**Minds essentially create realities**

**Sea slug**
- Very simple set of perceptual inputs and motor outputs
- Very simple reality

**Dolphin**
- Capable of much vaster set of perceptual inputs and motor outputs
- Sends sound out of Melon (in forehead), lower jaw receives sound and brings to inner ear
- Perceives world in acoustic imagery
- Tactile effect of echolocation
  - If hit feels like a punch, use on each other, may use on fish
  - Also used to tickle one another
- Vision is “good enough”
- Motor output
  - Varied repertoire
  - Can collaborate with others to attack school of fish, whack a sea lion out of water, etc.
- Complex social relationships
  - Form alliance
  - Sanctioning of others
  - Extensive juvenile period (12 years)
    - **duration of immaturity correlates best with complexity of animal**
      - learning from others, creativity, playfulness => key features of high intelligence
**how do you compare intelligence?**
- Level of complexity of the reality it can create
- Degree of flexibility of activity

**Primates**
- Forward-facing eyes
  - Improved depth perception: predator species
  - Expansion of areas used for visual processes
    - Sensitivity to color (fruit is ripe), Tri-chromatic vision perception
      - Dogs see the world in black and white
      - Gulls can see ultraviolet which we cannot see
      - **Imagination limited by range of perceptual input**
    - Ability to recognize facial expressions
- Use of the hands
• Opposable thumbs, fingers with fingernails
• Develops into hand-eye coordination
• Access otherwise inaccessible resources
  • Ape using stick to extract termites
  • Reinforcing to engage in manipulation for its own sake
• Complex processes of hand-eye-mouth coordination

• Sociality of primates
  o Primates need other primates
  o Cells respond to different facial orientations
  o Sensitivity to eye contact
    ▪ Cannot proceed without eye contact
  o Sensitivity to eye gazing
  o Deceptive behavior of rhesus monkey raises question of the theory of mind
  o Begging for forgiveness (feigning indifference)

Interesting diff human and non-human primates: humans are compulsive teachers, otherwise burden of learning falls on the observer

Generality of Cognition
• Classical conditioning:
  o Co-occurrence of events, event correlation
  o Basic characteristic of all learning
  o Natural systems – recognize correlation of one event to another
  o **Win-stay, Lose-shift is generally how most animals operate
    ▪ exceptions: hummingbird does not usually “win-stay” because they suck all of the nectar out of a flower
    ▪ rats will not learn to avoid novel food if sick immediately, but will avoid if sick in an hour due to slow metabolism
      ▪ learning system specific to this particular animal
• Inferences about what occurs in animals minds
  o Form cognitive maps
    ▪ Not just behavioral sequence but mapped world (for rats)
      ▪ Rats with cognitive map of maze took shortcut as soon as it was made available
      ▪ Must retain map of whole maze
  o Techniques from cognitive psychology
    ▪ Uses early techniques
    ▪ Prospective encoding
• Numerical Competence
  o Chimps can learn numbers based on inference
  o Give-away task – chimps cannot inhibit reaching for largest pile of M&Ms but can point to smaller number
    ▪ Importance of symbols as interface to our reality
Edwin Hutchins – Reasoning in the South Pacific: The Way We All Argue

1. Do people in other cultures think the same way we do?
   o Posed by Greeks
   o Cogsci question
   o Political Implications

2. Comparative Study Across Cultures
   o Study conducted by Prof. Hutchins
     ▪ 18 mo (1975-1976)
     ▪ Papua New Guinea
     ▪ 800 mutually unintelligible languages
     ▪ Trobriand Islands
       • in middle of Soloman Sea
       • Population ~ 8000
       • primary agriculturists and fisherman
         o slash-and-burn
           ▪ rights w/in large plot for individuals
         o yams – super important crop (mystical level)
     ▪ shelter
       • virtually no privacy, no one is anonymous, no object is anonymous, & everyone is someone you’ve known since childhood!
     ▪ Child bearing and childcare
       • Learn to be adults by participating in activities
       • Mother and infant kept indoors in smoky room
     ▪ Grieving
       • Social roles in grieving loudest
     ▪ Economy
       • Not a cash economy
       • Always giving stuff without expecting immediate
       • Exchange ritual – elaborate ritual to settle debts after death

How would we find out if they think the same as we do?
   • Examine folk beliefs about technically primitive people
     o Technology is a reflection of the mind
     o Primitive technology = primitive mind?
   • Formal Measures of Intellectual Ability: Cross-cultural psychology
     o Taking IQ tests into the field
     o Language free tests
     o Culture free tests
     o Some measurement instruments
       ▪ Raven Progressive Matrices
       ▪ Inducing a rule in a card game
       ▪ Constructing narratives about simple images
• A matrix of drawings of familiar objects
  • Choose N items and tell a story of them
    o What makes one narrative better than other?
      ▪ In the West, we tend to score abstract thinking higher

• Rorschach
  • Non-literate agriculturist and fisherman score about the level of 5th and 6th graders
  • **Yet children of same individuals performed at grade levels
  • Cultural thing? Logic taught in school?

• Examine Culturally Meaningful behavior
  o Typology of logical inferences
    ▪ Traditional tests show uneducated peoples to not do modus tollens reasoning
    ▪ denial of antecedent
      o P⇒Q
      Not P
      Therefore, not Q?
      o Modus tollens
      P⇒Q
      Not Q
      Therefore, not P?

• Alexander Luria in Central Soviet Republic (1930’s)
  • Uncollectivised peasants vs. collectivised
    o Uncollectivised unable to let go of current circumstance
    o By stating possible premise from which uncollectivised individual reasons, actually reason correctly!

Decontextualization
  ***to consider something without respect to its context
  o Typically in studying cognition of other societies, researchers created a bunch of tasks and put the burden on the subject to figure out task
  o Why not find a task in the society and put the burden on the researcher to understand the task and interpret cognitive characteristics of the task
    o Land litigation
      ▪ Arguments about rights to garden plots
      ▪ Cognitive task
        ▪ Each person must construct logical account of transfer rights
      ▪ Important due to value of possession
      ▪ Found modus tollens reasoning examples in argument!
• Found that non-literate, 3\textsuperscript{rd} world people use same
inference types as we do

○ Conclusion
  ○ Studies like this don’t happen a lot (expensive) Must learn:
    ▪ learn language
    ▪ Principles of social organization
    ▪ Gardening practices
    ▪ Individual people (social relationships and personal bios)

○ Technology and Mind
  ▪ Stone-aged people living space-aged lives
    • How do we accomplish high-level cognition?
      ○ Cultural practices

Optional info after questions:

Reading regarding how “geographical and environmental factors shaped the modern world”

*Germs, Guns, and Steel*
- Diamond

“No two cultures are more than one generation apart”

Cultural practices – things we do that have organization that depend on what others are doing

Culture – how we construct the lives that we live.