

# Building Intuition

for  
Low Frequency  
High Consequence  
Events

Clinton A. Culp, Ph.D.

Montana State University Billings

## **What we will cover**

- Frequency/Consequence Continuum
- How we make decisions
- How to build our intuitions

## **What we will do**

- Build and conduct a pre-mortem
- Conduct a post-mortem (after incident review)
- Design and conduct a realistic decision-making exercise (DMX)

## **Situation:**

You are preparing to lead a group of 4 people on an overnight backcountry ski/snowboard trip into the Tetons, WY with the goal of skiing/snowboarding “Shoot the Moon” and other runs in the area.

Your participants report they have above average skiing/snowboarding ability. You sent the gear list out but have not heard back from them. You will meet them for the first time in two days at the trailhead. The trailhead is at about 6,500 feet, you plan on camping at around 9,500 feet and the high pass is at 10,200 feet, 10+ miles round trip not including the other runs.

The weather the last few days has been sunny and stable with below freezing temperatures during the day and below 0<sup>o</sup>f at night. The forecast for the next 4 days calls for the same but there is a front moving in from the west and it is expected to put up to 10 inches of new snow on the mountains. Avalanche forecast has been favorable, moderate on all aspects and elevations.

In small groups (4 or 5) come up with a scenario and conduct a Pre-Mortem and answer the following questions.

## Questions

1. What can fail/go wrong? (Prioritize based on consequence and frequency.)
2. What caused the failure (there may be more than one cause for each failure)?

Cycle through questions 3-5 for each failure point.

3. What would an expert do that a novice would not do (ask if needed)?
4. How do we get reliable and timely feedback? What cues need to be attended to?
5. What is the real (core) skill that needs to be developed/learned? How do we acquire that skill.

# Pre-Mortems

Describe & Prep (i.e., what is the situation... the plan has failed).

1. Describe what can fail/go wrong.
  - Prioritize based on consequence & frequency.
2. What caused each failure (possible more than one cause)?
  - Lack of or Poor:
    - Technical, Communication, Intra/Inter Personal Skills, etc.
  - Uncertainty
    - Missing/Too Much Information
    - Distrust/Inconsistent Information
    - Irrelevant/Too Complex

Cycle through 3-5 for each failure point.

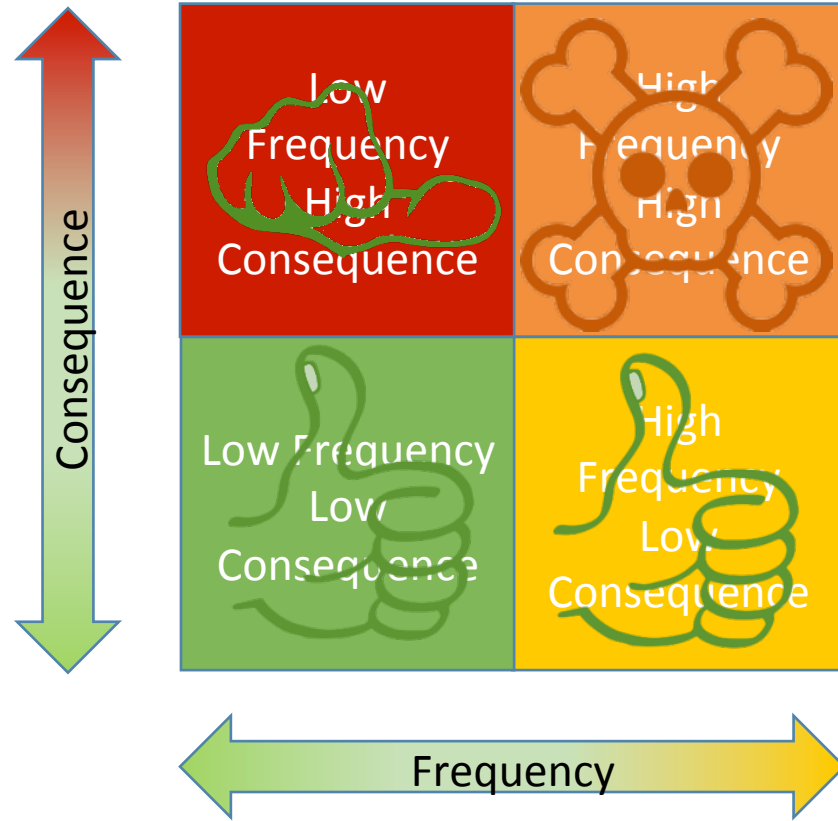
3. What would an expert do that a novice would not do (ask)?
4. How do we get reliable and timely feedback?
  - What cues need to be attended to.
5. What is the real (core) skill that needs to be developed/learned?
  - How do we acquire that skill?

