

Problem-Solving and Critical Path Reasoning (PSCPR)

Effective problem-solving requires consciously transitioning from comfortable certainty into productive uncertainty. Initially, we rely on clear facts and well-established methods. But genuine insight demands stepping beyond what's known to recognize gaps, implicit assumptions, and hidden perspectives. True mastery emerges when we courageously embrace exploration, engaging the unknown and transforming uncertainty into discovery and deeper understanding.

Certainty → Uncertainty → Exploration

1. **Observation** (Known Knowns – Type 1 Expert)
 - Questions: “What is given? What do I know? What did I know before?”
 - Givens: Measurements, observations, quantities, data, or explicitly stated conditions
 - Knowns: Concepts, theories, principles, relationships, or frameworks
 - Visuals: Graphs, charts, diagrams. Sketch out thoughts and ideas

2. **Analysis** (Known Unknowns – Type 1 Expert)
 - Questions: “What am I trying to find? What do I know I don’t know? What do I need to know?”
 - Objectives: Identify desired values, parameters, relations, or outcomes
 - Unknowns: Consider quantities, parameters, or relationships required to obtain objectives

3. **Inference** (Unknown Knowns – Type 2 Expert)
 - Questions: “What am I missing? What do I not know that I know? Has the problem been sufficiently reduced? Do I know/have enough to determine what needs to be known? What am I not acknowledging? What can be deduced?”
 - Alternatives: Consider multiple perspectives, challenge hidden assumptions, acknowledge implicit or overlooked knowledge (revisit Step 1).
 - Complexities: Reduce degrees of freedom, simplify the problem wherever possible (but no further)
 - Subtleties: Recognize possible equations, relations, or quantities that aren’t explicitly given yet are implicitly known and could be leveraged to solve the problem

4. **Exploration** (Unknown Unknowns – Type 3 Expert)
 - Questions: “Does this make sense? What do I not know that I do not know? What am I unaware of or not perceiving? What haven’t I considered?” What must be induced?”
 - Curiosities: Explore original ideas, embrace uncertainties. Perform tests and experiments, run simulations, gather observations
 - You don’t (won’t) know until you look.
 - “The cave you fear to enter holds the treasure you seek.” – Joseph Campbell
 - Answers: Perform sanity checks, redundancy checks, and consistency checks
 - Dimensional analysis
 - Reflections: Recalculate, reformulate, or revise approach as necessary
 - Refinements: Iteratively adjust methodologies, hypotheses, and solutions

How to Use the PSCPR Guide Sheet

1. **Observation** – Establish Claim, Null, and Assumptions
 - In the **Claim** line, write the statement under test (the proposed explanation or hypothesis).
 - In the **Null** line, write the “business-as-usual” alternative that holds if P is not true.
 - In **Assumptions**, list the key conditions, constants, knowns, givens, or context considered.
2. **Analysis** – Define Necessary Observables
 - Under “If P is true...”, record one or more **Necessary Observables (Questions)** that must hold if the Claim stands.
 - Under “If N is true...”, record one or more **Necessary Observables (Questions)** that must hold if the Null stands.
 - A Necessary Observable is a condition whose clear failure would directly undermine that position, turning each position into testable expectations.
3. **Inference** – Organize evidence and candidate stories
 - List concrete facts known to be true in this specific case (measurements, observations, calculations, documented events).
 - For each fact, mark whether it falsifies the Claim, the Null, both, or neither, based on the Necessary Observables.
 - List relevant patterns (how similar systems usually behave, base-rates, historical tendencies)
 - For each pattern, mark whether it rejects or weakens the Claim, the Null, both, or neither.
 - In the first story line, describe the behavior **if the Claim were true** (Claim story).
 - In the second story line, describe the behavior **if the Null were true** (Null story).
 - Indicate which story currently fits the recorded Facts and Patterns with the fewest added assumptions (Claim story, Null story, tie, or neither).
 - Stories in this section function as candidate models; Facts and Patterns determine which models remain viable.
4. **Exploration** – Apply falsification and test outcome
 - Answer the falsification prompts to indicate whether any Fact or Pattern clearly contradicts a Necessary Observable for the Claim or for the Null.
 - Identify the Outcome and select an appropriate Claim Status
5. **Hypothesis**
 - In the space provided, write a brief statement summarizing the current position.
 - Before writing the hypothesis, pause and ask:
 - *Does it follow from the facts (D), patterns (I), and the questions Q_P/Q_N , was anything ignored that clearly hits P or N ?*
 - *Is there a reasonable rival story that still explains $D + I$ almost as well (and should that become a new P or N next round)?*
 - *Is anything in A really an untested claim that needs its own P/N check?*
 - *And what single new observation or test would most change my rating for P ?*

Problem-Solving and Critical Path Reasoning (PSCPR) Guide Sheet

Test a claim *against a null* using facts (deduction), patterns (induction), and stories (abduction).

