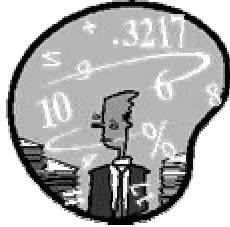


# Reasoning



- Stages of sleep
  - Awake
    - irregular EEG waves
  - Non-REM Sleep
    - progress down then up through stages
    - sleep thoughts
    - Stage 1
      - irregular EEG waves
    - Stage 2
      - sleep spindles and K-complexes in EEG
    - Stages 3&4 = "slow wave sleep"
      - deep sleep
      - low frequency waves in EEG indicate synchronous neural firing
  - REM (Rapid Eye Movement) Sleep
    - irregular EEG waves
    - sleep paralysis
    - dreams
  - Sleep pattern through the night
    - cycles every ~90 minutes
    - as night progresses, more time in REM and longer REM periods

## Three Minute Review

### EMOTION

- Brain Areas Involved in Emotion
  - two routes
    - fast: senses → amygdala → frontal lobes
    - slow: senses → cerebral cortex → frontal lobes
  - amygdala
  - frontal lobes
    - Phineas Gage
    - frontal lobotomies
    - orbitofrontal cortex in particular is important in emotion
    - may be differences between two hemispheres
      - left hemisphere - positive emotions
      - right hemisphere - negative emotions

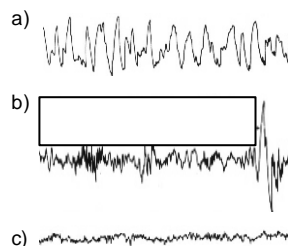
- Why sleep?
  - Restoration theory
  - Preservation theory
    - predators sleep, prey don't
    - why be awake if you can't hunt?
- What causes the drive to sleep/wake?
  - Is there a sleep chemical?
  - Reticular Activating System -- waking
  - Pons -- dreaming
- What do dreams mean?
  - Sigmund Freud Psychoanalytic Dream Analysis
    - manifest vs. latent content
  - Allan Hobson's Activation Synthesis Hypothesis
    - pons → random activation in brain → brain synthesizes a story to try to make sense of it
- Why dream?
  - role in learning, memory and development?

### SLEEP

- Circadian rhythms
  - daylight entrains rhythms in sleep and temperature
  - free-running body rhythms are typically ~25 hours
  - staying up later is easier than going to be earlier
  - superchiasmatic nucleus and pineal gland get input about light levels from retina
- Do you really need sleep?
  - can live without it but why would you want to?
  - microsleeps
- EEG waves
  - stadium analogy: irregular vs. synchronous patterns

## Test Yourself

- What stages of sleep do the following EEG traces suggest?



## You asked...

... about sleepwalking

- it is not acting out a dream
  - sleep paralysis during REM
  - occurs during slow-wave sleep
  - sleepwalkers are disoriented when awakened
- occurs most often before puberty, but kids almost always outgrow it
- happens to about 10-20% of people once in their lives
- runs in families
- not well-understood
- there are several cases of people who have murdered in their sleep and pleaded insanity

## Inductive reasoning

- Reasoning from the specific to the general
- Sherlock Holmes is perhaps a better example of **INDUCTIVE** reasoning than deductive reasoning
- He takes specific clues and comes up with a general theory



## Logical Reasoning

- Deductive reasoning
- Inductive reasoning
- How good is our reasoning? What types of errors are people prone to?

## Slides to follow

- I will present slides to illustrate various types of reasoning and problem solving
- I am not making these slides available in advance or it will spoil the demos
- The slides will be posted after today's lecture

## Deductive Reasoning

- Reasoning from the general to the specific
- Syllogisms
  - Present two general premises that must be combined to see if a particular conclusion is true
  - For example:
    - All men are mortal
    - Socrates is a man
    - Is Socrates mortal?
- Series problems
  - review series of statements
  - arrive at a conclusion not contained in any single statement
  - For example:
    - Robin is funnier than Billy
    - Billy is funnier than Sinbad
    - Whoopi is funnier than Robin
    - Q: Is Whoopi funnier than Sinbad?



## Insight



Archimedes  
287-212 B.C.



Wolfgang Kohler  
1887-1967



**Aha!**

Not just humans & chimps, crows too!

# Intelligence

## Man eats underwear to beat breathalyzer

By PAVEN BICKARD  
of The Advocate  
SCUTTLE — An 18-year-old Scutter man tried to eat the underwear in the hope that the cotton fabric would absorb alcohol before he took a breathalyzer test, provincial court judge said.

