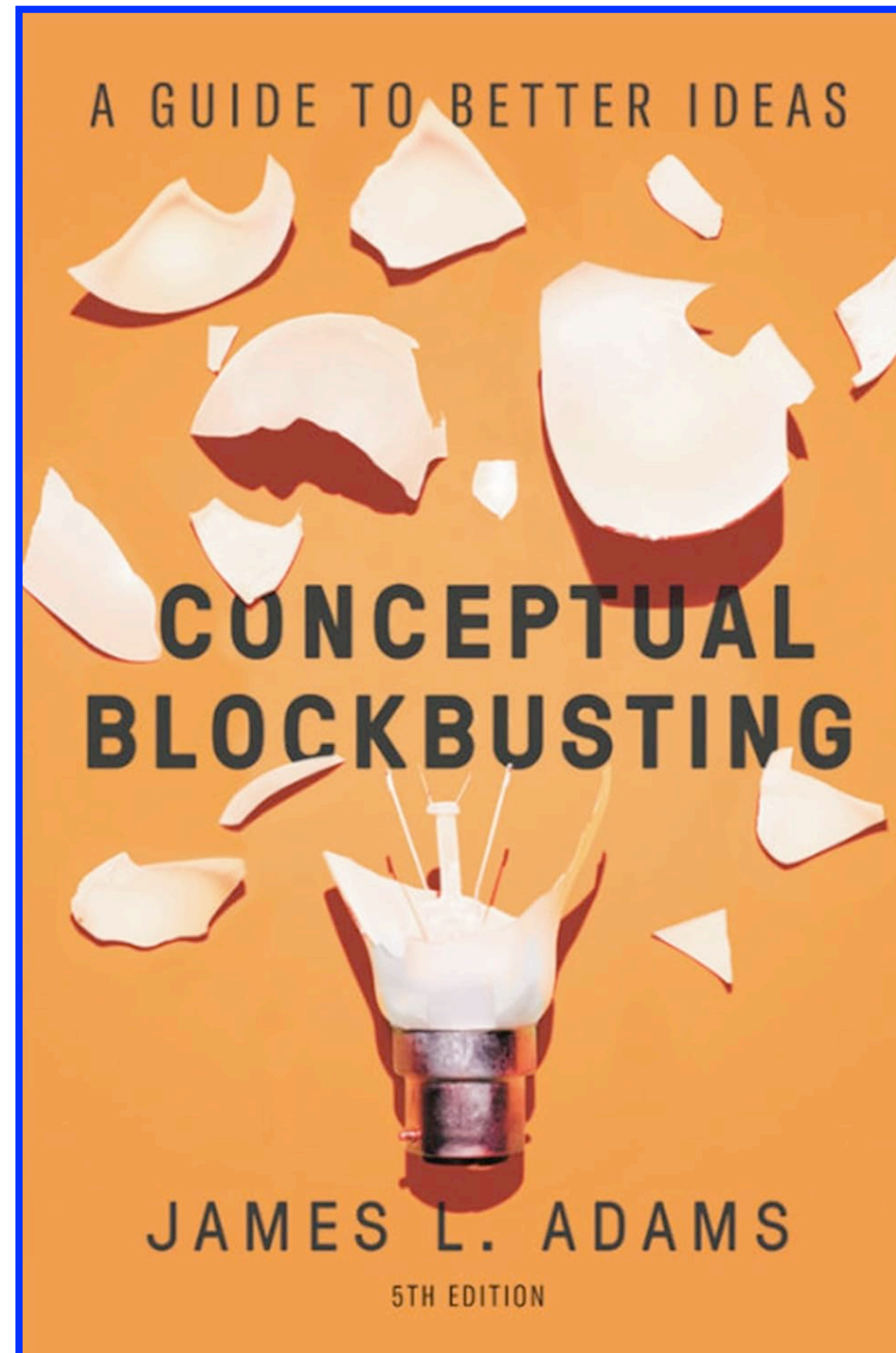


# CSC 595 - Research Skills

## Generating Ideas #2: Creativity

Nishant Mehta

# A good book



# Creativity

- Creativity requires the manipulation and recombination of experience

# Conceptualization

- Main focus: Conceptualization - the process by which one has ideas
- Can creativity be taught?
  - Maybe. But it certainly can be encouraged

# The Nature of Creativity

- Plato: poets were actually a god speaking himself
- Later: Geniuses are creative
- Much later: Non-geniuses can be creative
- Much much later: we can teach creativity?

