Unit 02 L52 Evolutionary Psychology

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- **Evolutionary Psychology (EP)**
  - The traditional view in cognitive psychology is that brains are general purpose processor. They can solve any problem of a given type.
  - Evolutionary Psychology (EP) describes how our early environment influenced and produced our current mental abilities
    - Many of our cognitive abilities are innate, supports he nativist position in Philosophy that we are born with knowledge.
    - Culture plays a big role in shaping our cognitive abilities.
  - In 1992, Leda Cosmides, John Tooby and Jerome Barkow edited *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*.
    - Cosmides and Tooby pioneered EP.
  - Cosmides and Tooby refer to the mind as a collection of special purpose devices or a "Swiss army knife".
    - This is in contrast to the traditional notion of mind as a general purpose processor.

- **Evolution and Categorization**
  - We form concepts in graded, continuous fashion, not "all or none."
  - Natural categories are also continuous. The mind mimics this organization.
  - This allow us to generalize our knowledge from one category to another
  - Concepts are organized around representative member of a class the *typical effect*.
- **Evolution and Memory**
  - We have a better memory for information, we are exposed to more often.
  - This is because it is more relevant or important for our survival.
  - Recall accuracy for words is proportional to their frequency for words is proportional to their frequency of occurrence (Anderson and Schooler, 1991).
- **Evolution and Logical Reasoning**
  - From the EP perspective, under certain conditions such as 'cheater detection' which is related to survival, human are good (Cosmides and Tooby, 1992)
    - The logic module of mind thus works very well in this context, implying logic is not domain general.

- **The Wason Selection Task (Hard Version)**
  - E G 4 8
  - **Problem**: There are some errors in the coding of the above documents, and you need to find the errors. Each document has a letter rating on one side and a numerical code on the other.
  - **Rule**: "If a document has an E rating, it must be marked with code 4."

- - **Question**: Here are four documents. Which document(s) do you need to turn over to check for errors?
  - **Correct Answers:** 'E' and '8'
  - **Explanation**: If E holds the other side must be 'E' but not vice versa. So, if one side is '4' and the other side is not 'E' it is not an error. However, if one side is '8' and the other side is 'E' then there is an error.
- **The Wason Selection Task (Hard Version)**
  - Vodka, Pepsi, 30 yrs, 17 yrs
  - **Problem**: The cards above have information about four people in the bar. One side of a card lists a person's age and the other side shows what he/she is drinking. You are a bouncer in a bar and you must enforce the following rule.
  - **Rule**: "If a person is drinking vodka, he/she must be over twenty years old."
  - **Question**: Which card(s) do you need to turn over to be sure no one is breaking the rule?
  - **Correct Answers**: 'vodka' and '17' are the. It doesn't matter what the 30 year old is drinking but if '17' year old is drinking 'vodka' it would violate the rule.
- **Conclusion from Wason Task**
  - Most people get the 2ndone correct. Why?
    - Because it is related to survival and cheater detection.

- **Evolution and Judgment under Uncertainty**
  - Uncertain judgments are when we make a decision without complete information.
    - Most everyday decisions in life are like this.
  - In such cases, we often rely on *heuristics* - past records or experiences.
  - But heuristics can lead us to commit fallacies, a misunderstanding of statistical rules.
    - A **fallacy** is an argument that uses poor reasoning. An argument can be fallacious even if the conclusion is true.

- **Behavioral Economics Fallacies**
  - **Base-rate fallacy**: Ignoring base rates. Example: Jack the lawyer/engineer.
    - Jack is a 45-year old man –married, has 4 children. Generally conservative, careful and ambitious –no interest in political and social issues –spends free time in home carpentry, sailing and mathematical puzzles.
    - 1st test –There are 30% lawyers and 70% engineers.
    - 2nd test –There are 70% lawyers and 30% engineers.
    - Is Jack a lawyer or an engineer?
    - People always answer 'Engineer'.
    - **Explanation** –based on *representative heuristics* and ignoring the base rate which is the population distribution (only 30% people are engineers) –*Base-rate Fallacy.*
  - **Conjunction fallacy**: Ignoring the conjunction rule. Example: Linda the

bank teller. Example: Linda the bank teller.
- Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with the 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 majority of those asked chose option 2. However the *probability of two events occurring together (in "conjunction") is always less than or equal to the probability of either one occurring alone* – **Conjunction Fallacy.**
  - For example, Pr(Linda is a bank teller) = 0.8 and Pr(Linda is a feminist) = 0.3, then Pr(both) = 0.8*0.3 = 0.24, always less than each
- Explanation -We deal more with **frequency** in our everyday life than *fraction or percentage.*
- **Gambler's fallacy**: Ignoring independent outcomes. Example: gambling.
  - In gambling after 9 wins, gamblers think that they can expect the same outcome the next time and win.
    - Caused by the belief that the probability of an event is influenced by how often it has occurred in the past.
    - Reality –Each win happens with the same probability and is independent of the previous result.
  - **Explanation** –That is what humans learned from natural evolution that the past often is the best predictor of the future – **Gambler's Fallacy**.
    - In artificially engineered devices such as gambling every outcome is independent of others.

- **Evolution and Sex Differences**
  - Attributed to a sexual division of labor in which men hunted and women gathered.
  - Hunting may have fostered increased spatial ability in men.
  - Gathering may have promoted increased verbal abilities in women.
  - But above distinction is too broad. Women are better at locating objects from memory.

- **Evolutionary Approaches in AI**
  - The study of manmade systems that behave in ways similar to natural living systems (Langton, 1989).
    - Computer 'creatures' are created through evolutionary rules. They navigate, seek out prey, and avoid predators in a virtual environment.
    - Complex adaptive behaviors emerge from such systems.
  - Genetic Algorithm, a procedure in machine learning, applies the concepts of fitness for survival and reproduction to generate a variation of possible solutions.