Psychology of Human Behavior

Part I

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David Martin received a B.A. in psychology from Hanover College in Indiana, where he also finished the necessary coursework for a major in physics. He received an M.A. in experimental psychology and a Ph.D. in engineering psychology from The Ohio State University.

Professor Martin began his professional career in 1969 as an assistant professor at New Mexico State University. He progressed through the ranks, becoming a professor in 1983. During this time, Professor Martin contributed to developing a prominent Ph.D. program in engineering psychology. During his final 11 years at NMSU, he was also head of the department. At NMSU, Professor Martin taught courses in introductory psychology, perception, research methods, and human performance; was selected as an outstanding professor by graduating seniors; was named a master teacher; and received a Roush Award for Teaching Excellence. In 1992, Professor Martin assumed his current position as professor and head of the Psychology Department at North Carolina State University. In addition to his administrative duties, he regularly teaches a psychology survey course, an honors seminar, and an evolutionary psychology seminar. He was named to the Academy of Outstanding Teachers at NC State in 1997.

Professor Martin's areas of research in engineering psychology and ergonomics include attention in visual search, particularly in human-computer interaction; operator workload; and cognitive modeling, particularly of human decision making. He has written more than 75 publications and papers. He is the author of *Doing Psychology Experiments*, an experimental methods text currently adopted by more than 100 colleges and in its sixth edition. Dr. Martin has also engaged in considerable professional consulting.

Professor Martin is a member and fellow of the American Psychological Association and a member of the American Psychological Society, the Psychonomic Society, and the Human Factors and Ergonomics Society (HFES). He is a past president of the Rocky Mountain Psychological Association and past president of both the Rio Grande Chapter and the Carolina Chapter of HFES. He has also served for many years on the national committee that designates doctoral psychology programs.

Professor Martin lives in Cary, North Carolina, with his two teenage sons.

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Part I

Psychology of Human Behavior

Scope:

This course of 36 lectures examines the breadth of modern psychology from both clinical and experimental perspectives. After an introduction to the precursors and early history of psychology in Lecture One, we discuss the research methods used in scientific psychology in Lectures Two and Three. Particular emphasis is given to the logic and procedures of the quantitative methods of experimentation, as well as correlational and quasi-experimental design. Consideration is also given to the qualitative designs of ethnography, naturalistic observation, and case history. Following a brief introduction to the scientific theory of evolution in Lecture Four, we discuss a less scientific theory in Lecture Five, that is, psychoanalytic theory as introduced by Sigmund Freud.

In Lectures Seven through Eleven, the topic of abnormal psychology is introduced, and we make a comprehensive examination of the various classifications of mental illness with reference to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR™). For each disorder, we look at the set of defining symptoms and, where known, the causes and prognosis of the illness. In Lectures Twelve through Seventeen, we explore three therapy classifications. For physical therapies, we discuss the various psychopharmacological approaches for each of the disorders, including discussion of electroconvulsive shock therapy and psychosurgeries. Psychotherapies are also covered, with an emphasis on psychoanalysis and humanistic and cognitive therapies. Behavior therapies are also examined, both those based on classical conditioning and those based on operant conditioning.

In Lectures Eighteen through Thirty-One, we examine the standard content areas of experimental scientific psychology. The lecture on motivation emphasizes the biologically based homeostatic model, in which the goal of behavior is the return to an optimal state, although a brief discussion of Abraham Maslow's self-actualization model is also included. The first lecture on motivation emphasizes the difficulty in measuring a private event, such as emotion, and examines the largely unsuccessful attempts of using facial expressions, self-report, and physiological measures, such as the polygraph, pupil size, and vocal tremors. In Lecture Twenty, we consider several theories of emotion, including the James-Lange theory, the Cannon-Bard theory, and Stanley Schachter's cognitive-labeling theory. Lectures Twenty-One and Twenty-Two provide an overview of various psychoactive drugs, including their classifications and behavioral effects.

In Lectures Twenty-Three and Twenty-Four, we introduce the broad area of social psychology, then cover in detail the mechanisms that influence us to behave in automatic ways, as put forth by Robert Cialdini in his book *Influence*. In the next three lectures, Twenty-Five through Twenty-Seven, we examine two forms of simple learning. Classical conditioning involves the pairing of an unconditioned stimulus with a conditioned stimulus, which eventually causes the conditioned stimulus to bring about a conditioned response. Operant conditioning involves repeatedly reinforcing a voluntary response, which increases the probability of the response recurring. For both forms of learning, we detail the time course of learning and the conditions under which learning takes place. In the final learning lecture, we look at progressively more complex forms of learning, such as avoidance learning, probability learning, and concept formation, and consider whether these could be explained as combinations of classical and operant conditioning.

In Lectures Twenty-Eight and Twenty-Nine, we look at memory. First, we consider how the various ways of assessing memory influence how good our memories seem to be. Then, we use an exercise in illusory memory to demonstrate how the modern view of memory is that of constructing memories from cues rather than calling up detailed snapshots. Finally, we review some research that demonstrates how this constructive process can lead to false memories. In the second memory lecture, we learn about some memory aids that can help us improve our memories, and we discuss three theories of forgetting: decay, interference, and consolidation. Perception is covered in Lectures Thirty and Thirty-One. In the first lecture, we use a series of visual illusions to convince ourselves that we are not in direct contact with the external world but that we use cues to form one or more external models that are sometimes in error. In the second lecture, we discuss three schools of thought about how we use cues to form internal models, and we then use the process of depth perception to illustrate what kinds of cues we employ. Finally, we look at evidence supporting the proposition that perception is built in or learned.

Lectures Thirty-Two through Thirty-Four examine modern thought regarding evolutionary psychology. In Lecture Thirty-Two, we discuss the requirements for evolution to take place and some of the myths about evolution. Then, we give a rough timeline of human evolution and look at evolved behavior from the perspective of Desmond

Morris's historical book *The Naked Ape*, particularly with respect to why we are naked, why we are sexy, and why human aggression is such a problem. The second evolution lecture examines the topics of altruism and mating. Altruistic behavior includes our behavior toward our kin and reciprocal behavior toward non-kin. Our discussion of mating includes the different behavioral strategies used by men and women related to differences in parental investment in their offspring. In the third evolutionary lecture, aggression is considered, along with parenting and eating behaviors. Evolutionary theory makes specific predictions about the kinds of family conflicts found even in today's families. The reasons we overeat to the point of obesity are also understandable from evolution.

In Lecture Thirty-Five, we look at the applied field of engineering psychology and consider how this field, which is concerned with the design of human-machine-environment, is integrated with other disciplines, such as industrial engineering. We also examine the types of recommendations engineering psychologists can make in the design of displays and controls. In the final lecture, we review where we have been, then briefly discuss a few topics not previously covered, including neuropsychology, cognitive modeling, and developmental psychology. Finally, we consider the future of psychology, with particular emphasis on genetic therapies for mental illnesses and the application of scientific psychology to practical societal problems.

Lecture One
Modern Psychology in Historical Context

Scope: This lecture introduces psychology as the study of human behavior, either from a clinical or a scientific perspective. It makes the distinction between clinical psychologists (who try to help people with behavioral problems in many settings, such as hospitals, clinics, schools, and prisons) and psychiatrists (who are medical doctors, can prescribe drugs, and are usually trained in a single type of therapy). Clinical psychologists have doctoral degrees, cannot prescribe drugs, and are often trained in a variety of therapies. The lecture also emphasizes the fact that experimental psychologists study human behavior as scientists. We put psychology in a historical perspective by introducing figures who served as precursors in psychology, including philosophers, such as Descartes, Locke, and Hume, and biologists, such as Weber and Darwin. The history of psychology covers only a little more than 100 years and has gone through several methodological approaches. In experimental psychology, the early introspectionists gave way to the behaviorists, who then were largely supplanted by cognitive psychologists. Recently, evolutionary psychologists have offered a new approach. This lecture also previews the topics that are covered in the course and explains why they are ordered as they are.

Outline

I. Psychologists are interested in human behavior, either studying behavior from a scientific perspective or using knowledge gained from the scientific perspective to try to improve the human condition.

- **A.** About two-thirds of psychologists fit the general label of *clinical psychologist* and are typically interested in helping people with behavioral problems.
  - **1.** Most people think of clinical psychologists as working in private practice one-on-one with clients.
  - **2.** Some clinical psychologists work in hospitals, clinics, schools, prisons, and other settings, not only doing therapy but giving tests, evaluating clients, setting up programs, and engaging in other activities to help people.
- **B.** Many people confuse psychiatrists and clinical psychologists.
  - **1.** Psychiatrists are medical doctors who can prescribe drugs and give physical exams.
  - **2.** Most psychiatrists are trained from a narrow therapeutic orientation, usually psychoanalysis.
  - **3.** A clinical psychologist typically has a doctoral degree, usually a Ph.D.
  - **4.** Most clinical psychologists cannot prescribe drugs.
  - **5.** Clinical psychologists are usually trained to use a wider variety of therapeutic techniques.
- **C.** About one-third of psychologists fit the general label of *experimental psychologist* and are typically interested in studying human behavior from a scientific perspective.
  - **1.** Many experimental psychologists work in universities and colleges, both teaching and doing research.
  - **2.** Experimental psychologists also work in research institutes for the government, performing both basic and applied research.
  - **3.** Increasingly, experimental psychologists work in industry as industrial/organizational psychologists or ergonomists.

II. An understanding of modern psychology requires some knowledge of the history of psychology and major movements in the field.

- **A.** Psychology originally grew out of philosophy and, to some extent, biology; indeed, some philosophical and biological thought still influences psychology.
  - **1.** In 1649, René Descartes speculated about the nature of the mind as distinct from the body, with the mind and the idea of self being innate.
  - **2.** In 1690, John Locke asserted that the mind is a *tabula rasa*, or blank slate, and all knowledge is gained through experience using the senses.

3. David Hume, working about 1740, was a British associationist who claimed that the mind was no more than a collection of sensory impressions linked together by associations formed by contiguity and similarity.
4. In the 1830s, Ernst Heinrich Weber was one of the first empiricists, who demonstrated the quantification of mental or psychological operations.
5. Charles Darwin in the 1870s applied his theory of evolution to humans.

B. Psychology as a separate discipline began in the latter half of the 1800s.

1. In 1879, Wilhelm Wundt established the first psychological laboratory in Leipzig, Germany.
2. In 1890, William James, although not an empiricist himself, introduced the empirical science of psychology to America.
3. About 1900, Sigmund Freud introduced psychoanalytic theory, giving particular emphasis to the unconscious mind.
4. About 1906, Ivan Pavlov, a physiologist, discovered classical conditioning while studying saliva in dogs.
5. About 1913, John Watson began the behaviorist tradition of psychology, in which behaviors, rather than the conscious mind, are studied.
6. In the 1950s, B. F. Skinner rejected theories of mental operations and argued that only observable behaviors were worth studying.
7. In the 1960s, Ulric Neisser reintroduced the possibility of studying mental operations of the cognitively functioning brain. This approach is called *cognitive psychology* and is still the primary paradigm of psychology today.
8. In 1975, Edward O. Wilson published a book on sociobiology, claiming that evolutionary theory could explain much of human behavior, as well as that of other animals. The evolutionary approach has had some impact since the 1990s.

III. Since its inception as a separate disciplinary field, psychology has undergone some significant changes in theoretical approaches, both in terms of experimental psychology and clinical psychology.

A. Experimental psychology has seen several approaches during a little more than a century.

1. One of the earliest methods used was introspection, in which trained observers attempted to determine the contents of their own minds.
2. The behaviorists claimed that people could not determine the contents of their own minds and that it was impossible to study the workings of the human mind; only observable behaviors could be studied. Because human behavior can be affected by conscious thinking, behaviorist research focused primarily on animal behavior. Behaviorists held sway for 40–60 years, until the arrival of cognitive psychology in the 1960s.
3. The development of the computer influenced the growth of cognitive psychology: Cognitive psychologists believed that it was possible to study the operations of the human mind by using sophisticated research techniques often based on a computer metaphor.
4. Although cognitive psychologists still consider the mind, to some extent, to be a blank slate, evolutionary psychologists claim that the human mind is not a "blank-slate" computer but contains many modules that have been built in to help solve evolutionary problems.

B. Clinical psychology has also seen several trends in its century of existence.

1. Freud proposed that human motivations lie largely at the unconscious level; for this reason, highly trained psychoanalysts must spend many years trying to determine the contents of the unconscious mind in order to help patients.
2. Carl Rogers and other humanistic psychologists proposed that clients have within themselves the ability to analyze and fix their own problems if given proper guidance by a therapist.
3. Behavior therapists believe that many psychological problems are caused by people having learned inappropriate responses to stimuli and that these problems can be solved by having clients learn appropriate responses.

4. Cognitive therapists believe that many psychological problems are caused by people having inappropriate thoughts and that these problems can be corrected by teaching clients to change their thinking.

IV. Psychology today has many sub-areas, most of which we will explore in this course.

A. First, in Lectures Two and Three, we will establish a foundation by looking at some of the research methods used by psychologists.

B. In Lecture Four, we will look at some of the basics of evolutionary theory, because evolutionary theory helps us understand some of the reasons why we behave as we do. I would like you to keep this theory in mind as we explore some of the basic areas of psychology.

C. In Lectures Five and Six, we will examine one of the oldest and most prominent theories of personality, Freud's psychoanalytic theory. I think it is important to understand psychoanalytic theory before covering the various mental illnesses, because to some extent, the classifications of mental illness are loosely based on this theory.

D. In Lectures Seven through Eleven, we will ask why we consider some behaviors to be abnormal and will classify these behaviors into categories of mental illnesses. I have found that it is better to examine abnormal behavior and therapies early in the course because, much as we might learn how a car works when it breaks down, we can learn a good deal about normal behavior by examining abnormal behavior.

E. In Lectures Twelve through Seventeen, we consider three categories of therapies that can be used in treating mental illnesses. I cover these categories separately from the illnesses themselves because, unlike physical illnesses, for which a particular therapy is used to treat a single illness, for mental illnesses, a particular illness might be treated by several different therapies, and the type of therapy chosen is sometimes determined more by the orientation of the therapist than by the illness.

F. In Lectures Eighteen through Twenty-Two, we examine some theories of motivation, that is, what drives us; of emotion, how we feel about events; and of psychoactive drugs, because drugs are a major way of altering our emotions.

G. In Lectures Twenty-Three and Twenty-Four, we look in detail at influence, one of the sub-areas of the very large field of social psychology.

H. In Lectures Twenty-Five through Thirty-One, we explore three of the major research areas of experimental psychology (learning, memory, and perception), emphasizing how our views of these areas have changed in recent years.

I. In Lectures Thirty-Three through Thirty-Four, we use the recently prominent field of evolutionary psychology to help us try to answer questions about why we behave the way we do.

J. In Lecture Thirty-Five, we consider engineering psychology, one of the several fields of applied psychology.

K. In Lecture Thirty-Six, I give a quick review of what we have covered in the course and a thumbnail sketch of several of areas we will not have time to cover in detail, such as neuropsychology, which we will discuss only briefly when we look at psychoactive drugs and drug therapies; cognitive modeling, which we will touch on in the context of complex learning; and developmental psychology, including child psychology and gerontology.

Essential Reading:
D. P. Schultz and S. E. Schultz, *A History of Modern Psychology*, 7th ed.

Supplementary Reading:
James Kalat, *Introduction to Psychology*, 6th ed.

Questions to Consider:
1. Should psychology still be considered only one discipline, or should it be redefined into several disciplines?
2. Do you think the behaviorists were right—that it is ultimately impossible to know the inner workings of the human mind, or are the cognitive psychologists right—that there are ways of knowing the mind?

Lecture Two
Experimentation as a Research Method

Scope: Experimentation has been adopted as one of the primary research methods of psychology. In an experiment, there is an attempt to establish a causal relationship between at least one circumstance and one behavior. Of the infinite number of circumstances, one circumstance, called the *independent variable*, is operationally defined by the experimenter and set on at least two levels. A behavior is then operationally defined and measured as the independent variable is manipulated. Other circumstances, called *control variables*, are set and not allowed to vary during the experiment. Some circumstances, are allowed to vary by chance; in an experiment, these are called *random variables*. Random variables contribute to the generalizability of results. Well-designed experiments have no *confounding variables*, which are those that change along with the levels of the independent variable.

Outline

I. As a science, much of psychology has modeled itself after the so-called hard sciences and adopted experimentation as a primary research methodology.

- **A.** Suppose you were asked to pretend you were a psychologist conducting research on the question: "Does violence on TV cause aggression in children?"
  - **1.** Many people would propose doing an experiment that involved at least two groups of children, one that watched violent TV shows and one that watched nonviolent TV shows.
  - **2.** An immediate problem is how to define *violent* with respect to TV shows.
  - **3.** What is required is an operational definition that describes the operations one would go through to determine which shows are violent and which are nonviolent (for example, ratings systems, checklists, and so on).
- **B.** Another problem is to determine how to measure aggression in children.
  - **1.** Saying that we will observe the children's behavior is not enough.
  - **2.** Again, what is required is an operational definition of aggression, such as the percent of time the children play with aggressive versus nonaggressive toys.
- **C.** Another problem is choosing representative children to use in the groups.
  - **1.** Should children be randomly assigned, or should they be chosen to represent some established criteria?
  - **2.** Randomization is a powerful selection mechanism that can eliminate the need to control many variables.

II. Experimentation is an agreed-on way to establish a causal relationship between a circumstance and a behavior.

- **A.** Picture on the left a vertical list of individual circumstances that we want to relate to one or more behaviors.
  - **1.** For our thought experiment, the list might include such items as violent TV shows, size of TV set, age of children, size of group watching TV, length of time in each TV session, number of TV sessions, and so on.
  - **2.** This list would be potentially infinite in length.
- **B.** To indicate the possible behaviors that could be measured, picture a vertical list on the right that shows all behaviors that could possibly be measured.
  - **1.** For our thought experiment, the list might include such items as type of toys played with, number of hitting incidents, noise level of the room, and so on.
  - **2.** The list of behaviors is also potentially infinite.
- **C.** Imagine an arrow pointing from the list of circumstances to the list of behaviors, indicating that the purpose of any experiment is to establish a causal relationship between circumstances and behaviors.

III. When conducting an experiment, some choices must be made regarding the circumstances and the behaviors.

A. First, at least one of the circumstances must be chosen to manipulate, that is, to be set on at least two levels.

1. The circumstance that the experimenter chooses to manipulate is called the *independent variable* because it is independent of the subject's behavior.

2. In our thought experiment, the independent variable would be something like viewing violent TV shows versus viewing nonviolent TV shows.

B. At least one behavior must also be chosen to be measured during the experiment.

1. The behavior that the experimenter chooses to measure is called the *dependent variable* because it is potentially dependent on the levels of the independent variable.

2. In our thought experiment, the dependent variable might be time spent playing with aggressive toys or nonaggressive toys, as defined by the operational definition.

C. Although the rest of the items on the behavior list can now be ignored, the rest of the circumstances list must be partitioned.

1. Some of the circumstances must be set at a particular level and not be allowed to vary during the experiment; these are called *control variables* because the experimenter exerts control over them.

2. In our thought experiment, some control variables might be size of the TV viewing group, size of the TV set, size of the TV viewing room, external noise allowed into the room, and so on.

3. Some of the circumstances will be allowed to vary through random selection; these are called *random variables*.

4. In our experiment, some random variables might include the children's socioeconomic status, the day of the week, or the weather outside.

5. Random variables are necessary in some cases because it is impossible to control some circumstances.

6. Random variables are also desirable in some cases because they allow results to be generalized to a larger population.

D. Experimenters must avoid having one or more circumstances vary along with the levels of the independent variable.

1. When a circumstance varies along with the independent variable, it is called a *confounding variable*.

2. A confounding variable makes the results of an experiment ambiguous because it is not possible to know whether the change in behavior was the result of the independent variable or the confounding variable.

3. In our thought experiment, if one group watched 2 hours of nonviolent TV and the other group watched 4 hours of violent TV, we wouldn't know whether any change in aggressiveness was the result of violence or time spent watching.

IV. Another example is an experiment I conducted that attempted to measure the relationship between students' attentiveness and the professor's lecture pace.

A. I varied the lecture pace from slow to medium to fast.

B. Ambient noise levels in the lecture room were measured.

C. The idea behind this was that when the students were quieter, they were more attentive; when they were rustling papers and talking, they were less attentive.

D. Graphing the noise level as a function of low, medium, and high pace, I found that the students were most attentive when I spoke at a medium pace.

E. This experiment embodied potential confounding variables.

1. My voice pitch tended to get lower when I spoke at a slower pace and higher when I spoke at a faster pace.

2. The number of words I used to talk about a concept also varied, depending on the pace of my speech.

3. It is important to be aware of confounding variables to try to eliminate them or, if that is not possible, to explain them.

V. If you manipulate an independent variable, measure a dependent variable, manage your controlled and random variables, and have no confounding variables, then you can attribute the change in behavior to the levels of the independent variables. This is a causal statement; the change in the independent variable caused the change in the dependent variable. This is the only methodology we have in which one piece of research shows a causal relationship between a set of circumstances and behavior.

Essential Reading:
David Martin, *Doing Psychology Experiments*, 6th ed., chapter 2.

Supplementary Reading:
Keith Stanovich, *How to Think Straight about Psychology*, 7th ed.

Questions to Consider:
1. What would be good operational definitions for the following terms: *intelligence*, *spousal abuse*, *attention*?
2. Under what conditions is randomization preferable to control in an experiment?

Lecture Three
Nonexperimental Research Methods

Scope: After experimentation, the next most widely used research method in psychology is *correlational observation*, in which there is no independent variable. In this case, the researcher attempts to determine whether there is a relationship between two behaviors. A statistical test can provide a correlation coefficient, which can indicate a strong relationship (the closer it is to 1.0) or a weaker relationship (the closer it is to 0). The numerical sign signifies the direction of the relationship. A single correlational observation cannot be used to infer causality, because we cannot determine which variable caused the other variable to change or if some third variable caused both to change. Psychologists also sometimes use qualitative designs to do research: *ethnography*, which is used to find behavior patterns through interviews and observation; *naturalistic observation*, in which behavior is observed in its natural setting; and *case studies*, in which a single individual is studied extensively and usually over a period of time to reveal recurring patterns. Qualitative designs have a number of limiting factors, including inability to draw causal inferences, limits on the use of statistical tests, subjectivity, and reliance on memory.

Outline

I. The second most widely used research method in psychology is *correlational observation*.

A. When correlational observation is used, no independent variable is manipulated.

1. In correlational observation, the researcher attempts to determine whether there is a relationship between two behaviors that are usually both under the control of the subject.

2. If we were trying to relate viewing violence on TV to aggression in children, we might have parents keep a TV log to determine the average level of violence of the shows watched and ask teachers to rate the aggressiveness of each child.

B. To determine whether there was a relationship between violence and aggression, a statistical computation could be used to find the correlation coefficient.

1. A correlation coefficient of 1.0 indicates that one variable is perfectly predictable from the other.

2. A correlation coefficient of 0 indicates that neither variable is useful in predicting the other one.

3. A correlation coefficient with a + sign indicates that as one variable increases, the other increases; a – sign indicates that as one variable increases, the other decreases.

C. Because no variable is independently manipulated, a single correlational observation cannot be used to establish causality.

1. In our TV research, even if we found a strong relationship between the average level of violence viewed on TV and the children's aggressiveness, we could not conclude that the TV viewing caused the aggressiveness.

2. One reason for our inability to establish causality is that, although the first variable might have caused the change in the second variable, alternatively, the second variable might have caused the change in the first. This is a problem of *directionality*.

3. For example, in our TV research, it may be that aggressive children choose to watch TV shows having more violence.

4. A second reason for our inability to infer causality is that a third variable that we haven't even measured might have unknowingly caused the relationship between the ones we measured.

5. In our TV research, perhaps aggressive parents teach their children to be aggressive and aggressive parents also pick more violent TV shows for their children to watch.

D. An additional example illustrating the difficulty in inferring causality from correlational data is an experiment that attempted to predict G.I. motorcycle accidents.

1. It was found that the more tattoos a G.I. had, the more motorcycle accidents he had.

2. Clearly, motorcycle accidents do not cause tattoos, nor do tattoos cause motorcycle accidents.

3. The tattoos and motorcycle accidents are probably related through a third variable, such as a preference for bodily risk.