# Creativity and Habits

- Habits are often inconsistent with creativity
- Creativity implies deviance from past procedures
- Habits include conceptual blocks (limitation of brain, also tied to a paradigm or socialization)

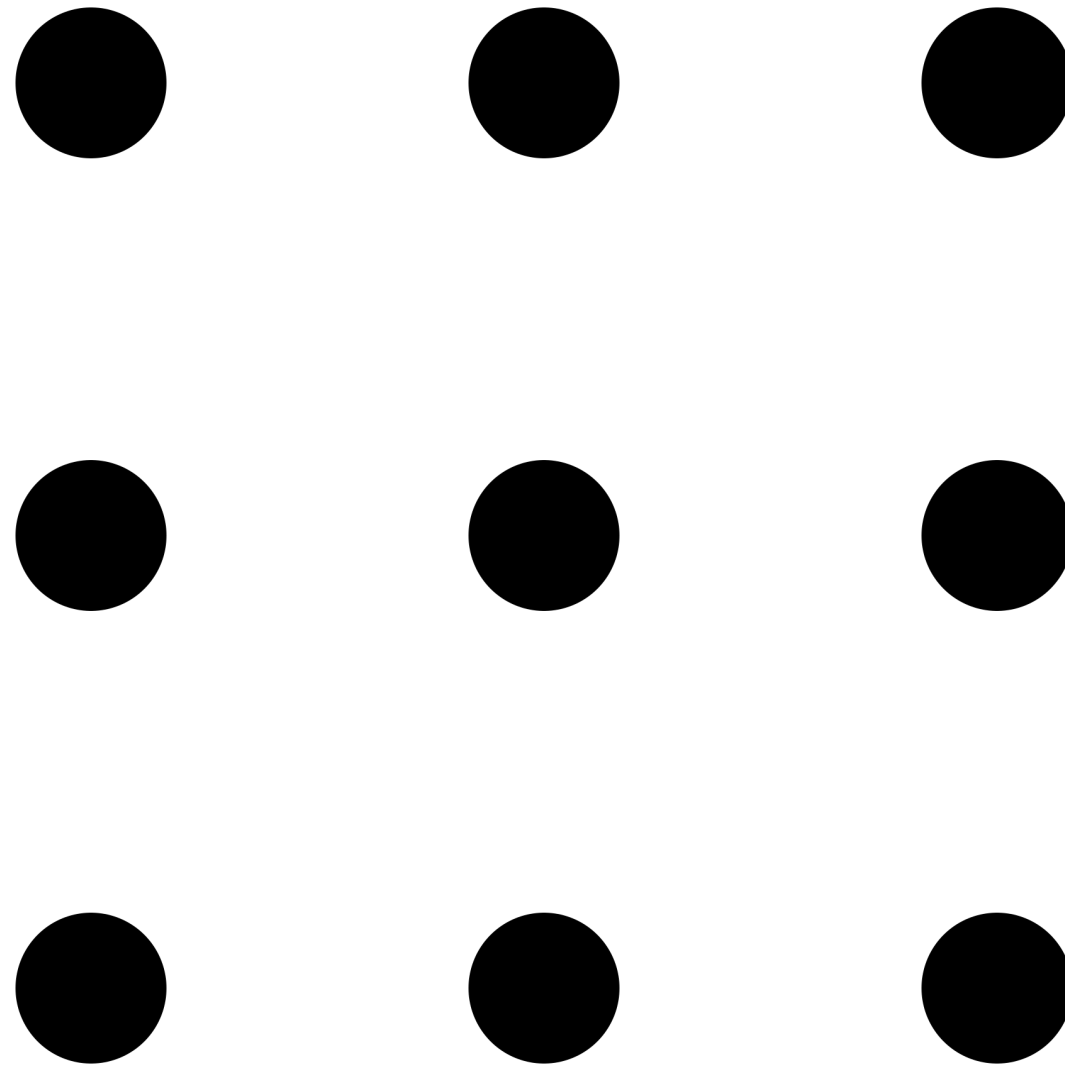
# Perceptual Blocks

- Stereotyping - seeing things as they have been labeled
  - A chair is just a chair, and nothing else
  - This algorithm is only for solving Problem X. Are there sub-parts of the algorithm that could be used for solving other problems?
  - We record more information about things we are interested in, and stereotype more heavily about things we are less interested in. Bias against an idea can lead to stereotyping and misjudging!

