Decision Making

Rational decision making

- Two different models
  - Prescriptive models
    - Models describing the best way to make a decision
  - Descriptive models
    - Models describing the way decisions are actually made
- Classical decision theory
  - Uses decision trees
  - Assumed decision makers
    - Knew all option
    - Understood pros and cons of each choice
- Expected utility theory
  - Expected Utility Theory (EUT) states that the decision maker (DM) chooses between risky or uncertain prospects by comparing their expected utility values, i.e., the weighted sums obtained by adding the utility values of outcomes multiplied by their respective probabilities.

Why don't we

- Gain/loss - prospect theory
  - Risk Averse
    - In choices involving gains
    - Gift of $1000 vs 50% chance of $2000 or either $0
      - Choose $1000
  - Risk Seeking
    - In choices involving losses
    - Loss of $1000 vs 50% chance loss of $2000 or either $0
      - Chose 50%
    - Value of $50 is 3x greater when we could lose - so when we've got it we don't want to lose it
  - Even when the outcomes are the same - will base on how Q is worded
    - Disease will kill 600 people
      - Will chose save 200 people over 1/3 chance save everyone 2/3 save no one
      - Will choose 1/3 kill no one 2/3 kill everyone over 400 people will die
      - Even though both the same odds but one is framed as a loss and other gain
        - Demonstrated loss aversion - aversion to loss is a stronger determinant of choice than gain
- Gut instinct or intuition
  - The ability to know or quickly recognise the possibilities of a given situation
  - A key element of DM under risk and uncertainty
  - Where does it come from
    - Unconscious process - but informed by experience and accumulated judgement
- Certainty effect
  - Reduction of the probability of an outcome by a constant factor has more impact when the outcome was initially certain than when it was merely probable
  - Allais' paradox
    - Decision makers prefer an alternative with certainty to an uncertain alternative
  - Eg
    - Certain outcome
      - Lottery 1
        - Sure win of $30
      - Lottery 2
        - 80% chance of $45, 20% $0

        - Choose lottery 1
    - Uncertain outcome
        - Lottery 1
            - 25% chance of $30
        - Lottery 2
            - 20% chance of $45
        - Choose lottery 2
- Allais
    - When certainty is remove
        - People focus on the bigger prize - even if their chances are slimmer
    - Playing safe disappears the more the remote the chance of winning

- Framing effect on decisions
    - Tversky and Kahneman - started this
    - Survival frame vs mortality frame
        - Wording of dilemma effects how decision is made
        - Eg Advantage of radiation over surgery looms larger when stated as a reduction of the risk of imminent death rather than an increase from 90-100% in the rate of short-term survival
- Satisficing
    - To obtain an outcome that is good enough
    - Simon
        - Humans are rational but within limits
        - Near enough is good enough
- Ambiguity aversion
    - Ellsberg
        - A urn contains 90 balls
            - 30 blue balls
            - Don't know how many red or yellow balls (but red + yellow = 60)
        - Choices
            - Draw a blue ball get $100 - other colour get nothing
            - Draw a red ball get $100 - other colour get nothing
        - Choose blue
            - Bc even though have the same probability
            - People avoid ambiguity
                - Called Ellsberg's paradox
        - Another eg
            - Urn with same balls
            - Choice 1
                - Win $100 if you pick a blue or yellow ball
            - Choice 2
                - Win $100 if you pick a red or yellow ball
            - People now pick red/yellow
    - Implications
        - Isnt explained by probability theory
        - People seem to use simple rules
            - Heuristics
            - Responses are habitual
    - Sunk Costs
        - Dilemma
            - Going to the theatre - want to buy ticket at door for $50. Get there and have lost the $50
            - Or going to the theatre - bought $50 ticket online. Get there and have lost the ticket
            - Would you spend another $50/buy another one
                - Would buy ticket in A, even though it's the same loss of $100 in both scenarios