E. Cigarette packs make a causal statement—that smoking causes health problems.

1. We knew many years ago that people who smoke have more health problems—a correlational observation.
2. But we can't make a causal statement from a correlational observation, and it was not until all other possible third variables were eliminated as possible causes through additional research that a causal statement could be made.

F. Surveys are usually done with correlational data—no independent variables have been manipulated. Surveys have the advantage of access to opinions, but because the data are correlational, we can't make causal statements from them.

G. We should also be wary of news headlines, which often make causal statements from correlational observations.

II. Experimentation and correlational observation are both considered quantitative research designs because the data collected are numerical, but qualitative designs are sometimes used in psychology, in which the data cannot be quantified.

A. *Ethnography* attempts to observe and collect data from those living in a particular culture or undergoing a common experience.

1. Ethnographers may interview individuals to understand common patterns of behavior.
2. Ethnographers sometimes set up focus groups that bring together individuals who have similar life experiences.

B. In *naturalistic observation*, behaviors are observed within their naturally occurring setting by an unobtrusive observer.

C. In *case-history research* (also called *case studies*) the behavior of a single individual is studied extensively and usually over a period of time in order to reveal recurring patterns.

D. Care must be taken in drawing conclusions from qualitative research.

1. Inferring causation is particularly dangerous because the data are correlational and, thus, no variable has been independently manipulated.
2. Most qualitative research does not lend itself to the standard statistical techniques used in quantitative research.
3. Interpretations of behaviors are typically more subjective and open to researcher biases.
4. Case-history research has the additional drawback of being based on data that may be subject to memory loss or distortion.

Essential Reading:

David Martin, *Doing Psychology Experiments*, 6th ed., chapter 1.

Supplementary Reading:

John Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 2nd ed., chapter 10.

W. R. Shadish, T. D. Cook, and D. T. Campbell, *Experimental and Quasi-experimental Designs for Generalized Causal Inference*.

Questions to Consider:

1. Can you think of a case where there would likely be a strong correlational relationship between two variables without a causal relationship?
2. Why do you think it took so long for a statement to be printed on the outside of cigarette packs warning that, in one way or another, smoking causes health problems?

Lecture Four
Evolutionary Theory and Modern Psychology

Scope: During most of the history of psychology, human behavior has been considered to be largely a function of environmental influences, with few innate behaviors. Recently, there has been a trend to view behavior within an evolutionary context. Charles Darwin proposed the theory of evolution, which requires three simple factors: inheritability, genetic variation, and selection. Further improvements to the theory were made by Mendel, Lorenz, Hamilton, Trivers, and Wilson. Evolutionary psychologists believe that this approach can help explain why humans behave the way they do. One common misunderstanding is that evolutionary psychologists attribute behavior solely to genetics; in actuality, evolutionary psychologists believe that behavior results from the interplay of genes with the environment. Another misconception is that built-in behavioral dispositions cannot be changed. A third misconception is that built-in behaviors are optimal when, in fact, mismatches may occur as a result of rapidly changing environmental conditions. Evolutionary psychology is not without its critics: Some claim that it is just a theory; others say that it is too post hoc and, thereby, irrefutable; and others fear that it may be used to rationalize social injustices.

Outline

I. Because of the dominance of behaviorism and cognitive psychology through much of the history of psychology, the role of experience was given predominance over the role of built-in behavioral predispositions.

- **A.** Behaviorists took the Lockean position that the organism is a blank slate to be written upon by experience and concluded that the study of learning should be the cornerstone of psychology.
- **B.** Cognitive psychologists adopted as a metaphor the unprogrammed computer, in which experience writes the software programs, and the primary study of psychology is of the information processing done by these cognitive programs.

II. A recent trend in psychology is to view human behavior in an evolutionary context, in which behavior is the result of an interplay between built-in evolutionary adaptations and environmental constraints.

- **A.** With his book *On the Origin of Species* (1859), Charles Darwin put forth the basic principles of evolution.
- **B.** Darwin proposed that there are three basic processes required for evolution to take place.
  - **1.** Although Darwin did not fully understand how it happens, he knew that there must be some way for inheritability to occur, for genetic material to be passed down through successive generations.
  - **2.** There must be variation (through mutation or sexual reproduction) in the genetic process.
  - **3.** There must be selection of some sort, such as natural selection.
- **C.** Subsequently, a number of improvements and revisions have been made to Darwin's basic evolutionary theory that allow it to be more easily applied to human behavior.
- **D.** An Austrian monk, Gregor Mendel, discovered that inheritance was *particulate*, that is, carried by discrete units called *genes* that are passed down to subsequent generations in an all-or-none manner.
- **E.** An ethologist, Konrad Lorenz, discovered that many animals have innate behavior patterns that have developed as evolutionary adaptations and are triggered by environmental cues.
  - **1.** One of Lorenz's more famous studies involved goslings following the first moving object they saw after hatching, which happened to be Lorenz, a phenomenon called *imprinting*.
  - **2.** In this case, a fixed behavior pattern (the following behavior), occurred in the presence of a sign stimulus (Lorenz).
- **F.** In 1964, the biologist William D. Hamilton proposed *inclusive fitness theory*, asserting that fitness includes not only an individual's reproductive success but also the reproductive success of genetic relatives, which introduced gene-level thinking.
- **G.** In the early 1970s, Robert Trivers proposed three theories that extended evolutionary thinking: reciprocal altruism, parental investment theory, and parent-offspring conflict.

1. *Reciprocal altruism theory* claims that reciprocal altruism has an adaptive advantage: If you do something good for someone, he or she will do something good for you later.
2. *Parental investment theory* claims that because women invest more time than men in the reproductive process and the raising of offspring, men and women may have differing value systems in picking mates.
3. The *parent/offspring conflict theory* suggests that conflicts arise because parents are related equally to all their offspring, while the offspring are related to each other by only 50% but to themselves by 100%; thus, their values are not equal to those of their parents.

H. In 1975, Edward O. Wilson published *Sociobiology: The New Synthesis*, proposing that evolutionary concepts could be applied to all animals, including humans.

I. Evolutionary thinking offers psychology the possibility of explaining not only the *what* and *how* of human behavior but also the *why*.

III. Several common misunderstandings have arisen about evolutionary theory as applied to human behavior.

A. One misunderstanding is a false nature-versus-nurture dichotomy.
1. Human behavior requires both evolved adaptations that are built into the individual and environmental conditions that activate these adaptations.
2. Sun-tanning is an example of the interaction of an adaptation, melanin synthesis, with the environment, causing uv_b exposure.
3. In a similar way, it is naïve to ask whether intelligence is the result of nature or nurture.

B. A second misunderstanding is that if an adaptation is built in, we cannot change it.
1. Because all behavior results from an interplay of nature with nurture, we can change behavior.
2. In the case of sun-tanning, we can control the shade of our skin by staying inside, covering our bodies, using sunscreen, and so on.
3. We can also change intelligence by manipulating the environment.

C. A third misunderstanding is that current adaptations are optimal.
1. Evolutionary change is a slow process, but the environment can change rapidly; for this reason, we can point to many cases of mismatches between adaptations that were optimal during a previous adaptation period and the current environment.
2. An example of a mismatch is humans' craving for fat and sugar and the minimization of unnecessary exercise, which was appropriate for an environment in which food was scarce, and the current environment, in which fat and sugar and exercise-saving machines are readily available, with the result obesity.

IV. We will discuss evolutionary psychology in more detail in future lectures, but in the meantime, keep in mind these caveats:

A. Although evolutionary theory is the most widely accepted theory in the scientific belief system about how we got to be the way we are, the scientific belief system itself is just a belief system and may compete with other personal belief systems.

B. Evolutionary psychology is sometimes criticized as being too post hoc and, because of this, able to explain any type of behavior.

C. There is a danger of applying the naturalistic fallacy that justifies our nature: If it is built in, it must be okay.

Essential Reading:
David M. Buss, *Evolutionary Psychology: The New Science of the Mind*.

Supplementary Reading:
Charles Darwin, *On the Origin of Species*.
Steven J. C. Gaulin and Donald H. McBurney, *Psychology: An Evolutionary Approach*.
John Dupré, *Human Nature and the Limits of Science*.

Questions to Consider:

1. What evidence would it take to convince you that a particular behavior (for example, monogamy) is an evolutionary adaptation rather than environmentally learned?
2. For what behaviors besides eating is there a mismatch between today's environment and our ancestors' environment of evolutionary adaptation?

Lecture Five
Freud's Thinking

Scope: Historically, the most prominent theory of personality is psychoanalytic theory, proposed by Sigmund Freud around 1900. Freud was a medical doctor who had patients with hysteria and, partly as a result of studying hypnotism, he began to believe that the unconscious level drives most of human behavior. Although Freud may not have been the first to propose the unconscious, he was the one who emphasized it as the largest component of the personality. This notion is now a major underlying concept that has led to many current policies and institutions. Freud also proposed that our personalities are made up of three parts. The *id* acts on a pleasure principle and, if unchecked, would cause us to behave in a hedonistic way. The *superego* operates on a moral principle and uses guilt to enforce rule-bound behavior. The *ego* operates on a reality principle and mediates between the id and the superego to determine appropriate behavior.

Outline

I. One of the major areas of psychology is the study of theories of personality, of which there are many.

A. For good or ill, the name most associated with psychology is Sigmund Freud, the father of the most famous personality theory, *psychoanalytic theory*, and psychoanalysis.

1. Freud was born in Moravia in 1856; moved to Vienna, Austria, at the age of four when his father's business failed; and studied medicine at the University of Vienna.

2. Freud was a rather unsuccessful physician in private practice until he began working with women having hysteria.

3. He studied hypnotism in Paris with Charcot, which helped to convince him of the power of the unconscious.

4. In 1900, he published *The Interpretation of Dreams* and, in 1901, *The Psychopathology of Everyday Life*, both of which introduced psychoanalytic theory.

B. The major cornerstone of psychoanalytic theory is the notion that our behavior is driven mainly by sexual and aggressive energy manifested at the unconscious level of the mind.

1. The unconscious is sometimes characterized as the submerged part of an iceberg; the part above water is the conscious level; and the waterline is a censoring mechanism preventing thoughts in the unconscious from entering the conscious level.

2. Freud believed that at the unconscious level, there are instincts from birth, one of which is the life force, or *libido*. This is largely made up of sexual energy.

3. Freud also talked about the death instinct, which exists at the unconscious level and may cause suicide or lead to aggressive behavior. Freud believed that efforts to suppress this instinct lead to conflict.

4. Although Freud is credited with inventing the notion of the unconscious, he was not the first to discuss the importance of the unconscious, as noted in an 1870 book by Henry Maudsley, *Body and Mind*.

5. Freud believed that all of behavior is determined, that there are no mistakes or accidents.

6. The notion of the unconscious permeates our society and forms the underpinnings of many of our institutions, such as our judicial system, prisons, and mental institutions.

II. Beyond the concept of the unconscious, Freud proposed that our personalities were made up of three conflicting entities.

A. The earliest and most basic part of the personality is the *id*.

1. The id operates on a pleasure principle: If it feels good, do it.

2. The id is built in at birth and is part of our basic physiology.

3. If we were solely id, we would take whatever we wanted in life without any consideration of others.

B. During childhood, with proper instruction from our parents and society, the *superego* is formed.

1. The superego operates on a moral principle and is a concept essentially equivalent to the conscience.

2. The superego contains all the rules, the dos and don'ts taught to us early in our lives.
3. The superego has guilt as its weapon against the pleasures of the id.
4. Obviously, the id and the superego have major conflicts, because many of the ways the id wants to behave are against the rules of the superego.

C. Acting as a mediator between the id and the superego is the *ego*.

1. The ego operates on a reality principle.
2. One role of the ego is to act as the referee between the id and the superego, giving each enough control to allow the game of life to be played.
3. As the ego develops strength, it begins to carry around a self-concept that can be used as a standard, so that each conflict between the id and superego does not have to be individually mediated.

Essential Reading:

Sigmund Freud, *Introductory Lectures on Psychoanalysis*.

Supplementary Reading:

F. C. Crews, *Unauthorized Freud*.

Robert Nye, *Three Psychologies: Perspectives from Freud, Skinner, and Rogers*, 4th ed., chapter 3.

Questions to Consider:

1. Do you think that most of behavior is driven by an unconscious level, and if so, what evidence would you cite to support that belief?
2. If hypnotism and dreams are not products of the unconscious, how else would you explain them?

Lecture Six
Details of Psychoanalytic Theory

Scope: Psychoanalytic theory proposes that psychosexual energy is focused on various anatomical parts during a series of developmental stages. During the oral stage, the energy is on activities of the mouth, such as eating, and insufficient gratification can lead to oral fixations, including overeating. During the anal stage, the focus is on toilet training, and fixations can lead to compulsive or slovenly behaviors. During the phallic stage, the focus is on dominance and aggressive activities, and fixation can involve undue competitiveness. During the genital phase, sharing, caring, mature relationships can occur. Boys go through an Oedipus conflict in which, unconsciously, they would like to sexually possess their mothers, but the father is in the way and might castrate them. This is resolved in the latent period, when boys learn to behave like dad in order to attract someone like mom. Girls discover they are missing a part and have penis envy, which leads them to want to possess dad or a boy child. During the latent period, they learn to act like mom as a wife and mother. Defense mechanisms are unconscious ways that we lie to ourselves to protect our psyches. These include: repression, rationalization, and projection. Some would argue that Freud's theory has outlived its usefulness in today's world, while others assert that parts of the theory are still applicable and that Freud's writings are valuable from a philosophical and literary point of view.

Outline

I. Psychoanalytic theory is a developmental theory and proposes that a person's psychosexual energy, called the *libido*, is cathected, or focused, on various anatomical parts; this process produces stages of development of the personality.

- **A.** In the earliest stage, the *oral stage*, energy is focused on the mouth, and oral activities give the most pleasure.
  - **1.** Especially during the first year of life, the baby is active in seeking out food and engaging in other oral activities, such as thumb sucking and teething.
  - **2.** If oral gratification is not sufficient, the person can get fixated on the oral stage, which might lead to such later-life activities as overeating, compulsive smoking, nail biting, and so on.
- **B.** The second stage, the *anal stage*, occurs at ages 2 to 4, and the energy is fixated on the anus.
  - **1.** During the anal stage, the child derives pleasure from anal activities, particularly those associated with toilet training.
  - **2.** If parents are too strict with toilet training, an anal compulsive fixation can occur, which in later life might be manifested in such behaviors as compulsive neatness.
  - **3.** If parents are too lenient in toilet training, the person might in later life be slovenly and disorganized.
- **C.** The third stage is the *phallic stage*, occurring about ages 3 to 5, in which the energy is focused on the (male) genitals.
  - **1.** During the phallic stage, energy is focused on the genitals, at least in little boys, and pleasure is derived from masturbatory behaviors and in behaviors related to dominance and aggression.
  - **2.** In the phallic stage, little boys begin to play aggressive games, such as war and king-of-the-hill, and to show dominance.
  - **3.** A fixation in the phallic stage can lead to adult behavior that overemphasizes competitiveness and treats women as trophies.
- **D.** After the third stage is the *latent period*, which is not really a stage and will be discussed later in this lecture.
- **E.** The last stage is called the *genital stage* and occurs around the time of puberty.
  - **1.** During the genital stage, energy is still focused on the genitals, but the focus is on developing caring/sharing relationships with significant others (of the opposite sex, according to Freud).
  - **2.** According to Freud, one cannot develop full maturity as a person unless the genital stage is achieved.

II. During the phallic stage and into the latent period, Freud proposed that some complex dynamics occur and that

these dynamics are different for boys than for girls.

A. During the phallic stage, when little boys are engaging in competitive activities and looking for prizes to be won, at the unconscious level, they discover that mom is the biggest prize and have yearnings to possess her sexually. This is called the *Oedipus conflict*.

1. An obvious impediment to the little boy's desire for his mother is his father.

2. At the unconscious level, the boy is afraid of his dad even to the point that, if his desire were known, dad might castrate him; this fear causes castration anxiety.

3. The resolution of this Oedipus conflict—the desire for mom with the fear of dad—is that the boy resolves to be like dad so that he can attract someone like mom.

4. The boy begins to behave like dad, and the latent period is needed to give the boy sufficient time to learn the sex-typed behavior to be like dad.

B. During the phallic stage, the little girl discovers she is missing an anatomical part and develops *penis envy*.

1. Her unconscious tells her that one way she can gain this missing part is to possess dad sexually; thus, she develops the female equivalent of the Oedipus conflict, sometimes called the *Electra conflict*.

2. A second way she could get a penis is to have a boy child.

3. Because mom is in the way, preventing her from possessing dad and having a child, she resolves the Electra conflict by deciding to become like mom, both as a wife and as a mother, and uses the latency period to learn the sex-typing that allows her to do this.

III. Because there is so much conflict present in the personality, such as the conflict among the id, superego, and ego, our personalities have developed unconscious ways of defending ourselves against the anxiety generated by conflict.

A. The way we deal with this anxiety is to use what are called *defense mechanisms*, which are lies we tell ourselves at the unconscious level.

1. Freud proposed a number of defense mechanisms, one of the most important of which is *repression*. This mechanism is used to keep unacceptable thoughts, feelings, and memories at an unconscious level and prevent these from reaching consciousness.

2. A second widely used defense mechanism is *rationalization*, which makes unacceptable and irrational behaviors appear rational.

3. *Projection* is a third defense mechanism, in which we deny our unacceptable characteristics and assign, or project, them onto other people.

B. Although some might argue that all defense mechanisms are bad because they are dishonest, others assert that when used in moderation, defense mechanisms lead to positive mental health outcomes.

1. A way to illustrate defense mechanisms is to draw a continuum from bad to good and have people indicate where on that continuum they fall.

2. The fact that the vast majority of people place themselves in the upper half ("good") of that continuum shows the power of defense mechanisms.

IV. Some psychologists today would argue that Freud's psychoanalytic theory has worn out its usefulness and is no longer relevant, while others maintain that there is still some usefulness to the theory.

A. Mikita Brottman argues that most psychologists consider Freud's theories to be absolutely irrelevant to modern science, but non-psychologists think that he is a valuable writer, theorist, and philosopher, much like Marx or Hegel.

B. Linda Peterson has written a tongue-in-cheek feminist version of psychoanalytic theory, proposing that little boys have vagina envy, which illustrates that the theory is largely semantic and not data-based.

C. I would argue that the concept of the unconscious has been quite valuable to modern society and still has social relevance.

D. It may also be the case that if one gets rid of the controversial anatomical names for the developmental stages, there may still be some validity to the concepts involved.

Essential Reading:
Sigmund Freud, *Introductory Lectures on Psychoanalysis*.

Supplementary Reading:
Mikita Brottman, "The Two Freuds," *The Chronicle of Higher Education*, July 9, 2004, p. B5.

Questions to Consider:
1. How would you go about collecting scientifically defensible evidence for the existence of Freud's psychosexual stages of development?
2. Do you think that psychoanalytic theory offers a language and conceptual structure that helps you understand behaviors and events in your life?

Lecture Seven
Classification of Mental Illnesses

Scope: The definition of abnormal behavior is multidimensional, a mixture of various criteria for determining whether a behavior pattern is normal. It is somewhat subjective and can change over time. Some of the criteria that can be used in this determination include the following: whether the behavior is statistically rare, whether the behavior violates social and moral norms, whether the behavior is so unpredictable that it causes safety concerns, and whether the behavior causes unhappiness. People have been trying to classify mental illness from the time of Hippocrates (400 B.C.) until today (DSM-IV–TR™). Today's system has increased its reliability by focusing on observable behaviors, rather than underlying theoretically based constructs. The system also has multiple axes that evaluate not only the clinical condition of a person but also whether the person has a personality disorder or mental retardation, whether there is a medical condition present, whether there are life stressors, and whether the person functions at a satisfactory level. In any particular year, more than 18% of the U.S. population will have mental disorders, with the most frequent being anxiety disorder (12%), substance abuse (6%), mood disorder (5%), and schizophrenia (1%).

Outline

I. Many criteria can be used to determine whether a person's behavior is normal or abnormal and whether the person has a mental disorder.

- **A.** One criterion is whether the person's behavior is statistically deviant, although this criterion by itself is not sufficient for inferring mental illness; for example, geniuses are rare, but that does not mean they are mentally ill.
- **B.** Another criterion is whether the person is violating the moral and social standards of society enough that it makes others uncomfortable. For example, exhibitionists may be of no danger to others, but they make us uncomfortable.
- **C.** Another criterion is whether the behavior is so unpredictable that we are unsure whether the person exhibiting the behavior may harm him- or herself or others.
- **D.** A final criterion is whether the person is unhappy with his or her condition.
- **E.** In most states and provinces, for a person to be committed to a mental facility, he or she must have a mental illness and must be of potential harm to others or to himself or herself.

II. Classification and treatment of mental disorders has a long history.

- **A.** What is the advantage of classifying mental illness?
  - **1.** The treatment depends on the classification.
  - **2.** An additional reason is that health insurance payments depend on the classification.
  - **3.** A disadvantage of classification is that it can become a self-fulfilling prophesy.
- **B.** We know from archeological digs that mental disorders were apparently treated by trephining, the process of chipping a hole in the skull.
- **C.** Hippocrates (460–377 B.C.), the father of medicine, offered the first classification of mental disorders, into three categories: mania, melancholia, and phrenitis (brain fever).
- **D.** From the Islamic tradition, Avicenna from Arabia (c. 980–1037) added epilepsy and hysteria to the list of disorders.
- **E.** Not much progress was made in the classification of mental illnesses through the Middle Ages and even up to the 20th century. Throughout this time, mental illness was considered to be caused by possession by demons.

F. Although some work was done on the classification of mental illnesses in the early part of the 20th century, a formal classification system was not introduced until 1952, when the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-I) was introduced in an attempt to standardize classification of soldiers from World War II.

G. Since the original DSM, there have been several revisions, leading to today's DSM-IV–TR™, which is more observation-based rather than theory-based.

III. In the next several lectures, we will use DSM-IV–TR™ to help us look at the major mental illnesses.

A. DSM-IV–TR™ actually has five axes on which people are classified, and a thorough diagnosis includes an evaluation of each of the axes.

1. Axis I lists all the possible clinical syndromes that may be the focus of clinical attention, such as schizophrenia and bipolar disorder.

2. Axis II contains personality disorders and mental retardation that a person may have in addition to a clinical syndrome.

3. Axis III is an evaluation of the person's general medical condition, such as having chronic pain or diabetes.

4. Axis IV evaluates psychosocial and environmental stressors that may have contributed to the person's problem.

5. Axis V is a global assessment of how the person is functioning at the current time.

B. Before looking in detail at the various mental disorders, it might be helpful to get some idea of the prevalence of the major types of disorders, using a recent study (Little, 2002) that estimated the 12-month prevalence of major disorders, excluding personality disorders.

1. Mental illness affects more than 37 million adults in America during a given year, or about 18.5% of the population.

2. Anxiety disorders affect nearly 12% of the population.

3. Mood disorders (such as depression and bipolar disorder) affect a little more than 5% of the population.

4. Substance-abuse disorders, including alcohol and drug abuse, affect about 6% of the population.

5. Schizophrenia affects about 1% of the population.

Essential Reading:

James Butcher, Susan Mineka, and Jill Hooley, *Abnormal Psychology*, 12th ed., chapters 1, 2, and 4.

Supplementary Reading:

American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed.

Questions to Consider:

1. For the following disorders, which of the criteria mentioned in item I above would be primary in determining whether the disorder was abnormal: depression, mental retardation, schizophrenia, and/or voyeurism (peeping)?

2. Do you think there are clear boundaries between the various classifications of mental disorders, or do you think that there are continua of behaviors with no clear boundaries?

