

# The Expert's Dilemma

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# “What are the chances?”

- “...that I’ll make it?”
  - That I’ll recover from cancer?
  - What if I *don’t* take this drug you’ve recommended?
- “...that this person will harm himself or others?”
- “...that this person will re-offend?”
- “...that this earthen dam will fail?”
- “...the Challenger will fail disastrously?”

# Sounds like probability!

- What are the chances that
  - ... I'll roll a 7?
  - ...I'll win the lottery?
  - ...a man born in 1947 will live to age 100?

# 350 year tradition

- Two kinds of probability: objective and subjective
- Versions of the same one thing:
  - Prob( 7 ) = 16%
  - Prob( win lottery ) = 1/175,000,000
  - Prob( 1947 reach age 100 ) = 7.1%
  - Prob( my recovery ) = 75%
  - Prob( harm self ) = 10%
  - Prob( Challenger disaster ) = 1/100,000

# Same language; same concept?

- Objective:
  - Rolling a 7: 36 combinations, 6 of them right
  - Winning the lottery: 175,000,000 tickets sold, you have one
- Subjective
  - Prob( **MY** recovery ) (not “% of a group”)
  - Prob( **THIS** person will harm himself ) (not “% of cases like this”)

# Clearly not the same

- “Objective”:
  - Counting cases
  - Out of this many cases, how many are the ones I want?
  - **Concept: Ratio of two numbers**
- “Subjective”:
  - Degree of belief
  - Strength of feeling
  - How much you’d be willing to bet
  - **Concept: What actions called for (and how strongly)**

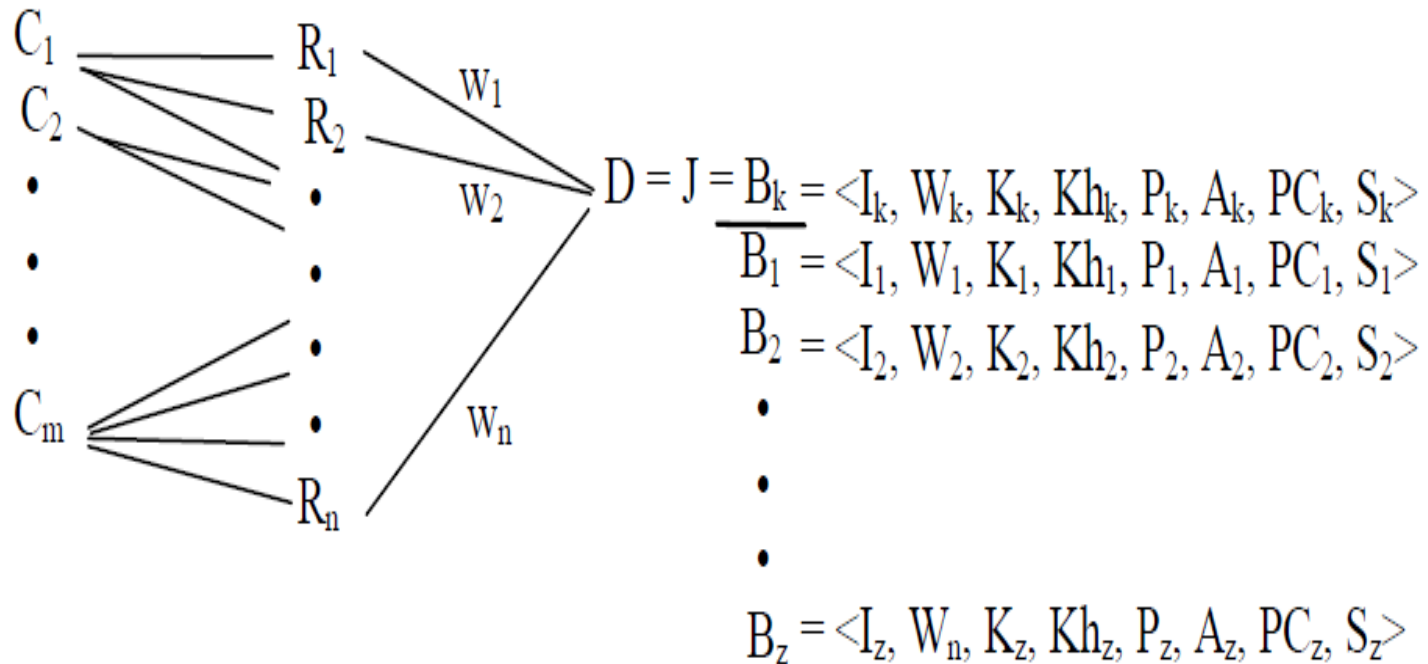
# What *is* “subjective probability”?