                - Mentally the $50 was already allocated to the ticket, but when just in wallet - not allocated to anything
            - Sunk costs are irrelevant to current decisions- instead, only incremental costs should influence future decisions
            - Sunk costs have already been paid- you can't get that cost back
    - Enlightenment effect
        - Knowing about our biases - will it stop our irrationality?
            - Not really
        - Eg bystander effect
- Prospect theory
    - Kahneman & Tversky
        - Irrational tendency to be less willing to gamble with profits than with losses
        - Loss aversion is greater than gain seeking
    - Reference level dependence
        - An individuals views consequences in terms of changes from the reference level with is usually that individual's status quo
    - Gain and loss satiation
        - Values of the outcomes for both positive and negative consequences of the choice have the diminishing returns characteristic

- Loss aversion
  - The resulting value function is steeper for losses than for gains
    - Losing $100 produces more pain than gaining $100 produces pleasure
  - We select the outcome that will maximise our outcome
- Endowment effect
  - We overly value property that we own
  - Eg experiment
    - Equally valued pen and mug
    - Given one and then asked if they wanted to trade
      - Only 10% traded

Consequences of choice

- Sheena
  - Tasting table
    - Either 6 jams to taste or 24 to taste
      - 6 attracted 40% of shoppers- 24 attracted 60% of shoppers
      - On average customers tasted 2 jams
      - 24 - 3% bought jam
        - Spent up to 10 minutes deciding to buy jam
      - 6 - 30% of shoppers bought jam
- Choice
  - Limited choice
    - More likely to buy
    - Attract less though
  - Extensive choice
    - Less likely to buy
    - Attract more though
- Avoidance of choice
  - Experiment
    - Control
      - Have $1.50 cash or a pen worth $2
      - 75% chose pen
    - Conflict condition
      - Have $1.50 cash or a pen worth $2 or 2 pens worth $1
      - 47% chose pen
      - 53% choose the money
  - Two similar value options increases avoidance
    - Too hard to make decision

Heuristics

- When we need a quick and easy answer - go for intuition
  - But prone to cognitive biases
    -
- Biases
  - Expectation bias
    - We see things as we think they ought to be
  - Probability bias
    - Gamblers fallacy
      - Random events are self correcting
      - Roulette wheel - last 8 spins are red - bet black next spin
        - But logically still 50/50
    - Resetting effect
      - Once been to jail - why reoffend
        - Caught and went to jail - what are the chances of the that happening again
      - Believe that the chances have been reset
  - Confirmation bias
    - Proactively seek out information that confirms our existing beliefs

- Wason
  - Harder to search for negative information
  - Easier with real world examples
- Hypothesis driven behaviour
  - Changing hypothesis requires greater cognitive effort than maintaining the same hypothesis

- Overconfidence
  - People are much more confident about their decisions than is reasonable given the environment in which they are making their decisions
  - Planning fallacy
    - Often underestimate the time it takes to complete a task
  - More overconfident when in a happy mood
  -
- The Fallacy of Ignoring of Base Rates
  - Are you more afraid of flying or driving
    - Most say flying
    - But really deaths are why higher from driving
  - Salience and attention of a plane crash increases the perception of the frequency that these events occur
- The Fallacy of Inferring Causation from Correlation
  - Illusion of causation
    - Assumption that if two things occur together that one caused the other
  - Illusion of correlation
    - Seeing significant relationships btw unrelated events
    - Seeing order in random events
- The Fallacies of Ignoring the Odds of Coincidences and Selective Memory
  Vividness effect - saliency
  - People often confer meaning on events that they believe are very unlikely - even when those events may occur by chance
  - People also tend to ignore or forget events that are not significant to them
  - This has the effect of making the events that they do remember seem that they could not be explained by chance
    - Eg "phone always rings when in the shower" but don't remember the time when it didn't ring
  - Put more weight on recent events
- The Conjunction Fallacy
  - Subjects rate certain conjunctions as more likely than in individual conjunct