Lecture Eight
Anxiety and Mood Disorders

Scope: Two of the major classifications of mental illness are anxiety and mood disorders. The former, which was earlier called *neurosis*, has as its major symptom a feeling of apprehension about possible danger. *Phobias* are undue fears of specific objects or situations, including fears of animals, natural environments, blood-injection-injury, and situations. Phobias are more prevalent in women and are treated with behavior therapies. *Panic disorders* involve activation of fight-or-flight responses with no appropriate stimulus. These occur and subside quickly and can lead to agoraphobia, fear of crowds. They are treated with both cognitive-behavioral therapies and drugs. *Generalized anxiety disorder* involves long-term worry about many life domains, with such symptoms as unhappiness or tension. Treatments include tranquilizers and cognitive-behavioral therapies. Mood disorders include *unipolar and bipolar depression*. Unipolar depression affects more women than men and includes the milder *dysthymia* and major depressive disorder, both of which are classified by the number and duration of symptoms. Treatments for depression include drugs, psychotherapies, and electroconvulsive therapy. Bipolar disorders include both depressive and manic episodes; the latter involves euphoric moods that are sometimes so severe that behavior becomes psychotic. Treatments for depressive phases are similar to those for unipolar depression and, for manic phases, include lithium and anticonvulsive and antipsychotic drugs.

Outline

I. *Anxiety disorders* are also sometimes called *neuroses* and have as a symptom a feeling of apprehension about possible danger.

A. A *phobia* is an undue fear of a specific object or situation that may cause avoidant behavior.

1. Animal subtype phobias include undue fear of snakes, spiders, dogs, and other animals.

2. Natural environment subtype includes fear of heights and water.

3. Blood-injection-injury subtype includes fear of hypodermic needles and the sight of blood.

4. Situational subtype includes fear of particular situations, such as flying in an airplane or riding in an elevator.

5. Atypical subtype includes fear of events that are difficult to classify, such as choking or vomiting.

6. The prevalence of phobias is about 16% for women and 7% for men.

7. Phobias can often be treated with behavior therapies, as will be discussed in a future lecture.

B. *Panic disorders* involve the unexpected activation of the fight-or-flight response of the sympathetic nervous system with no apparent appropriate stimulus.

1. A panic attack is often misidentified by the person experiencing it as a medical problem, such as a heart attack.

2. Panic attacks are distinguished from generalized anxiety by how quickly they develop (10 minutes) and subside (30 minutes).

3. Panic attacks sometimes lead to agoraphobia, the fear of crowds and public places.

4. The prevalence of panic disorders is about 5% for women and 2% for men.

5. Treatments for panic disorders include both cognitive-behavioral treatments and medications, such as minor tranquilizers and antidepressants.

C. *Generalized anxiety disorder* is characterized by chronic, excessive worry about life events.

1. In this case, the apprehension is not toward a specific situation or event but includes many concerns, such as work, money, relationships, and so on.

2. Symptoms include unhappiness, difficulty concentrating, tension, headaches, and sleep disturbances.

3. Treatments for generalized anxiety disorder include medications, such as minor tranquilizers, and cognitive-behavioral therapies.

D. *Obsessive-compulsive disorder* (OCD) is characterized by both intrusive, recurring thoughts and repetitive behaviors.

1. Obsessions are thoughts that are recurring, disturbing, and inappropriate.
2. Compulsions are difficult-to-resist behaviors that are usually highly repetitive.
3. Of those with OCD, up to 67% also are depressed.
4. Treatments for OCD include behavioral therapies and antidepressant drugs (especially selective serotonin reuptake inhibitors).

II. The two most common types of mood disorder are *unipolar depression* and *bipolar depression*.

A. Normal depressions that result from recent stress, such as the loss of a loved one, are not mood disorders.
1. Lifetime prevalence rates for unipolar depression are 13% in males and 21% in females.
2. The milder form of unipolar depression is called *dysthymia* and requires a person to have a depressed mood for most of the day, for more days than not, for at least 2 years and to have at least two of the following symptoms: appetite change, sleep disturbance, low energy, low self-esteem, concentration problems, and feelings of hopelessness.
3. Those with major depressive disorder must experience either depressed mood or loss of interest in pleasurable activities and three or four of the following (for a total of five symptoms): fatigue, sleep disturbance, appetite change, slowdown of activity, concentration difficulty, self-denunciation, and recurrent thoughts of death or suicide.
4. There is a recurrence of major depression in about 80% of cases.
5. Treatments for unipolar depression include antidepressant drugs (tricyclic and serotonin reuptake inhibitors), psychotherapies, and for severely depressed or drug-resistant patients, electroconvulsive therapy (ECT).

B. Bipolar disorders include both depressive episodes and manic episodes; the latter are characterized by markedly elevated or euphoric mood.
1. Lifetime risk for bipolar disorder is about 1%, with no sex differences.
2. The depressive episodes are largely indistinguishable from unipolar depression.
3. The manic phases may be so severe that patients become psychotic and have a break with reality.
4. Many of history's most creative people apparently had bipolar disorder and were most productive in the hypomanic phase, (for example, Robert Schumann and Virginia Woolf).
5. Treatments for the depressive phase are similar to those for unipolar depression; for manic episodes, lithium and anticonvulsive drugs are used for mood stabilization and antipsychotic drugs for psychotic symptoms.

C. A major risk with depressive disorders is suicide.
1. In the United States, suicide attempts are three to four times more likely in women than men, while completion rates are three to four times higher in men.
2. The highest rate of completed suicides is for those 65 years of age or older.
3. Among those who commit suicide, most have recently talked to family or friends about suicide or about death or dying, but only about 50% have seen a professional.

Essential Reading:
James Butcher, Susan Mineka, and Jill Hooley, *Abnormal Psychology*, 12th ed., chapters 6 and 7.

Supplementary Reading:
American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed.
Kay Redfield Jamison, *Touched with Fire: Manic-Depressive Illness and the Artistic Temperament*.

Questions to Consider:
1. Do you think that depression has any useful function in human life?
2. Do you think that bipolar disorder is just an extreme version of the normal mood swings we all go through, or do you think it is an entirely separate condition?

Lecture Nine
Disorders of Brain, Body, Self, Drugs, Sex

Scope: Cognitive disorders result from brain impairments that lead to disturbances of consciousness or deficits in cognition or memory. Alzheimer's disease is the most frequent cause, although stroke, Parkinson's disease, and injury are also possible causes. Somatoform disorders involve bodily complaints with no organic bases and include hypochondriasis, with complaints of one disease; somatization disorder, with complaints about multiple diseases; pain disorders; conversion disorders, which involve sensory or motor deficits; and body dysmorphic disorders, with perceived appearance flaws. Dissociative disorders include loss of self, called *depersonalization*; loss of memory, called *amnesia*; fugue, involving flight; and dissociative identity disorder, formerly called *multiple personalities*. Substance-related disorders involve physiological impairments due to substance abuse and the abuse itself. Sexual disorders involve dysfunctions, in which the disorder disturbs normal sexual functioning, and paraphilias, which involve a person receiving abnormal sexual gratification from objects, situations, or activities.

Outline

I. *Cognitive disorders* are the result of impairment of the brain.

A. Brain impairments can be of three types.

1. *Delirium* is characterized by a disturbance of consciousness that leads to confusion and disorientation; its most frequent cause is drug intoxication or withdrawal, particularly in the elderly.

2. *Dementia* is characterized by multiple cognitive deficits and usually involves impairment of memory.

3. *Amnestic disorders* are deficits in memory, usually without other cognitive impairments.

B. The most frequently occurring type of dementia is the result of Alzheimer's disease (56% of dementia cases).

1. Alzheimer's disease (AD) causes a slow but progressively deteriorating condition leading to death.

2. Although AD is increasingly likely with advancing age, early-onset AD may affect people in their 40s and 50s; early-onset AD is probably hereditary.

3. There are currently about 4 million people in the United States with AD, but this number is expected to triple in the next 50 years.

4. People with AD have protein plaques form on their brains that cause changes at both the neuronal level and the gross anatomical level.

5. There are currently no effective treatments for AD, although environmental interventions can improve quality of life.

C. Other major causes of dementia are stroke, Parkinson's disease, and brain injury.

D. The most frequently occurring cause of amnestic syndrome, which impairs memory, is chronic alcohol use.

II. *Soma* means body; thus, *somatoform disorders* involve conditions in which there are complaints about bodily symptoms or defects, but there are no corresponding organic bases.

A. With *hypochondriasis*, a person believes that he or she has a particular disease and the symptoms associated with that disease when physical exams fail to show medical abnormalities.

1. Those with hypochondriasis often are preoccupied by bodily functions, and this preoccupation persists for long periods of time (a minimum of 6 months).

2. Cognitive behavioral therapies show some benefit for this disorder.

B. *Somatization disorder* is similar to hypochondriasis but involves multiple physical complaints, including at a minimum, four pain symptoms, two gastrointestinal symptoms, one sexual symptom, and one pseudoneurological symptom.

C. *Pain disorders* involve persistent and severe pain in some area or areas of the body for which no medical condition can be found.

D. *Conversion disorder* is characterized by symptoms and deficits in sensory or motor functions of the body that cannot be explained by a medical condition, for example, partial paralysis or deafness.

E. A person with *body dysmorphic disorder* believes that he or she has a major bodily flaw that negatively affects his or her appearance to the extent that the person cannot function normally in social or work settings.

III. With *dissociative disorders*, some part of the normally well-integrated self becomes dissociated, or separated, from the other parts.

A. *Depersonalization* occurs when the sense of self is temporarily lost and the person feels that he or she does not really exist or is detached from reality.

B. *Dissociative amnesia* occurs when there is a memory loss, usually about the events in one's life or one's identity, for a period of time, but there is no physical precipitating condition.

C. *Fugue* means flight. With *dissociative fugue*, the person takes flight from his or her current life, begins a new life in a new location, and has amnesia of the previous life.

D. *Dissociative identity disorder*, formerly called *multiple personality disorder* or, more colloquially, *split personality*, is characterized by the person taking on two or more distinct identities.

1. Note that this disorder is entirely separate from schizophrenia.
2. The alter identities usually have no knowledge of the other identities, and switches between identities usually occur within seconds.
3. Only 200 cases of dissociative identity disorder could be found prior to 1979, whereas in 1999, more than 30,000 cases had been reported.
4. Part of the increased incidence may be due to the highly controversial possibility that some therapists are promoting the disorder, particularly for women who believe they have suffered childhood abuse.

IV. *Substance-related disorders* may include problems that occur as a result of taking a drug of abuse, the side effects of medication, or toxin exposure. (Most of the details of the first and largest category, drugs of abuse, will be discussed in a future lecture.)

A. One subcategory includes actual physiological impairments that are the result of prolonged and excessive ingestion of psychoactive drugs, such as alcohol abuse disorder (Korsakoff's syndrome).

B. The second major category includes addictive disorders resulting from the use of a substance.

1. *Substance abuse* involves the pathological use of a substance that results in hazardous behavior or the continued use of the substance even in the face of negative consequences.
2. *Substance dependence* is the physiological need for a substance to the point that tolerance develops and withdrawal symptoms can occur.

V. Sexual and gender-identity disorders group into three general categories that include *sexual dysfunctions*, *paraphilias*, and *gender-identity disorders*.

A. Someone who has a sexual dysfunction has a disturbance in sexual desire and the corresponding physiological reactions to the point that distress and interpersonal difficulty occur.

1. Included in sexual dysfunctions are dysfunctions of sexual desire, such as hyposexual desire, in which there is little interest in sex, and sexual aversion disorder, in which sexual contact is avoided.
2. Dysfunctions of sexual arousal include male erectile disorder (formerly *impotence*) and female sexual arousal disorder (formerly *frigidity*).
3. Dysfunctions of orgasm include premature ejaculation in men and inability to achieve orgasm in both sexes.
4. Sexual pain disorders occur when intercourse results in pain.

B. Paraphilias are characterized by frequent sexual urges, fantasies, or behaviors that involve unusual objects, activities, or situations and cause distress.

1. Note that homosexuality was once listed under this category; it was voted off the list in 1973 and is no longer considered a mental disorder but a normal alternative lifestyle.
2. Fetishism involves a person receiving sexual gratification from the use of an inanimate object, such as an article of clothing, or a body part not normally considered sexually arousing.
3. Transvestic fetishism involves a man receiving sexual gratification by dressing in women's clothing.
4. Voyeurism, which is commonly called peeping, occurs when a man receives sexual gratification by observing unsuspecting women in a state of undress or engaged in sexual activity.

5. Exhibitionism (indecent exposure or flashing) involves exposing one's genitals to others inappropriately and without consent.
6. Sadism involves receiving sexual pleasure by inflicting pain on someone else.
7. Sexual masochism involves deriving sexual pleasure from receiving pain.
8. Frotteurism involves deriving sexual pleasure from touching or rubbing against someone without his or her consent.
9. Pedophilia involves sexual activity with a child.
10. There is also a catchall category for less frequently occurring paraphilias, such as sexual activities with corpses or animals.

C. Gender-identity disorder occurs when one has a strong cross-gender identification and a persistent discomfort with one's assigned sex.

Essential Reading:
James Butcher, Susan Mineka, and Jill Hooley, *Abnormal Psychology*, 12th ed., chapters 15, 8, 12, and 13.

Supplementary Reading:
American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed.

S. O. Lilienfeld, et al., "Dissociative identity disorder and the sociocognitive model: Recalling lessons of the past," *Psychological Bulletin* 125 (1999), pp. 507–523.

Questions to Consider:
1. How would you ever know whether someone who was acting out multiple identities actually had dissociative identity disorder or was faking it?
2. What do you think is different about homosexuality that makes mental health professionals consider it an alternative lifestyle and not a paraphilia?

Lecture Ten
Schizophrenic Disorders

Scope: Schizophrenia is a psychotic disorder in which there is a break with reality and such positive symptoms as delusions (false beliefs), hallucinations (false perceptions), and disorganized speech and behaviors. Negative symptoms include emotional flattening, lessened speech, and deficient will. Schizophrenia occurs in 1% of the population, most often in late adolescence to early adulthood and, in men, earlier and more severely. The primary symptom for paranoid schizophrenia is persecutory delusions. In disorganized schizophrenia, there is not only disorganized behavior but also inappropriate emotions. Catatonic schizophrenia is usually associated with fixed posturing. Undifferentiated type is a catchall category, and residual type is for those who have been schizophrenic but do not currently exhibit positive symptoms. Although the specific causes of schizophrenia are still uncertain, there is evidence of genetic involvement, prenatal involvement, and anatomical and neuronal involvement, as well as family environmental influences.

Outline

I. *Schizophrenia* is a psychotic disorder or, more probably, a set of disorders, in which there is a break with reality, as well as other symptoms.

A. Schizophrenia includes positive symptoms, in which there is an excess or distortion of normal behavior.

1. *Delusions* are false beliefs that are held even in the face of contradictory evidence (for example, "I am the king of Prussia"), experienced by about 90% of schizophrenic patients.

2. *Hallucinations* are sensory events, usually auditory in nature for schizophrenia, for which there are no precipitating physical stimuli, experienced by about 75% of schizophrenic patients.

3. Schizophrenic patients also often have disorganized speech, in which they fail to make sense, even to the point of making up their own words, called *neologisms*.

4. Patients also usually have disorganized behavior in such areas as hygiene, dress, health, and personal interactions, and in the extreme case, they may exhibit catatonic behavior in the form of postural immobility.

B. Schizophrenia also includes negative symptoms, in which there is an absence of normally occurring behaviors, such as a flattening of emotions, lessened speech (*alogia*), and deficient will (*avolition*).

C. Many factors influence the likelihood of the onset of schizophrenia.

1. Schizophrenia occurs in about 1% of the population.

2. The most frequent onset time of the disorder is late adolescence to early adulthood, but this varies some with gender.

3. Schizophrenia occurs earlier in men than women and is usually more severe in men.

4. Children born to older fathers have a higher risk.

II. There are several different subtypes of schizophrenia, and these may, in fact, be different diseases.

A. In *paranoid-type* schizophrenic patients, the major symptom, besides a break with reality, is a pervasive belief that they are being persecuted.

1. The persecutory delusions are often quite elaborate, involving convoluted stories of multiple enemies and delusions of grandeur.

2. Cognitive functioning of this subtype is usually higher than other subtypes, and the prognosis for recovery is often better.

B. *Disorganized type*, which was once called *hebephrenic schizophrenia*, occurs earlier and more gradually and involves symptoms of disorganized behavior and speech and inappropriate emotions.

1. In this subtype, the inappropriate emotions are often characterized by inappropriate laughter and giggling.

2. Hallucinations or delusions may be present but are not elaborate or organized.

3. Bizarre behaviors are often present.

4. Prognosis for disorganized-type schizophrenia is poor, and patients are often institutionalized for long periods.

C. *Catatonic-type schizophrenic* patients appear to become unresponsive to the world around them, either by going into a stupor and maintaining a fixed posture or by becoming quite excited and agitated, much like the manic phase of a bipolar patient.

D. *Undifferentiated schizophrenia* is a catchall category for those who exhibit many of the symptoms of schizophrenia but do not fit neatly into one of the other subtypes.

E. People with *residual-type schizophrenia* have at one time had schizophrenia but are not currently showing any severe positive symptoms, although negative symptoms are still present.

III. The precise cause of schizophrenia is unknown although a number of factors influence the disorder and can help us infer what the cause or causes may be.

A. There is a clear genetic connection, apparent from studies in which the percentage of incidence of schizophrenia was determined for someone related in various ways to a relative with schizophrenia, as follows: identical twins, about 50%; first-degree relative (such as a sibling), about 10%; second-degree relative (such as a nephew or niece), about 5%; third-degree relative (such as a first cousin), about 2%.

B. Genetic studies have shown that at least four chromosomes might contain genes that are related to schizophrenia.

C. The prenatal environment also appears to be related to the incidence of schizophrenia in later life, with viral infections, Rh blood incompatibility with the mother, malnutrition, and delivery problems all implicated.

D. Brain volume is related to schizophrenia in some but not all patients.

E. Neurons in the central nervous system communicate by means of chemicals called *neurotransmitters*, and several of these, such as dopamine and glutamate, are related to schizophrenia.

F. The degree of emotional tension in families has also been shown to be related to how often schizophrenic patients return to the hospital.

Essential Reading:

James Butcher, Susan Mineka, and Jill Hooley, *Abnormal Psychology*, 12th ed., chapter 14.

Supplementary Reading:

American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed.

I. I. Gottesman, "Psychopathology through a life span-genetic prism," *American Psychologist* 56 (2001), pp. 867–878.

Mark Vonnegut, *The Eden Express*.

Questions to Consider:

1. In the word *schizophrenia*, *schizo* does mean "split," but if the split is not split personalities (as in dissociative identity disorder), what is being split?
2. If schizophrenia were an entirely genetic disorder, then identical twins, who are 100% genetically related, should always both be schizophrenic or not, but we know that when one is schizophrenic, the other is schizophrenic only 50% of the time. Why?

Lecture Eleven
Childhood, Retardation, Personality Disorders

Scope: Disorders usually diagnosed in infancy, childhood, or adolescence constitute a large category containing many learning, motor-skills, and communication problems experienced by children. One of the largest of these is attention-deficit/hyperactivity disorder, in which the child has impulsivity and overactivity problems. It occurs in up to 5% of children—much more frequently in boys—leads to lowered IQ scores, and is sometimes medicated by Ritalin. Autistic children seem to be cut off from the external world, have problems with social skills and speech, and engage in self-stimulation. Those with Tourette's syndrome have uncontrollable vocal and motor outbursts. Mental retardation is the diagnosis for someone under 18 years old who has significantly subaverage intelligence and limitations on functioning. It can be caused by genetic factors, infections and toxic agents, birth traumas, radiation, or dietary deficiencies. The degrees of severity are largely defined by IQ ranges and vary from mild, in which sixth-grade academic skills and self-support are possible, through moderate, severe, and profound, in which constant supervision and custodial care are necessary. Personality disorders are relatively permanent and inflexible patterns of interpersonal difficulties and problems with the sense of self that are categorized as paranoid, schizoid, schizotypal, antisocial, borderline, histrionic, narcissistic, avoidant, dependent, and obsessive-compulsive.

Outline

I. Disorders usually first diagnosed in infancy, childhood, or adolescence constitute a category that includes many learning, motor-skills, and communication disorders experienced by children for which parents might seek help, as well as some other notable disorders that we will discuss in more detail.

A. With *attention-deficit/hyperactivity disorder* (ADHD) the child has impulsivity and overactivity that interfere with schoolwork and interpersonal relations.

1. ADHD occurs in about 3% to 5% of school-aged children and is 6 to 9 times more prevalent in boys than girls.

2. Evolutionary psychology offers an explanation for ADHD in that our ancestors' children would have been physically active all day and not forced to sit still in a school room, behavior that is, from an evolutionary standpoint, unnatural.

3. Because of their behavior problems, children with ADHD test 7 to 15 points lower on IQ tests.

4. The question of whether ADHD continues beyond adolescence is somewhat controversial.

5. The most frequently prescribed medication for ADHD is Ritalin, which is found to be effective in about 75% of cases; ironically, Ritalin is an amphetamine, a stimulant.

B. With *autism*, children seem to cut themselves off from the external world, causing deficits in language, perception, and motor development, as well as difficulties functioning in social situations.

1. Autism occurs in 5 to 7 children out of every 10,000 and is 2 to 4 times more prevalent in boys than girls.

2. Autistic children seem to lack the ability to empathize, to put themselves in other people's places, and this inability leads to very poor social skills.

3. Without massive training, autistic children have severe deficits in speech and engage in such behaviors as *echolalia*, the parrot-like repeating of words and phrases.

4. Autistic children also engage in self-stimulation, such as spinning or rocking, and sometimes self-destructive behaviors, such as head banging.

5. Autistic children show significant intellectual deficits but sometimes have special abilities in a narrowly defined cognitive area. Such children are known as *savants*.

6. Medications have proved largely ineffective for autism. However, behavior therapies (which will be discussed in a future lecture) can be effective in bringing behaviors closer to a normal range.

7. Some adult autistic advocacy groups are now arguing that autism should not be treated as a mental disorder but that autistic individuals should be considered as having different talents and ways of behaving.

C. *Tourette's syndrome* is a tic disorder in which there can be inappropriate movements and vocal behaviors.

1. Those with Tourette's syndrome seem to have a build-up of tension that is relieved by an outburst that may include shouts, snorts, yelps, or words.
2. In about one-third of the cases, the vocal outburst may include speaking obscenities.
3. Tourette's syndrome usually begins around the age of 7 and lasts into adulthood.
4. Antipsychotic medications are sometimes effective, and behavioral therapies also sometimes show positive effects.

II. *Mental retardation* is the classification for someone under 18 years of age who has significantly subaverage intelligence and significant limitations in adaptive functioning in at least two areas, such as communication, self-care, academic skills, work, or health and safety.

A. Mental retardation can be caused by many factors.

1. Genetic factors are apparent in that mental retardation tends to run in families and in such conditions as Down syndrome, which is particularly prevalent for older mothers and fathers and is attributable to an extra chromosome.
2. Infections and toxic agents can increase the probability of mental retardation, such as prenatal German measles and alcohol intoxication.
3. Physical birth traumas, such as insufficient oxygen, can also cause mental retardation.
4. Although less frequent today than in the past, radiation, such as exposure to x-rays, may also be implicated.
5. Finally, prenatal dietary deficiencies can cause deficits.

B. The degrees of severity are defined by intelligence quotient (IQ) levels.

1. With mild mental retardation (IQ 50–55 to 70), which is the largest category (85% of cases), the person can acquire sixth-grade academic skills and can achieve social and vocational skills adequate for self-support.
2. With moderate mental retardation (IQ 35–40 to 50–55), constituting about 10% of cases, the person can achieve only second-grade academic skills but can be vocationally trained for unskilled or semiskilled work under supervision.
3. With severe mental retardation (IQ 20–25 to 35–40), constituting 3%–4% of cases, the person may eventually learn to talk and can be trained in self-care skills but cannot derive much benefit from academic training, although in most cases, the person can live at home or in a closely supervised group home.
4. With profound mental retardation (IQ below 20–25), constituting 1% to 2% of cases, the person usually has considerable impairment in functioning and needs constant supervision and custodial care.

III. *Personality disorders* (PD) have an onset in adolescence or early adulthood; these are relatively permanent and inflexible patterns of interpersonal difficulties and problems with one's sense of self.

A. Someone with a *paranoid PD* distrusts others and is suspicious of people's motives, although there is not a serious break with reality, as in paranoid schizophrenia.