# Building Intuition

## Designing and Implementing a Deliberate Training Program

- Conduct Pre-Mortems (before incident reviews)
- Conduct Post-Mortems (after incident reviews)
  - Don't forget the good!
- Design and conduct realistic Decision-Making Exercises (DMX)
  - Create stress – with time limits and/or pop-in on-the-fly DMXs
- Journal your decisions in the field to compare to Pre-Mortems
- Practice Decision-Making in Context (or at close to it as possible)

# Frequency/Consequence Continuum



The vast majority of decisions have discretionary time-to-task.  
We have time to think!  
They are not time competitive with regard to life, limb, or eyesight.



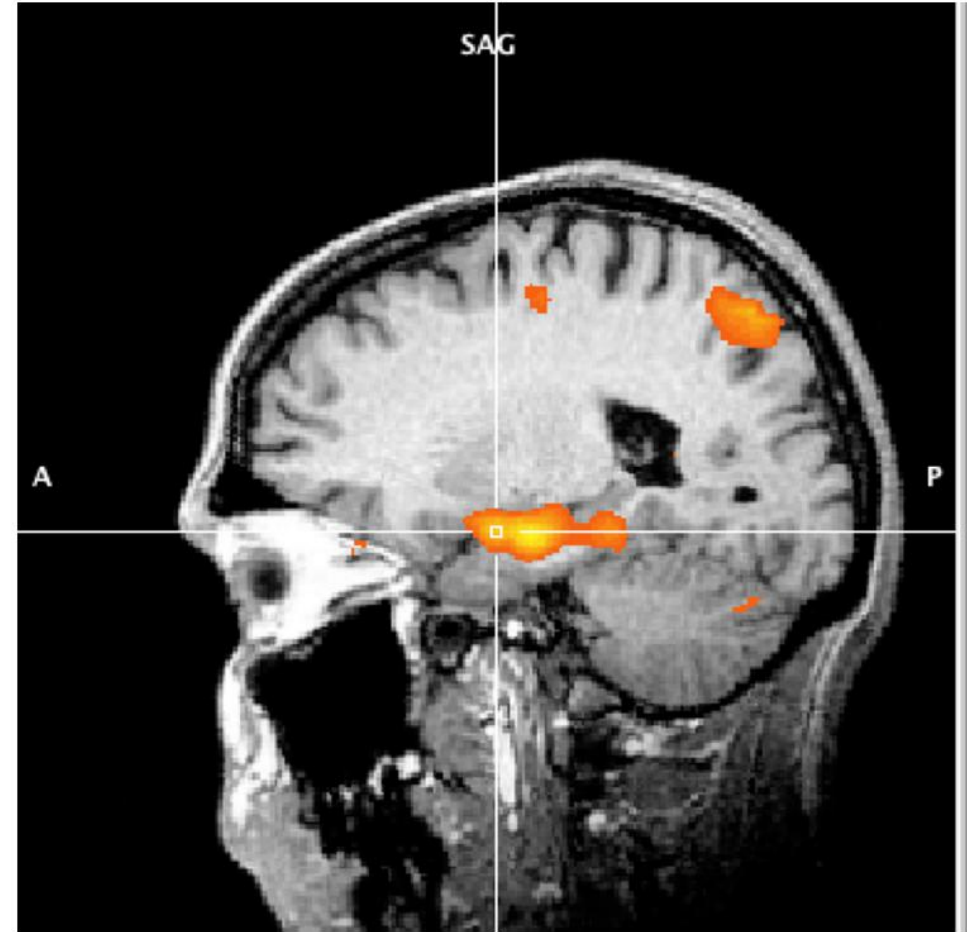
A small minority are non-discretionary time-to-task.  
We do not have time to think!  
They are time competitive with regard to life, limb, or eyesight.



