

Critical Thinking Skills & Tools for Decision Making™



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Topics

Anatomy of a Rational Decision

The FAGRI Decision Model

How Experts Make Decisions and Process Information

Three Types of Decision Errors

Tools to Assist in Framing and Reframing Decisions

Thinking Errors and Mind Traps that Inhibit Critical Thinking

The Precision versus Clarity Tradeoff and Why It Matters

Lessons Learned from Red Teams on Critical Thinking

Logical Errors, Weak Arguments, and False Conclusions

Gauging and Making Adjustments for Overconfidence

Uses and Abuses of Graphical and Quantitative Data

Recognizing and Avoiding Groupthink

Assessing Priorities and Tradeoffs

Supplementary Content

- Rapid Decision Analysis Tools
- Using Bayes' Theorem to Revise Decision Probabilities



Course Objectives

- To examine and acquire skills in using certain tools and techniques to assist in making complex decisions
- To heighten your awareness of how thinking and reasoning errors can influence both the process and the outcome when making individual and group decisions ... and in other contexts as well
- To have an enjoyable learning experience ... engaging, hands-on, interactive



Sample Charts



What is a Rational Decision?

Rational = Logical + Practical

Practical = _____ + _____ + Cost-Effective

Cost-Effective = _____

**The Opposite of “Rational” is _____,
not _____.**

So, How Would You Define a Rational Decision?



Roberts' Rule #1 of Problem Solving

A solution that is perfect in a technical sense but will not be embraced by the people it impacts, is not a “good” solution.



Roberts' Rule #2 of Problem Solving

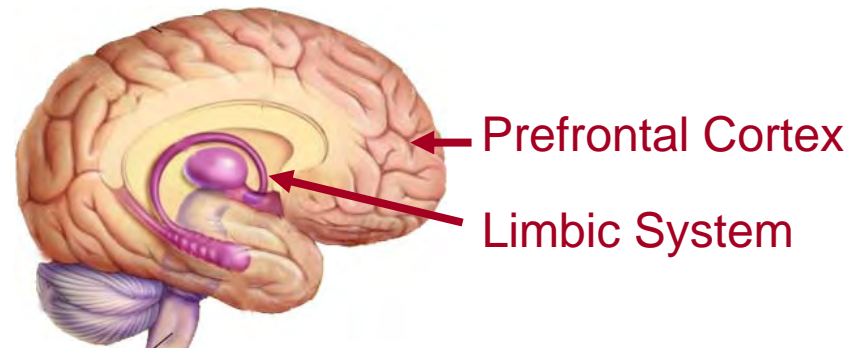
Every problem has a human component, which is often “messy,” frustrating to deal with, and may not have anything to do with logic.

Decision Makers – Experts Versus Novices

	Thinking Style	Information Needs	Information Format	Primary Brain Centers
Novices	Analytical	_____	Procedures, Rules, Flowcharts	Prefrontal cortex
Experts	Intuitive	_____	Graphs, Diagrams, Mindmaps	Integrated, but relatively more reliance on limbic system

What does this table tell you about yourself?

What does it tell you about how to communicate with others?



The 5-Stage FAGRI Decision Model

Decision-Quality Issues

Frame the Decision

- { Center & Narrow the Frame
- { Examine & Correct for Type III Errors

Assign Roles

- { Determine Who Will Gather Intelligence
- { Determine Who Will Make the Decision

Gather Intelligence

- { Gather Data & Information
- { Examine for Bias & Distortion
- { Clarify Assumptions & Uncertainties

Reach Conclusions

- { Choose Decision-Selection Approach
- { Analyze the Data & Information
- { Choose Best Available Course of Action

Implement Solution

- { Establish Implementation Approach
- { Implement, Measure, & Adjust



Three Types of Decision Errors

Type I: Accepting false “evidence”

Type II: Rejecting valid “evidence”

Type III: _____

- **Anchoring** and **Confirmation Bias** play a role in committing Type I and Type II errors
- **Framing Errors** and the **Availability Heuristic** play a role in committing Type III errors
- The **Investment Trap** plays a role in all 3 error types



“It often occurs that the major contribution of the operations research worker is to decide what is the real problem.”