B. Someone with a *schizoid PD* is perceived as cold and uncaring, is detached from social relationships, expresses little emotion, and has no desire to form close relationships.

C. Someone with *schizotypal PD* has peculiar thoughts and speech that interfere with social relationships; these symptoms seem similar to a mild form of schizophrenia.

D. Someone with *antisocial PD* disregards and violates other people's rights and feelings and refuses to follow ethical rules of behavior.

E. Someone with *borderline PD* has marked impulsivity, instability in interpersonal relationships, and sometimes self-destructive behaviors, such as self-mutilation.

F. Someone with *histrionic PD* has excessive emotionality and engages in attention-seeking behaviors, including acting in an infantile manner.

G. Someone with a *narcissistic PD* has a pattern of grandiosity with a need for admiration and lack of empathy.

H. Someone with *avoidant PD* tries to avoid social interaction because of feelings of insecurity and fear of being negatively evaluated.

I. Someone with *dependent PD* needs to be taken care of and develops a submissive and clinging personality.

J. Someone with *obsessive-compulsive PD* shows a preoccupation with orderliness, perfection, and control but does not exhibit true obsessions or compulsive rituals shown by people with obsessive-compulsive disorder.

Essential Reading:

James Butcher, Susan Mineka, and Jill Hooley, *Abnormal Psychology*, 12th ed., chapters 11 and 16.

Supplementary Reading:

American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed.

Questions to Consider:

1. Some argue that ADHD is over-diagnosed and is actually appropriate evolved behavior, particularly in little boys; in other words, that it was a useful adaptation for getting boys to move around actively in order to learn hunting skills. What do you think about this argument?
2. Many people with personality disorders think that they are perfectly okay; they like their personalities. What criteria should mental health professionals use to distinguish between someone who is a little odd and someone with a true personality disorder?

Lecture Twelve
Physical Therapies—Drugs

Scope: If it is assumed that biology is the primary cause of mental illnesses, then interventions to correct the illnesses should be biological in nature. In particular, if problems exist in biochemistry at the level of the neuron, then a psychopharmacological intervention would seem appropriate. Neurons communicate with one another by means of releasing neurotransmitter substances into the synapses between them. Most drugs work by manipulating the release, reception, or reuptake of neurotransmitters. Antipsychotic drugs have had a major impact on the number of patients in mental hospitals. Traditional antipsychotic drugs are effective but treat only the positive symptoms of psychosis and can have rather severe side effects, such as movement disorders. More recently, use of atypical antipsychotic drugs has become widespread. These drugs treat both negative and positive symptoms and do not have movement side effects. The original MAO-inhibiting and tricyclic antidepressants have been supplanted by selective serotonin reuptake inhibitors, such as Prozac, that are relatively safe and effective. The most widely prescribed antianxiety drugs are tranquilizers, such as Valium, which are quite effective, although sometimes addictive. Naturally occurring lithium and other manufactured drugs are used to control the manic phase of bipolar disorder.

Outline

I. The physical therapies used to correct mental disorders are based on the assumption that the primary causes of the disorders are biological in nature; therefore, interventions ought to be at a physiological level and, in the case of pharmacological interventions, usually at the neuronal level.

- **A.** Much of human behavior is controlled by neural impulses. Neurons communicate by releasing transmitter substances into the small space between neurons called the *synapse* or *synaptic cleft*.
- **B.** Packets of neurotransmitter substances are manufactured in the presynaptic neuron and released into the synapse.
- **C.** If there is a proper match, some of the neurotransmitters may be absorbed at receptor sites in the postsynaptic neuron, making that neuron more or less likely to fire.
- **D.** Some of the neurotransmitter substances may also be reabsorbed by the presynaptic neuron in a process called *reuptake*.
- **E.** Many drugs used in psychopharmacological interventions operate by changing the amount of transmitter substance manufactured, by blocking the receptor sites, or by blocking the reuptake of the transmitter substance.

II. Antipsychotic drugs, sometimes also called *neuroleptics* or *major tranquilizers*, are used to treat psychotic disorders associated with schizophrenia or severe mood disorders.

- **A.** These drugs were invented in the mid-1950s and have had a profound effect on the number of patients in mental hospitals and the quality of life of those with psychosis.
- **B.** Of patients treated with traditional antipsychotic drugs, positive symptoms (such as hallucinations and delusions) have been eliminated in approximately 60% of the cases within about 6 weeks, compared with those receiving placebos, 20% of whom have corrected symptoms.
- **C.** Although use of these drugs has reduced the number of patients in institutions, the disorder is not cured, and when patients discontinue using the drugs, they may be repeatedly hospitalized.
- **D.** A major side effect of traditional antipsychotic drugs is movement disorders, the most serious of which is Tardive dyskinesia, a relatively permanent disorder leading to bizarre repetitive movements of the face, tongue, hands, and feet.
- **E.** Within the past decade and a half, atypical antipsychotic drugs have been invented, such as Clozaril, that do not have movement side effects because they are not based on the manipulation of the transmitter substance dopamine, which is also instrumental in movement.
- **F.** These atypical drugs appear to be effective in treating both positive and negative symptoms, such as flattened affect and apathy.

G. Unfortunately, in about 1% of cases, Clozaril can cause a serious side effect called *agranulocytosis*, a drop in white blood cells.

H. However, other variants of atypical drugs do not have this problem; for this reason, atypical drugs are now considered preferable to traditional antipsychotic drugs.

III. The original antidepressant drugs were monoamine oxidase (MAO) inhibitors first used in the 1950s; these inhibit an enzyme in the synapse that helps break down serotonin and norepinephrine.

A. The tricyclic antidepressants have also been around for quite a while; and operate by inhibiting the reuptake of norepinephrine and, to some extent, serotonin.

B. A more effective and less dangerous class of antidepressant drugs was released in 1988, selective serotonin reuptake inhibitors (SSRIs). This class includes the most widely prescribed antidepressant in the world, Prozac.

C. The SSRIs block the reuptake of only serotonin and are much more widely prescribed than the older class of drugs because they have fewer side effects and are not fatal when overdosed.

D. Several other antidepressants are on the market that block both serotonin and norepinephrine (SNRI); others, such as Wellbutrin, are not related to either SSRIs or SNRIs.

E. Although the recent generations of antidepressants are quite effective, they are sometimes prescribed inappropriately for those without serious depressive disorders, and there are some data indicating a link to teenage suicide.

IV. The original antianxiety drugs were the barbiturates, but because of dangers associated with them, these are seldom used today except to control seizures.

A. In the 1960s, tranquilizers, technically known as *benzodiazepines*, became the drugs most widely prescribed for anxiety symptoms.

B. These drugs, such as Valium, are quite effective at lower doses in relieving anxiety symptoms and at higher doses in sedating patients.

C. Although generally considered safe, tranquilizers can be addictive and can cause withdrawal symptoms.

V. Lithium and some other drugs can be used to control the manic phase of bipolar disorder.

A. Lithium was discovered in the 1940s in Australia but was not used in the United States until 1970.

B. It is unclear why lithium works to control mood; although it is effective in many cases (70% to 80% of cases show improvement), it can be highly toxic and dosages must be carefully monitored.

C. Several other newer drugs can now be used in treating bipolar disorder in addition to lithium.

Essential Reading:

James Butcher, Susan Mineka, and Jill Hooley, *Abnormal Psychology*, 12th ed., chapter 17.

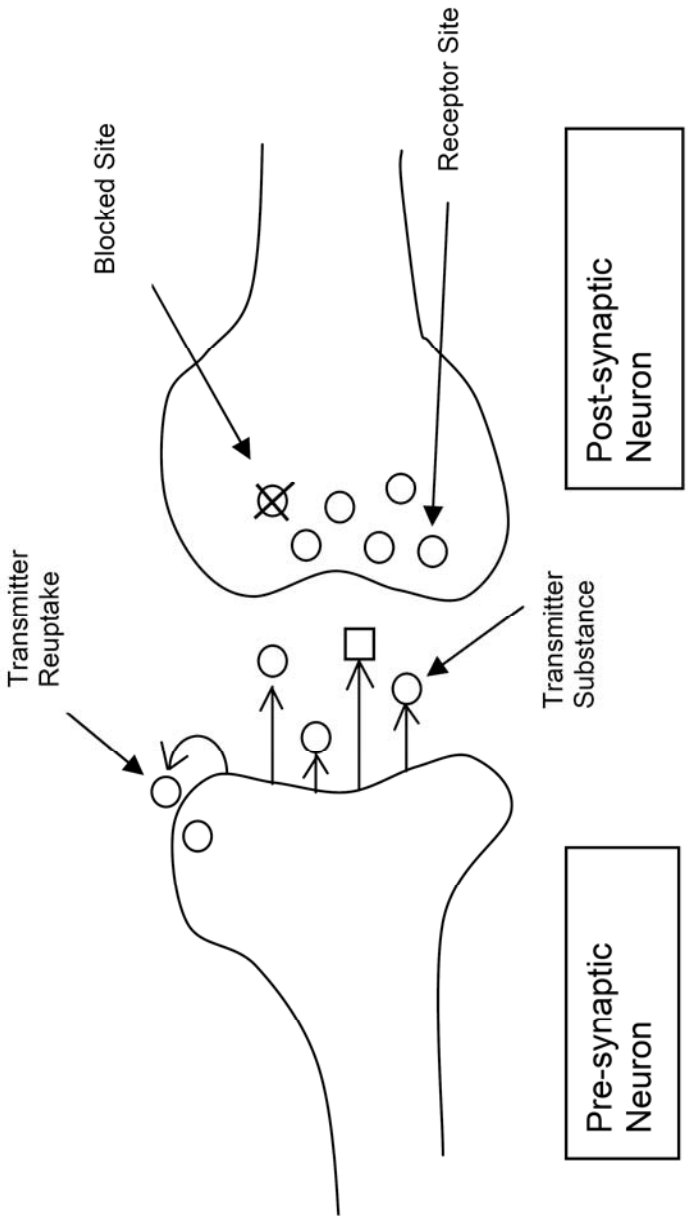
Supplementary Reading:

Peter Nathan and J. M. Gorman, eds., *A Guide to Treatments That Work*.

Questions to Consider:

1. Given that none of the drugs mentioned in this lecture can cure mental illness (they all just treat symptoms), what kind of therapy do you think it will take to actually provide a cure?

2. Most psychologists think that mental illnesses are caused by the interplay of our biology with our life experiences. If this is the case, how likely do you think it is that we can effectively treat mental illnesses solely using biological interventions (drugs)?



Timeline

1662 ..... René Descartes publishes *Treatise on Man*, proposing a mind-body dualism.

1690 ..... John Locke publishes *Essay Concerning Human Understanding*, stating, "There is nothing in the mind that was not first in the senses."

1739 ..... David Hume publishes *A Treatise of Human Nature*, claiming that the mind is a collection of sensory impressions linked by associations.

1834 ..... Ernst Weber publishes *On Touch: Anatomical and Physiological Notes*, demonstrating the quantification of mental operations.

1871 ..... Charles Darwin publishes *The Descent of Man*, applying evolutionary theory to humans.

1879 ..... Wilhelm Wundt establishes the first psychological laboratory in Leipzig, Germany.

1890 ..... William James publishes *The Principles of Psychology*, introducing the empirical science of psychology to America.

1900 ..... Sigmund Freud publishes *The Interpretation of Dreams*, his first major work on psychoanalytic theory.

c. 1906 ..... Ivan Pavlov discovers classical conditioning, although *Conditioned Reflexes: An Investigation of the Physiological Activity of the Cerebral Cortex* was not published until 1927.

1913 ..... John Watson publishes an article in *Psychological Review* introducing the concepts of behaviorist psychology.

1950 ..... B. F. Skinner publishes a paper titled "Are theories of learning necessary?" arguing that psychology should build its science only on observable behaviors.

1967 ..... Ulric Neisser publishes *Cognitive Psychology*, arguing that mental operations can be studied scientifically.

1975 ..... Edward O. Wilson publishes *Sociobiology: The New Synthesis*, claiming that modern evolutionary theory can explain much of human behavior.

Glossary

Alzheimer's disease: A cognitive disorder usually associated with older adults, characterized by progressive deterioration of cognitive functions, particularly memory.

Anal stage: In psychoanalytic theory, the developmental stage in which psychosexual energy is focused on the anus and anal activities, such as toilet training.

Antipsychotic drugs: A category of psychopharmacological intervention used to alleviate the symptoms of psychosis; this classification includes both traditional drugs that treat positive symptoms and atypical drugs that treat negative symptoms and have fewer undesirable side effects.

Anxiety disorders: The classification of mental disorders, formerly called *neuroses*, in which the major symptom is apprehension of possible danger.

Autism: A mental disorder that begins in childhood and is characterized by a disconnect from the social world, problems with social skills and speech, and self-stimulation.

Avoidance learning: A type of learning in which a stimulus that is paired with an aversive event signals the organism, which can then behave in a way to avoid the aversive event.

Behavior therapies: A classification of therapies based on the assumption that inappropriate classical or operant conditioning has taken place, in which the goal of therapy is to set up the conditions for appropriate re-learning to occur.

Behaviorism: A school of thought in psychology having its major influence from the early 1900s through about 1970, in which the mind was ignored and only behavior was considered the appropriate subject matter.

Biofeedback: A behavior therapy in which operant conditioning is used to condition a biological response normally considered to be involuntary.

Bipolar depression: A classification of mental disorders characterized by mood swings between depression and mania.

Cannon-Bard theory: A theory of emotion proposing that a stimulus causes a change in activation of the thalamus in the brain that then simultaneously sends messages to the cortex, interpreted as emotion, and to the physiological systems.

Classical conditioning: A type of basic learning discovered by Ivan Pavlov; an unconditioned stimulus, which automatically brings about an unconditioned response, is repeatedly paired with a conditioned stimulus until the conditioned stimulus comes to evoke a conditioned response.

Cognitive disorder: A classification of mental disorders that results from brain impairments leading to disturbances of consciousness or deficits in cognition or memory.

Cognitive-labeling theory: A theory of emotion proposed by Stanley Schachter, proposing that a stimulus causes generalized physiological activation, which then, depending on the context, is labeled as a particular emotion.

Cognitive psychology: A school of thought in psychology having its major influence beginning in the late 1960s through today, in which it is considered appropriate to use various methods to determine the flow of information and processing stages in the brain.

Cognitive therapy: A classification of therapies based on the goal of helping clients understand their thoughts and feelings so that they can reprogram these to achieve greater happiness and success.

Concept formation: A type of learning in which the individual must learn the defining dimensions of a concept by experiencing instances that confirm or disconfirm that concept.

Confounding variable: In an experiment, a circumstance with levels that are correlated with the levels of the independent variable, such that any change in the dependent variable could be due either to changes in the independent variable or changes in the confounding variable.

Consolidation theory: A theory of forgetting that proposes that time is required for memory traces to consolidate, that is, to become permanent enough that they cannot be interfered with by other salient events.

Control variable: In an experiment, a circumstance set by the experimenter at a particular level and not allowed to vary.

Correlational observation: A research method in which the statistical relationship between two or more variables can be determined, but the causality of this relationship cannot be determined.

Decay theory: A theory of memory that attributes memory loss to the fading of a memory trace as a result of the passage of time.

Depressant: A psychoactive drug that has a calming effect on the user.

Developmental psychology: The branch of psychology concerned with studying behavior across the lifespan.

Diagnostic and Statistical Manual of Mental Disorders: A document published by the American Psychiatric Association that classifies the various mental disorders.

Differential parental investment: In evolutionary theory, the concept that women have a much higher investment in their offspring, because of gestation, lactation, and so on, than do men.

Dissociative disorders: A classification of mental disorders in which some parts of the self become separated from the other parts.

Ego: In psychoanalytic theory, the part of the personality that operates on a reality principle and tries to determine what an individual should realistically do while still trying to satisfy the id and the superego.

Electroconvulsive shock treatment: A physical therapy, sometimes called ECT, in which electrical current is passed through the brain; usually used to treat symptoms of depression.

Engineering psychology: A branch of psychology that is concerned with specifying the characteristics and limitations of the human operator in a human-machine-environment system.

Ergonomics: An interdisciplinary field, also sometimes called *human factors*, concerned with the design of human-machine-environment systems.

Evolutionary theory: A scientific theory first proposed by Charles Darwin in the 1800s that uses the idea of survival of the fittest to explain the wide diversity of plants and animals in the world.

Experiment: A scientific method in which an independent variable is manipulated and a dependent variable is measured while other possible variables are accounted for such that it is possible to infer causality.

Gestalt school: A German school of perceptual thought that proposes that we have certain built-in principles, such as proximity, similarity, closure, and good figure, by which we organize parts of perceptual events into wholes.

Genital stage: In psychoanalytic theory, the final developmental stage, in which a truly intimate, sharing, and caring relationship can develop.

Hamilton's rule: A formula in evolutionary theory, $c < r \times b$, that attempts to explain altruism; according to the formula, we should act if the cost to us (c) is less than our relatedness to the person we are helping (r) times the benefit (b) to the person we are helping.

Homeostatic model: A biologically based theory of motivation in which the organism has a need that leads to a drive; the drive, in turn, leads to behavior that returns the organism to an optimal state.

Humanistic therapies: A classification of therapies, such as non-directive and existential, in which the goal is to improve the client's understanding of thoughts and feelings so that the client can achieve his or her full potential.

Id: In psychoanalytic theory, the part of the personality that operates on a pleasure principle; if unchecked by the superego or ego, the id would drive us to take whatever we wanted, whenever we wanted it.

Illusory memories: Under certain conditions, people will recall events that did not actually occur; this indicates that memory is a constructive process, in which memory cues are used in an attempt to reconstruct the original memory.

Inclusive fitness: A concept in evolutionary theory proposing that organisms behave in ways that improve the chances that all kin, not just children, will survive and reproduce.

Independent variable: In an experiment, the circumstance chosen by the experimenter to manipulate in order to determine its effects on the dependent variable.

Interference theory: A theory of memory that attributes memory loss to interfering material that occurs either before or after the event to be remembered.

Introspection: A technique in early experimental psychology in which trained observers attempted to analyze the contents of their own minds by reflecting on their thoughts and perceptions.

James-Lange theory: A theory of emotion proposing that a stimulus causes both a behavioral and a physiological reaction, and it is the latter that leads to an emotional feeling.

Mental retardation: A classification of mental disorder characterized by significantly subaverage intelligence and limitations on functioning.

Mnemonics: Aids used to improve memory.

Mood disorders: The classification of mental disorders in which there is an uncontrollable, undesirable change in emotion, such as unipolar or bipolar depression.

Narcotic: A psychoactive drug usually derived from the opium plant that gives the user a rush and is highly physiologically addictive.

Non-directive therapy: A type of humanistic therapy (also sometimes called *client-centered*), in which the therapist tries to act as a mirror to reflect the clients' thoughts and feelings so that clients gain the ability to solve their own problems.

Oedipus conflict: In psychoanalytic theory, the conflict that develops during the phallic stage when little boys unconsciously want to sexually possess their mothers but find their fathers in the way.

Operant conditioning: A type of simple learning, also sometimes called *instrumental conditioning*, in which a response is more likely to recur if followed by a reinforcement.

Oral stage: In psychoanalytic theory, the first developmental stage and the stage in which psychosexual energy is focused on the mouth.

Perceptual constancies: A school of perception proposing that early in life, we learn that certain properties of objects are invariant, such as size, shape, brightness, and color.

Perceptual illusions: Situations in which our internal perceptual model of the external world is not in correspondence with reality, causing us to make mistakes in what we perceive.

Phallic stage: In psychoanalytic theory, the developmental stage especially important for little boys, in which psychosexual energy is focused on the penis and aggressive competition begins.

Phobia: A classification of mental disorders in which there is an undue fear of objects or situations.

Polygraph: A machine, also called a *lie detector*, that measures heart rate, blood volume, breathing rate, and galvanic skin response in an attempt to determine whether a person is being truthful.

Population stereotypes: The expectations that users of human-machine-environment systems have about the effect of their actions.

Prefrontal lobotomy: A surgical technique in which the connections between the prefrontal cortex and the rest of the brain are severed; this technique was used for several decades in the middle of the 20th century to alleviate the symptoms of long-term schizophrenic patients.

Probability learning: A type of learning in which the individual learns the underlying probabilistic structure of the environment.

Psychoanalysis: A psychotherapy developed primarily by Sigmund Freud, based on psychoanalytic theory, in which the goal is an analysis of the unconscious.

Psychoanalytic theory: A theory of personality proposed by Sigmund Freud in the early 1900s, in which the unconscious plays a major role in determining behavior and the parts of the personality, the id, superego, and ego, are in constant conflict.

Psychosis: Mental disorders that are characterized by a break with reality.

Qualitative design: A research design, such as ethnography, in which patterns of behavior can be studied, but these observations are not amiable to quantitative analysis.

Random variable: In an experiment, a circumstance allowed to vary in a random way such that it is uncorrelated with the levels of the independent variable.

Schizophrenia: A classification of mental disorders in which there is a psychotic break with reality and often delusions, hallucinations, and disorganized speech and behaviors.

Self-actualization: A goal proposed by Abraham Maslow in his Hierarchy of Needs model of motivation, in which people can fulfill their full potential.

Sexual disorders: A classification of mental disorders in which there is either an inability to perform sexually as desired or sexual behavior characterized by an undue sexual attraction to abnormal sexual stimuli.

Social psychology: A branch of psychology concerned with social thinking, social influence, and social relations.

Somatoform disorder: A classification of mental disorders in which there are complaints about bodily symptoms or defects.

Stimulant: A psychoactive drug that produces feelings of heightened awareness and alertness.

Stimulus discrimination: In classical conditioning, when stimulus generalization has occurred, if similar stimuli continue to be presented, but only the conditioned stimulus is paired with the unconditioned stimulus, the responses to the similar stimuli will die out.

Stimulus generalization: In classical conditioning, after acquisition takes place and the conditioned stimulus reliably evokes the conditioned response, other similar stimuli also are found to evoke some lesser level of response.

Substance-related disorder: A classification of mental disorders related to problems caused by taking a drug of abuse.

Superego: In psychoanalytic theory, the part of the personality that operates on a moral principle much like our conscience and gives us guilt when we do not follow its rules.

Systematic desensitization: A behavior therapy in which clients pair up progressively more anxiety-producing situations with relaxation in order to learn new, more appropriate responses to these situations.

Token economy: In behavior therapies based on operant conditioning, when a symbolic reinforcer is used, such as a poker chip, that can be traded for a primary reinforcer, such as food.

Tourette's syndrome: A mental disorder characterized by a continuous repeated build-up of tension that sometimes leads to uncontrollable vocal and motor outbursts.

Transmitter substance: A chemical released into the synapse between neurons that makes the postsynaptic neuron more or less likely to fire.

Unconscious level: In psychoanalytic theory, the part of the personality below the level of awareness that plays a major role in determining how we behave.

Unipolar depression: A classification of mental disorders characterized by either depressed mood or loss of interest in pleasurable activities.

Biographical Notes

Charles Darwin (1809–1882). A British naturalist who, after his 1831–1836 trip collecting plant and animal specimens, wrote the classic book *On the Origin of Species*, published in 1859. This book was the basis for the theory of evolution, including the concept of natural selection and the theory's requirements of variation, inheritance, and selection. Later, Darwin would add the concept of sexual selection to his theory and would apply the theory to humans.

Sigmund Freud (1856–1939). An Austrian physician who, while treating patients with hysteria (conversion disorder) using hypnotism, discovered that patients improved if he could get them to talk about their problems. Over the years, he developed this therapeutic technique into psychoanalysis and proposed the associated psychoanalytic theory. This theory's emphasis on the unconscious level is the basis of many modern-day social policies, as well as today's psychodynamic therapies.

William James (1842–1910). An American psychologist who, with his 1890 textbook *The Principles of Psychology*, introduced scientific psychology to many university students and faculty. Although he was not a researcher, he was an outstanding philosopher and writer, well versed in psychological findings from around the world. He was adept at combining his knowledge of psychology with his personal observations to bring psychology alive to his readers.

Ivan Petrovitch Pavlov (1849–1936). A Russian physiologist who won the Nobel Prize for his research into the physiology of digestion; in the course of his research, he observed that pairings of certain events led to responses to new stimuli. From these observations and later experimentation, he founded the field of classical conditioning. Although he spent the rest of his career studying conditioned reflexes, he denied to the end that he was a psychologist.

