Biological Level of Analysis
Learning Outcomes Packet

B1- Outline principles that define the biological level of analysis.
B2- Explain how principles that define the biological level of analysis may be demonstrated in research.

Principle #1:

Studies that Demonstrate Principle #1:

Principle #2:

Studies that Demonstrate Principle #2:

Principle #3:

Studies that Demonstrate Principle #3:

B3- Discuss how and why particular research methods are used at the biological level of analysis.

Research Method #1: **Case Studies**

Studies that Demonstrate Research Method #1:

Explanation for use of Research Method #1:

Research Method #2: **Experiment**

Studies that Demonstrate Research Method #2:

Explanation for use of Research Method #2:

Research Method #3: **Correlational Studies**

Studies that Demonstrate Research Method #3:

Explanation for use of Research Method #3:

B4 - Discuss ethical considerations related to research studies at the biological level of analysis.

Study #1:

Ethical Considerations of Study #1:

Study #2:

Ethical Considerations of Study #2:

Study #3:

Ethical Considerations of Study #3:

B5- Explain one study related to localization of function in the brain.

Study #1: Phineas Gage Case Study (Dimasio et al (1994))

Notes about Phineas Gage:

Aim: To determine what areas of Phineas Gage's brain was damaged in the accident.
Method: Used MRI technology to create a model of the accident and determine what areas were damaged.
Findings: The frontal lobe, and only the frontal lobe was damaged in the accident.
Conclusions:

Critical Thinking:

Study #2: HM (Corkin et al (1997))

Notes About HM's Story

Aim: To determine the exact extent of damage to HM's brain.
Method: Conducted an MRI on HM.
Findings: Discovered that all of HM's Hippocampus and Amygdala were removed.
Conclusions:

Critical Thinking:

Additional Studies

B6- Using one or more examples, explain the effects of neurotransmission on human behavior.

Neuron:

Synapse:

Neurotransmitter:

Reuptake:

How Depression is linked to Neurotransmitters:

Neurotransmitter #1: Acetylchloline (Ach)

Function:

Study: Martinez and Kesner (1991)

Aim: To investigate the role of ACh in the formation of memories.

Method: Trained three groups of rats to run a maze.

- Group 1: Injected chemicals to block Ach receptor sites = **Less ACh**
- Group 2: Injected with a chemical to block Ach eating enzymes = More ACh
- Group 3: Control = Normal ACh

Findings:

Group 1 (Less ACh): Had problems learning to run the maze and made more errors.

Group 2 (More ACh): Ran quickly through the maze and made fewer mistakes. Quicker than the control.

Conclusions:

Critical Thinking:

Fisher et al (2003) Reading Guide Part I (B6 Continued)

Three Stages of Love: Describe what behaviors people in each stage demonstrate and what biological functions are happening that lead to these behaviors.

Lust

Behavior:

Romantic Love

Behavior:

Neurotransmitter	Increase or Decrease	Impact on Behavior
Dopamine		
Serotonin		

Attachment

Behavior:

Biological Function:

Brain Scanning Studies of Romantic Love

Fisher et al (2003) (fMRI of People in Love – Pages 5-6)

Aim:

Method:

Findings:

Conclusions:

Critical Thinking:

Marrazziti et al (1999) (ODC and Love - Page 7)

Aim:

Method:

Findings:

Conclusions:

Critical Thinking:

Fisher et al (2003) Reading Guide Part II

Love and Heartbreak: *For each section in the remainder of the article, record one important idea that you think is particularly important for teenagers to understand when dealing with love and heartbreak.*

Love

The Drive to Love:

Animal Attraction:

Romance Trigger Love:

Lust Brings Romance?

Lust, Romance, and Attachment:

Heartbreak

Protest: The first Stage of Rejection

Frustration Attraction:

Abandonment Rage:

Resignation/Despair: Stage Two of Rejection:

Addicted to Love:

B7- Using one or more examples, explain functions of two hormones in human behavior.

Hormone #1: Cortisol
Hormone Function:

Study #1:Newcomer et al (1999)
Aim: To determine the role of cortisol (stress) on memory.
Method: Double-Blind study that had asked three groups to take varying levels of cortisol over a four day period and tested their ability to remember verbal information.