— **Philip Morse**, 1903-1985
Princeton physics professor and
Pioneer of OR methods in WW II



Reality Check

Purpose of this Section: To understand, recognize, and avoid thinking “traps” that impede effective decision making. Also, to learn how to use Duncker Diagrams to assist in “reframing” a decision.

Your Current Reality: Referring back to the decision you described on page 4, please answer the following:

1. What were the key assumptions that played a role in the decision (for example: unknowns, expectations, beliefs, external factors)?

2. Which of these key assumptions were not explicitly identified?



Framing Errors

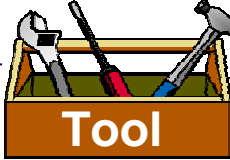


Description: Using the wrong “decision frame” to define the boundaries of a problem.

Decision Impact: Waste of time and effort in solving the wrong problem ... in other words, committing a Type III error

Example: During World War II the British suffered many aircraft losses over Germany. After examining the airplanes that made it back safely, the decision was made to add additional armor plating to the areas where bullet holes most often occurred.

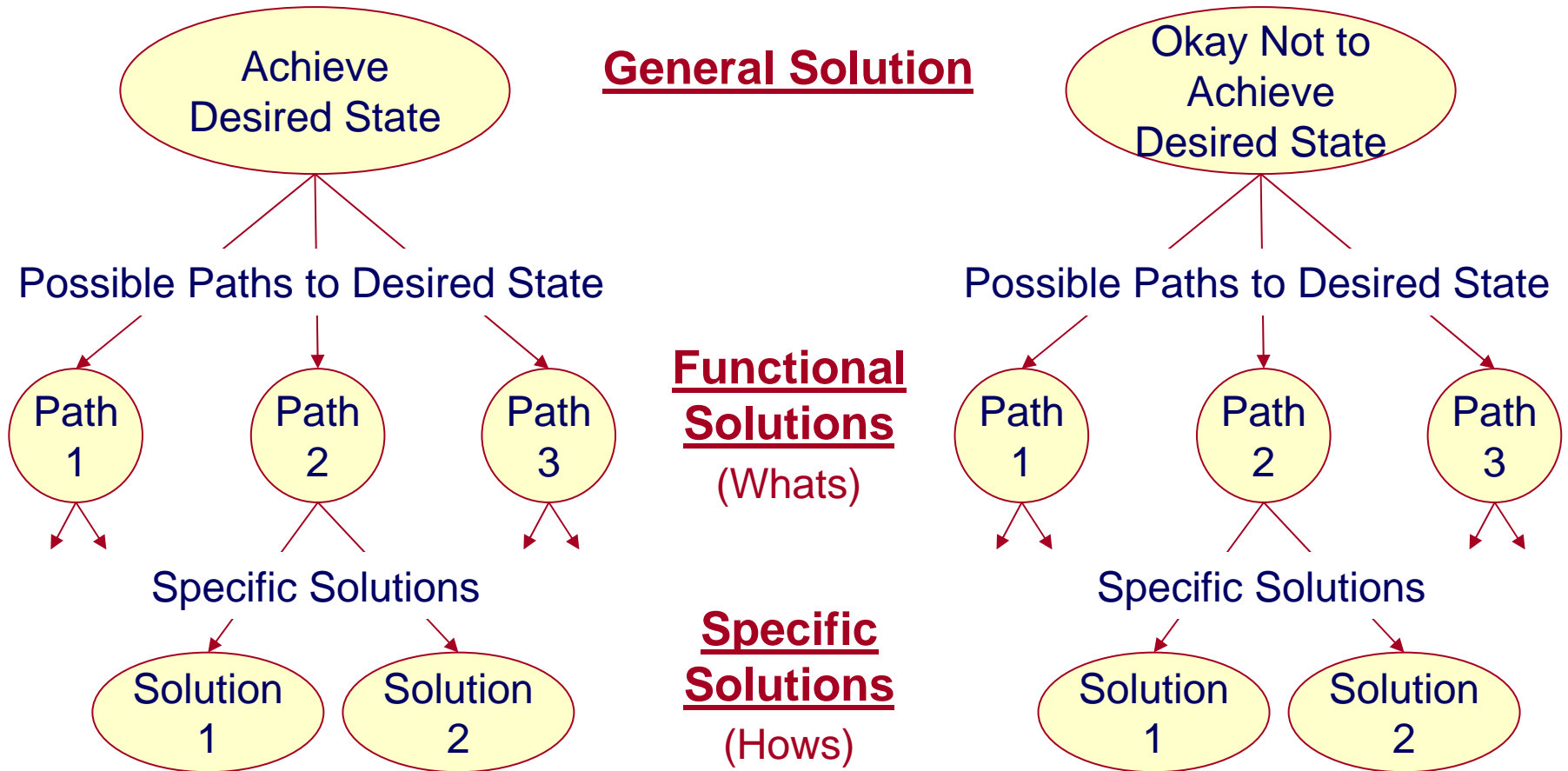
What’s wrong with the way this problem was framed?