# Perceptual Blocks

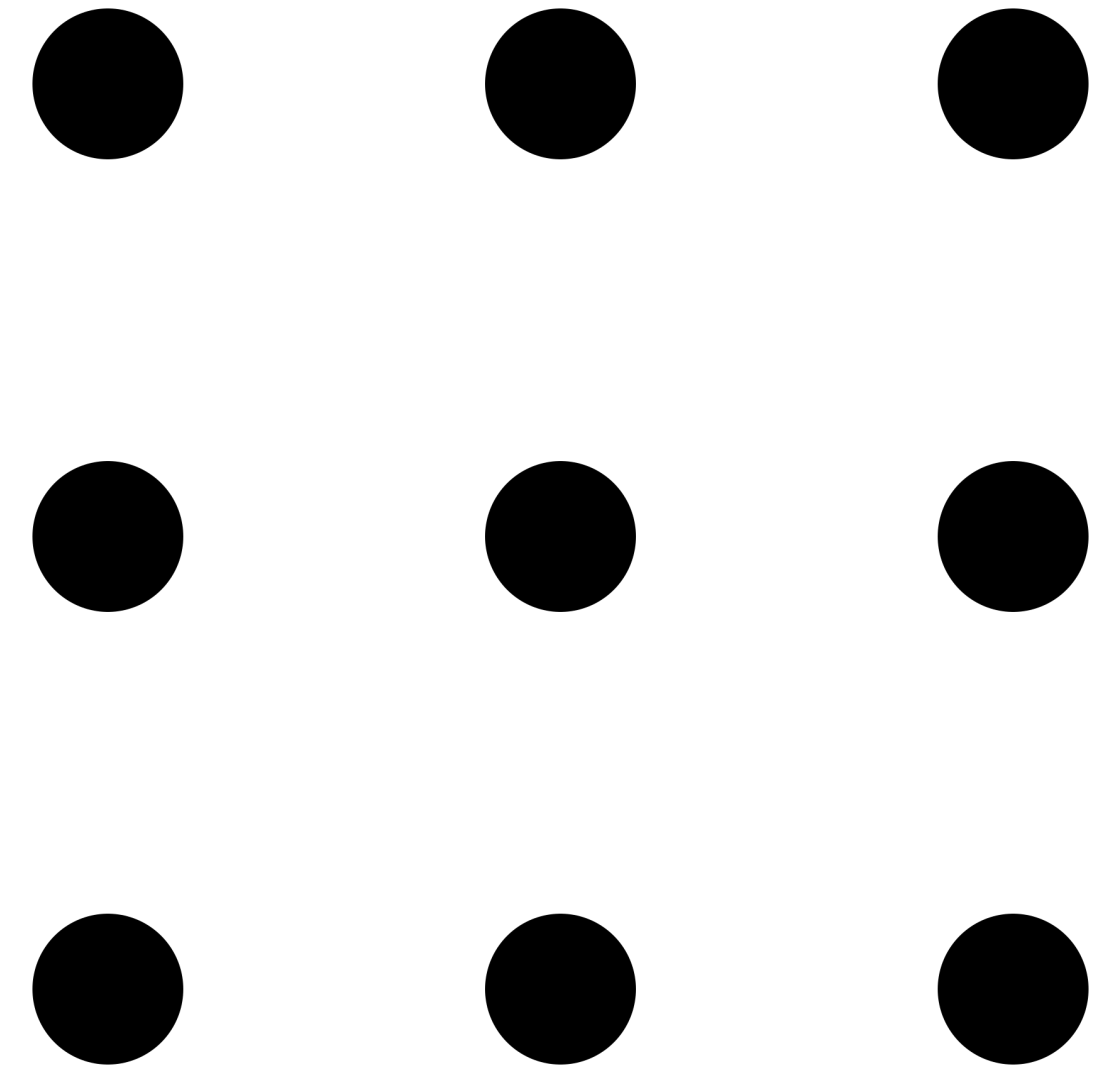
- Too finely delimiting the type of solution
- Find the best visual cue to remind someone to take their medicine. What about an audio cue instead?

