IDENTIFYING EMOTIONS AND COMPUTING EQUATIONS:
- We are able to instantly recognize facial expressions without really analyzing the features of someone having a certain emotion.

- We have enough commonality especially when it comes to motion expression and we are able to do emotion assessment.

- Facial expression and emotional recognition convey a lot of information about motivation intentions and emotion.

- It is something we are able to automatically read off people.

   Example of not identifying something easily: 12 x 26
   - You would need a pen and paper to solve if you're not really good at mental math.

   - This is something you can't just intuitively look at and know the answer.

   - Some things could be intuitive and you can know the range of the possible answer and have some type of plausible answer.

   - More **effortful decisions** require **working memory** and **multiplication task**

   - You had to use your memory to hold your equation and all the working steps in order to get the answer.

   - You also have to keep track of where you are in the calculation and know your next step.

   - This is also an example of short-term memory because you are using your "mental scratch-pad" in order to hold all the numbers until you get your answer.

   - The 2 big things that characterize these deliberative decision-making procedures are **deliberation** and being **effortful & orderly.**

   - When putting effort into something, your pupil diameter becomes bigger depending on how hard a certain task is.

   - Muscles will also become tense, blood pressure rises, and heart rate increases.

   - These are all the things we don't see in an automatic process if you're just automatically assessing any task.

DUAL SYSTEMS PROCESSING:
- The idea is that there is something called **System 1.**

- **System 1** is categorized as processing that is automatic and quick.

- It requires little to no effort and is involuntary.

- You just form that involuntary judgment when looking at something.

- **System 2** processing is deliberative.

- It is conscious, deliberate, and effortful.

- It requires agency choices and concentration.

- **Examples of System 1:**
    - Judge one object as more distant than another.

    - Orient to the source of the noise.

    - Making a disgusted face in response to smell.

    - Stereotype someone.

- **Examples of System 2**
    - File your taxes.

    - Walk faster than is natural for you (at first).

    - Compare two prices for cost and value.

    - Memorize a list.

- **System 1** and **System 2** try to reduce everything to either being automatic or deliberative.

HUMANS AS COGNITIVE MISERS:
- We utilize heuristics and shortcuts, simplifying informationally costly operations into more computationally tractable ones.

- We want our actions and decisions to be fast because we have a limited amount of time, but also accurate.

- Accuracy and speed will sometimes be more important than the other, but for the most part, humans try to balance both.

- Our minds as limited in terms of time and computational resources because we don't have an unlimited amount of time.

- Decision-making requires speed and accuracy, so we have to make decisions that are quick and efficient.

- We make many decisions about the likelihood of uncertain events.
    - **EX:** 'I think…', 'Chances are…', 'It's unlikely that…'.

- We are constantly assessing the likelihood of things all the time.

- How do people assess the probability of an uncertain event or the value of an uncertain quantity?

- All judgment is based on data and on limited validity.

- We use blur to determine how far an object is.

- If you see something sharply it is close, if it is blurry it is farther away.

- This is an automatic task your mind is doing when identifying objects.

- **Judgment Heuristics:**
    - Principles we use to reduce the complex tasks of assessing probabilities and predicting values to simple judgmental operations.

    - It is simple, often useful, but can systematically go awry.

- System 1 is not very responsive to educational questions.

DIFFERENT TYPES OF HEURISTICS:
- **Representatives:**
    - Question: What is the probability that A originates from B.

    - **Heuristic:** When A is highly representative of B, the probably A originates from B is judged to be higher.

    - Steve is very shy and withdrawn, invariably helpful, but with little interest in people, or in the world of reality.

- He is a meek and tidy soul, he has a need for order structure and a passion for detail.

- **Q:** Is he an airline pilot, librarian, or physician?

- **A:** He is a librarian.

- If there is a base rate, then the heuristic representation becomes flawed.

- **A base rate** is if someone told you to identify 100 pictures and tell which of those are engineers or doctors.

- **The base rate** is that 30 are doctors and 70 are engineers.

- This will have a computational effect on your judgment.

- However, the problem is that people are unresponsive to base rates and still use stereotypes.

- **Conjunction Fallacy:**
  - Linda is 31 years old.

  - She is single, outspoken, and very bright.

  - She majored in philosophy.

  - As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.

  - **Which is more probable?:**
    - Linda is a bank teller.

    - Linda is a bank teller and is active in the feminist movement.

  - The 2nd case is the most chosen even though it is just a subset of the first option.

  - Her description seems to fit the conception of people in social justice and participation.

  - Your System 1 is unreflective and falls back on representatives.

  - It over relies on heuristic responses.

- **Gambler's Fallacy:**
    - Misconception about probability.

    - The belief is that "Chance is a self-correcting process in which a deviation in one direction induces a deviation in the opposite direction to restore equilibrium."

    - All probabilities are independent of each other.

    - Probabilities are not connected, if you play roulette it could be just red every time.

- **Availability:**
    - Heuristic: People assess the frequency of a class of the probability of an event by the ease with which instances or occurrences can be brought to mind.

    - Useful because instances of large classes are usually recalled better than instances of less frequent classes.

    - **EX:** Retrievability (more retrieval instances are thought to be more numerous).

    - You think the probability of a house is burning is higher if you actually see one than reading about it online or in a newspaper.

- **Effectiveness of Search Set:**
    - Is it more likely that a word that starts with K or K is the third letter?

    - People struggle with sayings words where K is the third letter.

    - It is easier and is semantic to come up with words that start with a K.

    - Our semantic information is more organized in a way of what words start with what letter.

- **Media Representation:**
    - People are more afraid of plane crashes than car crashes.

    - It is because it is easier to bring plane crashes to mind because the media covers more plane crashes than car crashes.

    - The risk of car crashes is 1/98 while the risk for plane crashes is 1/7178.

    - People bring instances of plane crashes more than car crashes because of the media.

    - You are more likely to die in a car than in a plane.

- **Anchoring:**
    - Heuristic: People make estimates by starting an initial value and then adjusting.

    - Tversky and Kahneman studied that this heuristic can cause people to go awry.

    - They told people to guess the percentage of African countries in the UN.

    - They also spun this wheel with numbers between numbers 1-100.

    - Both researchers told participants that the wheel has nothing to do with the chance and was completely random.

    - Even though they were told the wheel did not matter, the wheel the number was had a bias effect on their response.

- **Summary:**
    - Heuristics (representatives, availability, and anchoring) represent quick and automatic ways of thinking which have evolved because they tend to be helpful.

    - However, heuristics can systematically lead us astray in our probability judgments.

    - We need to be using System 2 for more deliberative reasoning because we rely too much on System 1.

- **OTHER REASONING ERRORS:**
    - **The Sleeper Effect:**
        - If you hear something, and give it to someone and assess it to be true, there will be a normal decay.

        - As you forget about it, you are less likely to think it will be true.

        - Someone tells you something crazy that you don't believe.

        - As time goes on, they remember the crazy info but forget where they hear it.

        - As time goes on and you forget the source and then over time you will find it to be true.

        - **EX:** Fake news.

- **Fluency:**
    - **Processing fluency:** The subjective experience of the ease with which people process information (the feeling).

    - **Heuristic:** easier to process information must be more likely to be true (Alter & Oppenheimer 2009; Schwatz et al. 1991).

    - The easier it is to be processed, we judge it to be true or more representatives.