Psych 305A: Lecture 15

Biological Approach: Physiology

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Exam 3

- Monday, Feb. 23
- All multiple choice
- Will cover:
  - Self-Esteem (from 20/20 video on)
  - Traits & Trait taxonomies
  - Personality development and stability
  - Person-Situation Debate
  - Genetics & Physiological Approaches
  - Evolutionary Approach will NOT be on Exam 3 (even what we cover in class today)
- Chapters 3, 4, 5, 6, 7

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Eysenck's Theory of Personality

- Extraversion and introversion represent different levels of physiological arousal
- Extraverts: Below optimal level (under-aroused)
  - Seek out social interactions for stimulation
- Introverts: Above optimal level (over-aroused)
  - Avoid excessive stimulation (e.g., social interaction)
  - But, this does not mean that introverts are *shy*
    - What is the difference?

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Eysenck's Theory: Evidence

- Preference for quiet environment (e.g., library)
  - Introverts prefer and perform better in quiet environments
- Loud music
  - Extraverts set volume higher than introverts

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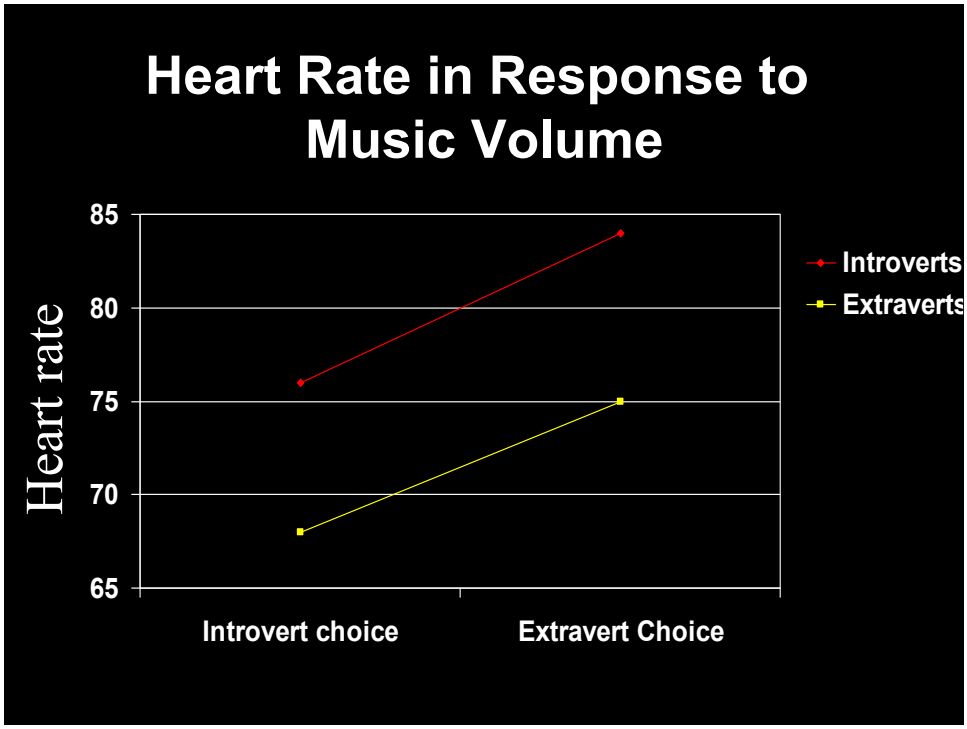

Eysenck's Theory: Evidence

- Bedtime
  - Introverts may be morning people and extraverts night people
- Recreational drug use
  - Extraverts tend to use stimulants (e.g., cocaine, caffeine)
  - Introverts tend to use sedatives (e.g., heroin, marijuana)

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INTRODUCTION

Alternate Theory: Jeffrey Gray

- Reinforcement Sensitivity
  - How sensitive are you to rewards and punishments?
- Two systems
  - Behavioral Activation System (BAS)
    - Sensitivity to reward
  - Behavioral Inhibition System (BIS)
    - Sensitivity to punishment

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BIS AND BAS THEORY

Behavioral Activation System (BAS) ENGINE or 'ON' SWITCH SYSTEM

- Individual differences in *sensitivity to reward*
- BAS activation => release of *dopamine*
- People with very strong BAS: highly impulsive, low gratification-delay, extreme novelty-seekers
- Linked to Positive Emotionality

Behavioral Inhibition System (BIS) BREAKS or 'OFF' SWITCH SYSTEM

- Individual differences in *sensitivity to novelty and punishment*
- BIS activation => lower levels of *serotonin*
- People with very strong BIS: very fearful, insecure, hyper-cautious
- Linked to Negative Emotionality

Measures of BIS and BAS

- Rate yourself on the following scale:

  1------2-------3------4-------5

  Not true of me Very true of me

- BIS (inhibition/avoidance)
  - ___Criticism or scolding hurts me quite a bit.
  - ___I worry about making mistakes.
  - ___If I think something unpleasant is going to happen I usually get pretty "worked up" about it.

- BAS (activation/approach)
  - ___When I get something I want, I feel excited and energized
  - ___When I want something, I usually go all-out to get it.
  - ___I often act on the spur of the moment.