Duncker Diagrams

A Tool for Reframing Problems

Description: Duncker Diagrams encourage you reframe a problem so that you can consider possible solutions from a different angle.





Lessons from Precision vs. Clarity Tradeoff

- Clarity is linked to simplicity, which enhances communication and understanding
- But clarity also sacrifices details that may be needed to make and also justify a complex decision

Lesson 1: Don't confuse your stakeholders with details that are only necessary for you to make an informed decision.

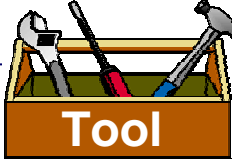
Lesson 2: Be aware that your own thinking as a decision maker can become clouded by details. Too many details may also affect your willingness to take necessary risks.

Lesson 3: _____



Benefits of Red Team Approach for Critical Thinking and Decision Making

- Finding weaknesses in a decision before the decision is executed
- Surfacing and challenging any assumptions that could increase _____ or _____
- Detecting any potential interactions between _____
- Identifying alternative scenarios that could be played out once the decision is executed, for instance, ways the market might respond to a new product under various conditions
- Preventing mind traps, such as the Availability Heuristic, Framing Errors, and overconfidence in one's judgment



Red Team Tool #2: Key Assumptions Check

Description: Used to identify hidden, perhaps unconscious assumptions that could result in significant risks to a plan.

Method:

- Examine the known risks, then record any assumptions about the likelihood or potential impact of each risk factor
- Expand the list of risk factors using other methods, such as pre-mortem analysis; then repeat the previous step
- Look for and challenge any logic errors or weak premises
- Look for hidden links and relationships between the factors that could amplify the likelihood or impact of a risk condition
- If necessary, revise the risk mitigation plans