# Perceptual Blocks



# Perceptual Blocks

- Tendency to delimit the problem area poorly
- artificial constraints (nine dot puzzle; why keep lines within bounding box? why force lines to pass through center of dots?)
- so, frame questions more broadly to allow for broader solutions (richer design space, more room for creative thinking)



# Perceptual Blocks

- Limitation from your own viewpoint
  - Try to consider another viewpoint. What would [Insert Person] do?
  - Simulate thinking like a different person
  - Consider stakeholders different from the ones usually considered

# Perceptual Blocks

- Saturation
  - Problem: Often exposed to so much information that mind learns to ignore many details
  - Solution: Find a way to see the details
    - Change your perspective
    - Look at parts of the problem you weren't looking at
    - Look *away* from the sunset. Look at the scene upside down

# Emotional Blocks

- Freund:
  - ideas come from the subconscious mind
  - ego scrutinizes ideas and may reject them if they seem unrealistic
  - superego may reject ideas for moral reasons
  - once ego accepts an idea, your identity gets partially fused to the idea; rejection of idea leads to rejection of self
  - over-selectivity: insanity
  - under-selectivity: no creativity, no risk, no exploration, reject all ideas (and papers!)

# Emotional Blocks

- Kubie - Preconscious mind
  - “Preconscious processes are assailed from both sides. From one side they are nagged and prodded into rigid and distorted symbols by unconscious drives which are oriented away from reality and which consist of rigid compromise formations, lacking in fluid inventiveness. From the other side they are driven by literal conscious purpose, checked and corrected by conscious retrospective critique.”

# Emotional Blocks

1. Fear to make a mistake
2. No tolerance for ambiguity/chaos
  - But if you won't formalize the problem, then who will? A colleague? Then what's left to do for you?
3. Inclined to judge ideas rather than generate them
4. Unable to incubate (relax, "sleep on it", etc.)
5. Too little passion (nothing matters...), or too much (zealot, megalomania, blind to reality, mistakes are likely)
6. Disconnection from reality (ego not doing its job)

# Emotional Blocks

- Problem: Fear of making a mistake
  - Once an idea has been made clear and expressed to someone else, they might see its imperfections
  - Danger 1: idea never brought to maturation; false optimism that it works
  - Danger 2: You need to make mistakes to learn
- Solution:
  - Think about the worst that can happen (catastrophic expectation). You may realize that the worst that can happen isn't that bad!
  - Think about a mistake not as terminal, but as part of a path (maybe some parts of idea can be saved, and remixed with an idea from a collaborator)
  - New idea is viewed as risky when compared to status quo
    - Trolley problem: let Nature take its course (trolley will hit children) or intervene (trolley hits one person on a different track). If you control the switch, who is to say which choice corresponds to status quo? **Not** switching may also be viewed as an action. Accepting status quo may also be viewed as an action. And status quo may be risky. Compare worst case of status quo (lost opportunities = opportunity cost) to worst-case of new idea.

# Emotional Blocks

- Problem: No tolerance for ambiguity/chaos
- Problem solving is bringing order to chaos
- Allowing some chaos is a must
- Real-world problems are messy
- Need to allow disparate ideas to live in your brain for long enough that you can combine them
  - Creativity as remixing

# Emotional Blocks

- Problem: Inclined to judge ideas rather than generating them
- Analysis
  - There is a right answer
- Judgement
  - Several answers, pick the “best” one
- Synthesis
  - Very large space of solutions, no concrete measure of how to decide which ones are better

# Emotional Blocks

- Problem: Inclined to judge ideas rather than generating them
  - Judging early is bad for creativity!
  - Newly formed ideas are fragile, imperfect. Need time to mature.
  - Judgement is an attempt to look smart. But it does not succeed in demonstrating intelligence as it does not lead to creation of ideas
  - Premature judgement also hurts you. *Your* creative process suffers as you kill your own ideas too early
- Solution:
  - Bake ideas more before sending to others (helps others). Avoid prematurely judging ideas of others. Look at the positives, see what parts can be used.
  - Brainstorming requires maintaining “out there” ideas for long enough that they can be brought to fruition. Judgement kills ideas as soon as they are spoken aloud.