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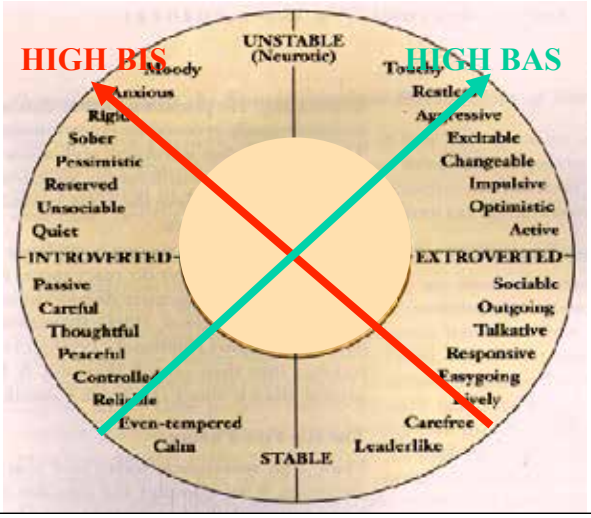
How can we integrate GRAY & EYSENCK?

Gray's dimensions are a rotation of Eysenck's dimensions (i.e., both sets of dimensions refer to the same phenomenon, they just cut the pie differently)

high BAS = Impulsivity = E+ N+

high BIS = Inhibition = E- N+



Neurotransmitters, Hormones (Brain Chemistry) and Personality

- Dopamine
- Serotonin
- Testosterone

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Dopamine and Mice

- Mice will keep pushing a lever (for hours and hours) that releases dopamine
- Genetically engineered mice
  - High dopamine mice very active, explored their cage
  - Low dopamine mice (dopamine circuits don't work) lethargic, don't eat or drink much

DOPAMINE

- Linked to Behavioral Activation System (BAS)
  - Increased levels in humans after sex, cocaine, a good meal
- Genetic Basis for Sensation Seeking
  - Long version of dopamine receptor gene (D4DR) = increased brain response to dopamine
    - High sensation seekers
  - Short version of D4DR = decreased brain response to dopamine
    - Low sensation seeking
  - Sensation Seeking is highly heritable (genetic influence = 50%)

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INTRODUCTION

SEROTONIN

- (Negatively) Related to Behavioral Inhibition System (BIS)
- Low Serotonin related to depression and anxiety
- Ecstasy (the recreational drug) increases serotonin
  - Removes inhibition
- Prozac (the medical drug) also increases serotonin
  - reduces depression and anxiety

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TESTOSTERONE

- Linked to aggression (Eysenk's Psychoticism)
  - Men are higher in Testosterone; also more aggressive in all cultures
- Higher testosterone at birth → increased aggression in boys (but not girls)
- Men convicted of violent crimes have higher testosterone levels than men convicted of non-violent crimes
  - Testosterone linked to crime for low but not high income men

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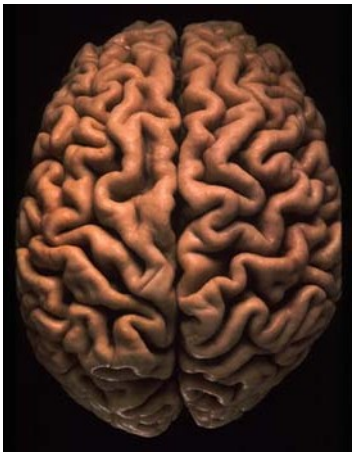
Neuro-anatomical Approach to Personality

There are regions in the brain associated with particular aspects of personality, emotion, and behavior



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Patterns of brain activity associated with personality

- **Right Prefrontal Cortex:**
  - Withdrawal (BIS)
- **Left Prefrontal Cortex:**
  - Approach (BAS)
- **Orbitofrontal Cortex:**
  - Anticipation of reward & punishment (BIS and BAS)
- **Medial Prefrontal Cortex**:
  - Self-referential judgments ("the self")
- **Amygdala**
  - Fear, emotion recognition

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How can we connect brain, physiology, and genes?

- Genes → different neuro-anatomy
  - Or, different levels of activity in different brain regions
- Brain activity in different regions → neurotransmitters & hormones
- Neurochemicals→ personality (e.g., BIS/ BAS, Extraversion/Introversion)

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Application of the Biological Approach: Sensation-Seeking

- High sensation seekers tend to scuba dive, sky dive, ride motorcycles, and have lots of sex partners
- "I sometimes like to do things that are a little frightening"
- "I like to have new and exciting experiences and sensations even if they are frightening, unconventional, or illegal"
- "Almost everything enjoyable is illegal or immoral."
- "I get bored seeing the same old faces."

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Sensation Seeking

- Neuroscience/ Physiological approach:
- High sensation seekers have different brains than low sensation seekers
  - Different anatomically
  - Different neural activation patterns
  - Different levels of neurotransmitters
    - high levels of dopamine

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Sensation Seeking

- Genetic approach:
- The degree to which you are a high vs. low sensation seeker is partially due to your genetic make-up
  - Sensation seeking is highly heritable
  - Linked to specific genes (e.g., long version of D4DR)

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Next Class

- Next week: Reading week! No class
- Monday, Feb. 23: Exam 3
- Wed., Feb. 25: Finish Biological Approach
- Fri., Feb. 27: Film- Body Doubles

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