Introduction to Mental Models

Based on Topics in Sakal-Column

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Introduction

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What Are Mental Models?

- Mental Models help us understand and interpret the world.
- They shape how we think, what we notice, and what we ignore.
- Mental Models simplify complexity and highlight relevance.
- They guide reasoning, decision-making, and perception.
- Every thought process relies on some form of Mental Model.

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Mental Models: From Data to Knowledge

- Information = raw data.
- Thinking = organizing information into structure.
- Knowledge = structured information with meaning.
- Mental Models are structured knowledge frameworks.
- They convert data into insight by imposing structure and meaning.

Information + Thinking = Knowledge

Individual Learning = Changes in Mental Models

Organizational Learning = Shared Changes in Mental Models

(Ref: The Art Of Thinking Clearly - Swabhav Tech Labs)

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Example: Paradigm Shift

- "Paradigm Shift" is a Mental Model for deep systemic change.
- It describes a total shift in how a subject is understood.
- Encourages openness to change and challenging assumptions.
- Used in science, business, and personal development.
- Helps recognize when old models no longer explain new realities.

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What Is Mental Model Thinking?

- Applying multiple models to interpret and solve problems.
- Helps identify patterns and structure information efficiently.
- Enhances insight, clarity, and decision-making.
- Encourages flexible and adaptive thinking.
- Widely used in strategy, systems thinking, and learning.

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Mental Models in Learning

- Learning forms internal frameworks called Mental Models.
- These models help organize, relate, and apply new knowledge.
- Prior experience shapes how new models are formed.
- Models evolve through active engagement and reflection.
- Teachers can help learners by fostering model-building skills.

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Building Better Mental Models

- Seek diverse models to gain richer perspectives.
- Continuously test and refine your mental frameworks.
- Discard models that no longer serve or predict well.
- Use models as tools, not truths.
- Read widely—Farnam Street's *The Great Mental Models* is a great start.

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Introduction to Mental Models

- Mental models are frameworks to simplify complex decision-making.
- Popularized by Charlie Munger and Shane Parrish.
- Originates from cognitive psychology and systems theory.
- Helps in investing (e.g., Munger's latticework), policymaking, and life choices.
- E.g., Ratan Tata applying mental models in Tata Nano's design.
- Be aware of over-relying on one model; use a toolbox approach.

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Why Do We Have Mental Models?

- Brains evolved to predict environmental changes and increase survival odds.
- Mental Models are tools the brain uses to make accurate predictions.
- Decision-making is based on predictions, consciously or subconsciously.
- Mental Models help assign meaning to experiences and emotions.
- We use them in both logical decisions and emotional interpretations.
- Even basic reactions (e.g. Fight or Flight) are driven by primal models.
- Mental Models fill gaps in uncertainty to help us make sense of the world.
- Everyday beliefs (e.g. monogamy, afterlife) are predictive Mental Models.

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Mental Models as Predictive Tools

- All decisions are bets on Mental Model-based predictions.
- Models like 80/20 or Second Order Thinking predict system outcomes.
- Mental Models help evaluate probabilities in uncertain environments.
- They convert external stimuli into internal meaning and action.
- Interpretation of social cues often uses layered Mental Models.
- Miscalibrated models can lead to incorrect assumptions and behavior.
- Models operate both reactively (instinct) and reflectively (consciously).
- They underpin both logical reasoning and emotional reactions.

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Five Cognitive Dimensions of Mental Models

- Instinct – hard-coded evolutionary models like Fight or Flight.
- Faith – belief-based models rooted in tradition, religion, and myth.
- Preference – ego-driven models shaped by desire, ideology, and culture.
- Logic – models based on reasoned inductive arguments and observation.
- Evidence – models validated through experience or experimentation.