1. High Level: Tablet of 160 mg Cortisol each day…simulates a major stressful event.
2. Low Level: Tablet of 40 mg of Cortisol each day…Simulated a minor stressful event.
3. Placebo: Tablet with no active ingredient.

Findings: The High Level group performed *worse* on the memory test than the Low Level group.
The Low Level group showed no memory decrease when compared with the placebo group.
Conclusions:

Critical Thinking:

Study #2: Bremner et al (2003)
Aim: To investigate whether prolonged stress (PTSD) reduces the volume of the hippocampus.
Method: Participants: War veterans and female adults who were sexually abused as children. (Some had PTSD, but not all)
Took MRI scans of brains and had participants take a memory test.
Findings: Veterans with the most memory problems had the smallest hippocampus.
The Hippocampus of PTSD suffers was smaller than a control group.

Conclusions:

Critical Thinking:

Hormone #2: Oxytocin

Hormone Function:

Study #1:
Aim:

Method:

Findings:

Conclusions:

Critical Thinking:

Study #2:
Aim:

Method:

Findings:

Conclusions:

Critical Thinking:

B8- Discuss two effects of the environment on physiological processes.

Environmental Impact: Stress

Physiological Process:
Study: Rosenzweig (1972)
Aim: To determine how the environment can impact the neurological development of rats.

Method: Randomly assigned lab rats to one of three conditions.

- **Control**: Typical Laboratory Cage (other rats, adequate room and food/water.)
- **Impoverished**: Small cage, isolated, adequate food/water.
- **Enriched**: Large space, Multiple Toys, Companions, adequate food/water.

After living 4-10 weeks, they were killed and autopsies were performed on their brains (randomly assigned numbers to eliminate researcher bias).

Findings: The enriched rats had…
1.
2.

Conclusion:

Critical Thinking:

Environmental Impact:

Physiological Process:

Aim:

Method:

Findings:

Conclusion:

Critical Thinking:

B9- Examine one interaction between cognition and physiological processes.

Cognitive Function:

Physiological Process:

Aim:

Method:

Findings:

Conclusion:

Critical Thinking:

Cognitive Function:

Physiological Process:

Aim:

Method:

Findings:

Conclusion:

Critical Thinking:

B10- Discuss the use of brain imaging technologies in investigating the relationship between biological factors and behavior.

MRI:
What it shows:

How it works:

Strengths:

Limitations:

Studies that Uses MRIs and Critical Thinking:
Study #1:

Study #2:

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fMRI:
What it shows:

How it works:

Strengths:

Limitations:

Studies that Uses fMRIs and Critical Thinking:
Study #1:

Study #2:

B11- With reference to relevant research studies, to what extent does genetic inheritance influence behavior?

Gene: 5-HTT

Function of Gene: Responsible for creating proteins that influence the reuptake of Serotonin

Study #1: Caspi et al. (2003)

Aim: To determine whether the 5-HTT gene predicts depression
Method: Followed a group of adolescents for several years and measured for stressful events. When they were 26, they tested them for depression.
Findings: Individuals who had a two short 5-HTT alleles were *more likely* to be depressed following stressful events.
Conclusions:

Critical Thinking:

Study #2: Levenson et al (2013)

Aim: To determine the role of the 5-HTT gene in marital satisfaction
Method: Followed couples since 1989 and surveyed them on marital satisfaction.
Findings: Individuals with a short 5-HTT allele were more likely to be unhappy in an unhealthy relationship or happy in a healthy relationship.

Conclusions about the extent which genetics influence behavior:

Critical Thinking:

B11- With reference to relevant research studies, to what extent does genetic inheritance influence behavior?

Gene:
Function of Gene:

Study #1:
Aim:

Method:

Findings:

Conclusions:

Critical Thinking:

Gene:
Function of Gene:

Study #2:
Aim:

Method:

Findings:

Conclusions:

Critical Thinking:

B12- Examine one evolutionary explanation of behavior.

General Notes about Evolutionary Theory:

Behavior: Romantic Love
Theory Name:

Evolutionary Explanation:

Strengths of Theory:

Limitations of Theory:

Behavior: Homosexuality
Theory Name:

Evolutionary Explanation:

Strengths of Theory:

Limitations of Theory:

B13- Discuss ethical considerations in research into genetic influences on behavior.

General Notes on Ethical Considerations:

Study:

Ethical Considerations:

Study:

Ethical Considerations: