**1**

**Biopsychology as a Neuroscience:**

**What Is Biopsychology, Anyway?**

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**Chapter****-at-a-Glance**

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**Learning O****bjectives**

After completion of this chapter, the student should be able to:

LO 1.1 Define and discuss what is meant by biopsychology.

LO 1.2 Discuss the origins of the field of biopsychology.

LO 1.3 List the six fields of neuroscience that are particularly relevant to biopsychological inquiry.

LO 1.4 Compare the advantages and disadvantages of humans and nonhumans as subjects in biopsychological research.

LO 1.5 Compare experiments, quasiexperimental studies, and case studies, emphasizing the study of causal effects.

LO 1.6 Compare pure and applied research.

LO 1.7 Describe the division of biopsychology known as physiological psychology.

LO 1.8 Describe the division of biopsychology known as psychopharmacology.

LO 1.9 Describe the division of biopsychology known as neuropsychology.

LO 1.10 Describe the division of biopsychology known as psychophysiology.

LO 1.11 Describe the division of biopsychology known as cognitive neuroscience.

LO 1.12 Describe the division of biopsychology known as comparative psychology.

LO 1.13 Explain how converging operations has contributed to the study of Korsakoff’s syndrome.

LO 1.14 Explain scientific inference with references to research on eye movement and the visual perception of motion.

LO 1.15 Discuss Delgado’s bull-ring demonstration, emphasizing its flawed interpretation.

LO 1.16 Describe the rise and fall of prefrontal lobotomy.

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**Brief Cha****pter Outline**

[**Lecture Launcher 1.1:** *First Impressions of Biopsychology*](#LL11)

* 1. [**The Four Major Themes of This Text**](#TO13)
     1. Thinking Creatively
     2. Clinical Implications
     3. The Evolutionary Perspective
     4. Neuroplasticity
  2. [**What Is Biopsychology?**](#TO14)

1. Defining Biopsychology
2. What Are the Origins of Biopsychology?
3. How Is Biopsychology Related to the Other Disciplines of Neuroscience?

[**Lecture Launcher 1.2:** *Biopsychology Research—More than White Rats and Lab Coats*](#LL12)

[**Lecture Launcher 1.3:** *Ethical Issues in Animal and Human Research*](#LL13)

* 1. [**What Types of Research Characterize the Biopsychological Approach?**](#TO16)

1. Human and Nonhuman Subjects
2. Experiments and Nonexperiments
3. Pure and Applied Research
   1. [**What Are the Divisions of Biopsychology?**](#TO17)
4. Physiological Psychology
5. Psychopharmacology
6. Neuropsychology
7. Psychophysiology
8. Cognitive Neuroscience

f. Comparative Psychology

[**Lecture Launcher 1.4:** *Neuropsychology’s Case Studies versus Physiological Psychology’s Experiments*](#LL14)

* 1. **[How Do Biopsychologists Conduct Their Work?](#TO20)**

a. Converging Operations: How Do Biopsychologists Work Together?

b. Scientific Inference: How Do Biopsychologists Study the Unobservable Workings of the Brain?

[**Lecture Launcher 1.5:** *Studying Brain and Behavior from All Sides*](#LL15)

[**Activity 1.1:** *Making Sense of Eye Movements*](#ACT11)

* 1. [**Critical Thinking About Biopsychological Claims**](#TO110)

1. Taming a Charging Bull with Caudate Stimulation
2. Prefrontal Lobotomy

[**Lecture Launcher 1.6:** *Chimpanzees and Mental Illness*](#LL16)

* 1. [**End-of-Chapter Discussion**](#TO111)

1. What Was Wrong with Delgado’s Claims?
2. What Was Wrong with Moniz’s Claims?

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# Teaching Outline

1. **A Persona****l Introduction**

Lend the course a personal perspective

* + 1. **Training and Teaching Experience**
  + How I first became interested in biopsychology (personal anecdotes)
  + Undergraduate training
  + Graduate training
  + Postgraduate experience
  + Other courses that I am currently teaching
  1. **Research Experience**
* Thesis research
* Past research
* Current research interests (encourage students to speak with me about my work)