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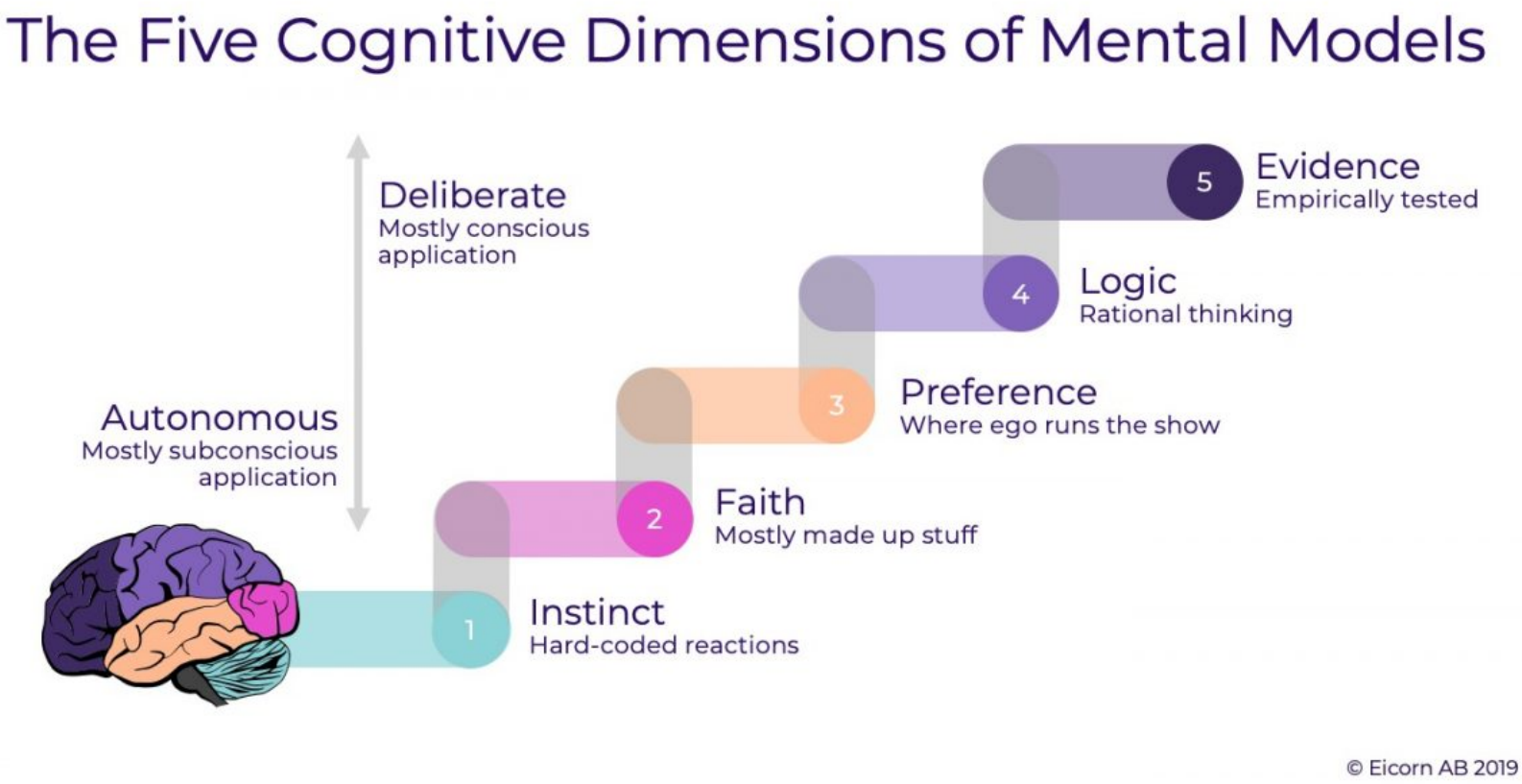
Cognitive Dimensions



(Ref: The Architecture of Mental Models - Eicorn)

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Instinct-Based Mental Models

- Instincts are primal and evolutionarily hardwired.
- Fight or Flight is a classic example of this dimension.
- Responses are automatic and cannot be reprogrammed directly.
- We can only train our reactions to instinctive triggers.
- These models are ancient, deep-seated, and difficult to override.

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Faith-Based Mental Models

- Built on beliefs, not necessarily evidence or logic.
- Often found in religious or cultural origin stories.
- Meaningful for many, but poor predictors of reality.
- Highly changeable—we can choose to revise or discard them.
- Some thinkers maintain faith models for meaning, not logic.

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Preference-Based Mental Models

- Shaped by ego, ideology, wishful thinking, and group norms.
- Often distort reality to match desires or identity.
- Tribalism and stubbornness emerge from these models.
- Social compliance reinforces many preference-based models.
- Often inherited from past belief systems or cultures.

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Logic-Based Mental Models

- Built from reasoning and inductive observation.
- Rooted in philosophy and early scientific thought (e.g. Logos).
- Theories and hypotheses form the basis of these models.
- Vulnerable to inductive errors, but very useful when crafted well.
- Common in science, business strategy, and critical thinking.

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Evidence-Based Mental Models

- Built from tested logic and real-world outcomes.
- Most accurate and useful for understanding reality.
- Examples: multitasking is inefficient; 80/20 works in specific domains.
- Can be misapplied if overgeneralized beyond the evidence.
- Critical to distinguish between tested truth and inductive guesswork.

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Mental Models

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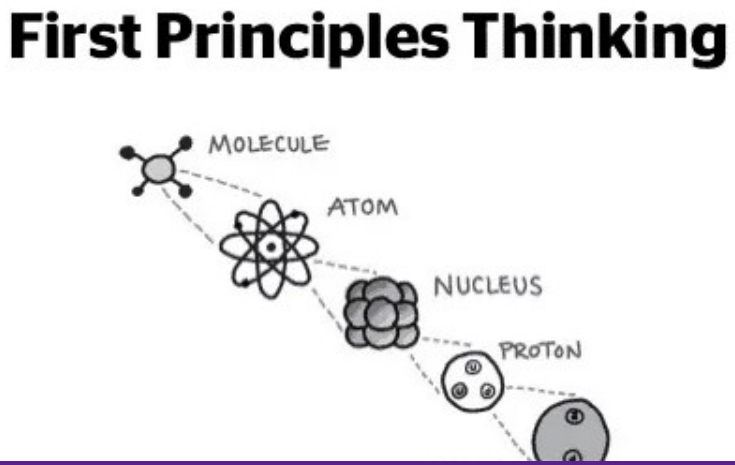
First Principles Thinking

- Break problems down to their fundamental truths.
- Originates from Aristotle and physics.
- Used in startups, e.g., Ola dissecting cab logistics vs. copying taxi systems.
- In cooking, understanding base ingredients vs. recipes.
- E.g., ISRO's cost-effective Mars mission using fundamental physics and constraints.
- Beware of ignoring proven heuristics and reinventing unnecessarily.