Frequency and Consequence are relative to your risk tolerance.

# How we make decisions

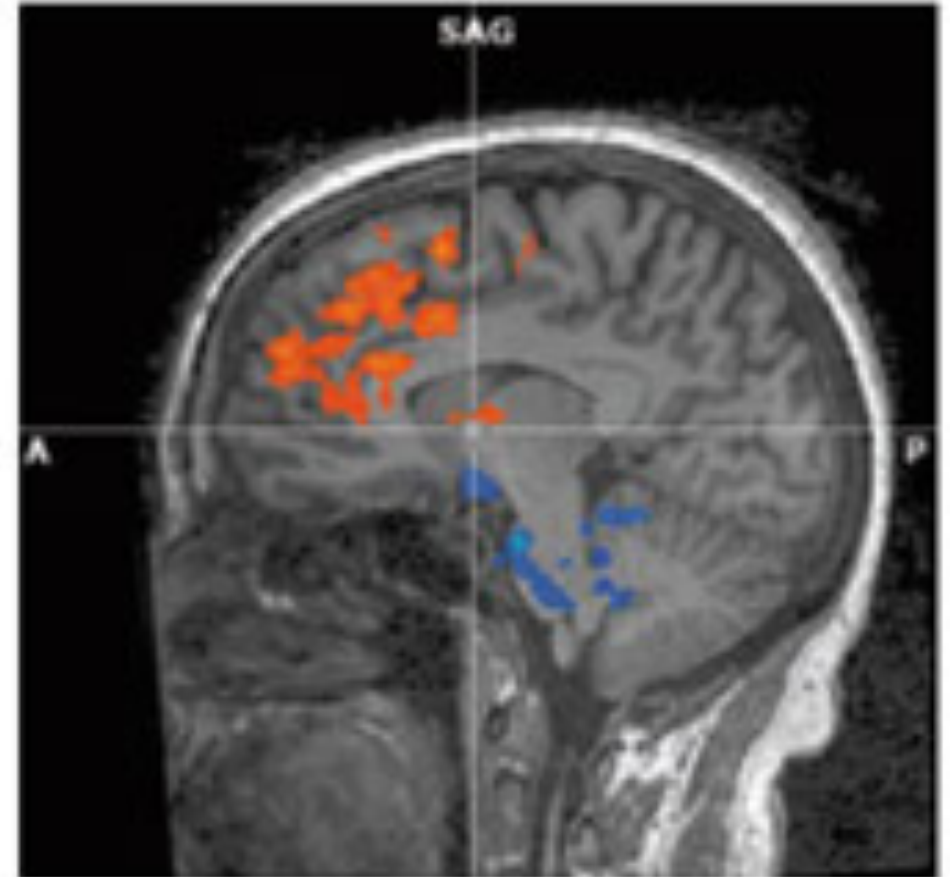
- System 1 (default)<sup>2</sup> (Limbic System)
  - Fast and automated
  - There is little or no effort or sense of control
  - Cognitively frugal
  - Decisions come to mind without awareness of the cues that evoke an obvious evaluation of their strength
- Pattern Recognition
  - Recognition Primed Decision-Making<sup>2</sup>



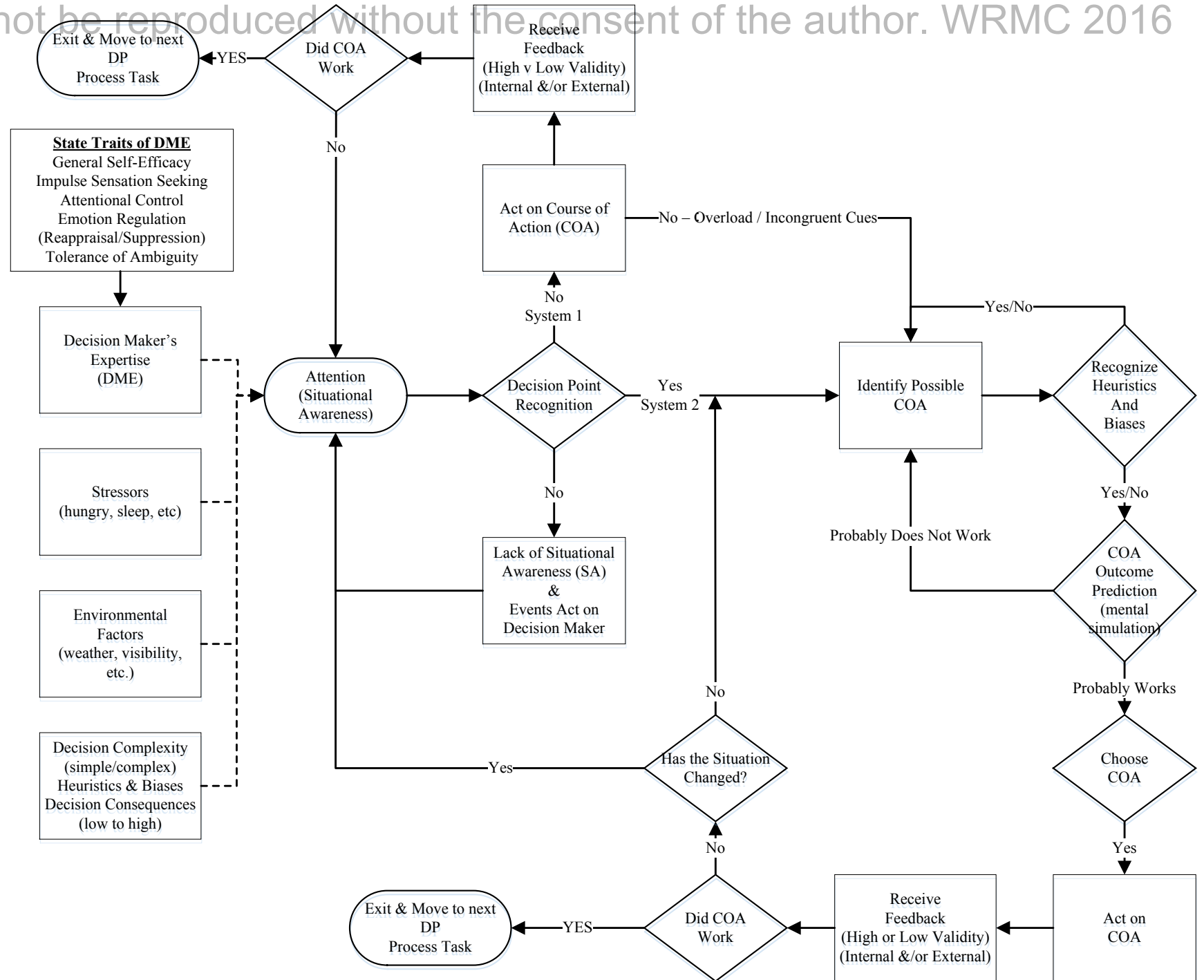


# How we make decisions

- System 2 (overload/fall back)<sup>1</sup>  
(Prefrontal Cortex/Central Executive)
  - Slower and more controlled
  - More effortful and there is a with a sense of control
  - Cognitively expensive
  - Decisions come to mind with an awareness of cues that evoke an obvious evaluation of their strength
- Systems & Checklists<sup>3</sup>
- Domain Specific Expertise<sup>4</sup>
  - Expert decision-maker's System 1 closer to System 2



# Dual-Process Model of Judgment and Decision-Making<sup>5</sup>



# Post-Mortem

## **Don't forget to post-mortem the GOOD!**

- As best you can, reconstruct the timeline of events and decision points. Sometimes diagrams/photos help.

Cycle through the following questions for each decision:

1. Why was this difficult?
2. How was the situation interpreted.
3. In hindsight, what were the red-flags, cues and patterns that you should have seen (proximal and distal)?
4. Why was the course of action taken?
5. What could have been done differently?
6. What training/education needs to occur to become better?

## **Post-Mortem:**

Ms. Kuo and her daughter were passengers in a raft that was part of a group that included other rafts and boats. Among the other passengers in Ms. Kuo's raft was a guide who was an employee of the raft company. During the trip, a participant fell out of a kayak and Ms. Kuo's raft was directed to the riverbank by the guide, who got out with a throw rope. The guide tossed one end of the rope, the participant swam toward the raft and grabbed it, which caused another passenger in the raft to fall into the water. At this point the guide threw the entire rope into Ms. Kuo's raft.