The following information should also be included in the syllabus:

1. **Teaching Assistant (if possible, have the teaching assistant speak about himself/herself)**

Training, current research interests

1. **Availability of Instructor and Teaching Assistant**
   * Office hours and location
   * Phone numbers/E-mail addresses/Web pages
     1. **Course O****rganization**
        1. **Who Is the Course For?**

Describe any prerequisites for the course (e.g., Introductory Psychology, Introductory Biology)

1. **Text and Ancillary Materials** (bring these to class so the students can see them)
   * ***Biopsychology, Tenth Edition***, by John P.J. Pinel
   * Any other assigned reading materials
   * Note use of other pedagogical tools, such as a Blackboard site for the course
2. **Lecture Format**

* Relation of lectures to text
* Note if questions or comments are encouraged at any point in your lectures
* If lecture notes are provided, note how they can be accessed

1. **Examination Format**

* Examination dates
* General format of exams (multiple choice, short answer, essay, and/or figure identification)
* Nature of final exam (Is it comprehensive or for the last block of material?)
* What to do if you think your examination has been graded incorrectly
  1. **Major Assignments and Due Dates**

What are they? When are they due?

1. **Special Learning or Examination Requirements**

Provide information about your institution’s learning resource center

1. **Missed Examinations/Assignments Policy**
2. **Final Grades**

Tell students how the final grades will be computed

* 1. **The Fou****r Major Themes of This Text**

1. **Thinking Creatively**

* Novel approaches to research have led to progress in biopsychology

1. **Clinical Implications**

* Much has been learned through the investigation of brain damage and behavioral change

1. **The Evolutionary Perspective**

* Much has been learned by comparing and contrasting different species

1. **Neuroplasticity**

* The brain changes continuously throughout the life span
  1. **What Is** **Biopsychology?**

1. **Defining Biopsychology**

**LO 1.1 Define and discuss what is meant by *biopsychology*.**

* + - **Brain** and **behavior** are two of the most interesting subjects in science; **biopsychology** focuses on brain/behavior relationships (refer to Figure 1.1, showing a human brain, from ***Biopsychology, Tenth Edition***).

1. **What Are the Origins of Biopsychology?**

**LO 1.2 Discuss the origins of the field of biopsychology.**

* + - Biopsychology emerged as a distinct area in psychology at the end of the nineteenth century; Hebb’s ***The Organization of Behavior*** (1949) was a key factor in its development into a major neuroscientific discipline.
    - Biopsychologists study how the brain and the rest of the nervous system determine what we perceive, feel, think, say, and do.
    - This may be the ***ultimate challenge for the human brain***: Does our brain have the capacity to understand something as complex as itself?

1. **How Is Biopsychology Related to the Other Disciplines of Neuroscience?**

**LO 1.3 List six fields of neuroscience that are particularly relevant to biopsychological inquiry.**

* **Neuroscience** is the scientific study of the nervous system; neuroscience includes many different approaches, including **neuroanatomy**, **neurophysiology**, **neurochemistry**, **neuroendocrinology**, **neuropharmacology**, and **neuropathology (see Figure 1.2)**.
* **Biopsychology** is a discipline of neuroscience that integrates these various approaches. Biopsychologists try to discover how the various phenomena studied by neurophysiologists, neuropharmacologists, neuroanatomists, and other neuroscientists relate to one another to produce psychological phenomena such as learning, memory, motivation, and perception.
  + - Thus, biopsychology can be viewed as a **bridge** between psychology and neuroscience.
    - The first part of the course will examine the fundamentals of neuroanatomy, neurophysiology, neuropharmacology, genetics, and evolution; the rest of the course will focus on how these biological fundamentals are applied to the study of biopsychological phenomena.
  1. **What** **Types of Research Characterize the Biopsychological Approach?**
* Biopsychologists use a variety of research approaches in their studies; to understand what biopsychology is, you must understand what biopsychologists do.
* This diversity can be illustrated by discussing three dimensions along which biopsychological research varies:
* human vs. nonhuman subjects
* experimental vs. nonexperimental studies
* applied vs. pure research
  1. **Human and Nonhuman Subjects**

**LO 1.4 Compare the advantages and disadvantages of humans and nonhumans as subjects in biopsychological research.**

*Advantages of human subjects:*

* + - They can follow directions.
    - They can report subjective experiences.
    - They are often less expensive.
    - They have a human brain.