OBSERVATION

Claim P: (paradigm)	
Null N: (status quo, business-as-usual)	
Assumptions A: (context/givens)	

ANALYSIS

If P is true, then the following are **Necessary Observables** of P (Questions):

Q_{P1} :	
Q_{P2} :	

If N is true, then the following are **Necessary Observables** of N (Questions):

Q_{N1} :	
Q_{N2} :	

INFERENCE

Facts (Deduction) – What <i>is</i> true? (observation / measurement)	This fact falsifies:
D_1 : <div style="border: 1px solid black; height: 20px; width: 500px;"></div>	<input type="checkbox"/> Q_P <input type="checkbox"/> Both <input type="checkbox"/> Q_N <input type="checkbox"/> Neither
D_2 : <div style="border: 1px solid black; height: 20px; width: 500px;"></div>	<input type="checkbox"/> Q_P <input type="checkbox"/> Both <input type="checkbox"/> Q_N <input type="checkbox"/> Neither

Patterns (Induction) – What <i>usually</i> happens? (base-rate / prior behavior)	This pattern rejects:
I_1 : <div style="border: 1px solid black; height: 20px; width: 500px;"></div>	<input type="checkbox"/> Q_P <input type="checkbox"/> Both <input type="checkbox"/> Q_N <input type="checkbox"/> Neither
I_2 : <div style="border: 1px solid black; height: 20px; width: 500px;"></div>	<input type="checkbox"/> Q_P <input type="checkbox"/> Both <input type="checkbox"/> Q_N <input type="checkbox"/> Neither

Stories (Abduction) – What <i>possibly</i> happens? (If P/N is true, how/why?)
S_P : <div style="border: 1px solid black; height: 20px; width: 700px;"></div>
S_N : <div style="border: 1px solid black; height: 20px; width: 700px;"></div>

Given the Facts and Patterns, which Story fits better with fewer assumptions? <i>Note: Stories are to be tested, not believed.</i>	<input type="checkbox"/> S_P <input type="checkbox"/> Tie <input type="checkbox"/> S_N <input type="checkbox"/> Neither
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EXPLORATION

Did any fact or pattern **falsify** P (a necessary Q_P clearly fails)? If so, which? yes no

Did any fact or pattern **falsify** N (a necessary Q_N clearly fails)? If so, which? yes no

Outcome:

- Retain N Evidence is too weak to dismiss the null; P is not yet better than N .
- Accept P Provisionally accept P ; N is not falsified, but P is better than N .
- Accept P , Reject N N is falsified by a failed Q_N or clear conflict with D ; P survives.
- Undecided D and I are insufficient or conflicting; need new observations or tests.

Claim Status:

- 0.0 – False Contradicted by facts or necessary conditions; P fails Q_P .
- 0.2 – Speculative Mostly a story; little or no support from D or I , but not yet ruled out.
- 0.4 – Plausible Consistent with D and I , worth considering, rivals are at least as strong.
- 0.6 – Probable Fits D and I better than N and other rivals; no serious contradictions.
- 0.8 – Corroborative Strong fit to D and I ; P survived several tests, rivals are weaker.
- 1.0 – True Operationally treated as true; no rival explains D and I better.

HYPOTHESIS

State your **working hypothesis** in the space below and check: does it follow from your facts (D), patterns (I), necessary questions (Q_P/Q_N), is there a live rival story left, and what one test would most change your rating for P ?

Example: “Given [A] and based on the current facts [D] and patterns [I], [P / N] is the best description, so [retain N / provisionally accept P / accept P and reject N / stay undecided].”

References:

The Ethical Skeptic, “The Elements of Hypothesis”; *The Ethical Skeptic*, WordPress, 4 Mar 2019;
Web, <https://wp.me/p17q0e-94J>

The Ethical Skeptic, “The Three Types of Expert”; *The Ethical Skeptic*, WordPress, 28 Nov 2021;
Web, <https://theethicalskeptic.com/?p=57222>