decision-making situation, outline the problem and clarify the objectives.

2 Determining decision criteria

Identifying the aspects on the basis of which we will evaluate the alternatives.

3 Weighting criteria

Determining the importance of the criteria and establishing priorities.

4 Developing alternatives

Collecting and developing possible solutions and courses of action.

5 Evaluating alternatives

Analysis of all alternatives based on specified criteria and weights.

6 Selection of the best alternative

Decision Matrix Example: Choosing a holiday destination

Criteria	Weight	Beach	Mountains	Big city
Cost	3	2 (6)	4 (12)	1 (3)
Activities	4	3 (12)	4 (16)	5 (20)
Weather	2	5 (10)	3 (6)	3 (6)
Access	1	2 (2)	3 (3)	5
Total	10	**30**	**37**	**34**

Practical task: Creating a decision matrix

Example: Purchasing a new laptop

Define the criteria and weight them (1-10) Collect 3-4 alternatives (laptop models)

Cognitive Biases - Basics

Research by Amos Tversky and Daniel Kahneman (1970s)

Confirmation Bias

We seek out information that confirms our existing beliefs, while ignoring contradictory evidence.

Example: We only read news sources that agree with our views.

Framing Effect

We evaluate the same information differently depending on how it is presented.

Example: "90% survival rate" vs "10% mortality rate".

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Blind Spot Bias

We recognise other people's biases more easily than our own.

Example: We see our colleague's bias, but not our own.

Blind spot bias

It is easier to recognise others' biases than our own.

Example We see our colleague's bias, but not our own.

Cognitive Biases - Practical Application

Anchoring Bias

The excessive influence of the first piece of information on subsequent decisions. Often, the first number or value we see "anchors" our thinking.

Example: Original price £100,000, now £70,000 - seems more attractive than if we only saw the sale price.

Availability Heuristic

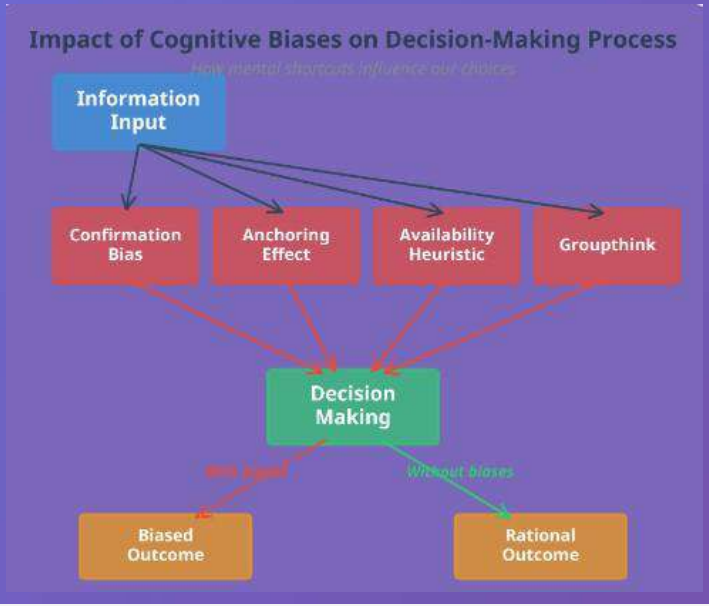
We consider events that are easy to recall to be more probable. We judge things that are vivid in our memory to be more frequent or more important.

Example: After a plane crash, many people are afraid to fly, even though statistically it is safer than driving.

Groupthink

Group harmony becomes more important than critical thinking. The pursuit of consensus suppresses dissenting opinions.

Example: No one dares to contradict the boss, even if he makes an obviously bad decision.



How can we defend ourselves?

- Be aware of the existence of biases Seek out opposing opinions Use structured methods Ask for feedback from others

Practical Tools for Better Decisions

Decision matrix

A tabular method that helps compare multiple alternatives based on different criteria, with weighting.

Advantages

- ✓ Objective comparison
- ✓ Transparent decision-making process
- ✓ Reduces emotional bias

Disadvantages

- ✗ Time-consuming
- ✗ Subjective weighting
- ✗ Excessive process

Pros and Cons List

Systematically collect and weigh the pros and cons of a given alternative.

Tip When evaluating, consider not only the number of items, but also their importance!

Devil's advocate technique

A method in which we deliberately look for arguments against the plan in order to reveal its weaknesses and avoid groupthink.

Tip Appoint a team member to be the critical thinker, or take on this role yourself!

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Tip The weighting of criteria should reflect real priorities; do not adjust them retrospectively to suit your preferred decision!

Exercise: Devil's advocate technique

Choose an important decision that you will have to make soon
Formulate your current preferred solution
Play the role of the devil's advocate: find at least 3 strong counterarguments
Re-evaluate your decision in light of the counterarguments

Summary and sources

Known tools and methods

Problem solving:

Polya's 4-step model, 5 Whys, Ishikawa diagram, SWOT analysis

Creative techniques:

Brainstorming, SCAMPER method, Six Thinking Hats technique

Decision-making:

Dual Process Theory, Rational Decision-Making Model

Cognitive biases:

Confirmation bias, Anchoring, Availability heuristic, Overconfidence, Groupthink

Practical tools:

Decision matrix, pros and cons list, devil's advocate technique

Key lessons

- A structured approach to problem solving and decision making increases efficiency and reduces the likelihood of errors.
- Combining creative and analytical techniques ensures the best results when dealing with complex problems.
- Recognising and being aware of cognitive biases is key to making better decisions.

Next steps for improvement

1. Choose a problem-solving technique and apply it to a current challenge
2. Keep a decision journal to record the process and results
3. Practise recognising cognitive distortions in everyday life. Read at least one book from the recommended reading list.
4.

Recommended reading

Fast and slow thinking

Daniel Kahneman

Nudge: Improving Decisions

Richard H. Thaler, Cass R. Sunstein

Six Thinking Hats

Edward de Bono

Identity at Work

Herminia Ibarra