*Advantages of nonhuman subjects:*

* They have simpler nervous systems.
* Studying various species makes it possible to use the **comparative approach**.
* There are fewer ethical constraints (although the ethics of both human and animal research is carefully scrutinized by independent committees).
  1. **Experiments and Nonexperiments**

**LO 1.5 Compare experiments, quasiexperimental studies, and case studies, emphasizing the study of causal effects.**

* + - Biopsychology research can involve experimental and nonexperimental studies.

***Experiments***

* Used by scientists to determine **cause-and-effect relationships**.
* Usually a **different group** of subjects is tested under each **treatment condition** of an experiment; this is a **between-subjects design**.
* Sometimes the **same group** of subjects can be tested under **multiple treatment conditions**; this is a **within-subjects design**.
* **Independent variables** are set or manipulated by the experimenter; these manipulations produce the different treatment conditions in an experiment.
* **Dependent variables** reflect the subject’s behavior; this is what the experimenter measures.
* The experimenter tries to conduct the experiment so that the independent variable is the only thing that varies between each treatment condition; the experimenter measures the effect of the independent variable on the dependent variable.
* In a well-designed experiment, the experimenter can conclude that any differences in the dependent variable between the various treatment conditions were ***caused*** by the independent variable (it’s the only possibility).
* Although the principle of good experimentation is conceptually simple, it is often difficult in practice to make sure that there is only one difference among conditions; unintended differences between conditions that can influence the dependent variable are called ***confounded variables***.
* The presence of confounded variables makes experiments difficult to interpret because it is impossible to tell how much of the effect on the dependent variable was caused by the independent variable and how much was caused by the confounded variable.
* An example of a well-designed experiment is the experiment of Lester and Gorzalka (1988) on the **Coolidge effect** in female hamsters (refer to Figure 1.3 from ***Biopsychology***).

## *Quasiexperimental Studies*

* Sometimes it is impossible to conduct controlled experiments (e.g., if human subjects are involved, it may be impossible for ethical or technical reasons to assign them to particular conditions and to administer the conditions).
* In a **quasiexperimental design**,researchers examine subjects in real-world situations who have self-selected into specific conditions (e.g., excessive alcohol intake); in a sense, these subjects have assigned themselves to treatment conditions.
* The major shortcoming of a quasiexperimental study is that although researchers can examine relations between the variables of interest (e.g., alcohol consumption’s relation to brain damage), a quasiexperimental study cannot control for potential confounding variables. Therefore, it does not allow a researcher to establish direct cause-and-effect relationships.

***Example:*** Researchers cannot randomly assign humans to control and alcohol groups, and then expose one group to 10 years of chronic alcohol exposure to see if alcohol causes brain damage. Instead, they must compare the brains of alcoholics and non-alcoholics found in the real world.

***Key Problem:*** Because subjects in the real world do not assign themselves to groups randomly, there are many other differences between the groups that could contribute to differences in the dependent measures. For example, the observation that alcoholics have far more brain damage than non-alcoholics does *not* mean that alcohol directly causes this difference, because alcoholics differ from non-alcoholics in many ways unrelated to their alcohol consumption (e.g., education, accidental head injury, diet, other drug use).