Burrhus Frederic (B. F.) Skinner (1904–1990). An American psychologist who many consider to be the father of operant conditioning; his first major book, *The Behavior of Organisms*, was published in 1938. He also wrote *Walden Two*, a fictional treatment of a utopian society based on reinforcement, and *Beyond Freedom and Dignity*, a book considering the uses of reinforcement for social engineering. Skinner's early work on schedules of reinforcement formed the basis for modern behavior therapies.

John Broadus Watson (1879–1958). An American psychologist who became uncomfortable with introspection as a research technique and, following Pavlov's lead, founded the school of psychology known as behaviorism, which he introduced in a 1913 article entitled "Psychology as the Behaviorist Views It." Behaviorism then became the dominant paradigm of psychology for more than 50 years, and the only subject matter deemed appropriate for study became behavior, rather than the mind.

Wilhelm Wundt (1832–1920). A German psychologist who is generally considered to be the father of experimental psychology; in 1879, he converted his demonstration laboratory into the first psychological laboratory for collecting empirical data. This laboratory served as a model for psychology and led psychology from being a discipline based in philosophy to one based in science.

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Psychology of Human Behavior

Part II

Professor David W. Martin

THE TEACHING COMPANY ®

David W. Martin, Ph.D.

Professor of Psychology, North Carolina State University

David Martin received a B.A. in psychology from Hanover College in Indiana, where he also finished the necessary coursework for a major in physics. He received an M.A. in experimental psychology and a Ph.D. in engineering psychology from The Ohio State University.

Professor Martin began his professional career in 1969 as an assistant professor at New Mexico State University. He progressed through the ranks, becoming a professor in 1983. During this time, Professor Martin contributed to developing a prominent Ph.D. program in engineering psychology. During his final 11 years at NMSU, he was also head of the department. At NMSU, Professor Martin taught courses in introductory psychology, perception, research methods, and human performance; was selected as an outstanding professor by graduating seniors; was named a master teacher; and received a Roush Award for Teaching Excellence. In 1992, Professor Martin assumed his current position as professor and head of the Psychology Department at North Carolina State University. In addition to his administrative duties, he regularly teaches a psychology survey course, an honors seminar, and an evolutionary psychology seminar. He was named to the Academy of Outstanding Teachers at NC State in 1997.

Professor Martin's areas of research in engineering psychology and ergonomics include attention in visual search, particularly in human-computer interaction; operator workload; and cognitive modeling, particularly of human decision making. He has written more than 75 publications and papers. He is the author of *Doing Psychology Experiments*, an experimental methods text currently adopted by more than 100 colleges and in its sixth edition. Dr. Martin has also engaged in considerable professional consulting.

Professor Martin is a member and fellow of the American Psychological Association and a member of the American Psychological Society, the Psychonomic Society, and the Human Factors and Ergonomics Society (HFES). He is a past president of the Rocky Mountain Psychological Association and past president of both the Rio Grande Chapter and the Carolina Chapter of HFES. He has also served for many years on the national committee that designates doctoral psychology programs.

Professor Martin lives in Cary, North Carolina, with his two teenage sons.

Table of Contents

Psychology of Human Behavior
Part II

Psychology of Human Behavior

Scope:

This course of 36 lectures examines the breadth of modern psychology from both clinical and experimental perspectives. After an introduction to the precursors and early history of psychology in Lecture One, we discuss the research methods used in scientific psychology in Lectures Two and Three. Particular emphasis is given to the logic and procedures of the quantitative methods of experimentation, as well as correlational and quasi-experimental design. Consideration is also given to the qualitative designs of ethnography, naturalistic observation, and case history. Following a brief introduction to the scientific theory of evolution in Lecture Four, we discuss a less scientific theory in Lecture Five, that is, psychoanalytic theory as introduced by Sigmund Freud.

In Lectures Seven through Eleven, the topic of abnormal psychology is introduced, and we make a comprehensive examination of the various classifications of mental illness with reference to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR™). For each disorder, we look at the set of defining symptoms and, where known, the causes and prognosis of the illness. In Lectures Twelve through Seventeen, we explore three therapy classifications. For physical therapies, we discuss the various psychopharmacological approaches for each of the disorders, including discussion of electroconvulsive shock therapy and psychosurgeries. Psychotherapies are also covered, with an emphasis on psychoanalysis and humanistic and cognitive therapies. Behavior therapies are also examined, both those based on classical conditioning and those based on operant conditioning.

In Lectures Eighteen through Thirty-One, we examine the standard content areas of experimental scientific psychology. The lecture on motivation emphasizes the biologically based homeostatic model, in which the goal of behavior is the return to an optimal state, although a brief discussion of Abraham Maslow's self-actualization model is also included. The first lecture on motivation emphasizes the difficulty in measuring a private event, such as emotion, and examines the largely unsuccessful attempts of using facial expressions, self-report, and physiological measures, such as the polygraph, pupil size, and vocal tremors. In Lecture Twenty, we consider several theories of emotion, including the James-Lange theory, the Cannon-Bard theory, and Stanley Schachter's cognitive-labeling theory. Lectures Twenty-One and Twenty-Two provide an overview of various psychoactive drugs, including their classifications and behavioral effects.

In Lectures Twenty-Three and Twenty-Four, we introduce the broad area of social psychology, then cover in detail the mechanisms that influence us to behave in automatic ways, as put forth by Robert Cialdini in his book *Influence*. In the next three lectures, Twenty-Five through Twenty-Seven, we examine two forms of simple learning. Classical conditioning involves the pairing of an unconditioned stimulus with a conditioned stimulus, which eventually causes the conditioned stimulus to bring about a conditioned response. Operant conditioning involves repeatedly reinforcing a voluntary response, which increases the probability of the response recurring. For both forms of learning, we detail the time course of learning and the conditions under which learning takes place. In the final learning lecture, we look at progressively more complex forms of learning, such as avoidance learning, probability learning, and concept formation, and consider whether these could be explained as combinations of classical and operant conditioning.

In Lectures Twenty-Eight and Twenty-Nine, we look at memory. First, we consider how the various ways of assessing memory influence how good our memories seem to be. Then, we use an exercise in illusory memory to demonstrate how the modern view of memory is that of constructing memories from cues rather than calling up detailed snapshots. Finally, we review some research that demonstrates how this constructive process can lead to false memories. In the second memory lecture, we learn about some memory aids that can help us improve our memories, and we discuss three theories of forgetting: decay, interference, and consolidation. Perception is covered in Lectures Thirty and Thirty-One. In the first lecture, we use a series of visual illusions to convince ourselves that we are not in direct contact with the external world but that we use cues to form one or more external models that are sometimes in error. In the second lecture, we discuss three schools of thought about how we use cues to form internal models, and we then use the process of depth perception to illustrate what kinds of cues we employ. Finally, we look at evidence supporting the proposition that perception is built in or learned.

Lectures Thirty-Two through Thirty-Four examine modern thought regarding evolutionary psychology. In Lecture Thirty-Two, we discuss the requirements for evolution to take place and some of the myths about evolution. Then, we give a rough timeline of human evolution and look at evolved behavior from the perspective of Desmond

Morris's historical book *The Naked Ape*, particularly with respect to why we are naked, why we are sexy, and why human aggression is such a problem. The second evolution lecture examines the topics of altruism and mating. Altruistic behavior includes our behavior toward our kin and reciprocal behavior toward non-kin. Our discussion of mating includes the different behavioral strategies used by men and women related to differences in parental investment in their offspring. In the third evolutionary lecture, aggression is considered, along with parenting and eating behaviors. Evolutionary theory makes specific predictions about the kinds of family conflicts found even in today's families. The reasons we overeat to the point of obesity are also understandable from evolution.

In Lecture Thirty-Five, we look at the applied field of engineering psychology and consider how this field, which is concerned with the design of human-machine-environment, is integrated with other disciplines, such as industrial engineering. We also examine the types of recommendations engineering psychologists can make in the design of displays and controls. In the final lecture, we review where we have been, then briefly discuss a few topics not previously covered, including neuropsychology, cognitive modeling, and developmental psychology. Finally, we consider the future of psychology, with particular emphasis on genetic therapies for mental illnesses and the application of scientific psychology to practical societal problems.

Lecture Thirteen

Physical Therapies—ECT, Surgery, Genes

Scope: Several physical interventions besides drugs have been used to treat mental illnesses. Beginning in the 1930s, both chemical and electrical means were used to put the body into shock to the point that convulsions occurred. It was originally thought that convulsions were antagonistic to schizophrenia. Chemical shock procedures, such as insulin shock, were not very effective, were somewhat dangerous, and have been discontinued. Electroconvulsive therapy (ECT) was introduced in 1938 and is still used today in a modified form to treat depression and sometimes obsessive compulsive disorders and catatonia. Prefrontal lobotomies are a type of psychosurgery that was widely used from 1935 until 1955. Although patients often became more placid, some developed problems with inability to inhibit impulses and flattened affect. Prefrontal lobotomies are no longer performed today, but much more selective forms of psychosurgery are performed on an experimental basis. Electrode implantation was briefly attempted many years ago. Little work is being done in the area today, but there may still be some potential for future progress. Genetic engineering offers a real hope for curing some mental illnesses. However, most mental illnesses have been found to have multiple genetic sites, and we currently do not have the technology to reengineer these sites.

Outline

I. Shock therapies were begun in the mid-1930s and evolved into electroconvulsive therapy (ECT) as we know it today.

- **A.** The original source of the convulsive shock was chemical, camphor oil, and was used on patients with schizophrenia.
  - **1.** Chemical shock therapy later used insulin to induce convulsions, but this type of therapy had inconsistent results and was potentially more dangerous than ECT.
  - **2.** Today, insulin shock therapy is seldom used.
- **B.** Electroconvulsive shock therapy was employed in 1938 using electrodes placed on both temples; within a few years, it became the dominant treatment for the severely mentally ill.
  - **1.** Although originally used to treat schizophrenia, today ECT is used primarily for major depression and, in some cases, for mania and catatonic schizophrenia.
  - **2.** Early ECT procedures caused a number of potentially dangerous problems, such as memory loss and broken bones.
  - **3.** Today, ECT includes muscle-relaxation drugs, anesthesia, continuous oxygenation, brief-pulse currents, and selected electrode placements; these changes have greatly decreased the undesirable side effects of the treatment.
  - **4.** ECT is used today on about 100,000 patients each year in the United States, mostly in university hospital settings and usually as a treatment of last resort.
  - **5.** It is unclear how ECT works to improve the patient's condition, but there is speculation that it is through altering transmitter substances, such as dopamine, serotonin, norepinephrine, and GABA.
  - **6.** The use of ECT is still controversial because of potential memory loss and a checkered history of use, and the procedure is severely limited in some states, such as California, Texas, and Tennessee.
  - **7.** However, in a 1999 report, the U.S. Surgeon General vouched for the efficacy and safety of ECT.

II. Psychosurgery involves operating on the brain in an attempt to correct a mental condition.

- **A.** In 1935, a procedure was introduced in which the connections from the frontal lobes to the deeper structures of the brain were severed.
- **B.** This operation eventually evolved into what was called a *prefrontal lobotomy*, in which the very front part of the brain, called the *prefrontal area*, was surgically disconnected from the rest of the brain.
- **C.** From 1935 to 1955, tens of thousands of patients underwent prefrontal lobotomies, and Egas Moniz, the person who developed the procedure, won a Nobel Prize in medicine.

D. Patients who received prefrontal lobotomies were reported to have become quieter and much less agitated, and there was usually little reported loss in intelligence.

E. Unfortunately, lobotomies sometimes resulted in severe side effects, such as an inability to inhibit impulses and an undesirable flatness or absence of feelings.

F. Although prefrontal lobotomies are no longer performed, more specific psychosurgery, in which smaller isolated areas deep in the brain are destroyed, is performed on an experimental basis for such conditions as obsessive-compulsive disorder.

G. Psychosurgery is still quite controversial and is illegal in some states and some countries.

III. Electrode implantation is not used as a therapy today but has some history and some experimental potential.

A. Many years ago, before ethics committees would have prevented it, a patient with a sleep disorder was given an experimental operation in which electrodes were inserted into the pain center, pleasure center, and arousal center of the brain.

B. The arousal electrode was effective in waking up the patient when his sleep disorder caused him to instantly fall asleep.

C. Extrapolating from some animal research, it might be possible to shape brainwave activity using electrodes by measuring EEG and using this to control the pain and pleasure centers of the brain.

D. There are obvious ethical concerns involved with this type of research.

IV. One therapeutic technique that holds hope for providing a cure for mental illnesses is genetic engineering.

A. If we were able to isolate the genetic location of a mental illness, it would be theoretically possible to reengineer the site and correct the genetic deficit.

B. A problem with genetic engineering as a therapy is that most mental disorders appear to be polygenic—to be controlled by multiple sites—thus, any genetic modification would have to involve changes at many locations.

C. A second problem is that although we have made progress in finding some of the locations that cause various mental disorders, we do not know much about how to engineer changes to the sites.

V. As we get more control over abnormal behavior, we are simultaneously increasing the potential for control over normal behavior, which raises a growing concern with ethical issues.

Essential Reading:
James Butcher, Susan Mineka, and Jill Hooley, *Abnormal Psychology*, 12th ed., chapter 17.

Supplementary Reading:
Max Fink, "Electroshock revisited," *American Scientist* 88 (2000), pp. 162–167.

John Cloud, "New sparks over electroshock," *Time*, February 26, 2001, pp. 60–62.

Questions to Consider:
1. Who should decide whether a particular therapeutic intervention should be allowable: individual mental health professionals, citizen committees, state legislators, the U.S. Congress?
2. What rights should mental patients have in determining the particular therapies used on them?

Lecture Fourteen

Talking Therapies—Psychoanalysis

Scope: Psychotherapies are talking therapies based on the assumption that behavioral problems are caused by inappropriate thoughts and feelings; the way to correct the problems is to help restructure these thoughts and feelings. *Psychoanalysis*, which is based on psychoanalytic theory, was devised by Freud to help patients find out what the contents of the unconscious are so that the unconscious can be restructured. One of the major techniques in psychoanalysis is *free association*, in which a stream of consciousness is produced by having the patient string together uncensored associated thoughts. *Dream analysis* is also sometimes conducted, in which the therapist tries to interpret the symbolic content of dreams. *Projective tests* can be used; in these, an ambiguous stimulus is presented, on which the patient projects interpretations or stories. *Hypnosis* and *word associations* are also sometimes used in psychoanalysis. During the course of psychoanalysis, patients usually develop *resistance* that may prevent problem areas from coming into conscious thought. Patients also undergo *transference* and develop a relationship with the therapist that is similar to other relationships they have had in their lives. The therapist uses *counter-transference* to resist the development of these problematic relationships and to help the patient understand the necessity of developing new relationship patterns. Newer psychodynamic therapies have been devised, still using psychoanalytic theory but within the context of shorter-duration therapies that concentrate heavily on the analysis of relationships.

Outline

I. Talking therapies are based on an assumption that the cause of psychological problems is inappropriate thinking in the client as a result of patterns established in the person's past experiences. They are exemplified by classic psychodynamic therapy, called *psychoanalysis*, which was devised by Freud and is based on Freud's psychoanalytic theory, as discussed in Lecture Five.

A. Remembering that the cornerstone of psychoanalytic theory is that the major source of behavior is the unconscious, it follows that if there are behavioral problems, the source of these problems must reside in the unconscious.

1. However, if the problems exist at the unconscious level, the therapist is in a quandary to identify and correct these problems because the content of the unconscious level is, by definition, not available at the conscious level for examination.

2. Freud attempted to devise techniques of psychoanalysis to find ways of gaining some access to the unconscious level.

3. It might again be helpful to characterize the personality as an iceberg, with the unconscious below the water level, the conscious above the water level, and the water line representing a censoring mechanism that prevents the unconscious thoughts from crossing over to consciousness.

B. The techniques of psychoanalysis attempt to make the censoring mechanism permeable so that, from time to time, bits and pieces of unconscious thoughts and feelings can cross to the conscious level.

1. The major technique used in psychoanalysis, as well as in many other types of psychotherapy, is *free association*, in which the patient is encouraged to talk freely in an uncensored way, producing a steam of consciousness with thoughts strung together by associations.

2. In some respects, free association is a way of wearing out the censoring mechanism, so that, from time to time, uncensored, unconscious thoughts may cross into consciousness.

3. The therapist's job is to continually look for these nuggets that come from the unconscious to try to build a picture of the structure and problems existing at the unconscious level.

4. The reason that psychoanalysis is so intensive and lengthy is that it takes a long time for enough information to be mined from the unconscious level to get a good picture of what the problems may be.

5. Another frequently used technique is *dream analysis*, in which dreams are analyzed for their *latent* content, the symbolic hidden meanings underlying their surface (*manifest*) content.

6. Again, the theory is that when we are dreaming, the censoring mechanism is a bit groggy and is more likely to let the contents of the unconscious cross over to the conscious level.

7. *Projective tests*, such as the Rorschach inkblot, are also sometimes used, and the symbolic contents of the answers are taken as indicators of unconscious thoughts.
8. Less frequently, *hypnosis* is also sometimes used in conjunction with psychotherapy, with the idea that a hypnotized person's censoring mechanism is less effective under hypnosis.
9. *Word associations* are also sometimes used, in which a stimulus word, such as "mother," is given and the client is asked to say a response word as quickly as possible. The speed or nature of the response (e.g., "Alice" versus "evil") is indicative of problem areas, the rationale being that the censoring mechanism is less effective at censoring such a quick response.

C. Over the course of therapy, the patient may initially resist sensitive topics but then develop a transference to the therapist, which the therapist resists through counter-transference.

1. In the first few sessions, the therapist attempts to establish a comfortable rapport with the patient.
2. Once the therapist begins pushing the patient to explore sensitive areas, the patient may develop *resistance* as the censoring mechanism uses repression to hold these thoughts and feelings at the unconscious level.
3. A natural part of the therapeutic process then occurs during *transference*, when the patient transfers to the therapist aspects of relationships the patient has with significant others in his or her life.
4. The patient begins interacting with the therapist using pathological patterns previously established with these other individuals.
5. The therapist must use *counter-transference* to resist being treated in this manner and to break these counterproductive behavior patterns.
6. When these patterns are no longer reinforced, the patient begins to understand what changes may be necessary to achieve a better ability to establish appropriate relationships with others.

II. Some psychodynamic therapies are in use today that break away from traditional psychoanalysis while still using some of the basic principles of psychoanalytic theory.

A. These psychodynamic therapies are typically less intensive, in that therapeutic sessions may be scheduled once a week rather than three times a week and the total duration of therapy is usually much shorter.

B. These newer therapies also tend to spend more time analyzing the dynamics of relationships rather than internal conflicts within the self.

Essential Reading:

Irving B. Weiner, *Principles of Psychotherapy*, 2nd ed.

Supplementary Reading:

J. O. Prochaska and J. C. Norcross, *Systems of Psychotherapy*, 5th ed.

Questions to Consider:

1. Given that psychoanalysis was devised for middle- to upper-class Jewish women living in Vienna during Victorian times, how relevant do you think it is to today's society?
2. How important do you think having an understanding of the contents of the unconscious level is to devising an effective psychotherapy?

Lecture Fifteen
Therapies—Humanistic, Cognitive, Group

Scope: *Humanistic therapies* all emphasize the worth of the individual. The therapist works to improve the individual's understanding of his or her thoughts and feelings in order to allow the client to make better life choices. In *nondirective* or *client-centered therapy*, the therapist acts as a mirror to reflect back the client's thoughts and feelings. It is then up to the client to solve his or her own problems and achieve self-actualization, the realization of full potential. In *existential therapy*, the therapist helps the client confront the fact of immortality and of life's inherent difficulties, then helps the client develop ways of discovering life's meanings. *Cognitive therapies* are based on the notion that clients' problems are caused by inappropriate thoughts and feelings. The goal of these therapies is to help clients achieve a better understanding of their thoughts and feelings in order to bring about a change and to help clients realize that they are in control of their thoughts and feelings and can reprogram these as necessary. *Group therapies* offer an economic advantage and provide an opportunity to observe and explore interpersonal relationships in realistic settings.

Outline

I. *Humanistic therapies* are based on valuing the unique humanness of each individual and maximizing each person's potential by stressing his or her wholeness and ability to change through choice.

A. *Nondirective* or *client-centered therapy* (sometimes derisively called *uh-huh therapy*) is a humanistic therapy devised by Carl Rogers and is based on the premise that the client has within himself or herself the ability to solve his or her own problems.

1. The role of the therapist is to act as a sympathetic sounding board or mirror, which allows the client to explore problems in an accepting context.

2. Note that in nondirective or client-centered therapy, the terms *therapist* and *client* replace the medical terms *doctor* and *patient* and indicate a more equal power status.

3. In all cases, the therapist encourages growth by giving the client unconditional positive regard in a totally nonjudgmental setting.

4. The goal of this therapy is to help the client achieve full potential or, as Abraham Maslow termed it, *self-actualization*.

5. Self-actualization can be achieved by helping the client form a strong self-concept, a positive assessment of his or her own worth.

6. The notion is that everybody has the potential to achieve self-actualization, but other people constrain us through their judgments and reduce our assessment of our worth.

7. In client-centered therapy, the therapist reflects the client's emotions and thoughts in a fully accepting way to enable the client to develop a more positive self-concept.

B. Another humanistic approach that is similar to client-centered therapy is *existential therapy*, in which the emphasis is on helping clients come to grips with nonexistence (death), so that they can take responsibility for their existence (life).

1. Existential therapy acknowledges not only that each of us will die but also that life is difficult and that the modern world alienates and depersonalizes people.

2. In order for us to counteract the acknowledged difficulties in life, it is necessary for us to individually develop ways of confronting these conditions and discovering the meaning of our existence.

C. Some criticisms of humanistic therapies are that they are difficult to use with seriously disturbed clients, that they are designed more to enhance the client's life rather than to correct mental disorders, and that because they are so individualistically tailored to each client, they are difficult to evaluate.

II. *Cognitive therapies* are directive therapies, in which the causes of behavioral problems are thought to be irrational and inappropriate thoughts.

A. Cognitive therapies, such as psychoanalysis, are directive in that the therapist takes a prominent role in advising the client about the source of the problem, but unlike psychotherapy, cognitive therapies are unconcerned with whatever intra-psychic conflicts might be causing the problems.

1. The notion is that the client's behavior is less determined by environmental events than by his or her perceptions and thoughts about those events.
2. Because it is the thoughts and perceptions that are causing the problem, the problem is within the client rather than in the environment; thus, fixing the problem involves restructuring the way the client thinks and feels.

B. Albert Ellis, the founder of one type of cognitive therapy, has proposed the A-B-C theory of personality. He argues that A, a particular environmental event, leads to B, as A is interpreted and thought about by the client, and it is B rather than A that leads to C, the client's behavior and behavioral problems.

C. Aaron Beck, another founder of cognitive therapy, considers the concept of *schemas* important; these are the ways that we represent knowledge that inform the way we process new information.

D. *Gestalt therapy* is another cognitive therapy based on a German word meaning "the whole"; in this kind of therapy, there is an emphasis on the unity of the mind and body.

1. A goal of this therapy is to become attuned to the body's reactions to life events in order to discover what feelings are hidden away.
2. Once the body's feelings are understood, the client is better able to choose new courses of action that will produce healthier feelings.

E. Cognitive therapy serves as a model for many of the current self-help books.

1. These books are predicated on the assertion that the person having the problem has the ability to change his or her thoughts and behaviors to correct the problem.
2. Even advice experts, such as Dr. Phil, borrow much from cognitive therapies; most of their advice is concerned with getting people to think differently about their problems and take ownership of the problems in order to solve them.

III. *Group therapy* describes a situation in which the therapist interacts with more than one client at a time.

A. One obvious advantage of group therapy is economic, in that the costs for a therapist are shared by all members of the group.

B. Independent of the economic advantages, however, is the fact that groups provide an opportunity for interpersonal interactions to be observed and explored in a realistic setting.

C. Group members who have similar problems can also offer one another social support and advice in dealing with these problems.