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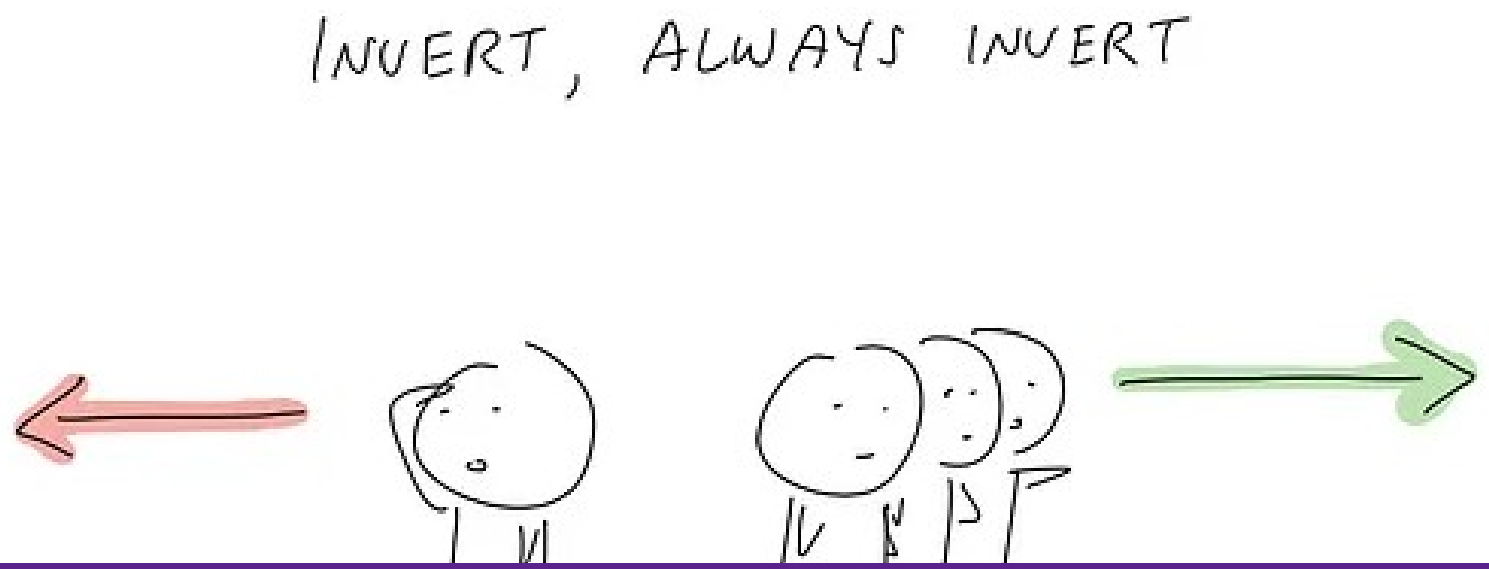
Inversion

- Thinking in reverse , “what would cause failure?”
- Inspired by Carl Jacobi’s “invert, always invert.”
- In finance: prevent loss before seeking gain.
- In daily life: avoiding bad health rather than only pursuing good.
- E.g., B-schools teaching case studies of failed Indian startups.
- Avoid over-focusing on negatives; it’s a tool, not a worldview.



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Opportunity Cost

- Cost of the next best alternative foregone.
- Core principle in economics since classical era.
- Choosing civil services over entrepreneurship , missed upside.
- In Indian agriculture: water for paddy vs. cash crops.
- E.g., investor choosing fixed deposit vs. equity.
- Don't ignore hidden or non-financial costs; measure holistically.