One end of the rope became caught under the water, and the other end wrapped around Ms. Kuo's lower right leg and began crushing it. Ms. Kuo shouted to the guide to cut the rope with a knife to free her leg, but the guide replied that he did not have a knife. He shouted to the senior guide and the other guides to bring him a knife, but no one had one.

At this point the guide in Ms. Kuo's raft froze and did nothing. Ms. Kuo asked him to jump into the river to try and free the rope. He was able to create enough slack on the rope that it could be removed from Ms. Kuo's leg.

Eventually the guides were able to move Ms. Kuo to shore where she was in excruciating pain and suffering from respiratory and circulatory problems. The guides did not have communication equipment with them so they could not contact outside sources for help. One of the guides ran to a road to locate a telephone and call for help. After three hours, Ms. Kuo was transported to a hospital.

Once at home, Ms. Kuo was seen by a vascular surgeon and other physicians, who diagnosed a strangulation injury to her lower right leg. In addition, her physicians referred her for psychological treatment. (Attarian, A., 2012, p. 52)

**Incident:**

Ms. Kuo and her daughter were passengers in a raft that was part of a group that included other rafts and boats. Among the other passengers in Ms. Kuo's raft was a guide who was an employee of the raft company. During the trip, a participant fell out of a kayak and Ms. Kuo's raft was directed to the riverbank by the guide, who got out with a throw rope. The guide tossed one end of the rope, the participant swam toward the raft and grabbed it, which caused another passenger in the raft to fall into the water. At this point the guide threw the entire rope into Ms. Kuo's raft.

One end of the rope became caught under the water, and the other end wrapped around Ms. Kuo's lower right leg and began crushing it. Ms. Kuo shouted to the guide to cut the rope with a knife to free her leg, but the guide replied that he did not have a knife. He shouted to the senior guide and the other guides to bring him a knife, but no one had one.

At this point the guide in Ms. Kuo's raft froze and did nothing. Ms. Kuo asked him to jump into the river to try and free the rope. He was able to create enough slack on the rope that it could be removed from Ms. Kuo's leg.

Eventually the guides were able to move Ms. Kuo to shore where she was in excruciating pain and suffering from respiratory and circulatory problems. The guides did not have communication equipment with them so they could not contact outside sources for help. One of the guides ran to a road to locate a telephone and call for help. After three hours, Ms. Kuo was transported to a hospital.

Once at home, Ms. Kuo was seen by a vascular surgeon and other physicians, who diagnosed a strangulation injury to her lower right leg. In addition, her physicians referred her for psychological treatment. (Attarian, A., 2012, p. 52)

**Questions**

As best you can, reconstruct the timeline of events and decision points.

Why was this difficult?

How was this situation interpreted?

In hindsight, what were the red-flags, cues and patterns that you should have seen (proximal and distal)?

Why was the course of action taken?

What could have been done differently?

What training/education needs to occur to become better?

## Psychological State Traits that Effect Decision-Making<sup>11</sup>

- **Generalized Self-Efficacy**<sup>6</sup> (higher in experts)
- **Attentional Control & Vigilance**<sup>7</sup> (higher in experts)
- **Emotional Regulation**<sup>8</sup> (higher in experts)
  - **Reappraisal** – higher in experts
  - **Suppression** – lower in experts
- **Tolerance for Ambiguity**<sup>9</sup> (higher with experts)
- **Impulsivity**<sup>10</sup> (lower in experts, experts average to general population)

# Decision-Making Exercise (DMX)

## Rules

- There is no absolute right answer... it is about the process.
- Simple scenario, thus there will be incomplete information that will require you to make assumptions.
  - Solve the problem do not critique the problem.
- Imposed time limit
  - 5-10 min for decision & ~30 min total
- You must communicate your decision orally to the group.
  - Be specific as to who, what, how (maybe), when, where, why (maybe); no generalizations or hypotheticals.
- Play
  - Solitaire, Group or Two-Sided

## Explain your decision-making process

- Why you made the decision you made?
- What were your options?
- What were the factors/considerations foremost on your mind?
- What assumptions, if any, did you make about the situation?
- What would you have liked to have known... or not known?
- On what principles, concepts, values was your plan based?