# Emotional Blocks

- Problem: Unable to incubate
- Solutions to important problems often come at strange times, during periods of relaxation
  - On the plane
  - On the Tube (London)
  - Walking to a restaurant
- Solution:
  - Leave time for incubation. Look a problem early. Allow yourself to get stuck and still have time to come back a few days (or even weeks!) later
  - Need a relaxed mind to allow for creative thoughts (to avoid pre-mature judgement)

# Cultural Blocks

- Problem: “Embracing fantasy is bad”
- Solution:
  - Is it? Why are children more creative than adults?
  - Think: Derive a better world from what we have, or... *imagine* a better world

# Cultural Blocks

- Problem: “Daydreaming is bad”
  - It looks lazy, right? Those ‘good for nothing’ people that don’t contribute anything to society
  - People that contribute nothing to society
- Solution:
  - Think: When do we get our best ideas?

“Watson and Crick’s working style appeared unorthodox to many. They seemed sloppy, did not seem hard working, and appeared as if they had plenty of free time for entertainment. At times they behaved as if they were underemployed—not the usual image of the mad scientist who lives for his work day and night.”

# Cultural Blocks

- Problem: “Research is a serious business”
  - Research is about solving problems. Jokes are silly and have no place in “work”
- Solution:
  - 1. Don’t think of research as work! It’s a passion. If research is “work”, then stop!
  - 2. Comedy/jokes are highly creative. Comedy evokes relaxation (good for creativity)
  - Value for group research: humor relaxes the group, reduces fear of failure

## Arthur Koestler’s “The Three Domains of Creativity”

1. Artistic originality (ah!)
2. Scientific discovery (aha!)
3. Comic inspiration (haha!)

# The value of comedy in creative research

- **Creative acts:** the combination of previously unrelated structures in such a way that you get more out of the emergent whole than what you have put in
- **Comic inspiration:** the interaction of two mutually exclusive associate contexts (an unusual combination of things!)
- **Advice:** try telling jokes. It takes creativity! Measure of success: laughs
  - How to practice humor? Watch stand-up comedy, try doing an open Mic night, try writing
- Examples:
  - “Insanity check bounds”
  - “Witness Protection Lemma”
  - “Learning without concentration”
  - Book: “Surely you’re joking, Mr. Feynman”

# Cultural Blocks

- Problem: ““My identity is quantitative/logical”
- Solution:
  - Try exploring the other side; we live in modern times!
  - Example: Steve Jobs - business world, but in tune with the soul



# Cultural Blocks

- Problem: “My identity is intuitive/qualitative”
- Solution:
  - Try exploring the other side; we live in modern times!
  - Examples
    - M. C. Escher: artist, in tune with math
    - Lewis Carroll: author, poet, and heavily emphasized math and logic

# Cultural Blocks

- Problem: “Questioning authority is bad. Breaking with tradition is bad. I’m an introvert”
- Toward a solution: When can we let loose?
  - Traveling to a foreign country (speaking a different language)
  - At a costume party (pretending to be a character)
- Solution:
  - Gamify: Try to adopt a new identity for short periods of time
    - Try working in a new setting (old identity reinforced by people who know you)
  - “Wear a mask”: change something about you (new hairstyle, new fashion style) to help you break out of your old self

# Cultural Blocks

- Problem: “I’m the best, everyone should be like me”
  - You are stuck in your own personal paradigm. Limits space of ideas.
  - Group of people you talk to is highly similar to you. Again limits space of ideas. Echo chamber, preaching to the choir
- Solution:
  - Seek out people that seem “weird” to you (different perspectives than you). Regularly talk with them. Try gamifying identity change to help with this
  - Payoff: Obvious. Talking to diverse people exposes you a diverse pool of ideas; can be useful for problem solving (might discover new stakeholders)

# Cultural Blocks

- Problem: “I believe tradition is important” (or my advisor does)
  - Long apprenticeship, following by designing buildings in the traditional style (... the way our people *a/ways* designed them)
  - Major blow to creativity; why criticize ideas just for being different?
- Solution:
  - In Canada/US, usually tradition takes a backseat to innovation. But traditionalists are around
  - Controversial advice:
    - Beware anyone who says their tradition is “the” way
    - Beware of people that claim to have “the” answer and are not open to new ways of doing things