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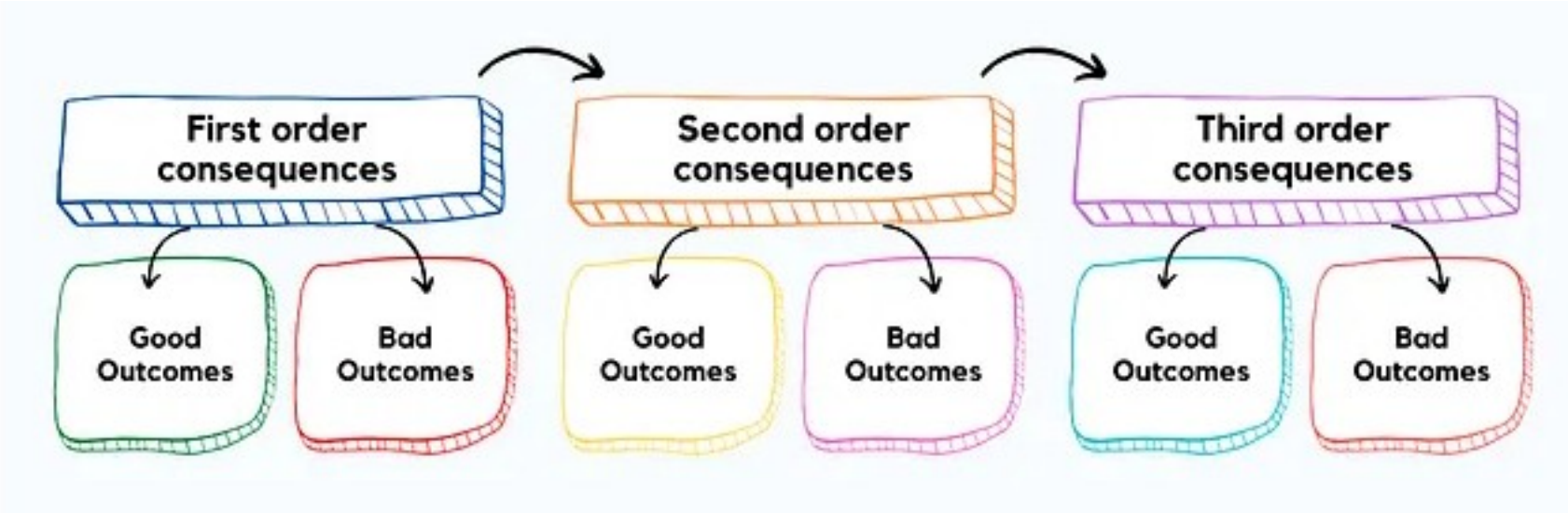
Second-Order Thinking

- Anticipating consequences of consequences.
- Key to systems thinking; used by top strategists.
- In politics: free electricity $\rightarrow$ higher consumption $\rightarrow$ grid stress.
- In business: discounts $\rightarrow$ loss leaders $\rightarrow$ brand erosion.
- E.g., UPI adoption $\rightarrow$ cashless economy $\rightarrow$ surveillance concerns.
- Avoid paralysis by analysis; balance depth with action.



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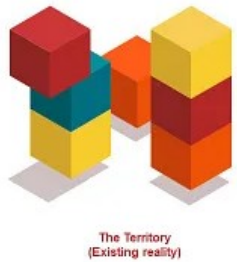
The Map is Not the Territory

- Models are simplifications , not reality itself.
- Coined by Alfred Korzybski, popular in systems science.
- GDP $\neq$ actual prosperity; rankings $\neq$ real competence.
- E.g., exam scores $\neq$ intelligence; IRCTC waitlist $\neq$ travel reality.
- E.g., BPL card $\neq$ real poverty in rural India.
- Don't confuse labels or proxies with full understanding.



(Ref: The Art Of Thinking Clearly - Swabhav Tech Labs)

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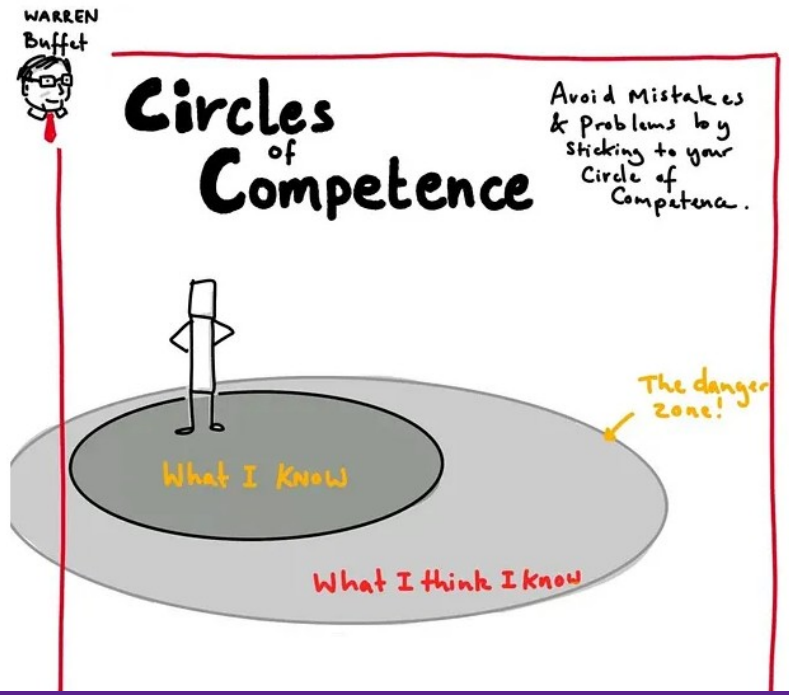
Circle of Competence

- Know what you know , and what you don't.
- Warren Buffett's key idea; deeply tied to humility.
- Investors stick to known sectors , pharma vs. tech.
- E.g., Indian cricket team sticking to seamers on green pitches.
- E.g., Byju's scaling fast in edtech, failed in physical schools.
- Don't make your circle too small , be open to learning.