- Types
  - Availability
    - A mental shortcut in which judgements are based on information that is most easily brought to mind
    - Based on saliency of memory
    - Letter K
      - Is the letter K more likely to come first or third in a word
      - Most say first
        - But 2x as many words where its third
        - But easier to recall starting with
    - The ease of bringing an example to mind is a means of estimating the probability of occurrence (likelihood)
    - Priming
      - Cues can unconsciously make some memories readily available
        - Happy mood primes happy memories
  - Representativeness
    - A mental shortcut that involves judging whether something belongs in a given class on the basis of its similarity to other members of that class
    - Judge probability of an event based on how it matches a prototype
    - Most will overuse representativeness
    - Conjunction fallacy
      - Representativeness refers to the tendency of decision makers to make decisions based on stereotype
        - See patterns where perhaps none exist

        - It is a judgement strategy in which we make estimates on how similar (or representative) an event is to its population.
    - E.G: Coin toss: Which is more representative?
        - HHHHHTTTTT
        - HTHTHTTHHT
            - Both the same
            - But would say B
    - Joint probability
        - People think that 2 events are more likely to occur together than either individual event
        - The fallacy is that with more and more pieces of information people think here is a higher probability that all are true, but actually the probability diminishes rapidly
- Anchoring
    - Choice that we make by comparison to a reference point
    - Eg Dan Ariely study
        - Journal subscription
            - Online - $59
            - Print - $125
            - Print & Web $125
                - 16% chose online
                - 0% print
                - 84% chose both
            - If take out print only from option
                - 68% chose online
                - 32% chose both
            - Presence of clearly inferior option swayed decision
    - Focus on a particular value and compare it to our other options
        - Seeing the difference btw values rather than the value of each option itself
    - Tversky and kahneman
        - Had a wheel of fortune - stop at either 65 or 10
        - Then asked what percentage of countries in Africa are in the UN
            - If saw 65 on wheel guessed 45%
            - If saw 10 on wheel guessed 25%
- Also
    - Negativity bias
        - The tendency to pay extra attention to negative information
        - Occurs because of evolutionary factors
            - Negative information reflects threatening features of the external world
    - Optimistic bias
        - Predisposition to expect things to turn out well overall
        - We often think we can do more, sooner, than we really can
        - Planning fallacy
            - Optimistic predictions how long a given task will take
        - Expectation
            - Bracing for loss
    - Illusion of control
        - Preception of uncontrollable events as subject to one's control or as being more controllable than they really are
        - Tendency to perceive randon events are related
            - The idea that chance events are subject to our influence
        - Eg
            - Throwing the dice or spinning the wheel themselves increases people's confidence

- Want low number roll dice gently
- Gambling win
  - Attribute to own skill
- Gambling loss
  - Become near misses
  - Or flukes

        - Hindsight bias
            - I knew it all along effect
            - The memory of how we acted previously changes when we learn the outcome of an event
            - Reconstruction after feedback theory (RAFT)
                - Proposed by Hoffrage, Hertwig & Gigerenzer (2000)
                - Allows us to remove clutter by tossing out inaccurate information and embracing the right answers in our memory
            - Simplify conditions and underestimate complexity that people involved in an error or accident at the time of event
                - Most common result of hindsight bias is to attribute the cause of a medical accident to human error
                - Once found a scapegoat all learning stops and the conditions that were present lay in wait to realign to produce another accident in the future
        - Overconfidence
        - Illusory correlation
        - As if
        - Confirmation bias
        - Framing
        - Mental representation
        - Sunk costs
- Cognitive biases
    - Total 180
    - Why we use heuristics
        - Basically
            - Too much information
                - So only notice
                    - Changes
                    - Bizarreness
                    - Repetition
                    - Confirmation
            - Not enough meaning
                - So fill in gaps with
                    - Patterns
                    - Gernalities
                    - Benefit of doubt
                    - Easier problems
                    - Our current mindset
            - Not enough time
                - So assume
                    - We're right
                    - We can do this
                    - Nearest thing is best
                    - Finish what's started
                    - Keep options open
                    - Easier is better
            - Not enough memory
                - So save space by
                    - Editing memories down
                    - Generalising
                    - Keeping an example
                    - Using external memory