# Environmental Blocks

- Problem: Distractions
  - Phone interruptions
  - Other people
  - External factors (construction)
- Solution:
  - Shift locations:
    - Work outside the lab (e.g. library, coffee shop), with absolute minimum necessary to write (no phone, no WiFi, no reading material)
    - Work on the beach.
      - Steve Smale did his best mathematical work “on the beaches of Rio”

# Environmental Blocks

- Problem: Distractions
  - Tasks you do to avoid the MAIN task. Sound familiar?
    - “My apartment has never been so clean” - quote from person with upcoming deadline
- Solution:
  - Work in environment where distracting tasks (cleaning room) are inaccessible

# Environmental Blocks

- Problem: Environment is not supportive
  - Because people around you are overly critical
  - OR hyper-competitive environment
  - OR lack of trust
- Solution:
  - Try to tell people about their negativity. People often don't recognize patterns in their behavior until others bring it up
  - If not possible, change location
  - Avoid competitive environments: stifles creativity if afraid of others stealing ideas
  - Examples:
    - Friedrich Schiller (famous German playwright and poet). His creativity was stimulated by rotten apples, so he kept them in his desk
    - Immanuel Kant (famous philosopher). Would sometimes work in bed with blankets wrapped around him in a special way.

# Environmental Blocks

- Problem: Autocratic “boss”
  - Beware of a boss (or, more on point, an advisor) that always has their own ideas and seems to always push those ideas over your ideas
  - Cost of boss not listening: student tries to change advisors, person switches from one tech company to another
- Solution:
  - Tricky one. Requires conversation with advisor, figuring out the underlying issue (adjusting the way you pitch your ideas), or switching advisors

# Intellectual Blocks

- Problem: Lack of information
  - Can be a block... but some people advise to start with a clean mind (a mind that hasn't yet looked at prior work on problem)
- Solution:
  - Try to attack the problem with a clean mind for a few weeks (with little information)
  - If stuck, gather more information