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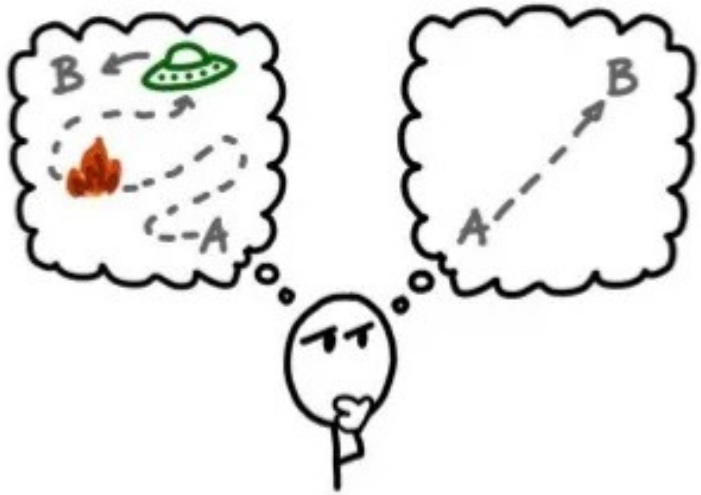
Ockham's Razor

- Simplest explanation is often correct.
- Named after William of Ockham, 14th century.
- Used in diagnosis, journalism, and science.
- E.g., missing train due to traffic vs. conspiracy by cabbie.
- E.g., Aadhaar leaks more likely due to mismanagement than espionage.
- Beware of oversimplification; simple $\neq$ accurate.



"When faced with two equally good hypotheses, always

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The Lindy Effect

- The longer something survives, the longer it's likely to.
- Popularized by Nassim Taleb; derived from theater.
- Sanskrit, Ayurveda , resilient knowledge in Indian context.
- Brands like Amul, Tata indicate trust through time.
- E.g., epics like Mahabharata enduring cultural relevance.
- New $\neq$ better; but old $\neq$ always useful , evaluate critically.

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Sunk Cost Fallacy

- Continuing due to past investment, not future value.
- Studied in behavioral economics.
- Government projects continued despite low returns.
- E.g., B-school student finishing MBA despite hating it.
- E.g., personal relationships carried forward "because of time invested."
- Don't throw good money (or time) after bad.

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The Pareto Principle (80/20 Rule)

- 80
- Discovered by Vilfredo Pareto in economics.
- E.g., 20
- In exams, 20
- E.g., Indian IT firms rely heavily on top 20
- Avoid ignoring the remaining 80

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Cognitive Biases

- Systematic deviations from rational thinking.
- Studied extensively by Kahneman and Tversky.
- Media bias, confirmation bias, anchoring , common in investing and politics.
- E.g., brand loyalty despite better alternatives.
- Indian voters influenced by recency bias during elections.
- Learn biases to spot them, not to feel superior.

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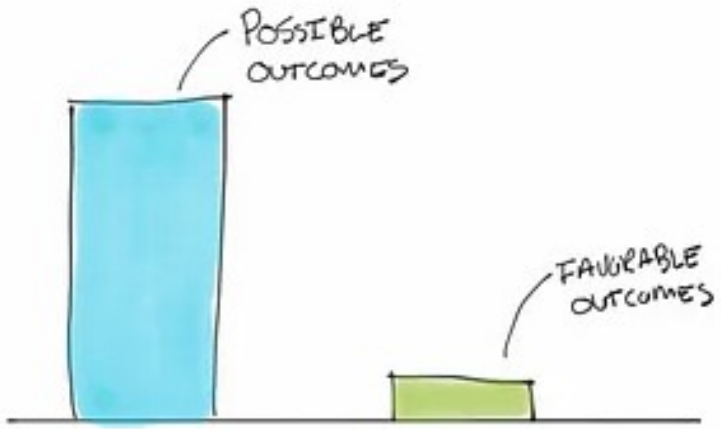
Probabilistic Thinking

- Thinking in terms of likelihoods, not certainties.
- Core to Bayesian reasoning and decision theory.
- E.g., cricket match predictions, monsoon forecasts.
- Stock investors use expected value calculations.
- E.g., Indian RTOs plan road design using accident probabilities.
- Avoid overconfidence; even 90



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The Dunning-Kruger Effect

- Incompetent people overestimate their competence.
- Coined by psychologists Dunning and Kruger.
- E.g., novice trader in India believing they're stock experts post one gain.
- Political debates full of loud but uninformed opinions.
- E.g., early success of startups can lead to overexpansion.
- Competence includes knowing limits; humility is key.

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Hanlon's Razor

- Never attribute to malice what can be explained by stupidity.
- Popular in management and conflict resolution.
- E.g., government inefficiency $\neq$ conspiracy.
- Indian Railways delays often due to process, not sabotage.
- In family arguments, ignorance may explain behavior better than bad intent.
- Beware of excusing true malice , discern with care.

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Systems Thinking

- Viewing elements as parts of interrelated wholes.
- Rooted in cybernetics and ecology.
- E.g., Indian river pollution due to upstream waste + politics + habits.
- Public health influenced by education, nutrition, and social norms.
- E.g., traffic = vehicles + roads + behavior + enforcement.
- Risk: complexity can obscure actionable insight , avoid analysis paralysis.

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The Availability Heuristic

- People judge likelihood by what comes easily to mind.
- From cognitive psychology.
- After plane crash news, people avoid flying.
- E.g., fear of crime rising due to sensational Indian news channels.
- COVID panic in India driven by social media images.
- Recognize bias: what's vivid $\neq$ what's common.