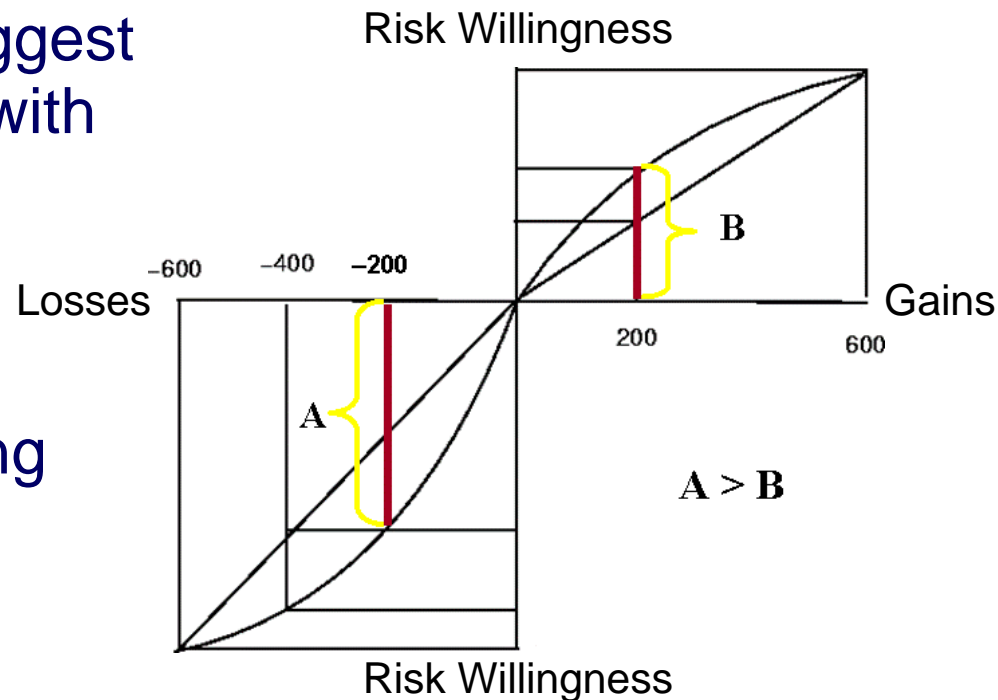
Problematic Probabilities

Suggestion 2: Be cognizant of and alert to the ways in which subjective probabilities can be biased.

Example: Studies have shown that individuals are less likely to take a risk in order to achieve a gain than they are to avoid a loss, when the gain and loss are of equal magnitude.

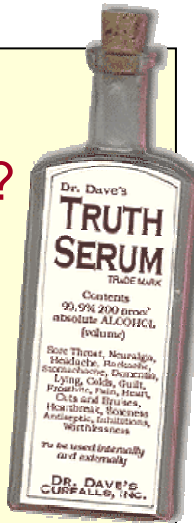
Question: What does this suggest when it comes to negotiating with clients?

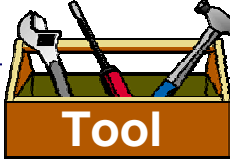
Question: What does the graph suggest about risk-taking when it comes to large losses versus small losses?



Sanity Check for Statistical Data

- Are the numbers within the range of what appears to be reasonable?
- Are there any apparent inconsistencies, contradictions, or omissions?
- Where do the data come from? Is it a credible source?
- Who collected and compiled the data?
- Have proper statistical techniques been employed?
- Is there any ambiguity in the labels, categories, scales, or constructs?
- What's the data provider's personal stake in how the data are interpreted?
- How, specifically, does the data provider hope to influence you?
- Does the data provider clarify what can't be inferred from the numbers?
- To what extent do the data support the premises and conclusions?
- Is there any confirming or disconfirming evidence from other sources?
- And most important, _____?

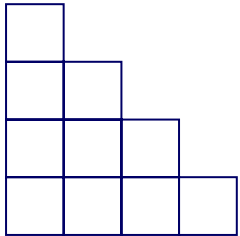




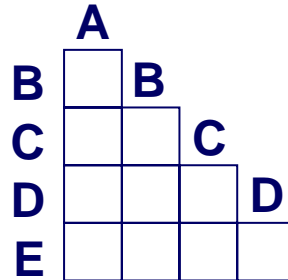
Pairwise Ranking Example

After analyzing the options for a marketing strategy to accompany a new product rollout, five alternatives were identified. The following diagrams show how Pairwise Ranking was used to rank the alternatives. (Note: For convenience they are labeled A, B, C, D, E.)

