

Cognitive Psychology (PSYC 363)
Arlo Clark-Foos

Test 3 - Study Guide

Module XII: Problem Solving

- Definition of a problem
 - Unfulfilled goal
- Newell & Simon (1972): Four Features of a Problem
 - Goal
 - Objects
 - Operations/Actions
 - Constraints
 - Well-Defined vs. Ill Defined problems
 - Initial State, Goal State, Operators
- Problem of representation
 - Duncker's Buddhist Monky Problem
 - Carroll, Thomas, Malhorta (1880): Spatial vs. Temporal Organizing
 - Mutiated Checkerboard
 - Adams' example of paper folding (71 million miles!!)
- Algorithms
- Four Types of Heuristics
 - Inference
 - Train/Bird Problem
 - Means-End Analysis/Difference Reduction (working forward)
 - Hobbits and Orcs (or... Missionaries and Cannibals)
 - Working Backwards (math problems, proofs)
 - Only works if operators and goal-state are well-defined
 - Analogy (Gick & Holyoak, 1983)
 - Army, Radiation, Fire
- Functional Fixedness
 - Duncker's Matchbox & Candle example
 - Maier's String Problem
- Set Effects
 - Luchin (1942 water jug problem)
 - Anagrams & Series completion
 - Drinking Glass Problem
 - Nine Dot Problem
- Cultural/Taboo effects: ping pong ball
- Incubation
 - Cheap Necklace Problem
 - Explanations
 - Fatigue
 - Memory

- Unconscious Processing
- Insight
 - Metcalfe & Wiebe (1987): warmth ratings
 - Corn Maze
 - Riddles
- Ways to improve problem solving

Module XIV: Reasoning

- Normative vs. Descriptive theories
- Deduction vs. Induction
- Logic
- Conditional Statements
- Validity (deductive) vs. Truth (inductive)
- Valid Rules of Inference
 - Modus Ponens
 - Modus Tollens
- Confirmation Bias
- Wason Selection Task
 - Twist on Wason (Evans & Lynch)
 - Matching Bias
 - Concrete examples (context) for Wason Selection
 - Johnson-Laird, Legrenzi, & Legrenzi (1972): Postage Rule
 - Griggs & Cox (1982): Postal Rule with dif. age groups
 - Memory-Retrieval Explanation
 - Pragmatic Reasoning Schemata (Cheng & Holyoak, 1985)
 - Permission Schema
 - Obligation Schema
 - Social Contract Theory (Cosmides)
- Descriptive Reasoning
 - Role of contradictory evidence
 - Sweeney & Gruber (1984): Nixon/Watergate study
 - Lord, Lepper, & Ross (1979): Capital punishment study
 - Vallone, Ross, & Lepper (1980): Hostile media effect
 - Palestinians vs. Israelis
 - Carter vs. Reagan debate

Module XV: Judgment & Decision Making

- Judgments of Similarity
- Common vs. Distinctive Features
 - Alligators, Crocodiles, & Elephants
- Tversky's Contrast Model
 - Weighting of features
 - Less known objects judged more similar because less distinctive features are known.
- Estimates of Probability
- Representativeness Heuristic
 - Coin toss & Die roll examples
 - Hollywood actress...democrat or divorced 5 times.

- Gambler's Fallacy
- Base-Rate Neglect
- Conjunction Fallacy
 - Linda is a bank teller. (Kahneman & Tversky, 1983)
- Availability Heuristic
 - [-N] vs. [-ING] words example
 - Married couples & household chores (Ross & Sicoly, 1970)
 - Frequency of reported deaths (Slovic, Fischhoff, & Lichtenstein, 1979)
- Decision Making
 - Relation to Classical Economics
 - Description Invariance
 - Framing Effects
 - Ratio-Difference Principle
 - Employment vs. Unemployment (Quattrone & Tversky, 1988)
 - Pseudo-Certainty Effect
 - Vaccine example (Slovic, Fischhoff, & Lichtenstein, 1982)
 - Probabilistic Insurance
 - Odd vs. Even days
 - Risk Aversion
 - People are risk averse in the domain of gain
 - Lives saved vs. lost (Kahneman & Tversky, 1984)
 - Loss Aversion
 - People are risk seeking in the domain of loss
 - Endowment Effect (Kahneman, Knetsch, & Thaler, 1990)

Module XVI: Cognitive Neuroscience

- Complexity ("most mysterious thing in the world," William James)
- Plasticity
- Neurons
 - Structure of the Neuron
 - Soma (Cell Body)
 - Dendrites
 - Axon
 - Myelin
 - Terminal Buttons
 - Neurotransmitters
 - Action Potentials (All or None)
 - Synapse
- Transduction
 - Visual transduction
 - Role of the corpus callosum
 - Gazzaniga's Split-Brain Studies
- Specificity coding vs. distributed processing
- Localization of function
- Hemispheric Specificity
 - Rule of thumb: Left is Language
- Location and Function of Lobes
 - Occipital: Vision

- Temporal: Hearing & “What” system
- Parietal: “Where” system & Sensory integration
- Frontal: Attention & Cognitive control
- Additional important structures of the cerebral cortex
 - Hippocampus
 - Amygdala
 - Primary motor cortex
 - Primary somatosensory cortex
 - Broca’s area
 - Broca’s aphasia: production problem
 - Wernicke’s area
 - Wernicke’s aphasia: comprehension problem
- Measuring brain activity
 - Lesion studies
 - Single-Unit Recordings (microelectrodes & in-situ)
 - EEG: great time lock, poor spatial resolution
 - MEG: great time lock, slightly better spatial resolution
 - PET: poor temporal resolution, good spatial resolution
 - fMRI: decent time lock, excellent spatial resolution