D. Group therapy can be based on a variety of theoretical approaches, such as transactional analysis or psychodrama.

E. Group therapies also have drawbacks, such as issues of confidentiality and a decreased likelihood of developing a close relationship with the therapist.

IV. What is psychotherapy, and how is it evaluated?

A. One of the problems with determining the value of psychotherapy is in defining what constitutes therapy and keeping what goes on in therapy constant, because therapists want to have the flexibility to adapt their therapy to individual clients.

B. Another problem arises in picking the dependent variable: How do we know when a patient has been helped? What do we measure to find out given that neither patient nor therapist can be relied on to make objective evaluations?

C. Finally, there is a problem of picking a control group for the independent variable because of ethical concerns of withholding therapy and because those receiving therapy usually also get other help, such as physical exams and improved environments.

V. Research has been done on the outcomes or efficacy of psychotherapies.

A. In 1952, Hans Eysenck published a review evaluating the effects of psychotherapy.

1. Eysenck concluded that patients with a diagnosis of neurosis, if left alone, recovered 72% of the time over a two-year period; those treated with psychoanalysis recovered 44% of the time; and those treated eclectically recovered 64% of the time.

2. In later articles in 1960 and 1969, which had more data, Eysenck confirmed the conclusion that he could find no data supporting the effectiveness of psychotherapy.

B. In the 1970s, several articles claimed a small but positive effect for psychotherapy but also found that all types of psychotherapies produced similar outcomes.

C. In 1977, articles published using meta-analysis claimed to show a moderately large positive effect of psychotherapy, but there were some criticisms of the methodologies used to draw these conclusions.

D. In the 1980s, articles showing mixed results were published, which generally reaffirmed the conclusion that psychotherapies produce small positive results without much to distinguish one therapy from another.

Essential Reading:

David Sue, Derald Wing Sue, and Stanley Sue, *Understanding Abnormal Behavior*, 6th ed., pp. 525–529.

Supplementary Reading:

Albert Ellis, "Rational-emotive therapy," in *Current Psychotherapies*, edited by R. J. Corsini and D. Wedding, pp. 197–238.

Aaron Beck, "Cognitive therapy," *American Psychologist* 46 (1991), pp. 368–375.

Questions to Consider:

1. If you were having problems and needed to see a therapist, which type of therapist do you think you would be most comfortable with or do you think would do you the most good (psychoanalytic, humanistic, cognitive, or group)? Why?
2. Do you agree with the premise from cognitive therapies that the ultimate control of our behavior and thinking is in our own hands so that we can solve our own problems? Do you have any personal experiences that would support that claim?

Lecture Sixteen
Behavior Therapies—Classical Conditioning

Scope: *Behavior therapies* are based on the assumption that the client has learned an inappropriate way of responding. Thus, the purpose of the therapy is to teach the client new responses. For behavior therapies based on *classical conditioning*, the inappropriate response is an involuntary response resulting from an inappropriate temporal pairing of that response with a stimulus situation. During therapy, the situation is presented and a new appropriate response is paired with the situation. In *systematic desensitization*, the client is taught to relax, usually by means of progressive muscle relaxation. While the client is relaxed, anxiety-producing situations are presented progressively, from mild to intense. In some cases, the situations are simulated through the use of imagery and, in some cases, by using real stimuli, *in vivo*. Both types of therapy are effective, although *in vivo* exposure may be more effective. In some cases, the client is exposed to an extreme anxiety-producing situation without the milder situations. When done *in vivo*, this is called *flooding*; when it is done through imagery, it is called *implosion*. It is thought that such an exposure without the possibility of escape breaks the self-reinforcing avoidance cycle and allows the client to learn an appropriate response.

Outline

I. *Behavior therapies* are based on the assumption that behavioral problems are caused by having learned inappropriate responses to life's situations; the way to correct these inappropriate responses is to teach the client new appropriate responses to these situations.

A. One class of behavior therapies is based on classical conditioning, which we will learn more about in a future lecture.

1. *Classical conditioning* occurs when a situation or particular stimulus is paired in time with a particular involuntary response, such as a large attacking dog causing fear, so that in the future, the recurrence of the stimulus will lead to a recurrence of the learned response.

2. Learning can be the result of multiple pairings of the stimulus and response or, in the case of particularly strong stimuli, a single pairing.

3. The response is usually aversive, and this leads to avoidant behavior, such that new pairings of the stimulus with appropriate responses are avoided, causing the inappropriate response to be maintained and strengthened.

B. The goal of behavior therapies based on classical conditioning, then, is to substitute a new appropriate response for the old inappropriate response and strengthen the new stimulus-response connection so that the old response is eliminated.

II. Joseph Wolpe devised a therapy called *systematic desensitization*, in which anxiety-producing stimuli are progressively paired, from the weakest to the strongest, with a new response that is incompatible with anxiety.

A. When *imaginal exposure* is used, the stimulus consists of an image of the situation rather than an actual exposure to the real situation.

1. In conjunction with the therapist, the client forms a hierarchical list of 12 to 14 images, progressing from mildly anxiety provoking to highly provoking (e.g., for claustrophobia, from an image of being in a large room to an image of being in a footlocker).

2. These images should be as realistic as possible and familiar to the client, and the images should be chosen so that the distances between successive images are approximately equal in anxiety steps.

B. The next step is to teach the client to relax, because it is impossible to relax and be anxious at the same time.

1. Progressive muscle relaxation is usually taught to clients, which involves relaxing muscle groups throughout the body.

2. Starting with one muscle group, such as the fist and forearm, the muscles are tensed, then relaxed multiple times until these muscles reach a state of maximum relaxation.

3. While keeping the original muscle group relaxed, a new muscle group, such as the upper-arm triceps and biceps, is tensed and relaxed.

4. Each muscle group in the body is progressively relaxed until the entire body is relaxed and difficult to move.

C. In a therapy session, the client is led through the relaxation exercise and is then asked to call up the least anxiety-producing image while remaining relaxed.

1. If the image causes anxiety and the client begins to lose the relaxed state, the client is instructed to discard the image and is again put through the relaxation exercise; the image and relaxation are then repeatedly re-paired until the image can be called up without a change in relaxation.
2. Once one image is desensitized, the second most anxiety-producing image is paired and so forth through the images until the most anxiety-producing image can be called up without losing relaxation.
3. If at any point an image cannot be desensitized, a new image may have to be inserted to try to create more equal steps.
4. Research has shown that successful desensitization with images generalizes well to real situations and that there is no symptom substitution, as predicted by psychoanalytic theory (i.e., having a new phobia occur when the old one is gone).

D. Systematic desensitization can also be done *in vivo*, that is, using real situations rather than images, and there is some research showing that this approach may be a bit more effective.

III. Rather than exposing the client gradually to successively more intense anxiety-producing situations, flooding or implosion can be used.

A. With *flooding*, the client is put directly into a high anxiety-producing situation *in vivo*, in the real situation, such as in a small closed space for claustrophobia.

B. With *implosion*, the client is asked to imagine being put into a high anxiety-producing situation.

C. The general idea for both flooding and implosion is that when the client is not allowed to escape the situation, the self-reinforcing cycle of avoidance learning will be broken and the client will learn that the causal link between the situation and the dire outcome is not valid.

D. Less research has been done to evaluate flooding and implosion than systematic desensitization; what little has been done has shown the techniques to be effective, although some clients find these therapies to be quite stressful.

Essential Reading:

David Sue, Derald Wing Sue, and Stanley Sue, *Understanding Abnormal Behavior*, 6th ed., pp. 529–531.

Supplementary Reading:

Joseph Wolpe, *The Practice of Behavior Therapy*, 3rd ed.

Questions to Consider:

1. For what types of mental disorders do you think behavior therapies based on classical conditioning would be least effective?
2. Do you think that there are any phobias, such as fear of snakes, that exist in nearly all people and societies that would be impervious to behavior therapies?

Lecture Seventeen

Behavior Therapies—Operant Conditioning

Scope: Some behavior therapies (sometimes called *behavior modification*) are based on *operant conditioning*. This is a form of simple learning that occurs when a voluntary response is reinforced, thereby making that response more likely to recur. When used in a therapeutic setting, the response desired must first be carefully defined and a reinforcer must be identified. Often, successive approximations to the desired response must be reinforced, a process called *shaping*. This process has been applied successfully in educational settings and for training autistic children to use language. Punishment within behavior modification is controversial both for ethical reasons and because it is usually less effective than positive reinforcement. In some settings, it is easier and more effective to use a *token economy*, in which tokens are given to replace primary reinforcers and can be exchanged for primary reinforcers, such as food or privileges. In some cases, it is possible to use operant conditioning for involuntary biological behaviors, a process called *biofeedback*. Information about a biological system, such as brain waves, is fed back to the person using a tone. The tone reinforces a change in the biological system, such as the production of more alpha waves, making this change more likely to recur. Overall, behavior therapies have been found to be quite effective.

Outline

I. *Operant conditioning*, which will be discussed at length in a future lecture, is a form of simple learning that is based on a response being followed in close temporal order by a reinforcement, thereby making the response more likely to recur.

- **A.** In a somewhat circular definition, a *reinforcement* is defined as something that makes the response more likely to recur.
- **B.** The behavioral response for operant conditioning is usually under voluntary control, unlike classical conditioning, in which the response is usually involuntary.
- **C.** Particularly for complex responses, it is difficult to get the full-blown response quickly; thus, a process of *shaping* is used, in which successive approximations to the response are reinforced.

II. When operant conditioning is used as a behavior therapy (sometimes called *behavior modification*), the therapist first tries to carefully define the desired response, then chooses an appropriate reinforcement.

- **A.** An example of a setting in which a reinforcement-based therapy might be attempted is in dealing with a disruptive student in an elementary school classroom setting.
  1. A teacher not trained in behavior therapy might yell at the student to return to his seat whenever he disrupts the class by leaving his seat and running around the room.
  2. In this case, although the teacher may have thought she was punishing the student by yelling at him, the frequency of the disruptive behavior might actually increase because the attention shown to the student is reinforcing.
  3. Using behavior therapy principles, the teacher might be encouraged to use an overt reinforcer, such as candy, and give these to the student when he returns to his seat, while otherwise ignoring his disruptive behavior.
  4. Once the nondisruptive behavior is established by candy, the student can be weaned to a more natural reinforcer, such as praises and affection.
- **B.** One of the more famous applications of behavior therapy using operant conditioning is a program established by Ivar Lovaas that attempts to teach language skills to severely autistic children.
  1. Severely autistic children seem to be cut off from the external world in that they engage in repetitive individual play, along with self-stimulatory and sometimes self-destructive behaviors.
  2. In his original program, Lovaas sometimes used punishment to eliminate self-destructive behaviors and other behaviors that prevented the children from engaging in appropriate behaviors.
  3. However, using punishment rather than positive reinforcement in behavior therapy is controversial.

4. First, the use of punishment raises ethical concerns, particularly for children and other populations who cannot give informed consent to the procedure.
5. Second, although punishment can temporarily eliminate undesirable behaviors, clients learn to discriminate between situations in which punishment is given and other situations, so that the inappropriate behavior may still occur under conditions where punishment cannot be given.
6. In an intensive 40-hour-per-week program, Lovaas employs shaping by first reinforcing simple behaviors, such as sitting still and making eye contact, using such reinforcers as cereal, juice, and hugs.
7. Then, progressive vocalizations are reinforced, going from simple sounds to phonemes to words to sentences.
8. Over many months, sometimes years, autistic children can be taught to converse, albeit sometimes in a somewhat unnatural-sounding way.
9. Lovaas's program has been criticized by some for several reasons: for using punishment on children, for subjecting children to such intensive treatment, and by autistic rights groups who claim that autism is not a disorder that needs to be corrected.
10. Other behavior therapy-based treatment programs are used for autistic children, some of which focus more on home and community adjustment and some that use virtual-reality simulators to do such things as labeling objects.

C. When clients are confined to a structured environment, such as a prison or mental institution, it is possible to create a reinforcement system called a *token economy*.

1. Tokens, such as poker chips, are secondary reinforcers that may be exchanged for primary reinforcers, such as food, weekend passes, or other privileges.
2. An advantage of token economies is that the tokens can be exchanged for a reinforcer of the client's choosing, which makes it likely that the reinforcer will be desired.
3. Tokens can also be accumulated so that the presentation of the token does not produce conflicting behaviors that might interfere with the behavior being reinforced, unlike a food reinforcer, for example, that would be immediately consumed.
4. Tokens also resemble secondary reinforcers actually used in society, such as money, which may mean that their use more easily generalizes to the real world.
5. However, token economies have not always been found to be successful, for example, when trying to shape complex behaviors and when trying to change behaviors so that they generalize outside of the confined setting.

III. One type of behavior therapy that is used on involuntary behaviors closely associated with the body's biological systems is called *biofeedback*.

A. For many years, it was thought that involuntary behaviors controlled by the autonomic nervous system could not be modified by behavioral means.

B. Several decades ago, it was discovered that if information about the status of certain biological systems, such as hand temperature or brainwave activity, was fed back to a person, the person could exert some control over the activity of that system.

C. If a person wanted to produce a larger proportion of alpha wave brain activity, which is associated with a relaxed, meditative state, rather than beta waves, which are associated with active thinking, that person might be hooked up to a machine that analyzes brain waves and gives a tone whenever alpha waves are being produced.

D. With such biofeedback, the person could, within several short sessions, begin to produce a much larger proportion of alpha waves.

E. Apparently, the tone acts as a reinforcer, making the involuntary behavior more likely to recur, even though this behavior is not usually considered to be under the person's control.

F. Biofeedback has been found to work with some biological systems, such as brain waves and hand temperature, but not well with others, such as blood pressure.

IV. Overall, behavior therapies as a class of therapies have achieved higher success rates than most other therapies, such as psychotherapies, particularly for relatively simple behaviors displayed by less severely disturbed clients.

Essential Reading:
Alan Kazdin, *Research Design in Clinical Psychology*, 4th ed.

Supplementary Reading:
Ivar Lovaas, *The Autistic Child: Language Development through Behavior Modification*.

Questions to Consider:

1. Suppose you wanted to devise a behavior modification program to train your child to do chores around the house. What would be the essential characteristics of that program?
2. Under what conditions do you think it is ethical to use punishment in a behavior therapy program?

Lecture Eighteen
Models of Motivation

Scope: Historically, many answers have been proposed in response to the question: "What motivates human behavior?"—from the gods, to biological systems, to the unconscious. A prominent model of motivation in psychology has been the *homeostatic model*, according to which our behavior is motivated by a need to return to an optimal state. When we leave the optimal state, we develop a physiological need that is converted into a psychological drive. The drive leads to behavior toward a goal, which is consumed in order to return us to an optimal state. In the case of hunger, the stomach plays a role and apparently communicates with the brain by means of the blood. Hunger is apparently assessed by an area of the hypothalamus that then communicates with the cortex, leading to behavior culminating in eating, which returns us to the optimal state. The homeostatic model can account for simple primary behaviors but does not do a good job of predicting complex behaviors or explaining needs for sensory variation, curiosity, risk, and so on. Maslow has proposed a model of motivation in which lower-level needs, such as physiological needs and safety, must be met before higher-level needs become important. He proposes that the ultimate goal should be to achieve self-actualization in order to fulfill our complete potential.

Outline

I. In psychology, motivation refers to what energizes our behavior, what causes us to behave.
- **A.** We could, for instance, ask why you are listening to or watching this tape, and you might have a variety of motivations, such as "to be more informed."
  - **1.** However, there could also be a variety of reasons why you want to be more informed, such as "I want to be more successful at my job."
  - **2.** Again, we could keep asking why, until a dead end was reached: "So that I can be promoted," "So that I can earn more money," "So that I can buy the necessities of life, such as food and shelter."
  - **3.** Such reductionistic thinking does not do a good job of predicting why you are listening or watching; are other folks not listening or watching because they are not hungry?
- **B.** Historically, a number of explanations have been put forward that attempt to account for what motivates us.
  - **1.** Early in human history, many thought that we were pawns of some higher power, moved around by the gods for reasons known only to them.
  - **2.** When Darwin proposed evolutionary theory, one implication was that humans are motivated by the same biological demands as other animals.
  - **3.** Freud proposed that we are driven by sexual and aggressive energy, and this energy is manifested at the unconscious level, the level that drives most of our behavior.

II. One of the most prominent models of motivation in psychology is the *homeostatic model*, which is highly biological in nature.
- **A.** A homeostatic system is a system that behaves in order to stay in the same (*homeo*) state (*static*).
  - **1.** Homeostatic systems need not be psychological; they can be mechanical, physiological, and so on.
  - **2.** For example, a heating system with a thermostat, furnace, and air conditioner is a homeostatic system, the goal of which is to maintain room temperature.
  - **3.** In humans and other animals, there exists an optimal biological state from which departures can lead to ill health and death.
  - **4.** Physiological mechanisms can come into play to maintain this optimal state.
  - **5.** For example, sweating and shivering are physiological mechanisms used to maintain temperature at an optimal level.
- **B.** The homeostatic model of motivation says that when humans drift out of the optimal state, they behave in ways that tend to move them back into the optimal state.
  - **1.** Once the person leaves the optimal state, a physiological state called a *need* is created, and unless this need is met in some way, the person will begin to have difficulty.

2. Humans do not necessarily know there is a need unless the need is converted into a psychological state called a *drive*.
3. The link between the need and the drive is usually so automatic that the person is unaware of the distinction between the two.
4. However, there are exceptions, such as in unusual environments where the need is not converted into a drive, for example, in scuba diving, when the person does not realize that exhaling is necessary while ascending, and in sex, where there is a drive for sex but not an individual need.
5. The drive leads to a behavior leading to a goal, usually followed by a consummatory activity that returns the person to the optimal state.

C. Within the homeostatic model, there has been considerable research on hunger, particularly on the locus of the hunger need and drive.

1. Some very early research on an individual who had a balloon inserted into his stomach showed that stomach contractions were correlated with hunger pangs.
2. Because we do not think with our stomachs, the stomach cannot have a drive; the stomach must have a way of communicating with the brain, but the nerve running from the stomach to the brain can be severed and animals still eat and humans still report being hungry.
3. Research with dogs found that when the blood from a dog who had not eaten was exchanged with that of a dog who had just eaten, the second dog would once again begin eating, indicating that the blood was carrying a message to the dog's brain about hunger.
4. Research with rats found that when a certain part of the hypothalamus was progressively destroyed, rats would consume more and more food and gain weight until they literally died from overeating, which indicates that this part of the hypothalamus acts as a hunger switch.
5. Because there are many nerve connections between the hypothalamus and the cortex, where advanced thinking takes place, there is no mystery about how the final message is sent to the part of the brain where behavior can be planned.

D. There are several problems that make the homeostatic model a less than ideal model of motivation.

1. One problem is that for more complex behaviors that do not satisfy primary needs, such as listening to or watching this tape, the model does not do a good job of predicting behavior.
2. A second problem is that there seem to be many behaviors that cause us to redefine the characteristics of the optimal state, such as behaviors that reflect a need for sensory variation, for curiosity, for risk, and so on.

III. A more recent and much less biological model of motivation has been proposed by Abraham Maslow.

A. Maslow's model describes a hierarchy of needs to be fulfilled; he stacks these needs in a pyramid.

B. Behaviors leading to the satisfaction of the lower needs, such as physiological and safety needs, predominate initially, and until these needs are satisfied, we are not interested in behaving to satisfy the higher needs, such as love and esteem.

C. According to Maslow, we should be motivated to satisfy all the needs on the pyramid so that we can get to the top need of self-actualization, the need to completely fulfill our potential in life.

Essential Reading:

M. H. Appley, "Motivation, equilibrium, and stress," in *Nebraska Symposium on Motivation, 1990*, edited by R. Diensthier, pp. 1–67.

Supplementary Reading:

Abraham Maslow, *The Farther Reaches of Human Nature*.

Questions to Consider:

1. Can you think of cases, other than those mentioned in the lecture, in which there is a physiological need that is not converted into a psychological drive?
2. Maslow states that the goal of life should be to become self-actualized. For you, how do you think you would be behaving if you were self-actualized, if you had reached your full potential?

Lecture Nineteen

Emotion—What Do We Measure?

Scope: Although emotion is one of the most important topics for psychologists to study, it is particularly difficult to do so because emotions are private events and not publicly observable. For that reason, much of the research work on emotions has been directed at finding a measurable byproduct of emotion. Facial expression would seem to be a good candidate for measuring emotion, and research has shown that people are good at naming seven or so basic emotional facial expressions even when doing so with members of other cultures. However, facial expressions can be faked or masked. Another possible measure is self-report. When people worldwide are asked to report how happy they are, on average, people report being relatively happy. Such variables as wealth, gender, and age seem to have little influence on reported happiness, but relationships and religion do matter. Physiological measures have not been shown to be good measures of emotion. The polygraph is better than chance but far from perfectly valid. Pupil size can vary with emotion but probably is more influenced by information processing than emotion. Psychological stress evaluation has been found to be invalid.

Outline

I. It is difficult to study emotion scientifically because science requires events to be publicly observable and emotions are private events; hence, much of the scientific work on emotion has attempted to determine what to measure.

- **A.** If you ask most people how they know what someone else is feeling, the answer would probably be facial expression.
- **B.** Research has been done on people's ability to identify emotions from facial expressions.
  - **1.** If photographs of actors simulating various emotions are taken and people are asked to match those photos with labels of emotions, they are pretty good at identifying about seven basic emotions, including happy, sad, fearful, and so on.
  - **2.** Using photographs, people are even pretty good at identifying emotions of those from a different culture.
  - **3.** However, there are certainly problems with using facial expressions as a measure of emotion, such as our ability to simulate an emotion (the actor) or to mask an emotion (the poker player).

II. Another way to measure emotion is to ask people how they feel using a questionnaire.

- **A.** One area of emotion that has been studied using self-report is happiness.
  - **1.** Ed Diener used data from 1.1 million people from 45 nations who were asked to indicate on a 0-to-10 scale how happy they are. Diener found that most people report they are fairly happy, finding a mean response of 6.75, where neutral is 5 and 10 is high extreme.
  - **2.** About the only exceptions to this fairly rosy finding were hospitalized alcoholics, newly incarcerated inmates, new therapy clients, South American blacks under apartheid, and students living under political suppression.
- **B.** Some of the conditions under which one might expect a difference in happiness had no influence on self-reported happiness.
  - **1.** For instance, the amount of money one possesses has little effect on happiness once one achieves more than a subsistence-level income.
  - **2.** Other variables that have little influence on happiness include gender and age.
- **C.** What does influence happiness is personal relationships.
  - **1.** How many reported friends one has influences reported happiness, with those who have more friends being happier.
  - **2.** Married people, regardless of sex, report being happier than those never married, divorced, or separated.
  - **3.** Those who are religiously active also report being happier.

III. Various physiological measures have also been proposed as indicators of emotional states.

A. The polygraph, or lie detector, is reputed to be able to distinguish between the emotions involved in truth versus lying.
  1. The polygraph (*poly* = "multiple") measures the multiple physiological indexes of respiratory rate, blood volume, pulse rate, and galvanic skin response.
  2. Multiple questions are posed and the suspect's patterns of response are evaluated by a polygraph examiner trained to distinguish between truth and falsehood.
  3. In the laboratory, the validity of the standard polygraph procedure has been found to be better than chance but far from perfect.
  4. Alternative procedures, such as the guilty knowledge test, which is a bit like a multiple-choice test, have been found to improve the statistical validity of the polygraph.
  5. However, even with its multiple physiological measures and the strong emotional difference between lying and telling the truth, the polygraph is not a very good measure of emotion, which is why polygraph results are not usually admissible in most courts.

B. In the 1970s, Eckhard Hess noticed that people's pupil size changed as they viewed pleasant scenes. After conducting research, Hess concluded that pupils dilate to positive emotions and contract to negative emotions.
  1. Subsequent research has confirmed the dilation finding but not the contraction finding.
  2. However, pupils also dilate to other tasks, such as adding numbers or remembering words, and dilation may be a better measure of information processing than of emotion.

C. For a time in the 1980s, it was thought that a measure of vocal tremors might be an indication of emotion.
  1. In psychological stress evaluation (PSE), recordings are taken of vocalizations, and these are evaluated for tremors in the 10-Hz range.
  2. It was initially thought that such tremors were an indication of high stress that would occur when a person was lying.
  3. Research generally failed to support the validity of PSE as a measure of emotion.

