Final Exam

- Where: GR 4.428 (regular classroom)
- When: Thursday August 2 - 8:00-10:50 PM
- No blue books required
- Format similar to midterm
- Final exam study guide can be downloaded from the course web page:
  http://www.utdallas.edu/~assmann/PSY3360/

Final Exam Review Benefit
Optional extra credit assignment

- Counts toward your participation grade.
- Due August 2 (same day as the final exam).
- Download instructions and the final exam study guide from the course web page:
  http://www.utdallas.edu/~assmann/PSY3360

Studies of animal behavior

- Natural history and field studies
- Laboratory experiments
- Ethology versus behaviorism

Ethology: The naturalistic study of behavior


Neobehaviorism

- Intervening variables
  - Clark Hull (1943)
  - Edward Tolman (1951)
Comparative psychology

- Marion and Keller Breland (1959)
  *The misbehavior of organisms*

Methodological Behaviorism

*methodological behaviorism*: cognitive concepts may be necessary to explain aspects of behavior, but such intervening variables must be operationally defined.

Development and intelligence

- Francis Galton
  - sensory acuity, head size, reaction time
  - nature vs. nurture
  - biological determinism

Alfred Binet (1857-1911)

- Binet criticized Galton’s view of inherited intelligence; emphasized individual differences in intelligence, attention, motivation, and background
- Binet-Simon tests of intelligence
- mental age vs chronological age

Development and intelligence

- Charles Spearman’s two-factor theory of intelligence (“g” and “s”)
- William Stern: intelligence quotient (IQ)
- Howard Gardner: Multiple intelligences

Jean Piaget (1896-1980)

- Genetic epistemology
- Active construction of knowledge
- Interaction with environment involves psychological adaptations to environmental contingencies
Jean Piaget (1896-1980)

- Stage theory of cognitive development
- Intellectual development is not gradual but abrupt, progressing through a series of developmental stages.

Stage theory of development

- Sensory-motor stage
  - 0-2 years
  - Egocentric
  - Basic sensory and motor activities
  - Pre-linguistic
  - Criterion for moving to the next stage: object permanence (basis for naming and linguistic reference)

Stage theory of development

- Preoperational stage
  - 2-7 years
  - Classification by similarity
  - Not yet able to master mental operations (e.g. arithmetic)
  - Emerging use of symbols
  - Criterion for moving to the next stage: Conservation of quantity

Stage theory of development

- Concrete operations stage
  - 7-11 years
  - Able to master conservation and some abstract concepts but only if applied to concrete problems
  - Reversibility
  - Transitivity
  - Less egocentric
  - Criterion for moving to the next stage: mastery of abstract problems

Stage theory of development

- Formal operations stage
  - 12 years - adulthood
  - Able to master abstract and symbolic reasoning
  - Metacognition
  - Hypothetico-deductive reasoning

How does change occur?

- Schema/schemata - cognitive structure or framework
- Assimilation: process by which new experiences are incorporated by existing modes of thinking
### How does change occur?

- **Accommodation**: process by which existing modes of thinking (cognitive structures) are changed to incorporate new experiences.

### Jean Piaget (1896-1980)

- *The child's conception of number* (1941)
- *The child's conception of space* (1948)
- *The child's conception of time* (1947)
- *The construction of reality in the child* (1957)

### How does change occur?

- **Equilibration**: process of reconciling cognitive structures with experience
  - force responsible for intellectual growth
  - the “driving force” behind Piaget's theory of intellectual development.

### Jean Piaget (1896-1980)

- Stage theory of development
  - Invariant sequence
  - All-or-none
  - Hierarchical progression

### Jean Piaget (1896-1980)

- Problems for the theory
  - Intermediate stages?
  - Children may show less mature modes of reasoning on some tasks
  - Underestimation of young children's reasoning abilities
  - Concepts of assimilation and accommodation are vague.
Jean Piaget (1896-1980)

- Testing the theory
  - Cross-cultural studies
  - Generalization
  - Kohlberg – stages of moral development

Linguistics: the study of language

- Phonetics – articulation & perception of speech sounds
- Phonology – patterning of sounds (phonemes) in a language
- Morphology – principles of word (morpheme) formation
- Syntax – arrangement of morphemes in sentences
- Semantics – study of meaning
- Pragmatics – language use in social context