***Case Studies***

* Case studies are scientific studies that focus on a **single subject**; for example, you will learn later in the course about how the in-depth study of one amnesic subject (H. M.) has contributed much to our understanding of the neural basis of memory.
* The main problem with case studies is their **generalizability**, or the extent to which their results tell us something about the general population.
  1. **Pure and Applied Research**

**LO 1.6 Compare pure and applied research.**

* + - Pure and applied research are defined by the motivation of the researcher.
    - **Pure research** is motivated primarily by the curiosity of the researcher to find out how things work; pure research focuses on establishing building blocks or basic concepts that may provide information salient to many problems.
    - **Applied research** is motivated by an attempt to directly use the building blocks of basic research to answer specific questions; human and animal problems are directly addressed.
      1. **What** **Are the Divisions of Biopsychology (**see Figure 1.5 in ***Biopsychology*)?**
         1. **Physiological Psychology**

**LO 1.7 Describe the division of biopsychology known as physiological psychology.**

It focuses on **direct manipulation** of the nervous system in controlled lab settings (e.g., lesions, invasive recording).

The subjects are usually laboratory animals.

There is a strong focus on **pure research**.

* 1. **Psychopharmacology**

**LO 1.8 Describe the division of biopsychology known as psychopharmacology.**

* + - Similar to physiological psychology, except that the nervous system is manipulated pharmacologically
    - Focuses on drug effects on behavior and how these changes are mediated by changes in neural activity
    - Many psychopharmacologists favor **pure research** and use drugs to reveal the nature of brain-behavior interactions, while others concentrate on **applied questions** (e.g., drug abuse, therapeutic drugs)
  1. **Neuropsychology**

**LO 1.9 Describe the division of biopsychology known as neuropsychology.**

* + - Focuses on the behavioral effects of brain damage in **humans**, typically **cortical damage**
    - Cannot be studied in humans by experimentation; research focuses on **case studies** and **quasiexperimental studies**
    - Most applied of the six divisions of biopsychology; neuropsychological tests of brain-damaged patients facilitate diagnosis, treatment, and lifestyle counseling (e.g., the case of Mr. R. described in the text)

1. **Psychophysiology**

**LO 1.10 Describe the division of biopsychology known as psychophysiology.**

* It focuses on the relationship between physiological and psychological processes in human subjects.
* Because human subjects are used, all brain recordings are **noninvasive** (i.e., from the surface of the head).
* The usual measure of brain activity is the **scalp electroencephalogram** **(EEG)**.
* Muscle tension, eye movement, heart rate, pupil dilation, and electrical conductance of the skin are other common psychophysiological measures.

**Example:** Eyetracking deficits in schizophrenics; refer students to Figure 1.6 from **Biopsychology**

**e. Cognitive Neuroscience**

**LO 1.11 Describe the division of biopsychology known as cognitive neuroscience.**

* Newest division of biopsychology
* Focuses on the **neural bases of cognitive processes** like learning/memory, attention, and perceptual processes
* Often employs human subjects—key methods are **noninvasive**, **functional brain imaging techniques** (refer students to Figure 1.7 from ***Biopsychology***)
* Often involves collaborations between researchers with widely different backgrounds (e.g., biopsychology, cognitive psychology, computer science)

1. **Comparative Psychology**

**LO 1.12 Describe the division of biopsychology known as comparative psychology.**

* Focuses on the biology of behavior
* Features **comparative** and **functional** approaches
* Features laboratory research, as well as studies of animals in their natural environments (**ethology**)
* Includes disciplines of **evolutionary psychology** (understanding behavior through its evolutionary origins) and **behavioral genetics** (understanding the genetic influences on behavior)
  + - 1. **How Do Biopsychologists Conduct Their Work?**

**a. Converging Operations: How Do Biopsychologists Work Together?**

**LO 1.13 Explain how converging operations has contributed to the study of Korsakoff’s syndrome.**

* + - Each of the six approaches to biopsychological research is not without its weaknesses; thus, biopsychological issues are rarely resolved by a single experiment or study, or by any single approach.
    - Progress is greatest when several different approaches, each compensating for the shortcomings of the others, are used to solve the same problems; this is called ***converging operations***.
      * 1. **Scientific Inference: Ho****w Do Biopsychologists Study the Unobservable Workings of the Brain?**

**LO 1.14 Explain scientific inference with reference to research on eye movement and the visual perception of motion.**

* + - Science is a method of answering questions by direct observation; it is an **empirical method**.
    - However, brain activity is not directly observable (e.g., one cannot see a neuron firing or neurochemicals being released from neurons).
    - This situation is no different than other sciences (e.g., physicists cannot see gravity, chemists cannot see evaporation); the effects of the processes are observable, but not the processes themselves.