David Zorfluh was subsequently acquitted of a charge of impaired driving because he blew 0% on the legal limit.

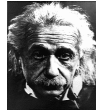
But the testimony broke up people in Judge Lloyd MacIsaac's provincial court here Thursday afternoon.

Mr. Zorfluh was ordered by RCMP Const. Bill Robinson after he ran from his vehicle, which had been seen weaving down the highway.

While sitting in the back of the patrol car, Mr. Zorfluh tried to eat his shorts, Const. Robinson told the court.

Mr. Zorfluh said he ripped the crotch out of his shorts, stuffed the fabric in his mouth and then spit it out.

A class of law students from William E. Hoy Community High, in court an observer,



## WAIS -style Verbal Subtest Questions

- Vocabulary
  - What does *emulate* mean?
- Similarities
  - In what ways are airplanes and submarines alike?
- Information:
  - Who wrote *The Great Gatsby*?
- Comprehension
  - What does it mean when people say "Birds of a feather flock together"?
- Digit Span
  - Repeat the following numbers: 3 2 7 5 9
- Arithmetic
  - If you paid \$8.50 for a movie ticket and \$2.75 for a bucket of popcorn, how much change would you have left from a \$20 bill?

## Why Would We Want to Measure Intelligence?



**KAPLAN Test Prep**  
Visit the one stop resource for test prep, admissions, and testing information and career information.

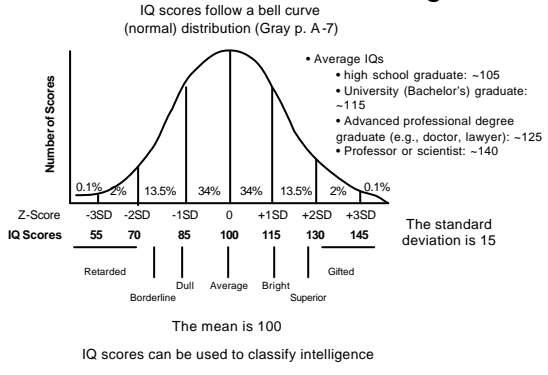
- SAT
- ACT
- GRE
- GMAT
- LSAT
- MCAT
- TOEFL
- IELTS
- GRE Subject Tests
- GRE General Test
- GRE Math Subject Test
- GRE Verbal Subject Test
- GRE Writing Subject Test

- Education
- Defining extremes
- Job testing (e.g., military recruits)
- University admissions (mean = 500, SD = 100)
  - SAT (Scholastic Assessment Test)
  - MCAT (Medical College Admission Test)
  - LSAT (Law School Admission Test)
  - GMAT (Graduate Management Admission Test)
  - GRE (Graduate Record Exam, for graduate school)

## WAIS -style Performance Subtest Questions

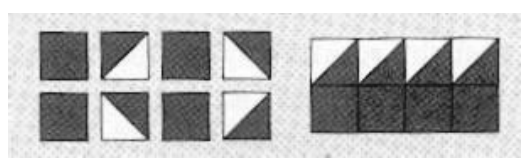
- Block Design
- Picture Completion
- Picture Arrangement
- Object Assembly
- Matrix Reasoning
- Digit Symbol
- Symbol Search

## How Can We Measure Intelligence?



## Block Design

- Assemble the blocks on the left to make the design on the right



### Picture Completion

- What is missing from the picture?



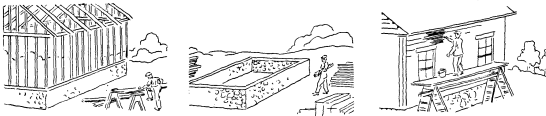
### Digit Symbol

- Look carefully at the key on the left. In the blanks on the right, write the correct numeral for the symbol below each symbol

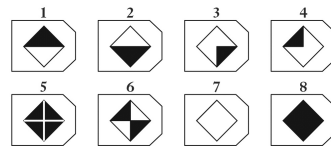
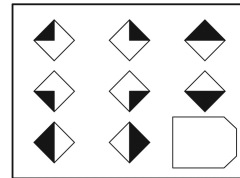
○	□	⊗	◇	⊖	□	◇	⊖	□	○	⊗	◇	⊖
1	2	3	4	5								

### Picture Arrangement

- Arrange these pictures in an order that tells a story, and then tell what is happening in the story



### Raven's Progressive Matrices



### Object Assembly

- Put these pieces together to make an object