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Skin in the Game

- Decision-makers must share risks of their actions.
- Advocated by Nassim Taleb.
- E.g., Indian politicians rarely affected by laws they make.
- Business owners risking personal capital vs. salaried CEOs.
- E.g., doctors prescribing tests vs. family treating conservatively.
- Don't assume skin always = alignment; people may still act irrationally.

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Confirmation Bias

- Tendency to seek info that confirms preconceptions.
- Found in psychology and behavioral economics.
- E.g., political debates in India , media consumed selectively.
- Investors seek news that supports their portfolio.
- E.g., religious or caste-based beliefs reinforced via social networks.
- Actively seek disconfirming evidence for better clarity.

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The Law of Diminishing Returns

- Each additional input yields less output after a point.
- Core to economics and productivity.
- E.g., studying 10 hrs vs. 20 hrs doesn't double marks.
- Government subsidies show lower impact over time.
- E.g., fertilizer overuse harming Indian soils.
- Be aware of optimal input level , don't push endlessly.

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Falsifiability

- A theory must be testable to be scientific.
- Philosopher Karl Popper's key principle.
- E.g., Astrology in India: not falsifiable = pseudoscience.
- Good economic models are those we can disprove.
- E.g., ISRO missions are evaluated on clear success/failure.
- Avoid vague goals or models that can't fail , they're useless.

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Survivorship Bias

- Focus on successes and ignore failures.
- WWII bomber example; key in statistics.
- E.g., highlighting startup unicorns, ignoring 90
- Bollywood stories of actors from small towns miss thousands who failed.
- E.g., glorifying IIT success without showing coaching burnout cases.
- Always ask: "What am I not seeing?"

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The Peter Principle

- People get promoted to their level of incompetence.
- Formulated by Laurence J. Peter.
- Seen in bureaucracies and Indian PSUs.
- E.g., great engineer made manager , fails at leadership.
- Indian government often promotes seniority, not ability.
- Avoid automatic promotions , match role to strengths.

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Tragedy of the Commons

- Individuals overuse shared resources for personal gain.
- Coined by Garrett Hardin, 1968.
- E.g., overgrazing in Indian village pastures.
- Overfishing in coastal India, water tanker usage in Bangalore.
- Pollution of Yamuna due to collective neglect.
- Collective solutions + incentives required to escape the trap.

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Reciprocity

- People respond to kindness with kindness.
- From social psychology, basis of social contracts.
- E.g., Indian wedding invites $\rightarrow$ social obligation to reciprocate.
- Business offers: "free" samples $\rightarrow$ expectation to buy.
- Indian politics: favors given in return for votes.
- Can be manipulated , be conscious of emotional traps.

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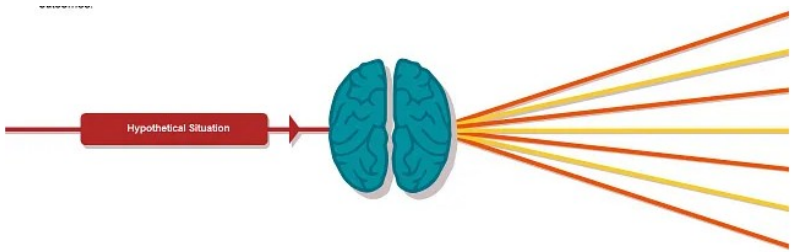
Thought Experiment

- Imagining a scenario to reason abstractly.
- Used by Einstein, Schrödinger, philosophers.
- E.g., "What if no one followed traffic signals in Delhi?"
- Indian planners simulate monsoon scenarios for disaster prep.
- Business leaders imagining customer journeys to refine UX.
- Avoid mental experiments with flawed premises.



(Ref: The Art Of Thinking Clearly - Swabhav Tech Labs)

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Relativity

- Perception depends on comparison.
- Not just physics , applies in psychology and economics.
- E.g., Rs.1000 seems big at a tea shop, small at Croma.
- Discounted MRPs manipulate perception of value.
- E.g., coaching institutes: “Only Rs.1 lakh” vs. “Just 2 months’ salary.”
- Avoid judging in isolation; watch your frame of reference.

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Thermodynamics

- Energy systems tend toward disorder (entropy).
- From physics; metaphor in organizational design.
- E.g., Indian government departments decay without active effort.
- Relationships degrade without energy (attention, care).
- E.g., neglected public infrastructure like Indian toilets, libraries.
- Systems must be fed with effort to counter entropy.

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Inertia

- Objects at rest stay at rest; systems resist change.
- From Newtonian physics; metaphor for habits, culture.
- Bureaucracies in India resist reform , status quo bias.
- People stick to routines despite better alternatives.
- E.g., cash use persists despite UPI in rural India.
- Momentum can be good or bad , be mindful of direction.

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Friction and Viscosity

- Resistance slows systems down.
- Physics origin, applied in design thinking.
- E.g., paperwork in Indian passport process adds friction.
- Online education failing due to tech/infrastructure drag.
- E.g., MSME loans delayed by regulatory viscosity.
- Reduce friction strategically, but preserve checks where needed.