# Major Issue: Mental Set

Mental Set: stuck with the same, usual way of thinking

# Set Breakers

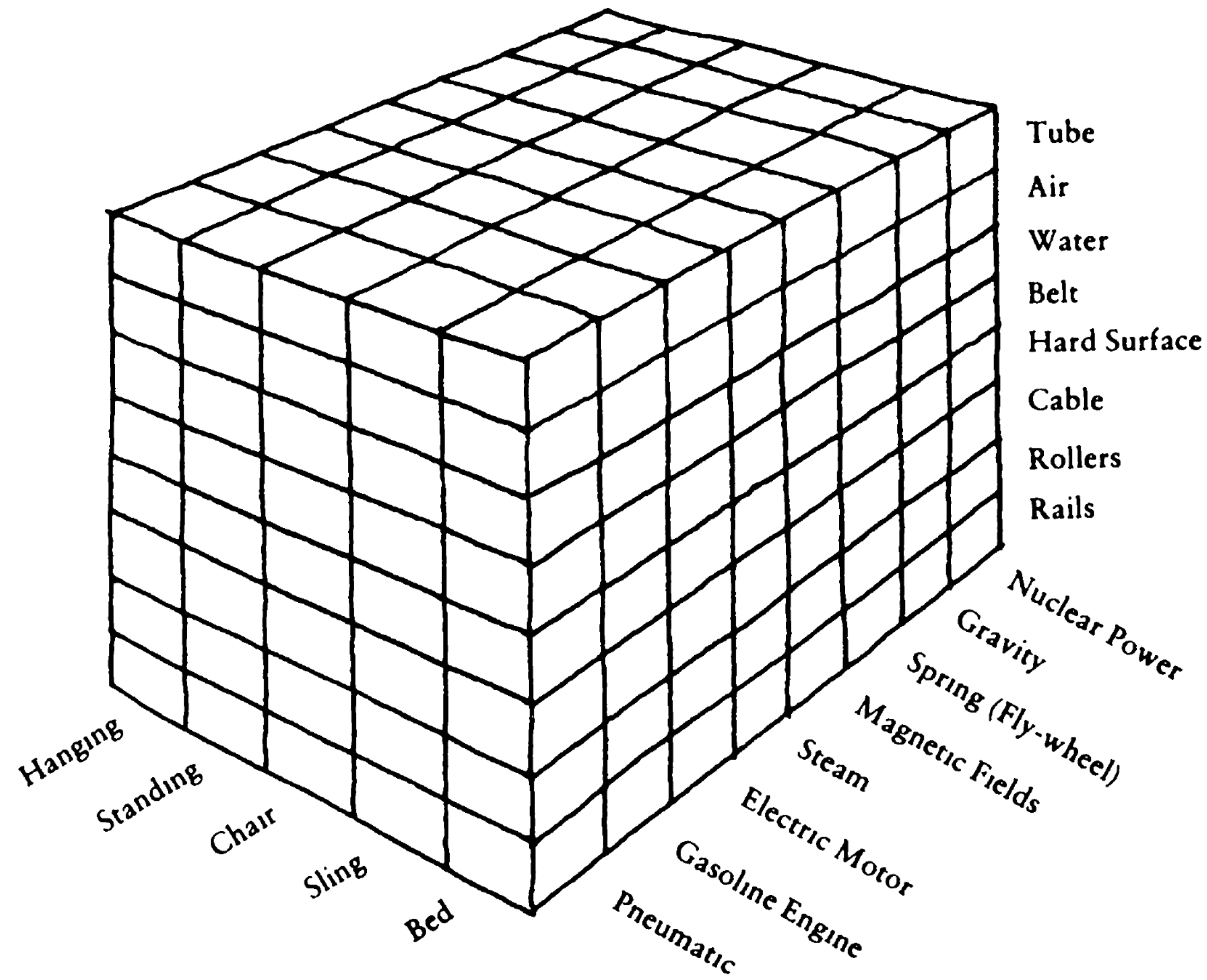
- Morphological Analysis
- 1. List attributes of situation (attributes of item you want to improve, like a ballpoint pen)
- 2. For each attribute, list as many alternates as you can (e.g., different shapes of the pen)
- 3. When completed, pick random element from each list and see what you get

# Set Breakers

- Morphological Analysis, Example 1: Improve a ballpoint pen
- Decide the parameters and potential settings:
  - Shape: cylindrical, faceted, square, beaded, sculptured
  - Material: metal, glass, wood, paper
  - Cap type: attached cap, no cap, retractable cap, cleaning cap
  - Cartridge type: no cartridge, permanent, paper cartridge, cartridge made of ink
- Try a random combination, see what you get
  - Example: cube pen - square wooden pen without a cap and with a paper cartridge

# Set Breakers

- Morphological Analysis, Example 2: Design a new concept in personal transportation
- Decide the parameters and potential settings
  - Source of movement: steam, nuclear power, electric motor, magnetic field, pneumatic, etc.
  - Surface on which movement happens: rails, rollers, belt, air, tube
  - Placement of people: chair, standing, bed, sling
- Try combinations, see if anything is good



# Set Breakers

- Keep a research notebook that tracks the chronological progress of what you have tried.
- Why?
  - Writing forces you to conceptualize
  - Avoid going in circles (avoid trying the exact same thing again)
  - Useful to communicate with others (“oh yeah, I tried that. Hold my martini while I find my notes.....”)
  - Can remember what you tried, build upon it, and even remix it with new ideas

# Set Breakers

- Bounce ideas off of others
  - Forces you to express problem differently (suitable for other person), which may help you
  - Other person may have ideas

# Unconscious Blockbusting

- Problem: Judging ideas too early
- Schiller writes:
  - “... In the case of the creative mind ... the intellect has withdrawn the watchers from the gates, and the ideas rush in pell-mell, and only then does it review and inspect the multitude. You worthy critics ... are ashamed or afraid of the momentary and passing madness which is found in all real creators...”
- Solution: Delay judgement. How?
  - Make it a game. I’m going to consciously suspend judgement for the next 10 minutes. It’s ok if the ideas are wild, weird, crazy.
  - Important to make it a game, so you can step outside your usual way of operating (break out of your usual habits)
  - The ego is ok to shut up, because it’s just a game. Your ego is no longer in charge!
  - Positivity begets positivity. If you get something good, you relax more, and easier to generate more good ideas