“Modern MacGyver: Creative Problem-solving in Disasters”

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TV series 1985 - 1992

- Secret agent
- Practical application of scientific knowledge
- Swiss Army knife and duct tape
- Often locked up in a room full of useful materials!
- Implemented solutions to intractable problems in life and death situations
Reason for Session

• In any crisis unforeseen circumstances arise
  – Can’t plan for everything
• Novel problems often call for novel solutions…quickly!
• Novel solutions are generated via innovative problem-solving
• Hypothesis: We can be better prepared for unknown problems by learning about innovation and practicing principles of innovation
“When you step into an intersection of fields, disciplines, or cultures, you can combine existing concepts into a large number of extraordinary new ideas.”
The Medici Family

• Banking family in Florence
• Patrons who funded creators from a wide range of disciplines (e.g. Leonardo da Vinci)
  – Sculptors, scientists, poets, philosophers, financiers, painters, and architects converged
  – Learned from each other
  – Broke down barriers between disciplines and cultures
• Society changed based on resultant new ideas: The Renaissance
Modern Example: Mick Pearce (architect)

- **Challenge:**
  - Build attractive, functioning, office building
  - Use no air conditioning
  - Location: Harare, Zimbabwe

- **Key to the solution:**

  Termites!
What’s the connection between termites, office buildings, and air conditioning?

• Design based on how termites cool their towerlike mounds of mud and dirt

• Termites keep internal temp of mounds at a constant 87° to grow an essential fungus
  – Ambient temp 100° in day < 40° at night
  – Termites direct breezes at base of mound into chambers containing cool, wet mud
  – Cooled air directed to peak of mound by opening and closing vents
Pearce’s Solution

• Teamed with engineer Ove Arup
• The office complex, Eastgate, opened in 1996
  – Largest commercial/retail complex in Zimbabwe
  – Steady temp 73 to 77 degrees
  – Uses less than 10% of energy consumed by other buildings its size
• Combined architectural design, engineering, and processes in nature
The Intersection

- Term used by Johannson to describe where different fields meet
- Medici Effect is a book about how to create it
  - Explain what The Intersection is and what is driving an increase in the number of intersections
  - Explain why stepping into the intersection creates The Medici Effect
  - Outline the unique challenges in executing intersectional ideas and how to overcome them
The Intersection:

Where different fields meet
Two types of ideas

• Directional— we know where we’re going
  – Majority of ideas (often refine existing ideas)

• Intersectional— change the world in leaps along new directions
  – Surprising and fascinating
  – Take leaps in new directions
  – Open up entirely new fields
  – Provide a space for a person, team, or company to call its own
  – Generate followers
  – Provide a source of directional innovation for years or decades
  – Can affect the world in unprecedented ways
The Intersection is your best chance to innovate.

The place that drastically increases the chances for unusual combinations to occur
Creating The Medici Effect

Break down the barriers between fields!

• Marcus Samuelsson
  – Chef, Aquavit Restaurant

• Menu Items:
  – Caramelized lobster, seaweed pasta, sea urchin sausage and cauliflower sauce
  – Gravlax and Tandori Smoked salmon, espresso mustard sauce, and dill foam
What are associative barriers?

• Associations-
  – By hearing a word or seeing an image the mind unlocks a string of connected ideas.

• Consider two people looking at a codfish
  – Chef vs Writer for sport-fishing magazine

• The mind follows the simplest path

• Exercise–
How do associative barriers help and hinder us?

• Help
  – Chains of associations are efficient allowing us to move quickly from analysis to action
  – Find order
  – Group concepts
  – Find structure in the environment

• Hinder
  – Inhibit ability to think broadly
  – Prevent us from questioning assumptions
  – Create barriers to alternate ways of thinking
  – Inhibit creativity

Example: Charles Darwin and John Gould
How to make the barriers fall

• Exposure to a range of cultures
• Learn differently
• Reverse assumptions
• View multiple perspectives
Expose oneself to a range of cultures

- Ad campaign for HSBC (one of the world’s largest banks) used simple yellow squares

USA  Malaysia  Venezuela

Cowardice  Royalty  Lucky underwear

Crucial to breaking down associative barriers: seeing things from other cultural views
Learn differently

• Innovators are often self-taught
  – Often have a broad learning experience having excelled in one field and learned another

• Broad education
  – Expertise can make it more difficult to break out of established patterns of thought

• Self education
  – Allows one to approach fields and disciplines from a different perspective
Reverse assumptions

• The first two strategies are long-term; this one can help break barriers right now

• Process:
  – Think of a situation, product, or concept related to a challenge you are facing and think about the assumptions associated with that situation
  – Write down those assumptions, then reverse them
  – Finally, think about how to make those reversals meaningful

• Exercise: you want to open a restaurant but are having difficulty coming up with a novel concept
Try on different perspectives

• Da Vinci felt that to fully understand something one needed to view it from at least three different perspectives
• Suggestion- Apply the idea to someone or something else
  – Designing a beach house for Picasso vs Pavarotti
• Suggestion- Create constraints
  – To innovate in-store customer service operation, what happens if personnel can’t speak or use their hands?
How do we find concept combinations that lead to innovative change?

- Diversifying occupations
- Interacting with diverse groups of people
- Go intersection hunting
Occupation diversification

• Moving between or switching fields through different jobs, projects, or hobbies
  – Can be an effective way to generate unplanned unique insights

• Example: Luis Alvarez (astronomer & physicist)
  – Took an interest in paleontology
Work with diverse groups of people

• Breaking the German enigma code WWII
  – Linguistics experts, mathematicians, scientists, classicists, chess grandmasters, and crossword addicts

• People can be hesitant
  – “Similar attraction” effect

• Diversity can lead to conflict
  – Depersonalize disagreements
  – Anyone can disagree but not without a reason
  – All ideas get a fair hearing
Go intersection hunting

• Introduce randomness in our thought patterns
  – Example: Edgar Allan Poe

• Take a “thought walk”
  – Stroll through office, parking lot, or down street and pickup, borrow, purchase, or randomly note items
  – Select items apparently unrelated to the problem
  – Job is to find a connection
  – Example: ice on power lines
    • Jar of honey
    • bears
Igniting an explosion of ideas

• The most successful innovators produce and realize an incredible number of ideas
• Why are some innovators so productive?
  – Large number of ideas and pursue the best of them
  – Intersectional ideas result from random combinations of concepts \( \rightarrow \) the more random combinations one has \( \rightarrow \) better chances something truly exceptional
• Explosion at the Intersection
  – Exponential increase of unique combinations
How to capture the explosion

• Strike a balance between depth and breadth
  – Remember, too much expertise can fortify associative barriers; and yet expertise is clearly needed

• Actively generate many ideas
  – Don’t wait until you have a “really good one”
  – Sit down and brainstorm; set a large target number for your ideas; write them down as you think of them

• Allow time for evaluation
  – Yourself or with others; work on those that are promising
  – Save list…you will probably want to come back to it
Rules for brainstorming

• Produce as many ideas as possible
• Produce ideas as wild as possible
• Build upon each other’s ideas
• Avoid passing judgment on ideas
• PARADOX: Real groups that engage in brainstorming generate about half the number of ideas of separate individuals
  – “free rider”
  – “evaluation apprehension”
  – “blocking”
How do we brainstorm the right way?

• Before group meets:
  – Individuals brainstorm for 15 to 20 minutes (eliminates blocking; facilitates well-formulated problem statement)

• In group session:
  – Don’t let people just take turns reading their list (stifles momentum and impairs building off each other’s ideas).

• ALTERNATIVE: Brainwriting
  – Written ideas; others build on them
  – Place written idea in center of table in exchange for someone else’s
  – Each person writes or sketches one idea and builds on previous contributors trying to make connections and igniting sparks of new ideas
Allow time for evaluation

• **Myth:** We generate our best ideas when time is tight and deadlines are looming

• **Fact:** Research shows that people are less creative under serious time pressure.

• Two reasons to take your time:
  – It is critical to postpone judgment of new ideas.
  – “Incubation Period” is well-documented
    • Returning to an idea days to weeks later usually enables it to be much better refined
    • Not usually an option in a disaster!
Execute past your failures!

• Innovative people experience more failures than their less creative counterparts
  – Because they pursue more ideas

• Successful execution of intersectional ideas does not come from planning for success
  – Comes from planning for failure

• How to succeed in the face of failure
  – Try ideas that fail in order to find those that won’t
  – Reserve resources for trial and error
  – Remain motivated
Innovation summary

• Innovation happens through the generation of unique ideas at *The Intersection* of fields
• Intersectional ideas lead us in new unexpected directions
• Diversity of culture, self-education, questioning assumptions, and different perspectives break down our normal “Associative Barriers”
• Hunting for intersections by generating large numbers of ideas and brainstorming in the right way can result in innovative solutions
• Innovative ideas often fail
Failure is not an option!

http://www.criticalthinking.org
Criteria for Evaluating Reasoning

• Is the purpose clearly stated or implied?
• Is the question at issue well-stated? Clear?
• Was relevant evidence, experience, and accurate information used in the reasoning?
• Did we identify and clarify key concepts?
• Did we address potential flaws in our assumptions?
• Did we develop a line of reasoning that explains how we arrived at our conclusions?
• Did we consider alternate lines of reasoning?
• Did we adequately consider the implications of the solution we chose?
Makeshift Exercise

- Created series of problem-solving contests for readers
  - Lee Zlotoff (MacGyver creator)
- I chose several
- Work in groups using the principles/techniques discussed
- Review winning entries
- Discuss helps/hindrances
Makeshift #1

- **Scenario**
  - Camping; Car battery is dead; 50 miles from nearest road; limited food and water; cell phone dead and out of range; snowy weather by late evening

- **Challenge**
  - Recharge battery and start car. You have 10 hours. (automatic transmission: push starting won’t work)

- **Materials**
  - Tent, 2 Sleeping bags, Sterno (stove and fuel), First-aid kit (aspirin, adhesive bandages, hydrogen peroxide), 2 Pencils, 6 pack of cola, 1 dozen limes, 2 apples, 1 banana, 1 large bag of potato chips, 2 liters of bottled water, 1 cellular phone, 2 road flares, tools (screwdrivers, wrenches, pliers, Swiss Army knife, matches, jumper cables
Makeshift #2

• Scenario
  – You are in a rural village in East Asia; water supply has been contaminated (severe diarrhea illnesses). Suspect other contaminants (arsenic & benzene) from upstream industry

• Challenge
  – Filter and purify the water. Provide drinkable water for 20 to 30 people. You have 48 hours.

• Materials
  – 2 barrels, 1 bicycle with flat tires, 1 car battery, 6 1-liter plastic bottles of water, various lengths of bamboo tubes (1" to 3" diameter), tools (saw, hammer, pliers, hand drill), steel wool, endless supply of coconuts, $10 in mixed American coins
Makeshift #7

• Scenario
  – Solo backpacking; mountain hot spring (12 hour hike); hear agonized shouting; find large man (broken leg) at bottom of cylindrical fissure 15 ft wide and 20 ft deep; noxious, toxic sulfur smell.

• Challenge
  – keep guy breathing; safely extract him from fissure; stabilize and transport or stabilize, then get help.

• Materials
  – backpack (detachable water container), sleeping bag, inflatable air mattress, two-man tent, towel, cook set, butane stove, camping food, first aid kit. 40 ft nylon rope, Swiss Army knife, a 25-ft duct tape, Maglite-type flashlight, 6-foot bamboo walking stick, bandanna