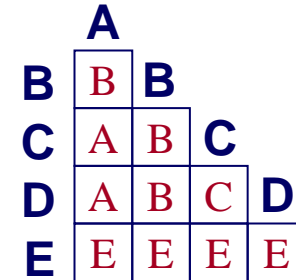
1. Construct an n-1 triangular matrix



2. Add the alternatives as shown below



3. Compare the alternatives; Note the winner in the cell

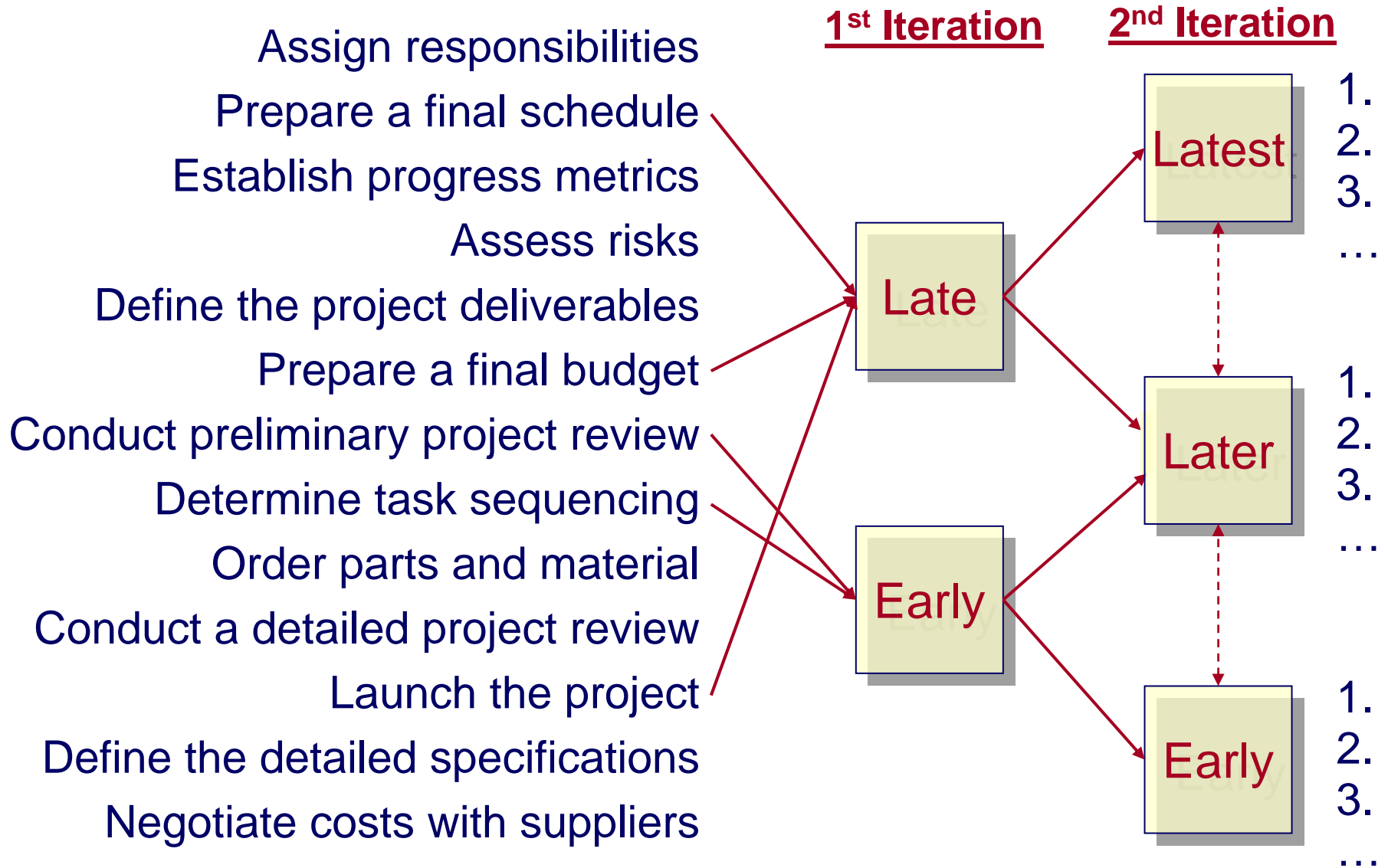


4. Tabulate the results and rank the alternatives

Alternative	A	B	C	D	E
Count					
Rank					



Queue Sorting Example – Project Task Sequence





References and Recommended Reading

SPC for Right-Brain Thinkers, Lon Roberts, Quality Press, 2005.

Gut Feelings: The Intelligence of the Unconscious, Gerd Gigerenzer, Viking, 2007

The Signal and the Noise: Why So Many Predictions Fail – But Some Don't, Nate Silver, The Penguin Press, 2012

The Psychology of Judgment and Decision Making, Scott Plous, McGraw-Hill, 1993

Winning Decisions: Getting It Right the First Time, Edward Russo and Paul J. H. Schoemaker, Doubleday, 2002

Leading Accelerated Projects: Why Projects Overrun their Schedules and What to Do About It, forthcoming book by Lon Roberts. Visit website at www.R2assoc.com for availability information.

Training Courses

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