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Velocity

- Speed in a particular direction.
- Physics model applied to business and policy.
- E.g., Indian startup growth = velocity, not just speed.
- Quick reforms + right direction = compounding effect.
- E.g., GST rollout aimed to increase fiscal velocity.
- Beware of high speed in wrong direction , causes more harm.

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Leverage

- Small inputs yielding large outputs.
- Originates from mechanics and finance.
- E.g., using tech (like UPI) to scale access to banking.
- Influencers use platforms to gain massive reach.
- Debt in real estate , high leverage in Indian housing boom.
- Use leverage carefully; too much can break the system.

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Activation Energy

- Minimum energy required to start a reaction.
- Chemistry origin; metaphor for habits and change.
- E.g., initial setup of solar in Indian homes is high, then payoff.
- Form-filling keeps citizens from accessing subsidies.
- E.g., waking up early needs energy "spike" at first.
- Lowering activation energy = increasing adoption.

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Catalysts

- Something that accelerates change without being consumed.
- From chemistry; used in transformation processes.
- E.g., a good mentor can catalyze career in Indian startups.
- Policies like Make in India as industrial catalysts.
- E.g., cricket coach who turns underdog into star.
- Catalysts don't guarantee success , they enable it.

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Alloying

- Combining elements for strength.
- From metallurgy; used metaphorically in teams/ideas.
- E.g., diverse coalition governments in India.
- Interdisciplinary education = alloy of skills.
- E.g., Hindi + tech = strong vernacular apps.
- Alloys may have trade-offs , balance strength vs. flexibility.

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Evolution - Natural Selection

- Survival of the fittest over generations.
- Darwinian principle; applicable to markets.
- Indian startups that adapt thrive (Zerodha, Paytm).
- Weak policies die out over time; strong ones stay.
- E.g., traditional farming surviving despite modern competition.
- Avoid romanticizing all survivors , some survive by chance.

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Evolution - Adaptation

- Organisms change to fit environment.
- Evolutionary biology principle.
- E.g., Indian retail moving from cash to QR codes.
- COVID forced remote working and online schooling.
- Small businesses adopted e-commerce or died.
- Adaptation is not always optimal , may be reactive.

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Ecosystems

- Interdependent networks of entities.
- From ecology; applied to business, tech.
- E.g., India's startup ecosystem: VCs, colleges, infra.
- Agriculture involves weather, soil, politics, supply chain.
- Bollywood = actors + OTT + media + fans.
- Don't isolate systems , analyze interactions.

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Niches

- Specialized roles within systems.
- From biology, used in marketing and strategy.
- E.g., Indian vernacular YouTubers targeting Tier-2 cities.
- Brands like Patanjali tapping Ayurvedic niche.
- Job roles like drone pilot, data annotator = new niches.
- Niches can be fragile , depend on broader system health.

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Self-Preservation

- Tendency of organisms/systems to protect themselves.
- Evolutionary instinct; metaphor in institutions.
- E.g., Indian babus resisting administrative reforms.
- People resist feedback that threatens ego.
- E.g., companies killing innovations to protect core business.
- Self-preservation is natural, but can block growth.

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Replication

- Ability to copy and scale reliably.
- From biology and manufacturing.
- E.g., Indian franchise model , CCD, Amul parlors.
- Education: coaching classes cloned in every city.
- E.g., political strategies replicated across states.
- Mindless replication can ignore local context.

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Cooperation

- Working together for mutual benefit.
- Core to human evolution and society.
- SHGs in India empowering rural women.
- Farmers pooling land/machinery.
- Swachh Bharat relied on mass cooperation.
- Needs trust, alignment , forced cooperation fails.

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Hierarchical Organization

- Systems structured in layers of control.
- Found in biology, military, governance.
- E.g., Indian bureaucracy: central, state, district levels.
- Companies with vertical vs. flat hierarchies.
- Indian family structures: elders $\rightarrow$ juniors.
- Hierarchy brings order, but can stifle speed and creativity.

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Incentives

- Behavior is shaped by rewards and penalties.
- Economics principle; vital in policy and business.
- E.g., LPG subsidy linked to Aadhaar = better targeting.
- Swiggy/Zomato drivers incentivized on deliveries.
- Voters swayed by freebie promises.
- Misaligned incentives = corruption, manipulation.

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Tendency to Minimize Energy

- Systems prefer the path of least resistance.
- Physics + human psychology.
- E.g., people choose WhatsApp forwards over research.
- Politicians use slogans instead of nuanced solutions.
- E.g., shortcuts in JEE prep , coaching hacks.
- Shortcuts are tempting , but costly if misused.

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Feedback Loops

- Outputs become new inputs, amplifying or correcting.
- From cybernetics; applies in economics, learning.
- E.g., social media likes $\rightarrow$ more posts $\rightarrow$ more likes.
- UPI usage loop: adoption $\rightarrow$ trust $\rightarrow$ more users.
- Crime in areas $\rightarrow$ police presence $\rightarrow$ less crime.
- Watch for both positive (amplifying) and negative (balancing) loops.

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Building Your Personal Mental Models

(Ref: A Comprehensive Guide to Mental Models - Habits for Thinking)

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Why Build a Latticework of Mental Models?