**Background:** You are leading a group of five backpackers (Bill and Joan, Becca and Matt, and Jim) in the Beartooth Mountains on three-day trip up Black Canyon off the Lake Fork Trail. Your goal is to camp the first night at the headwater of Black Canyon Lake then cut cross country making the pass to the east of Mount Rearguard and spend the next night at Moon Lake then hike Hellroaring Plateau to the high trailhead where you have a friend scheduled to pick you up the afternoon of the third day.

Bill and Joan, a married couple, are fit but have not backpacked in several years. They each have current First Aid/CPR training. Becca and Matt are engaged, fit and have backpacked quite a bit in the southern desert of Utah but never in the mountains of Montana. Becca took a wilderness first aid class four years ago and Matt has had no medical training. Matt also has Type II Diabetes. Jim is very fit but this is his first backpacking trip and he seemed very nervous when the group encountered a snake on the trail yesterday. You have the first aid kit and all have bear spray and prior to departing you checked for understanding on what to do if they encounter a bear. You currently have no cell coverage and are not carrying a sat-phone.

It is mid-morning the second day and you are heading up to the pass from Black Canyon Lake. Becca spots a grizzly bear about 100 yards up slope from the group to the south east. As you start to simultaneously tell the group what to do and look for any cubs. Without any explanation Jim starts moving fast (running) back toward the lake and then you spot it... a cub. Jim does not realize that he is running right toward it. Then the worst happens, the sow takes off after Jim. What do you do now?



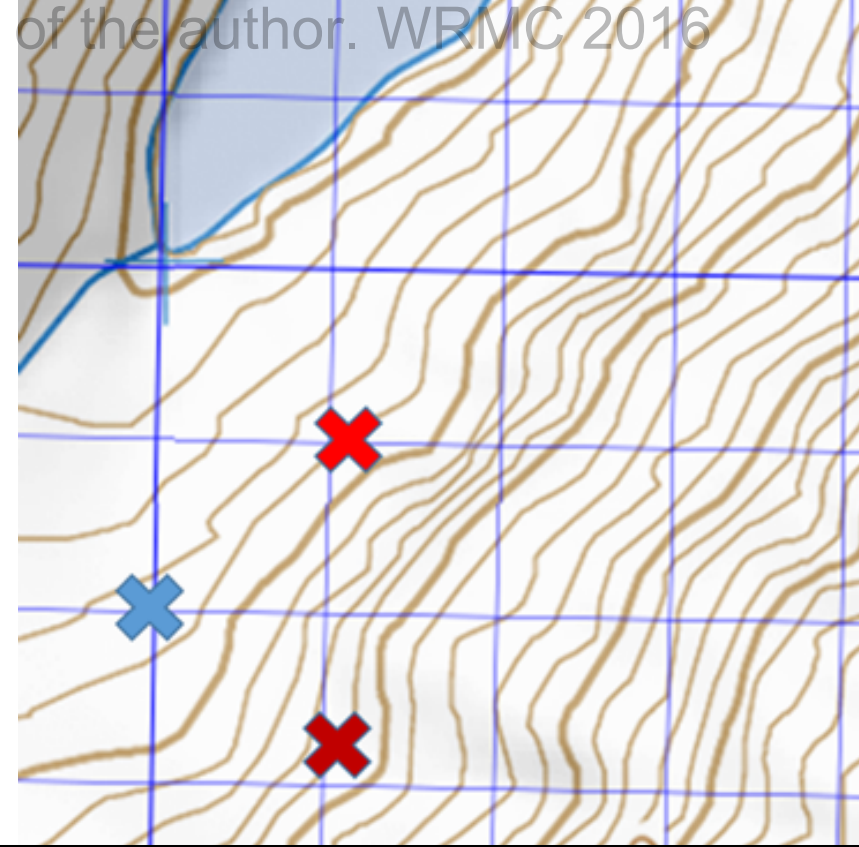
There is no single correct answer; however, there may be a wrong or less than desirable answer.

**Title:** Bear Attack

**Background:** You are leading a group of five backpackers (Bill and Joan, Becca and Matt, and Jim) in the Beartooth Mountains on three-day trip up Black Canyon off the Lake Fork Trail. Your goal is to camp the first night at the headwater of Black Canyon Lake then cut cross country making the pass to the east of Mount Rearguard and spend the next night at Moon Lake then hike Hellroaring Plateau to the high trailhead where you have a friend scheduled to pick you up the afternoon of the third day.