**Question:** *How do scientists study the unobservable using a method (i.e., the scientific method) that is fundamentally observational?*

**Answer:** *By* ***scientific inference****; scientists observe the consequences of unobservable processes and from these they infer the nature of unobservable processes.*

* 1. **Critical** **Thinking about Biopsychological Claims**

You might think it odd to begin a course on biopsychology by considering two bad examples of its science. This is done for two reasons:

* + - because disciplines learn from their mistakes; understanding biopsychology’s previous errors help biopsychologists to avoid these mistakes in their own work; and
    - because it will make you a better consumer of scientific research—it will help you develop critical thinking about biopsychological research.

1. **Taming a Charging Bull with Caudate Stimulation**

**LO 1.15 Discuss Delgado’s bull-ring demonstration, emphasizing its flawed interpretation.**

* + The biopsychologist Jose Delgado implanted an **electrode** into the **caudate nucleus** of a bull.
  + Each time the bull charged, Delgado used his hand-held transmitter to deliver an electrical stimulation to the caudate nucleus of the bull via the implanted electrode.
  + This stopped the charge and after a few attempts, the bull stood tamely as Delgado strode about the ring.
  + Delgado and the popular press declared this a major discovery, the discovery of the caudate **taming center**. It was even suggested that caudate stimulation might cure human psychopaths.

1. **Prefrontal Lobotomy** (use Figures 1.9, 1.10, and 1.11 from ***Biopsychology***)

**LO 1.16 Describe the rise and fall of prefrontal lobotomy.**

* In 1949, Dr. Egas Moniz received a Nobel Prize for developing a novel treatment for mental illness: **prefrontal lobotomy**, a procedure that separates the prefrontal lobes from the rest of the brain.
* Moniz based his technique on a report that a **chimpanzee** (Becky) was easier to handle after part of her prefrontal lobes had been destroyed as part of an experiment.
* Various forms of the operation were devised, such as the **transorbital lobotomy** procedure, which was performed by inserting an ice pick-like device through the eye sockets, often in a doctor’s office.
* Following the initial reports by Moniz of the operation’s benefits, it was performed on mentally-ill patients all over the world (over 40,000 in the United States alone).
* Note the case of Howard Dully, the boy who was lobotomized at the insistence of his stepmother.

**End-of-****Chapter Discussion**

Guide the discussion to the following points and issues:

1. **What Was Wrong with Delgado’s Claims?**
   * There are many ways that stimulation might stop a charging bull other than by taming it (e.g., the stimulation might have been painful, blinded the bull, made it sick, or made movement difficult).
   * When there is more than one reasonable interpretation of a behavior, the general rule is to favor the simplest one; this rule is called ***Morgan’s Canon***.
   * In fact, analyses of the filmed record of this event strongly support a more simple interpretation: The left and right caudate are motor structures, and stimulating one side often causes an animal to walk in circles.
   * This appears to be what happened in Delgado’s case; the bull was confused and incapable of charging, but not tamed.
2. **What Was Wrong with Moniz’s Claims?**

* The surgery was based on the study of only one subject (Becky), and a nonhuman subject at that!
* It is difficult to see how one could conclude that an operation that would eliminate the adaptive defensive reactions of a chimpanzee to an experimenter would help the mentally ill.
* Moniz and others who prescribed prefrontal lobotomy were not in a position to be objective in its evaluation, nor were they trained to perform such evaluations. Early reports of the benefits of prefrontal lobotomy were based on poorly controlled studies focused on **manageability** and published by Moniz himself.
* After many thousands of people had been lobotomized, controlled studies by objective researchers revealed terrible side effects (e.g., “vegetable-like behavior,” urinary incontinence, epilepsy).