- Latticework means interlocking structure of big ideas from different disciplines
- Repeating mistakes? You're not alone.
- Best thinkers don't think harder—they think in models.
- A latticework = multiple models from various fields.
- Inspired by Charlie Munger's approach to decision-making.
- Models create clarity, prevent bias, and improve reasoning.

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The Brain as a Workshop

- Every mental model = a tool.
- Relying on one tool = repeated errors.
- Full toolkit = deeper insight + fewer blindspots.
- Munger: "Array experience on a latticework of models."
- Real decisions require multiple perspectives.

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Why Interconnected Models Matter

- Complex problems need multi-model solutions.
- Examples:
  - Inversion (think backwards to prevent failure)
  - 80/20 Rule (focus on leverage points)
  - Second-order thinking (anticipate consequences)
- Together: see around corners, think systemically.

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Step 1: Cultivate Curiosity

- Read across disciplines: psychology, biology, economics, etc.
- Look for timeless, transferable ideas.
- Ask: "What's the principle here?"
- Apply ideas outside their original context.
- One book outside your comfort zone can shift your thinking.

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Step 2: Actively Understand Models

- Move from passive to active learning.
- Use the Feynman Technique: explain in plain language.
- Create analogies to what you know.
- Journal 3 uses per model.
- Seek cross-discipline examples for each model.

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Step 3: Find Model Connections

- Insight = when models intersect.
- Example intersections:
  - Feedback loops + habit formation
  - Marginal utility + diminishing returns
  - Hanlon's Razor + Occam's Razor
- Use mind maps or journals to visualize links.
- Practice with real decisions: apply 3 models at once.

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Step 4: Practice & Apply

- Use models like lenses.
- Ask: "What model fits this problem?"
- Try on everyday decisions:
  - Weekly planning $\rightarrow$ Pareto Principle
  - Disagreements $\rightarrow$ Steelman Technique
  - Scheduling $\rightarrow$ Parkinson's Law
- Repetition builds intuition.

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Step 5: Review and Refine

- Every quarter, reflect:
  - Which models do I use most?
  - Which still confuse me?
  - What should I add next?
- Keep a Mental Models Journal.
- Be willing to discard outdated models.
- Your latticework evolves with experience.

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Overcoming Common Challenges

- **Info Overload:** Start with 10 core models.
- **Time Constraints:** Use daily touchpoints—podcasts, short reads.
- **Shallow Learning:** Go deep, not wide.
- Value comes from mastery, not memory.

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The Lifelong Edge

- Your brain is a framework builder, not a sponge.
- A strong latticework lets you:
  - Make better decisions
  - Spot unseen patterns
  - Avoid mental traps
  - Communicate clearly
- This is lifelong work. Build with care.
- Your mental toolkit is your edge.

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Closure

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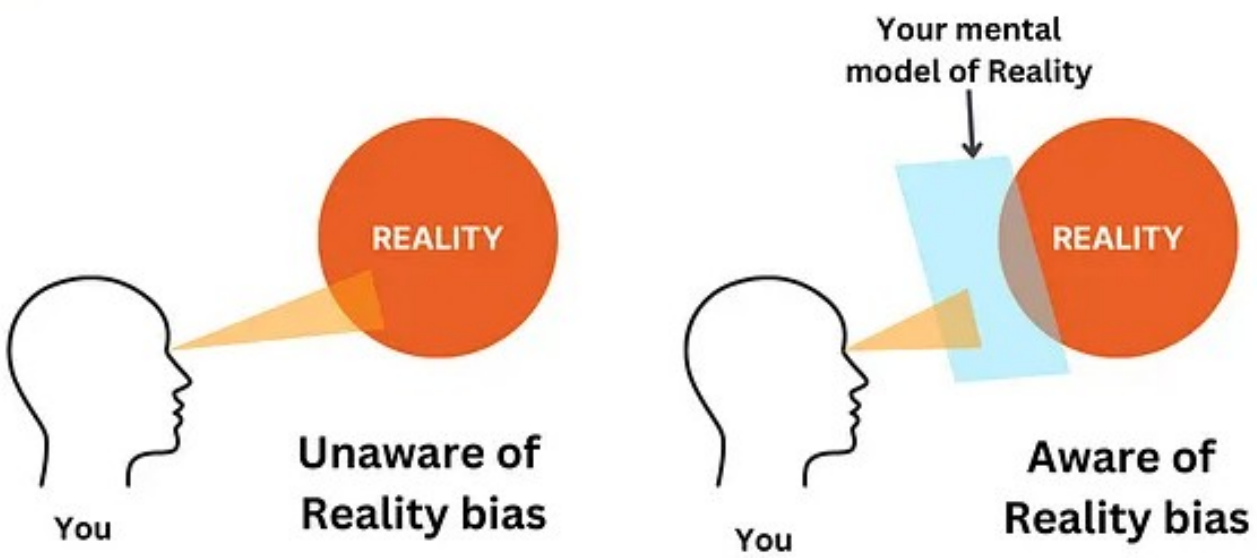
Closure

- A mental model is simply a representation of how something works.
- We cannot keep all of the details of the world in our brains, so we use mental models to simplify the complex into understandable and organizable chunks.



(Ref: The Art Of Thinking Clearly - Swabhav Tech Labs)

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Thanks ...

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