- Let’s look at the context?
  - What is the person doing by asking, “What are my chances?”
- Ans: deciding what to *do*
  - Do I get chemo?
  - Do I get this operation?
  - Do I recommend hospitalization for this person?
  - Do I recommend release of this person?
- Deliberate action when *something* is uncertain

# So what can be uncertain?

- Recall:

Circumstances    Reasons    Priorities

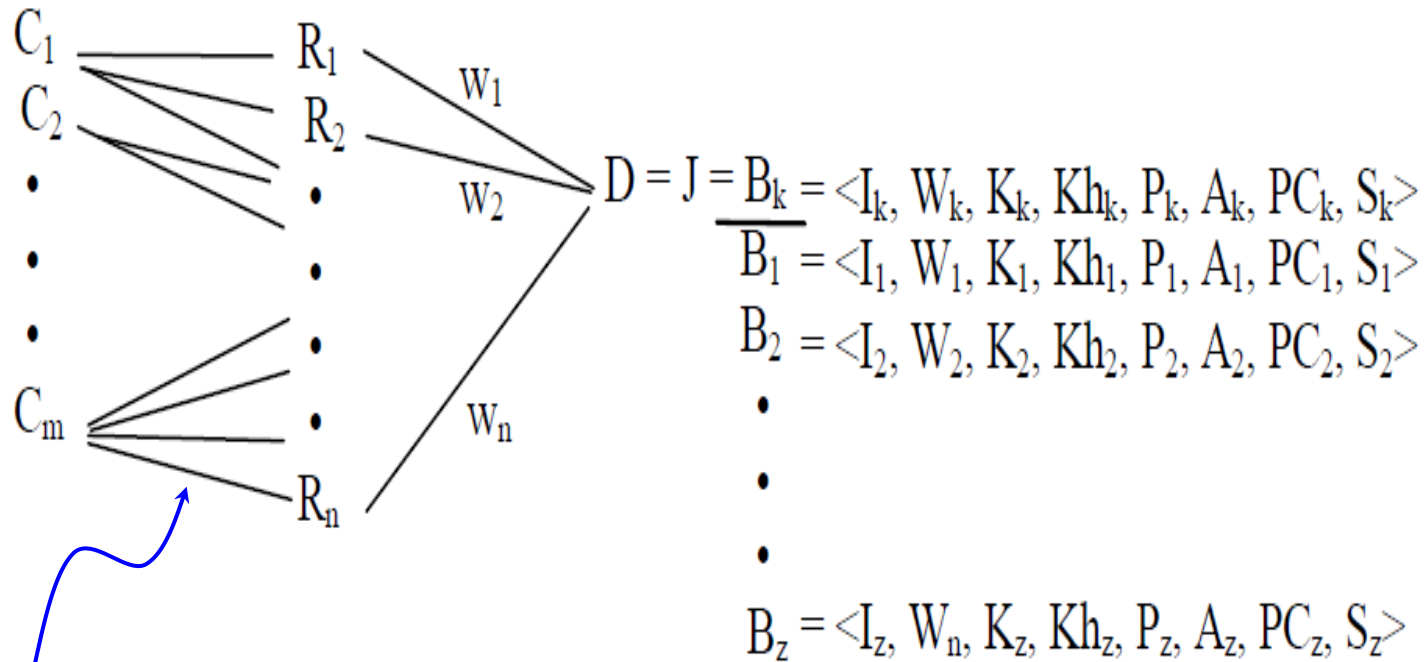




# So what can be uncertain?

- Recall:

Circumstances      Reasons      Priorities



Re-descriptions

# Pragmatic assurance of success

- Paradigm case: P has *pragmatic assurance* of success doing B
  - I want a sip of coffee; I lift the cup, tilt it, take a sip
- Engaging in B results in the intended state of affairs *and* no other behavior is called for to ensure that  $W = A$ .

# Paradigm – but not universal

- But many things are uncertain
  - Will taking this drug cure me?
  - Will releasing this person result in harm to himself or others?
- “X is uncertain” = “Acting on X has no pragmatic assurance of success.”
- Notice: “X is uncertain” is a **re-description of X with tautological implications for action**
  - **i.e., an appraisal**

## “What are the chances...”

- “...that I’ll make it?”
- “...that this person will harm himself or others?”
- “...that this person will re-offend?”
- “...that this earthen dam will fail?”
- “...that the Challenger will fail disastrously?”

➤ **Are requests for *uncertainty appraisals***

# What kind of appraisal?

- C is dangerous: a prudential appraisal
  - That is, re-describes a C as a prudential reason to avoid X, or take precautions
- C is beautiful: an esthetic appraisal
  - Reason to seek out C, look at C, etc.
- C is uncertain: **an *uncertainty* appraisal**
  - Reason to engage in certain behaviors

# What behaviors?

- The things one does differently when one is unsure:
  - Non-standard performance (more slowly, more carefully, etc.)
  - Re-assessing C's, R's, or w's, or any parameter of any B
  - Pausing to re-assess the version of the B (or doing B at all)
  - Taking steps to avoid going wrong

# Making decisions – simple version

- Give each possible outcome a probability between 0 and 1
- Assign a numerical value to each outcome
- Multiply the probability and the value of each outcome (“expected value”)
- Add up the expected values
  - Example: Play lottery?
    - 100% chance of paying \$1: expected value = -\$1
    - 1/175,000,000 of winning \$1m: expected winnings = 57¢
    - Net expected value: - 43¢

Great for combining probabilities – BUT!

- If some of the “probabilities” are subjective:
- Neat, clean, simple – and *wrong*
  - **The subjective probabilities don't add up to 1!**
  - **So the calculations are meaningless**
- **The problem: appraisals are not numerical**



# A lesson in conflation

- Feynman's analysis of the Challenger disaster:
  - Shuttle mgr estimate of failure probability: 1 in 100,000
  - Means: 1 Shuttle/day for 300 years, losing only one
  - **Completely implausible**
  - Stems from treating appraisals as probabilities
  - (Category error: “This lion's danger level is 3 pounds”)

# What to do instead: Life State Analysis

- **Step 1:** build an event (outcome) set
  - But, *complete* outcomes
    - Everything unique *to the individual*
    - Everything that person is uncertain about (formerly “subjective probabilities”)
- **Step 2:** apply actual probabilities to the complete outcomes

# LSA

1. Specify the behaviors to choose between, including the actor
2. Identify the actually possible outcomes of each choice (A parameter)
3. Expand the the descriptions of each behavior
4. Associate the (actual) probabilities with each Complete Situation.
5. Decide.

# Example: Do I undergo chemo?

1. **Behavioral choices: Get chemo or refuse**
2. **Actually possible outcomes:**
  1. **Undergo chemo and survive**
  2. **Undergo chemo and live 6 months longer**
  3. **Undergo chemo and die within 2 years**
  4. **Forgo chemo and die within 2 years.**
  5. **Forgo chemo and recover**
3. **Expansion of undergo chemo & survive (LS1):**
  - **Months of very unpleasant sickness, very low life quality and inability to carry out normal duties in my family and work;**
  - **I'm affirming my self-image as a fighter**
  - **My spouse sees I did all I possibly could**
  - **My spouse will see me suffering during the treatment**
  - **I'll be able to finish the research project I'm working on, which means a lot to me**
  - **I get to attend my daughter's wedding in 10 months**
  - **I may see grandchildren.**

# Do I undergo chemo?

- **Expansion of undergo chemo and live 6 months (LS2):**
  - Months of very unpleasant sickness, very low life quality and inability to carry out normal duties in my family and work;
  - I'm affirming my self-image as a fighter
  - My spouse sees I did all I possibly could
  - My spouse will see me suffering during the treatment
  - I'll be able to finish the research project I'm working on, which means a lot to me
- **Expansion of undergo chemo and die within 2 years (LS3):**
  - Months of very unpleasant sickness, very low life quality and inability to carry out normal duties in my family and work;
  - I'm affirming my self-image as a fighter
  - My spouse sees I did all I possibly could
  - My spouse will see me suffering during the treatment

# Do I undergo chemo?

- **Expansion of forego chemo and die 2 years (LS4):**
  - A 2-year decline
  - Much better time with my family during the two years
  - I'll be able to finish a research project that is important to me
  - I'll have time to make peace with my passing
  - I'm doing something that conflicts with my image of myself as a fighter
  - My spouse will not see me suffering until the end
  - I'll be able to finish the research project I'm working on, which means a lot to me
  - I get to attend my daughter's wedding in 10 months.
- **Expansion of forego chemo and die in 2 years (LS5):**
  - A 2-year decline
  - Much better time with my family during the two years
  - I'll be able to finish a research project that is important to me
  - I'll have time to make peace with my passing
  - I'm doing something that conflicts with my image of myself as a fighter
  - My spouse will not see me suffering until the end
  - I'll be able to finish the research project I'm working on, which means a lot to me
  - I get to attend my daughter's wedding in 10 months.

# Example: Do I undergo chemo?

4. Apply known statistics for survival rates for this cancer and this treatment regime to these Life States:

–  $\text{prob}(\text{LS1}) = 0.60$

–  $\text{prob}(\text{LS2}) = 0.30$

–  $\text{prob}(\text{LS3}) = 0.10$

–  $\text{prob}(\text{LS4}) = 0.98$

–  $\text{prob}(\text{LS5}) = 0.02$

5. Decide