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**Lecture** **Launchers**

**Lecture Launche****r 1.1: First Impressions of Biopsychology**

Based on their reading of Chapter 1, and on preconceptions that they may have from other psychology classes, have your students discuss what **THEY** think biopsychology is—where it fits into psychology and where it fits into science. For background material to help you with this discussion, see the Web site for the International Society for the History of the Neurosciences at <http://www.ishn.org>.

**Lectu****re Launcher 1.2: Biopsychology Research—More Than White Rats and Lab Coats**

Based upon lectures to this point, talk about another area of biopsychological inquiry in which experiments, quasiexperimental studies, and case studies complement one another to make valuable contributions to our understanding of brain/behavior relations (e.g., ask students to split into groups of three to five students to discuss how these three methods for studying brain/behavior relations could be used to study the neural bases of the behavioral changes that emerged following Phineas Gage’s accident).

### Lecture Launcher 1.3: Ethical Issues in Animal and Human Research

Biopsychology uses both human and nonhuman subjects, and there are different sorts of ethical issues associated with the use of each. Discuss the procedure of applying for ethics approval in your university or college. What are the factors that the ethics committees consider when determining whether to approve a particular experiment? Also, talk about what checks are in place in your country, state, or province to protect human and animal subjects.

Web sites for responsible use of nonhuman animal research:

[www.understandinganimalresearch.org.uk](http://www.understandinganimalresearch.org.uk)

Go to <http://www.apa.org/> and place “Guidelines for Animal Research” in the search box. Scroll down the page to “Guidelines for Ethical Conduct in the Care and Use of Animals” and click that link.

Go to <http://www.the-aps.org/> and search for “APS and Animal Research.” Click “Introduction: APS and Animal Research.”

Web sites against the use of nonhuman animal research:

[www.uncaged.co.uk](http://www.uncaged.co.uk)

[www.navs.org](http://www.navs.org)

[www.stopanimaltests.com](http://www.stopanimaltests.com)

### Lecture Launcher 1.4: Neuropsychology’s Case Studies versus Physiological Psychology’s Experiments

Neuropsychologists and physiological psychologists both study the effects of brain damage on their subjects. However, they use dramatically different methodologies: Neuropsychologists typically use case studies of human subjects, whereas physiological psychologists use experimental studies of nonhuman subjects. Given that neuropsychology can collect data directly from human subjects, why is it necessary to perform experiments on nonhuman subjects?

**Lecture Launche****r 1.5: Studying the Brain and Behavior from All Sides**

Consider the relative strengths and weakness of **physiological psychology** and **neuropsychology.** Neuropsychology’s strength is that it deals with humans, but this is also its weakness because it precludes experimentation. In contrast, physiological psychology can bring the power of the experimental method and invasive neuroscientific techniques to bear on the question, but it is limited to the study of laboratory animals.

Because the two approaches complement one another, together they can provide evidence for points of view that neither can defend individually. Read about the case of Jimmie G. to see the power of this approach in action.

### Lecture Launcher 1.6: Chimpanzees and Mental Illness

In the analysis of Case 2 (Beck, Moniz, and Prefrontal Lobotomy), it was pointed out that a treatment for mental illness was developed from the results of a single case study in a nonhuman animal. Moniz basing his conclusions on a single case study was problematic in itself, but what about the fact that the removal of an adaptive behavior in a nonhuman animal was taken as evidence for the viability of a treatment for a form of mental illness? To what degree are studies of nonhuman animals currently used as part of the process for developing treatments for mental illness? If they are similar, then how are the interpretations of the data obtained from these nonhuman animals different from that of Moniz?

Lecture Launcher 1.7: The History of the Brain

Use the PBS Web site on the History of Research on the Brain to find events and illustrations for use in a classroom presentation. Images can often be copied from a Web site and inserted into a PowerPoint Presentation for use in class. (Make sure you keep a record of where the image came from.) This is not only good for legal defense of fair use, but it may allow you to find something again when you need it.

**Web Link**

[Web Link 1.1 History of the Brain](#WL11)

Lecture Launcher 1.8: Research with Animals in Psychology

“Psychologists undertake research with animals ‘...with a clear scientific purpose.’...There should be a reasonable expectation that the research will a) increase knowledge of the processes underlying the evolution, development, maintenance, alteration, control, or biological significance of behavior, b) increase understanding of the species under study, or c) provide results that benefit the health or welfare of humans or other animals.” (APA Guidelines for Ethical Conduct in the Care and Use of Animals, Section VI.A.)

**Web Links**

[Web Link 1.4 Ethical Principles for Psychologists and Code of Conduct](#WL14)

[Web Link 1.5 Guidelines for Ethical Conduct in the Care and Use of Animals](#WL15)

[Web Link 1.6 Research with Animals in Psychology](#WL16)

[Web Link 1.7 PETA: People for the Ethical Treatment of Animals](#WL17)

Lecture Launcher 1.9: Careers in Neuroscience

Have a neuroscientist visit your classroom. The Society for Neuroscience has a listing of neuroscientists willing to make classroom visits. The list is organized by state.

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**Acti****vities**

**Activity** **1.1: Making Sense of Eye Movements (refer students to Figure 1.6 from *Biopsychology*)**

Manually move your eye upward; the world appears to move downward. This is because the brain interprets movement across the retina as movement of the world, unless the eye movements are actively produced by the brain itself.

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**Web** **Links**

Web Link 1.1: History of the Brain

Place “Secret Life of the Brain” in your search engine. Select the clickable link from <http://www.pbs.org>. On the left hand menu is a clickable link titled “History of the Brain.” Click that link to get to your final webpage destination.

“The history of our quest to understand the brain is certainly as long as human history itself. Use this extensive timeline to meander through some of the highlights (and lowlights) of this great journey of understanding.”

Web Link 1.2: Society for Neuroscience: Public Resources

Go to <http://www.sfn.org> and click on the menu tab labeled “Public Outreach.” From that menu select the link “Brain Awareness Week” and click on that to reach the resources.

Neuroscience-related resources are intended to help you stay apprised of neuroscience research in its path from laboratory to bedside and to better understand the functions of the healthy brain. Links are provided to hundreds of sites related to neuroscience, including patient advocacy groups. Have a neuroscientist visit your classroom and learn about pursuing a career in neuroscience.

Web Link 1.3: Comparative Mammalian Brain Collection

<http://www.brainmuseum.org/>

Web Link 1.4: Ethical Principles for Psychologists and Code of Conduct

Go to <http://www.apa.org> and place “ethical conduct for psychologists” in the search box. Select the result titled “Ethical Principles of Psychologists and Code of Conduct” and click the link.

Web Link 1.5: Guidelines for Ethical Conduct in the Care and Use of Animals

Go to <http://www.apa.org/> and place “Guidelines for Animal Research” in the search box. Scroll down the page to “Guidelines for Ethical Conduct in the Care and Use of Animals” and click on that link.

Developed by the American Psychological Association’s Committee on Animal Research and Ethics (CARE)

Web Link 1.6: Research with Animals in Psychology

Go to <http://www.apa.org/> and place “lab animal welfare” in the search bar. Select the first result titled “Lab Animal Welfare” and click on the link.

Suggestions from APA on why it is important to use animals in research.

Web Link 1.7: PETA: People for Ethical Treatment of Animals

<http://www.peta.org>

For another point of view, see information from the animal rights perspective.

Web Link 1.8: Career Counseling of College Students

Go to [http://www.apa.org](https://www.apa.org/) and place “Career Counseling of College Students” in the search bar. Select the first result in the search titled “Career Counseling of College Students: An Empirical Guide to Strategies That Work.”

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