Bill and Joan, a married couple, are fit but have not backpacked in several years. They each have current First Aid/CPR training. Becca and Matt are engaged, fit and have backpacked quite a bit in the southern desert of Utah but never in the mountains of Montana. Becca took a wilderness first aid class four years ago and Matt has had no medical training. Matt also has Type II Diabetes. Jim is very fit but this is his first backpacking trip and he seemed very nervous when the group encountered a snake on the trail yesterday. You have the first aid kit and all have bear spray and prior to departing you checked for understanding on what to do if they encounter a bear. You currently have no cell coverage and are not carrying a sat-phone.

It is mid-morning the second day and you are heading up to the pass from Black Canyon Lake. Becca spots a grizzly bear about 100 yards up slope from the group to the south east. As you start to simultaneously tell the group what to do and look for any cubs. Without any explanation Jim starts moving fast (running) back toward the lake and then you spot it... a cub. Jim does not realize that he is running right toward it. Then the worst happens, the sow takes off after Jim. What do you do



**Requirement:** Within 5 minutes:  
Write down what you tell your group members to do? Be specific as to who, what, how (maybe), when, where, why (maybe); no generalizations or hypotheticals.

# Decision-Making Exercise (DMX)

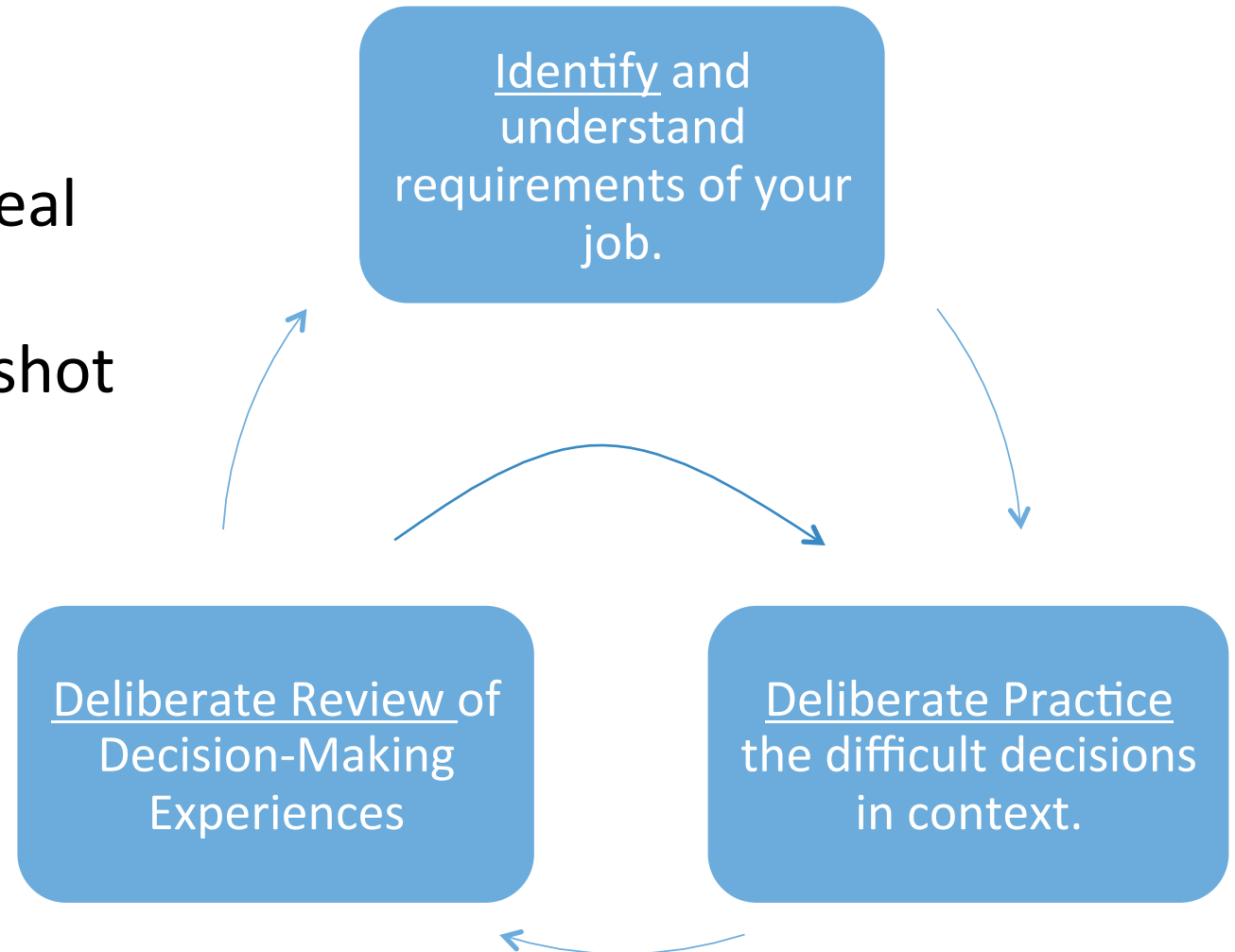
Explain your decision-making process

- Why you made the decision you made?
- What were your options?
- What were the factors/considerations foremost on your mind?
- What assumptions, if any, did you make about the situation?
- What would you have liked to have known... or not known?
- On what principles, concepts, values was your plan based?

# Meaningful Experience leads to better intuition

## The Paradox of Experience<sup>1</sup>

- How do we get meaningful real world experiences?
- Sometimes we only get one shot at the experience.



# Action Steps

1. Be deliberate about your process, we can gain *experience*, to a greater or lesser degree, vicariously.
2. Incorporate Pre-Mortems, Post-Mortems, and DMXs into your regular staff training.
3. If you have the ability... slow down... be intentional in your decision!
  - You will be able to identify low frequency, high consequence, non-discretionary time-to-task events and conduct a pre-mortem that will help your staff reduce risk.