Phonetics

- Production and perception of speech sounds
- Structure / function of larynx and vocal tract
- Universal properties found across languages
- Acoustic and articulatory properties

Phonology

- Study of sound systems within a language
- How sounds are used to differentiate words
  - Example: the vowel in “bet” versus “bit”
- Unit = phoneme
  - smallest meaning-differentiating units
  - Similar to letters, but some English phonemes are spelled with more than one letter (/f/ in phone)
  - some phonemes have multiple spellings (e.g., the vowel in “cup” and “enough”)

Morphology

- How sounds (phonemes) are combined to form words; how words are constructed
- Unit = morpheme
  - smallest meaning-carrying units
  - Similar to words, but some words contain multiple morphemes (cats => 2 morphemes; cat + plural marker; “walk” => “walked” (past tense formation rule))

Syntax

- the study of how words (morphemes) combine to form grammatical sentences
- Traditional “grammar” (parts of speech: nouns, verbs, adjectives etc. and rules of sentence structure)
- Active versus passive voice in English
  - “The boy hit the ball”
  - “The ball was hit by the boy”
Semantics

- the study of word meaning (lexical semantics), and how words combine to form the meanings of sentences
- Kinship systems: words used to describe relatives (second cousin, brother-in-law)

Pragmatics

- Use of speech and language in social context
- Choice of vocabulary and speaking style depends on the audience and circumstances

Theories of language behavior

- Pavlov – language as conditioned responses
  - first and second symbol systems
- Lashley – complex planned behavior
  - rejection of telephone switchboard metaphor
  - central planning agency for mapping and controlling long sequences of behavior
  - The problem of serial order in behavior

B.F. Skinner

- Operant behavior:
  - operant response (naturally occurring behavior)
  - reinforcement (alters probability of response)
  - setting (situation in which behavior is emitted)
- Experimental analysis of behavior: systematic description of contingencies of reinforcement

B.F. Skinner

- Verbal Behavior (1957)
  - speech and language are forms of verbal behavior whose reinforcement is mediated by other people.
  - operant responses
  - contingencies of reinforcement
  - tact: a verbal operant response under the stimulus control of the environment

Noam Chomsky (1928-)

- Transformational generative grammar
- Language as system of rules
- Cartesian linguistics
- Nativism: language as a biological, species-specific trait
Abstractness of syntax

Phrase-structure grammar

S: sentence
NP: noun phrase
VP: verb phrase
N: noun
V: verb

Noam Chomsky

• Universal grammar: innate structure governed by transformational rules
• Language acquisition device
• Surface and deep structure

Chomsky’s attack on Skinner

• Skinner: language is nothing more than a form of verbal behavior whose reinforcement is provided by other people.
• Language development is a form of operant learning in which randomly occurring verbal behavior is selectively reinforced.
• Chomsky: impossible to explain language acquisition as operant learning; the reinforcement is non-existent or poorly specified
• Speech input to the child is impoverished (underspecified)
• Children produce novel and complex sentences they have not previously heard

Chomsky on language

• Noam Chomsky (1965) – all children are born with an innate capacity for language
• Language acquisition device (LAD)

Primary data (adult speech) General language learning principles Grammatical knowledge (rules) Child’s speech

Language acquisition

• Eric Lenneberg (1921-1975)
  – Critical period for language acquisition?
  – Hemispheric specialization
  – Recovery from aphasia
  – “Motherese” (infant-directed speech)
  – Stages of language development
Hemispheric specialization for language

Behaviorist themes

- Most behavior is learned, with minimal role of genetics
- All species, including humans, learn by the same principles
- The same principles apply to childhood and adult learning
- Mental events and processes do not explain or cause behavior
- Language is just another form of learned behavior

- Challenged by ethologists
- Task-specific forms of learning
- Challenged by Piaget
- Challenged by cognitive theorists
- Challenged by linguists (Chomsky)

The demise of radical behaviorism

- Chomsky’s attack on Skinner
- Intervening variables
- Rise of cognitive psychology
- Social and developmental psychology
- Psycholinguistics
- Information processing models
- Connectionism
- Cognitive science
- Behavioral neuroscience

Turing test

- Alan Turing (1950)
- Q: Can machines think?
- A: Only if they pass the Turing test.