  - You will be able to design and conduct a realistic decision-making exercises that will help you and your staff gain simulated experiences of low frequency high consequence events.
  - You and your staff will be able to conduct a critical after review of an incident, or near miss, designed to give detailed feedback and improve the decision-making process and quality of low frequency, high consequence, non-discretionary time-to-task events.

# References

1. Klein, G. (2003). *The power of intuition* (Paperback ed.). New York: Doubleday.
2. Stanovich, K. E., & West, R. F. (2000). Individual differences in reasoning: Implications for the rationality debate? *Behavioral & Brain Sciences*, 23(5), 645.
3. Gawande, A. (2010). *The checklist manifesto: How to get things right* (1st ed.). New York: Metropolitan Books. Budner, S. (1962). Intolerance of ambiguity as a personality variable. *Journal of Personality*, 30(1), 29. doi:10.1111/1467-6494.ep8933446
4. Klein, G., Calderwood, R., & Clinton-Cirocco, A. (1986). *Rapid decision making on the fireground*. Paper presented at the Human Factors and Ergonomics Society 30th Annual Meeting, Norwood, NJ.
5. Culp, C. A. (2016). Judgment and decision-making in outdoor adventure leadership: A dual-process model. *Journal of Outdoor Recreation, Education and Leadership*, 8(1). doi:http://dx.doi.org/10.18666/JOREL-2016-V8-I1-7380
6. Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efficacy scale. *Measures in health psychology: A user's portfolio. Causal and control beliefs*, 35-37.
7. Derryberry, D., & Reed, M. A. (2002). Anxiety-related attentional biases and their regulation by attentional control. *Journal of Abnormal Psychology*, 111(2), 225.
8. Gross, J. J., & John, O. P. (2003). Individual Differences in Two Emotion Regulation Processes: Implications for Affect, Relationships, and Well-Being. *Journal of Personality & Social Psychology*, 85(2), 348-362. doi:10.1037/0022-3514.85.2.348
9. Budner, S. (1962). Intolerance of ambiguity as a personality variable. *Journal of Personality*, 30(1), 29. doi: 10.1111/1467-6494.ep8933446
10. Zuckerman, M. (2007). *Sensation seeking and risky behavior*. Washington, D.C., USA: American Psychological Association.
11. Culp (working)

# Building Intuition

Clinton A. Culp, Ph.D.

Major, USMC (Ret)

Montana State University Billings

[clinton.culp@msubillings.edu](mailto:clinton.culp@msubillings.edu)