D. Considerable research is still underway to find valid measures of emotion; such measures would not only constitute a scientific breakthrough but would be of great interest to those in corporate sales and marketing.

Essential Reading:
David Myers, "The funds, friends, and faith of happy people," *American Psychologist* 55, no. 1 (2000), pp. 56–67.

Supplementary Reading:
Eckhard Hess, "The role of pupil size in communication," *Scientific American* (November 1975), pp. 110–119.

Questions to Consider:
1. If such variables as money have so little impact on whether we report being happy, why do you think we put so much emphasis on money in our society?
2. What variables do you think professional poker players use to tell whether an opponent is bluffing?

Lecture Twenty
Emotion—Theories

Scope: Several theories of emotion have been proposed over the years by psychologists and physiologists. The common-sense notion is that a stimulus leads to an emotion, which in turn, leads to both a behavioral and a physiological response. However, the James-Lange theory of emotion says that the stimulus causes both a behavioral and a physiological reaction, and the latter is what leads to the emotion. A problem with this ordering is that physiological patterns do not exist that correspond to all the various emotions. The Cannon-Bard theory states that the stimulus causes a change in activation of the thalamus, which then simultaneously sends messages to the cortex, interpreted as emotion, and to the physiological systems. Schachter proposed cognitive-labeling theory, asserting that a stimulus causes a general physiological activation, which then, depending on the context, is labeled as a particular emotion. Thus, it is possible for physiological activation to be artificially induced or induced by a particular emotion, and a new context can then cause it to be labeled as an entirely different emotion. Modern theories of emotion borrow to a degree from each of these historically important theories. One modern theory of emotion emphasizes the moral emotions and asserts that the four families of moral emotion are evolutionary adaptations that support reciprocal altruism. Brain-scan research has shown the importance of the amygdala in the emotion of fear and in other emotions as well. The ultimate theory of emotion will have to be compatible with both the historical theories and modern findings.

Outline

I. Although emotion is difficult to measure, that fact has not kept psychologists from developing theories to explain the interaction of the stimulus, physiological reactions of the body, the feeling of emotion, and the overt behavior.

II. The first theory of emotion isn't really a theory but a commonsense notion about how emotion works.

- **A.** Common sense says that if we are walking through the woods and we see a bear, we experience fear at the sight of the bear; the fear causes us to run from the bear and, simultaneously, to have a physiological reaction, such as a pounding heart, sweating, and an adrenaline rush.
- **B.** The time course of events, then, for emotion is a stimulus followed by an emotion followed simultaneously by a physiological reaction and a behavior.

III. In the late 1800s, two psychologists, William James in America and Carl Lange in Denmark, simultaneously but independently proposed that the time course of events actually occurs in a different sequence than common sense would lead us to believe.

- **A.** The James-Lange theory of emotion says that if we are walking through the woods and see a bear, the bear causes our hearts to beat and adrenaline to rush and, simultaneously, causes us to run away; then, we become afraid because our hearts are beating and adrenaline is rushing.
- **B.** According to the James-Lange theory, first comes the stimulus, which causes the physiological reaction and the behavior, and the emotional feeling follows, caused by the physiological reaction.
- **C.** There is even some subjective experience that seems to support this ordering of events.
  1. I was once out in the desert hunting when I heard a loud rattling right behind me; the sound caused me to turn around to see a coiled rattlesnake, which I calmly blew apart with my shotgun. It was not until after I acted and felt my heart pounding that I experienced the feeling of great fear.
  2. I had a similar experience once when driving a sports car over a small hill and seeing a child on a bike in the road, which caused me to spin the car around; not until I had come to a stop and felt my body react did I notice my emotional feelings.
- **D.** The major problem with attributing our emotions entirely to physiological responses is that we should be able to find different physiological patterns that correspond to each of our many emotions.
  1. Unfortunately, there are only a few physiological patterns, basically one associated with "fight" and one associated with "flight."

2. If one believes that there are many emotions (there are more than 100 words for different emotions in the dictionary), then something besides our physiology must be causing them.

IV. In the late 1920s, two physiologists, Walter Cannon and Phillip Bard, offered a different theory of emotion: If we are walking through the woods and see a bear, the bear causes the arousal center of the brain, the thalamus, to be activated; the thalamus then simultaneously sends a message to our physiological systems to activate them and to the cortex, which begins our behavior and gives us our emotional feelings.

A. According to the Cannon-Bard theory of emotion, then, the stimulus causes the thalamus to be aroused, and, in turn, the thalamus simultaneously causes the physiological systems and the cortex to be activated. Physiological reaction, emotion, and behavior occur simultaneously.

B. Although physiological evidence tends to support the Cannon-Bard theory, it still does not do a good job of accounting for all the various emotions we experience.

V. In the 1970s, Stanley Schachter proposed a theory of emotion sometimes called *cognitive-labeling theory*.

A. Cognitive-labeling theory says that if we walk through the woods and see a bear, that energizes our physiological arousal system, and because we label a bear in the woods as threatening, we experience fear.

B. Thus, once generalized physiological activation takes place, it is the label or context that determines the emotion.

1. Research support for this theory includes an experiment in which subjects were given either an injection of epinephrine (like adrenaline), causing physiological arousal, or a placebo injection, then exposed to an uplifting experience or a downer experience. The epinephrine subjects reported being more up or down from the experience than the placebo subjects.
2. Apparently, the injection caused physiological arousal and, because of the situation, prompted the subjects to label the emotion caused by the arousal as either positive or negative.

C. Some real-world experiences seem to support the labeling theory.

1. For example, people often report that after having gotten into a verbal fight with their mates, once they make up and re-label their arousal from anger to love, the love is even stronger than if they had not fought.
2. The dating bachelor who scares his date to death, then asks her how much she loves him is using labeling theory to his advantage.

D. In another experiment, male subjects who were interviewed by a female interviewer on a swaying suspension bridge were more likely to call her back than those interviewed on a solid wooden bridge.

VI. Today, those who do research on theories of emotion often take characteristics of each of the theories we have been discussing and combine them into a modern all-purpose theory.

A. One recent theory of emotion by Jonathan Haidt distinguishes between self-interested emotions and moral emotions, in which the self has no stake in the triggering event (e.g., becoming angry when reading about an injustice) and the emotion motivates an action that benefits others or the social order.

1. It is hypothesized that the moral emotions are evolutionary adaptations for the purpose of supporting reciprocal altruism.
2. The other-condemning family of emotions, including contempt, anger, and disgust, motivates the punishment of cheaters.
3. The self-conscious emotions of guilt, shame, and embarrassment motivate us to avoid cheating.
4. The other-suffering emotions of compassion, sympathy, and empathy motivate us to help those who have been wronged.
5. The other-praising emotions of gratitude and awe motivate the reward of altruists.

B. From brain-imaging work, we know that various areas of the brain are involved in various emotions.

1. One of the areas of importance for fear is the amygdala, an area deep in the brain just above the brain stem that is activated to a fear stimulus even when the person is not aware of the stimulus.
2. The amygdala sends messages to other brain areas, such as the hypothalamus, that cause physiological reactions to occur. It is also important for determining that other people are experiencing fear.
3. The amygdala is also involved in some other emotions, including positive emotions, and it is not the only source of the fear emotion in that a person can feel fear even with a damaged amygdala.

C. Whatever theory of emotion is finally accepted, it will have to account for the following facts: Different stimuli cause different emotions, different emotions influence different brain patterns, emotions are influenced by situational context, some emotions have survival value, and emotions are, to a degree, modifiable by experience.

Essential Reading:

K. T. Strongman, *The Psychology of Emotion*.

Supplementary Reading:

Stanley Schachter and L. Wheeler. "Epinephrine, chlorpromazine and amusement," *Journal of Abnormal and Social Psychology* 65 (1962), pp. 121–128.

HaidtLab: Research on Morality, Emotion, and Culture, http://www.people.virginia.edu/~haidtlab/. Click on the articles link to connect to an article on moral emotions by Jonathan Haidt of the University of Virginia.

Questions to Consider:

1. Can you recall a time when a stimulus or situation caused a particularly strong and immediate emotional response and action on your part? What was your subjective experience as to the time course of the physiological reaction, the emotion, and the behavior?
2. Do you think that the theories discussed in this section apply equally well to more subtle emotions, such as satisfaction and pride, as to strong emotions, such as fear and hate?

Lecture Twenty-One
Psychoactive Drugs—Processes, Stimulants

Scope: Most people use some form of psychoactive drugs to change the way they feel or act. The incidence of illicit drug use is high, with 26% of high school seniors and 7% of the general population reporting use in the previous month and 42% of the general population reporting having used illicit drugs during their lifetimes. Drug abuse has a hereditary component and is also higher for those with mental illness. As a drug is used, tolerance often develops, leading to physical addiction. Failure to receive the drug can then lead to withdrawal. Psychological addiction to the rituals and lifestyle of drug use can also have a powerful effect. Psychoactive drugs change the way in which the chemicals that allow neurons to communicate with each other, called *transmitter substances*, are processed. Drugs can cause these transmitters to increase in amount, be blocked at receptor sites, or not be reabsorbed. With prolonged drug use, relatively persistent changes take place in a brain pathway that usually controls basic drives, and these changes are a major source of addiction. Stimulants produce feelings of heightened awareness and alertness. Amphetamines were prescribed as diet pills or pep pills but now are often taken illegally. They deplete a naturally occurring transmitter substance, causing a high. But as the transmitter substance is depleted, increasing amounts of the drug are required to keep the high; as the transmitter runs out, the user crashes into a depressed, fatigued state. Today, crystal methamphetamine and ecstasy are two chemically similar forms of the drug. Cocaine, which is also chemically similar to amphetamines, is derived from the coca plant and can be quite dangerous, particularly in its freebase form called crack. Caffeine is found in many products and is a mild stimulant having mildly addictive properties. Nicotine is a mildly stimulating poison found in tobacco that is addictive and causes dangerous medical consequences.

Outline

I. For most of us, it is not a matter of asking whether we will use psychoactive drugs but, rather, which of those drugs we use.

A. Illicit psychoactive drugs are used by a sizable proportion of the population.

1. Approximately 42% of the population aged 12 and older report using illicit drugs during their lifetimes, about 13% during the past year, and about 7% during the past month.

2. In 1975, 31% of high school seniors reported using an illicit drug, decreasing to 14% in 1992 and increasing to 26% in 2001.

3. Most of the drug use by high school seniors is marijuana, at 23%, with some use of cocaine, at 2%.

4. Examining the number of drug-related emergency department episodes in 2001 indicates that most were due to cocaine-related substances (193,034), followed by marijuana/hashish-related episodes (110,512), heroin-related episodes (94,804), and methamphetamine/speed-related episodes (14,923).

5. The largest increase in emergency department episodes between 1990 and 2000 was in marijuana/hashish-related episodes, up 604% (from 15,706 to 110,512).

B. Usage trends for various illicit drugs vary.

1. Cocaine/crack usage has been trending down for the past several years.

2. Heroin trends have generally increased in recent years.

3. Marijuana trends peaked in the late 1970s, decreased until 1992, increased until a couple of years ago, and have now flattened out.

4. Methamphetamine/speed has a fairly low but stable usage, although there is some indication of a recent trend upward.

5. Ecstasy (MDMA) use is small compared to major drugs, but its use is spreading beyond raves and clubs.

C. There is some evidence from family studies that show drug abuse/dependence to have a heritability component, with calculations of heritability from twin studies of approximately 50%.

D. There is also a high incidence of substance abuse among the mentally ill (comorbidity), with lifetime prevalence percentages of 47% for schizophrenia, 56% for bipolar disorder, and 27% for major depression.

E. Psychoactive drugs are any chemical substances ingested in the body for their desired psychological effects.

F. Several terms are used to describe psychoactive drug use.

1. *Drug tolerance* occurs when increasing amounts of a drug are required to get the desired effect.

2. *Physical addiction*, or *dependence*, occurs when a person needs a drug for the body to feel and act normally.

3. *Withdrawal* symptoms occur as a result of physical dependence, when a drug is abruptly withdrawn, and may include nausea, vomiting, diarrhea, dizziness, chills, and even death.

4. *Psychological addiction* occurs when the person needs to engage in the lifestyle and drug culture associated with a particular drug and does not feel emotionally normal without these activities.

II. Nearly all the psychoactive drugs produce their effects by changing the processing of transmitter substances, the chemicals that allow neurons to communicate with each other.

A. The central nervous system is composed of neurons that, when strung together, form the communication lines and links to allow the processing of complex information.

B. Information is carried down the length of a neuron by means of a neuronal discharge that has both chemical and electrical characteristics.

1. When a neuron discharges, it releases one or more transmitter substances into a synapse, a small gap between that presynaptic neuron and a postsynaptic neuron further down the line.

2. If the postsynaptic neuron has receptor sites compatible with the released transmitter substance (like a lock and key), this neuron will absorb some of the transmitter substance, making it more (or less) likely to discharge.

3. Unabsorbed transmitter substance can be reabsorbed by the presynaptic neuron.

4. Usually, many neurons are converging on a single synapse and many factors determine whether postsynaptic neurons will discharge: the number of converging neurons, the type of transmitter substances being released, the amount of transmitter substances being released, the proportion of neurons releasing excitatory versus inhibitory substances, the type of receptor sites on the postsynaptic neurons, and so on.

C. The effects of most psychoactive drugs are produced by changing the processes occurring in the synapse: the amount of neurotransmitter produced by presynaptic neurons, whether postsynaptic receptor sites have been blocked, the inhibition of reuptake of transmitter substances, and so on.

1. An example of a drug affecting the amount of neurotransmitter substance is the increase in dopamine caused by heroin.

2. The reason methadone works to control heroin addiction is that it occupies opiate receptor sites in the postsynaptic neuron, thereby lessening the effect of dopamine on those sites.

D. Recent discoveries show that taking drugs of abuse repeatedly changes brain pathways and contributes to addiction.

1. In particular, a pathway called the *mesolimbic dopamine system*, which originates in the brain stem and runs to higher levels of the brain in the frontal cortex, is affected by drug use.

2. This pathway normally regulates natural drives, such as the desires for food, drink, and sex, but with prolonged drug use, long-lasting changes, including changes in gene expression, can occur that lead to tolerance and persistent withdrawal symptoms.

III. One class of drugs is stimulants, or uppers, taken to produce heightened feelings of awareness and alertness.

A. Amphetamines were once prescribed for such purposes as weight loss and to counter depression but are now considered too dangerous to be used for these conditions.

1. Amphetamines operate by depleting a naturally occurring transmitter substance in the body.

2. Because there are limited supplies of this chemical, as it is used up, the drug user must have more and more of the drug to get the desired effect, which produces tolerance and addiction.

3. Amphetamine users often get into a vicious cycle of several days of heavy use, followed by a crash into depression and paranoia as the depleted resources are restored.

4. Heavy use of amphetamines can lead to major changes in personality, as well as the possibility of high blood pressure, strokes, and fatal heart problems.

5. Today, an even more dangerous form of this drug, called crystal methamphetamine (or ice), is smoked by users and leads to a more rapid rush that can cause serious addiction.
6. Another drug that is similar chemically to amphetamines is ecstasy (MDMA), a designer drug, sometimes used at "rave" parties, that is reported to both stimulate the user and to give heightened sensory experiences.

B. Cocaine is another stimulant and is extracted from the coca plant.
1. In terms of its chemical effects, cocaine is quite similar to amphetamines, although its effects occur more quickly and last for less time, at least partly because it is typically taken in through the nasal membranes.
2. Cocaine is dangerous even for first-time users, who can suffer from heart attacks or strokes.
3. Cocaine in freebase form is called crack and is typically smoked, which produces an even quicker and stronger effect and leads to strong addictions.

C. Caffeine is a mild stimulant and is the most widely used psychoactive drug in the United States.
1. Besides coffee, caffeine is found in tea, many soft drinks, chocolate, and many prescription drugs.
2. Although caffeine is relatively safe, it can be mildly addictive and withdrawal symptoms can occur.
3. Medically, heavy caffeine use can increase the risks of heart problems, high blood pressure, and miscarriages.

D. Nicotine is a poison found in tobacco that has a stimulating effect, although experienced smokers can find smoking to be calming.
1. Nicotine use is addictive with tolerance developing.
2. Withdrawal symptoms can be as severe and cessation as difficult as for heroin.
3. Medically, smoking increases the risk of various cancers, heart disease, stroke, breathing disorders, and health problems from second-hand smoke.

Essential Reading:

Robin Timmons and Leonard Hamilton, "Drugs, brains and behavior," www.rci.rutgers.edu/~lwh/drugs/.

Supplementary Reading:

James Kalat, *Biological Psychology*, 8th edition, pp. 452–456.

Drugstory.org, http://www.drugstory.org/drug_stats/druguse_stats.asp.

Questions to Consider:

1. Drugs can be taken into the body by many means, such as sniffing, smoking, injecting, and eating. What properties do you think these various means have in terms of how quickly the drug takes effect, how long-lasting its effects are, and how dangerous it is?
2. A statement was made in the lecture that withdrawal from tobacco smoking can be as difficult as for heroin use. Citing specific effects, such as the rate of success, the physical symptoms, the length of withdrawal symptoms, and so on, could you defend or refute this statement?

Lecture Twenty-Two
Drugs—Depressants, Narcotics, Hallucinogens

Scope: The most dangerous class of drugs is depressants because the potential for death from overdose is high. Barbiturates are seldom prescribed today because of their danger, particularly in combination with alcohol. Tranquilizers are frequently prescribed for anxiety, but dependence is possible. Alcohol causes serious drug problems worldwide and can be dangerous both from health problems associated with prolonged use and from toxic effects of an overdose. Most narcotics are derived from the opium plant, are highly addictive, and have other health problems associated with injection. Hallucinogens, such as LSD and certain mushrooms, cause altered perceptions. Marijuana comes from the *Cannabis sativa* plant and contains the active substance THC, which has increased three- to five-fold in recent decades. Either smoked or eaten, it produces a reverse tolerance in that active users get high more quickly. Although not very physiologically addictive, it can be psychologically addictive. Performance on both simple and complex tasks is degraded by marijuana use for naïve users, although performance for experienced users is degraded only for complex tasks. Use of illicit drugs can be problematic because the social cost may be great, the drugs may be contaminated or of unknown strength, the drugs can interact, and they can exacerbate psychiatric conditions.

Outline

I. A major class of drugs is depressants or downers, which have a calming effect on the user and, as a class, have the highest potential to kill the user from an overdose.

- **A.** Barbiturates are sedatives that were historically prescribed to calm distraught users and to induce sleep.
  - **1.** Because of their danger, barbiturates are seldom prescribed today for their sedative effects and are more frequently prescribed as anticonvulsants.
  - **2.** The combination of barbiturates and alcohol, both being depressants, is particularly dangerous; their combined interactive effects have led to the deaths of several Hollywood stars.
- **B.** Tranquilizers are prescribed for symptoms of anxiety and stress.
  - **1.** Although much safer than barbiturates, tranquilizers, such as Valium, Xanax, and Librium, can produce dependence and withdrawal symptoms.
  - **2.** A tranquilizer called Rohypnol, or "roofies," is odorless and tasteless; because it can produce sleep and amnesia in heavy doses, it is sometimes used to spike drinks of victims of rape.
- **C.** Alcohol is a depressant drug derived from the fermentation or distillation of various sugar-based substances.
  - **1.** Alcohol is used worldwide, and in terms of health problems, death, lost work productivity, money spent, and most other measures, its use constitutes the most significant drug problem.
  - **2.** Depending on how it is defined, alcoholism affects about 14% of the U.S. population.
  - **3.** Prolonged use of alcohol can increase the risk of a variety of health problems.
  - **4.** Because it is a depressant, alcohol can also cause death due to toxicity.
  - **5.** The safety of a drug is called its *therapeutic index* and is measured by the drug's lethal dose divided by its effective dose, where the lethal dose is the amount taken that would kill half the population and the effective dose is the amount taken to be effective for half the population.
  - **6.** The therapeutic index for alcohol is between 5 and 10, meaning that 5 to 10 times the effective dose can kill you.
  - **7.** By comparison, the therapeutic index for marijuana is about 35,000, meaning that a person would have to smoke a wheelbarrow full or eat a pickup-truck full to die of its toxic effects.

II. Most narcotics are opiates, either derived from the opium plant or manufactured as artificial drugs having similar compositions.

- **A.** Opiates reduce pain and decrease responsiveness to stimuli and, depending upon how quickly they cross the blood-brain barrier, produce a rush of euphoria.
- **B.** The human body produces its own morphine-like substances called *endorphins* that are absorbed by the same receptor sites as the opiates.

C. Opiates, particularly heroin, can be highly physically addictive and cause severe withdrawal symptoms.

D. Illegal opiates are usually injected, which leads to other dangers, such as infections (e.g., HIV) and blood disorders.

III. Hallucinogens are drugs that alter sensory perceptions.

A. LSD is a liquid that is put on solid substances, such as sugar cubes, and can produce strong hallucinogenic effects.

1. LSD is not usually considered addictive and is typically used for occasional "trips" that are characterized by altered states of consciousness.

2. Sometimes, the hallucinogenic effects of LSD are so strong that the user becomes extremely upset and may put himself or herself in danger.

B. Sometimes, mushrooms, such as peyote (mescaline) and psilocybin, are used as hallucinogens, in some cases amongst native Americans as part of religious observances.

C. Marijuana, produced from the *Cannabis sativa* plant by chopping up the leaves, stems, and flowers, is a mildly hallucinogenic drug that may be used by as many as 20 million people in the United States and Canada.

1. The active ingredient in marijuana, abbreviated THC, now averages about 5%, compared to plants from the 1970s that averaged between 1% and 2%.

2. When marijuana smoke is inhaled, the effects begin within 10 to 15 seconds, peak at about 1 hour, and last a total of 5 to 6 hours (although there are still traces in the body for about a week).

3. When marijuana is eaten, the effects begin in about 2 hours, peak at 4 to 5 hours, and last up to 18 hours.

4. Marijuana has a reverse tolerance in that experienced users get high more quickly because the high is actually due not so much to the THC as to a derivative of the THC; as tolerance develops, the THC is broken down more quickly into this secondary component and the user gets high more quickly.

5. Although marijuana may be psychologically addictive, evidence suggests that it is not very physically addictive.

6. Under the influence of marijuana, performance on simple cognitive and motor tasks is degraded for inexperienced users but shows little degradation for experienced users.

7. Performance on a driving simulator is less degraded for experienced users under the influence of marijuana than experienced alcohol users under the influence of alcohol.

8. Complex tasks, such as starting with 100 subtracting 7 and adding 3 until a goal number is reached, are degraded even for experienced users.

IV. When deciding whether to use an illicit drug, several issues need to be considered.

A. Even if the legal penalties are small, the possible penalties for employment and social disclosure may be great.

B. Illicit drugs do not come with a safety guarantee as to composition or strength.

C. We do not know much about the interactive effects of various drugs taken together.

D. Even drugs that are generally considered to be safe can exacerbate psychiatric conditions.

Essential Reading:

Robin Timmons and Leonard Hamilton, "Drugs, brains and behavior," www.rci.rutgers.edu/~lwh/drugs/.

Supplementary Reading:

James Kalat, *Biological Psychology*, 8th edition, pp. 456–463.

Questions to Consider:

1. If alcohol is a depressant, why do you think so many people believe it to be a stimulant?

2. Given the similarities in terms of risk, why do you think that the U.S. government treats marijuana and alcohol so differently from a legal standpoint?

Lecture Twenty-Three
Social Psychology—Influence and Reciprocity

Scope: Social psychology is concerned with: (1) social thinking, including thoughts of self, beliefs and judgments, behavior and attitudes, and social thoughts; (2) social influence, including conformity, persuasion, and group influences; and (3) social relations, including prejudice, aggression, attraction, intimacy, altruism, and conflict. Robert Cialdini wrote an influential book on persuasion. He claims that in order to have mental efficiency, humans have certain triggering mechanisms that tend to automatically activate fixed behavior patterns. In this way, we often end up unthinkingly persuaded to behave in ways we might not wish to behave. One triggering mechanism is reciprocation, which is the tendency to return favors for those who have given us favors in the past. These favors can be direct, and research has shown that a small favor will often provide the incentive for a larger reciprocal favor. In some cases, the original favor does not even have to be a direct favor but can be the result of a person having turned down the opportunity to comply with the request for a favor. Because the person turned down the initial request, an obligation is established to comply with a subsequent request.

Outline

I. Social psychology is a large specialty area in psychology, too big to be covered in detail in these lectures. We will briefly take an overview of the area, then go into considerable detail about one sub-area of social psychology.

- **A.** Social psychology is the scientific study of how people think about, influence, and relate to one another.
- **B.** Social thinking includes thoughts about one's self, one's beliefs and judgments, one's behavior and attitudes, and one's thoughts about social situations.
  - **1.** An example of thoughts about social situations includes attribution theory.
  - **2.** In the case of *internal attribution*, you are presumed to do what you do because that is the way you are—your behavior is *internal* to you and is based on your personality traits or abilities.
  - **3.** In the case of *external attribution*, the situation forces you to behave in a certain way.
  - **4.** In American culture, we tend to make a fundamental attribution error: We look at someone's behavior and assume that it is an internal attribution. In some other cultures, there is a tendency to assume an external attribution; for example, given an image of a fish swimming ahead of a group of fish, an American would tend to see the first fish as the leader, while an Asian would probably see the first fish as being chased by the others.
- **C.** A second category of social psychology is the study of social influence, including conformity and persuasion (these will be covered extensively in this lecture and the next) and group influences.
- **D.** A third category of social psychology is the study of social relations, which includes the topics of prejudice, aggression, attraction and intimacy, altruism, and conflict.
  - **1.** An example of the study of prejudice was an experiment in which subjects were asked if they were prejudiced.
  - **2.** Most denied they were prejudiced. However, an experiment in which subjects had to choose between photos of black and white individuals and pleasant and unpleasant words could be interpreted as demonstrating an association of black individuals with unpleasantness.

II. Robert Cialdini is a social psychologist at Arizona State University who has written one of the most influential books on the psychology of persuasion.

- **A.** Cialdini claims that because we do not have enough time and mental resources to process all information, humans, as well as other animals, have developed fixed action patterns, which are behaviors that are set off by triggering events.
  - **1.** An example in animals is the mother turkey that will begin to "mother" her mortal enemy, a polecat, if a tape-recorded "cheep, cheep" sound is put into a stuffed polecat.

2. In humans, an example is the large number of people who will comply with the request of a person who wants to cut into a line at the copy machine, if only the person says "because," even if the reason given is nonsensical.

B. Cialdini then claims that his study of social psychological research and of real-world practical sales and marketing situations has revealed six particularly powerful triggering mechanisms.

1. The events that occurred while applying for a sales job and going on a training call illustrate nicely each of these triggers, and I will refer to these events as each of the triggers is discussed.
2. The job was to sell record players (back when there were such things) by showing up for a scheduled appointment at a house, presenting a gift shaver to the occupants, setting up the record player, asking the customers to pick out some records to play, and describing the way the customers could get a record player for free.
3. The customers were told that the record player was theirs if they could get 27 friends to allow us to come to their homes with a free gift and listen for an hour as they were told about the product.
4. We were nice to the customers, complimenting them on their house and their taste in records, and we told them how nice their friends were who had already gotten a record player and referred them to us.
5. We used the "putting the yes leaves on the yes tree approach" by asking such questions as: "Doesn't that record player sound nice in your home? Wouldn't your friends like to come over to listen to your music? Wouldn't you like to have this product if you could get it for free?"
6. At the end, we told the customers that if they signed up today, we would leave this record player with them, but if they waited, we would have to have one delivered, and they were on back order at the moment.

III. The first trigger is reciprocation, which is the powerful tendency to owe favors to those who have done things for us.

A. The tendency to reciprocate was probably built in to our ancestors because their survival depended on the fair sharing of limited resources; for this reason, even today, we are quite good at keeping score of to whom we owe favors and who owes us favors.

B. Many pieces of research and real-world experiences illustrate the power of reciprocity.

1. If you send out Christmas cards to strangers, many of them will send cards back, never questioning whether they know you.
2. In one experiment, two subjects were together in a room; one was a trained confederate of the experimenter who left the room to buy two sodas. After the experiment, the confederate asked the real subject to buy a raffle ticket. On average, the subject bought two 25-cent tickets, rather than one, apparently because he had been given a 10-cent soda.
3. Before they were banned, Hare Krishna Society members would frequent airports giving out flowers and asking for donations, which was a much more effective strategy that just asking for donations, even though the value of the flower was considerably less than the average donation.
4. Reciprocation is so powerful that people feel they owe you a favor even if you have not given them anything but, instead, have asked them for a favor with which they were unable to comply.
5. For example, subjects who were asked to mentor a child for two years and who turned the commitment down were much more likely to agree to chaperon a short trip to the zoo than were subjects who had not been asked to be a mentor.
6. In my record-player example, the gift shaver was an example of reciprocation in that we thought the customer was more likely to buy the expensive record player if given a cheap shaver.

IV. The five additional triggers will be discussed in the next lecture.

Essential Reading:
Robert Cialdini, *Influence: The Psychology of Persuasion*, pp. 1–56.

Supplementary Reading:
Robert Cialdini, "The science of persuasion," *Scientific American* 284 (2001), pp. 76–81.

Questions to Consider:

1. Can you think of reasons other than serving as mental shortcuts for the existence of mechanisms that automatically trigger behavior patterns, such as reciprocation?
2. Can you think of a time when you ended up doing something you really didn't want to do out of a sense of reciprocal obligation?

Lecture Twenty-Four
Social Psychology—Additional Mechanisms

Scope: Other triggering mechanisms influence our behavior beyond reciprocity. When people make a commitment to behave in a certain way, they feel an obligation to be consistent with the commitment. Examples of this mechanism include bettors who are more confident of a bet after making it, prisoners of war who are forced to make statements, jurors who express their opinions, and car buyers who commit to buying a car. Social proof tells us to behave in the way other people are behaving. Examples include laugh tracks, the public murder of a woman with nobody calling the police, research on bystander effects, and suicide groupings. We also tend to behave in ways that please those we like. Examples of situations in which liking is involved include Tupperware parties and voting patterns for attractive candidates. Authority figures can also influence people's behavior. Milgram's obedience experiments demonstrated that an authority figure can get people to subject others to severe and dangerous levels of electrical shock. Other examples of authority include estimated heights of professors and the effects of fancy clothes and automobiles. The scarcity of items can also make them more appealing, as exemplified by the auctioning of single versus multiple items and the perceived value of scarce flu shots.

Outline

I. A second triggering mechanism that sets up a fixed action pattern is *commitment and consistency*.

- **A.** *Commitment and consistency* describe the tendency to behave consistently once a commitment is made, particularly if that commitment is a public one.
- **B.** An example of this mechanism is found in bettors at a racetrack who are considerably more confident that their horses will do well after they make their bets than before.
- **C.** A real-world use of this mechanism occurred during the Korean War: Prisoners in Chinese prisoner-of-war camps were forced to first copy antiwar and anti-American propaganda, then read such material to other prisoners, then read it in front of video cameras, after which they came to believe the statements.
- **D.** Research has also found that juries are more likely to fail to reach a consensus if an early non-secret vote is taken, because jurors then feel an obligation to be consistent with their committed positions.
- **E.** Car salesmen use this technique by getting customers to commit to a particular deal, even filling out the paperwork, then claiming that the sales manager needs a little more money to make the deal go through.

II. A third triggering mechanism proposed by Cialdini is *social proof*.

- **A.** *Social proof* is the tendency to behave in the same way that others around you are behaving.
- **B.** A real-world example of the power of social proof is the laugh track used on TV comedy shows, which people claim to dislike, but without which they find the show less humorous.
- **C.** A frightening example of social proof was the case of Catherine Genovese, who was murdered outside of an apartment building while 38 people watched without calling the police. The witnesses justified their behavior because nobody else seemed to be calling the police.
- **D.** Bibb Latane and John Darley have done considerable research showing that if you need help in a public place, for example, if you are having a heart attack, you are better off with fewer people around than with more people, because the more bystanders who seem to be doing nothing give social proof that it is okay to do nothing.
- **E.** It has been found that when a prominent person is in the news as having committed suicide, the suicide rate goes up dramatically during the next two months, and even the numbers of airplane and motor vehicle fatalities increase.

III. A fourth triggering mechanism is *liking*.

- **A.** *Liking* refers to the tendency of people to behave in ways that people they like want them to behave.
- **B.** A real-world example of liking is a Tupperware party, where people invite their friends to their homes to visit, eat snacks, and play games, before the friends are asked to purchase some kitchen goods.

C. We also tend to like attractive people; in a research study, attractive candidates received 2 ½ times as many votes as less attractive candidates, although 73% of voters denied being influenced by attractiveness.

IV. The fifth triggering mechanism is *authority*.

A. When people try to influence others, the influence is more successful if they convey a sense of authority.

1. One of the most famous and notorious experiments in psychology was Stanley Milgram's attempt to discover the conditions under which an authority figure could demand obedience.

2. In Milgram's experiment, an experimenter in a lab coat attempted to get a subject, called a "teacher," to administer electrical shocks to another subject, called the "learner," whenever the learner failed to correctly answer a question.

3. The surprising finding was that when the experimenter insisted that the teacher continue to give an increasing amount of voltage to the learner, 60% of the teachers continued all the way to the top of the shock scale, even though it was labeled "dangerous" and the learner was screaming in the other room.

4. The effectiveness of the authority was influenced by the emotional distance from the victim, the physical closeness of the authority figure, and the presence of others in the room.

B. Other examples of authority are the overestimates of the height of professors, the increased likelihood of people jaywalking behind someone with a suit and tie, and the time people wait to honk their horns at luxury cars.

V. The final triggering mechanism is *scarcity*.

A. People are more likely to want a scarce product than one that is readily available.

B. At auctions, the auctioneer will often try to sell a batch of identical items by first getting a high bid on just one, then revealing that others are available at that price.

C. This past winter, when it was discovered that there would not be enough flu shots to go around, people stood in long lines and paid high prices to get a shot.

VI. These triggering mechanisms can be summarized in our record-player example as follows:

A. An example of an act of commitment occurred when the customer was asked to pick out records and was encouraged to say yes to a series of little questions leading up to the big question of "Will you buy it?" to which a consistent response would be yes.

B. An example of social proof occurred when we pointed out that several of the customer's friends had already bought the product.

C. As an example of the triggering mechanism of liking, we did our best by being friendly, complimenting the customers on their house, and dressing nicely, to make them like us.

D. We claimed some authority by wearing suits and showing our expertise in the sales plan and the characteristics of the record player.

E. The triggering mechanism of scarcity was put into play when we told the customer that this was the last record player in stock and that we could not guarantee that the deal we were offering would be available after we left.

Essential Reading:
Robert Cialdini, *Influence: The Psychology of Persuasion*, pp. 57–280.

Supplementary Reading:
Stanley Milgram, *Obedience to Authority*.

Questions to Consider:

1. Can you think of times when people were trying to sell you products when they employed each of the triggering mechanisms Cialdini introduced us to?
2. Because you now know about these various triggering mechanisms do you think you will be any more successful at avoiding being influenced by them? What steps would you take to diffuse their effectiveness?

Timeline

1662 ..... René Descartes publishes *Treatise on Man*, proposing a mind-body dualism.

1690 ..... John Locke publishes *Essay Concerning Human Understanding*, stating, "There is nothing in the mind that was not first in the senses."

1739 ..... David Hume publishes *A Treatise of Human Nature*, claiming that the mind is a collection of sensory impressions linked by associations.

1834 ..... Ernst Weber publishes *On Touch: Anatomical and Physiological Notes*, demonstrating the quantification of mental operations.

1871 ..... Charles Darwin publishes *The Descent of Man*, applying evolutionary theory to humans.

1879 ..... Wilhelm Wundt establishes the first psychological laboratory in Leipzig, Germany.

1890 ..... William James publishes *The Principles of Psychology*, introducing the empirical science of psychology to America.

1900 ..... Sigmund Freud publishes *The Interpretation of Dreams*, his first major work on psychoanalytic theory.

c. 1906 ..... Ivan Pavlov discovers classical conditioning, although *Conditioned Reflexes: An Investigation of the Physiological Activity of the Cerebral Cortex* was not published until 1927.

1913 ..... John Watson publishes an article in *Psychological Review* introducing the concepts of behaviorist psychology.

1950 ..... B. F. Skinner publishes a paper titled "Are theories of learning necessary?" arguing that psychology should build its science only on observable behaviors.

1967 ..... Ulric Neisser publishes *Cognitive Psychology*, arguing that mental operations can be studied scientifically.

1975 ..... Edward O. Wilson publishes *Sociobiology: The New Synthesis*, claiming that modern evolutionary theory can explain much of human behavior.

Glossary

Alzheimer's disease: A cognitive disorder usually associated with older adults, characterized by progressive deterioration of cognitive functions, particularly memory.

Anal stage: In psychoanalytic theory, the developmental stage in which psychosexual energy is focused on the anus and anal activities, such as toilet training.

Antipsychotic drugs: A category of psychopharmacological intervention used to alleviate the symptoms of psychosis; this classification includes both traditional drugs that treat positive symptoms and atypical drugs that treat negative symptoms and have fewer undesirable side effects.

Anxiety disorders: The classification of mental disorders, formerly called *neuroses*, in which the major symptom is apprehension of possible danger.

Autism: A mental disorder that begins in childhood and is characterized by a disconnect from the social world, problems with social skills and speech, and self-stimulation.

Avoidance learning: A type of learning in which a stimulus that is paired with an aversive event signals the organism, which can then behave in a way to avoid the aversive event.

Behavior therapies: A classification of therapies based on the assumption that inappropriate classical or operant conditioning has taken place, in which the goal of therapy is to set up the conditions for appropriate re-learning to occur.

Behaviorism: A school of thought in psychology having its major influence from the early 1900s through about 1970, in which the mind was ignored and only behavior was considered the appropriate subject matter.

Biofeedback: A behavior therapy in which operant conditioning is used to condition a biological response normally considered to be involuntary.

Bipolar depression: A classification of mental disorders characterized by mood swings between depression and mania.

Cannon-Bard theory: A theory of emotion proposing that a stimulus causes a change in activation of the thalamus in the brain that then simultaneously sends messages to the cortex, interpreted as emotion, and to the physiological systems.

Classical conditioning: A type of basic learning discovered by Ivan Pavlov; an unconditioned stimulus, which automatically brings about an unconditioned response, is repeatedly paired with a conditioned stimulus until the conditioned stimulus comes to evoke a conditioned response.

Cognitive disorder: A classification of mental disorders that results from brain impairments leading to disturbances of consciousness or deficits in cognition or memory.

Cognitive-labeling theory: A theory of emotion proposed by Stanley Schachter, proposing that a stimulus causes generalized physiological activation, which then, depending on the context, is labeled as a particular emotion.

Cognitive psychology: A school of thought in psychology having its major influence beginning in the late 1960s through today, in which it is considered appropriate to use various methods to determine the flow of information and processing stages in the brain.

Cognitive therapy: A classification of therapies based on the goal of helping clients understand their thoughts and feelings so that they can reprogram these to achieve greater happiness and success.

Concept formation: A type of learning in which the individual must learn the defining dimensions of a concept by experiencing instances that confirm or disconfirm that concept.

Confounding variable: In an experiment, a circumstance with levels that are correlated with the levels of the independent variable, such that any change in the dependent variable could be due either to changes in the independent variable or changes in the confounding variable.

Consolidation theory: A theory of forgetting that proposes that time is required for memory traces to consolidate, that is, to become permanent enough that they cannot be interfered with by other salient events.

Control variable: In an experiment, a circumstance set by the experimenter at a particular level and not allowed to vary.

Correlational observation: A research method in which the statistical relationship between two or more variables can be determined, but the causality of this relationship cannot be determined.

Decay theory: A theory of memory that attributes memory loss to the fading of a memory trace as a result of the passage of time.

Depressant: A psychoactive drug that has a calming effect on the user.

Developmental psychology: The branch of psychology concerned with studying behavior across the lifespan.

Diagnostic and Statistical Manual of Mental Disorders: A document published by the American Psychiatric Association that classifies the various mental disorders.

Differential parental investment: In evolutionary theory, the concept that women have a much higher investment in their offspring, because of gestation, lactation, and so on, than do men.

Dissociative disorders: A classification of mental disorders in which some parts of the self become separated from the other parts.

Ego: In psychoanalytic theory, the part of the personality that operates on a reality principle and tries to determine what an individual should realistically do while still trying to satisfy the id and the superego.

Electroconvulsive shock treatment: A physical therapy, sometimes called ECT, in which electrical current is passed through the brain; usually used to treat symptoms of depression.

Engineering psychology: A branch of psychology that is concerned with specifying the characteristics and limitations of the human operator in a human-machine-environment system.

Ergonomics: An interdisciplinary field, also sometimes called *human factors*, concerned with the design of human-machine-environment systems.

Evolutionary theory: A scientific theory first proposed by Charles Darwin in the 1800s that uses the idea of survival of the fittest to explain the wide diversity of plants and animals in the world.

Experiment: A scientific method in which an independent variable is manipulated and a dependent variable is measured while other possible variables are accounted for such that it is possible to infer causality.

Gestalt school: A German school of perceptual thought that proposes that we have certain built-in principles, such as proximity, similarity, closure, and good figure, by which we organize parts of perceptual events into wholes.

Genital stage: In psychoanalytic theory, the final developmental stage, in which a truly intimate, sharing, and caring relationship can develop.

Hamilton's rule: A formula in evolutionary theory, $c < r \times b$, that attempts to explain altruism; according to the formula, we should act if the cost to us (c) is less than our relatedness to the person we are helping (r) times the benefit (b) to the person we are helping.

Homeostatic model: A biologically based theory of motivation in which the organism has a need that leads to a drive; the drive, in turn, leads to behavior that returns the organism to an optimal state.

Humanistic therapies: A classification of therapies, such as non-directive and existential, in which the goal is to improve the client's understanding of thoughts and feelings so that the client can achieve his or her full potential.

Id: In psychoanalytic theory, the part of the personality that operates on a pleasure principle; if unchecked by the superego or ego, the id would drive us to take whatever we wanted, whenever we wanted it.

Illusory memories: Under certain conditions, people will recall events that did not actually occur; this indicates that memory is a constructive process, in which memory cues are used in an attempt to reconstruct the original memory.

Inclusive fitness: A concept in evolutionary theory proposing that organisms behave in ways that improve the chances that all kin, not just children, will survive and reproduce.

Independent variable: In an experiment, the circumstance chosen by the experimenter to manipulate in order to determine its effects on the dependent variable.

Interference theory: A theory of memory that attributes memory loss to interfering material that occurs either before or after the event to be remembered.

Introspection: A technique in early experimental psychology in which trained observers attempted to analyze the contents of their own minds by reflecting on their thoughts and perceptions.

James-Lange theory: A theory of emotion proposing that a stimulus causes both a behavioral and a physiological reaction, and it is the latter that leads to an emotional feeling.

Mental retardation: A classification of mental disorder characterized by significantly subaverage intelligence and limitations on functioning.

Mnemonics: Aids used to improve memory.

Mood disorders: The classification of mental disorders in which there is an uncontrollable, undesirable change in emotion, such as unipolar or bipolar depression.

Narcotic: A psychoactive drug usually derived from the opium plant that gives the user a rush and is highly physiologically addictive.

Non-directive therapy: A type of humanistic therapy (also sometimes called *client-centered*), in which the therapist tries to act as a mirror to reflect the clients' thoughts and feelings so that clients gain the ability to solve their own problems.

Oedipus conflict: In psychoanalytic theory, the conflict that develops during the phallic stage when little boys unconsciously want to sexually possess their mothers but find their fathers in the way.

Operant conditioning: A type of simple learning, also sometimes called *instrumental conditioning*, in which a response is more likely to recur if followed by a reinforcement.

Oral stage: In psychoanalytic theory, the first developmental stage and the stage in which psychosexual energy is focused on the mouth.

Perceptual constancies: A school of perception proposing that early in life, we learn that certain properties of objects are invariant, such as size, shape, brightness, and color.

Perceptual illusions: Situations in which our internal perceptual model of the external world is not in correspondence with reality, causing us to make mistakes in what we perceive.

Phallic stage: In psychoanalytic theory, the developmental stage especially important for little boys, in which psychosexual energy is focused on the penis and aggressive competition begins.

Phobia: A classification of mental disorders in which there is an undue fear of objects or situations.

Polygraph: A machine, also called a *lie detector*, that measures heart rate, blood volume, breathing rate, and galvanic skin response in an attempt to determine whether a person is being truthful.

Population stereotypes: The expectations that users of human-machine-environment systems have about the effect of their actions.

Prefrontal lobotomy: A surgical technique in which the connections between the prefrontal cortex and the rest of the brain are severed; this technique was used for several decades in the middle of the 20th century to alleviate the symptoms of long-term schizophrenic patients.

Probability learning: A type of learning in which the individual learns the underlying probabilistic structure of the environment.

Psychoanalysis: A psychotherapy developed primarily by Sigmund Freud, based on psychoanalytic theory, in which the goal is an analysis of the unconscious.

Psychoanalytic theory: A theory of personality proposed by Sigmund Freud in the early 1900s, in which the unconscious plays a major role in determining behavior and the parts of the personality, the id, superego, and ego, are in constant conflict.

Psychosis: Mental disorders that are characterized by a break with reality.

Qualitative design: A research design, such as ethnography, in which patterns of behavior can be studied, but these observations are not amiable to quantitative analysis.

Random variable: In an experiment, a circumstance allowed to vary in a random way such that it is uncorrelated with the levels of the independent variable.

Schizophrenia: A classification of mental disorders in which there is a psychotic break with reality and often delusions, hallucinations, and disorganized speech and behaviors.

Self-actualization: A goal proposed by Abraham Maslow in his Hierarchy of Needs model of motivation, in which people can fulfill their full potential.

Sexual disorders: A classification of mental disorders in which there is either an inability to perform sexually as desired or sexual behavior characterized by an undue sexual attraction to abnormal sexual stimuli.

Social psychology: A branch of psychology concerned with social thinking, social influence, and social relations.

Somatoform disorder: A classification of mental disorders in which there are complaints about bodily symptoms or defects.

Stimulant: A psychoactive drug that produces feelings of heightened awareness and alertness.

Stimulus discrimination: In classical conditioning, when stimulus generalization has occurred, if similar stimuli continue to be presented, but only the conditioned stimulus is paired with the unconditioned stimulus, the responses to the similar stimuli will die out.

Stimulus generalization: In classical conditioning, after acquisition takes place and the conditioned stimulus reliably evokes the conditioned response, other similar stimuli also are found to evoke some lesser level of response.

Substance-related disorder: A classification of mental disorders related to problems caused by taking a drug of abuse.

Superego: In psychoanalytic theory, the part of the personality that operates on a moral principle much like our conscience and gives us guilt when we do not follow its rules.

Systematic desensitization: A behavior therapy in which clients pair up progressively more anxiety-producing situations with relaxation in order to learn new, more appropriate responses to these situations.

Token economy: In behavior therapies based on operant conditioning, when a symbolic reinforcer is used, such as a poker chip, that can be traded for a primary reinforcer, such as food.

Tourette's syndrome: A mental disorder characterized by a continuous repeated build-up of tension that sometimes leads to uncontrollable vocal and motor outbursts.

Transmitter substance: A chemical released into the synapse between neurons that makes the postsynaptic neuron more or less likely to fire.

Unconscious level: In psychoanalytic theory, the part of the personality below the level of awareness that plays a major role in determining how we behave.

Unipolar depression: A classification of mental disorders characterized by either depressed mood or loss of interest in pleasurable activities.

Biographical Notes

Charles Darwin (1809–1882). A British naturalist who, after his 1831–1836 trip collecting plant and animal specimens, wrote the classic book *On the Origin of Species*, published in 1859. This book was the basis for the theory of evolution, including the concept of natural selection and the theory's requirements of variation, inheritance, and selection. Later, Darwin would add the concept of sexual selection to his theory and would apply the theory to humans.

Sigmund Freud (1856–1939). An Austrian physician who, while treating patients with hysteria (conversion disorder) using hypnotism, discovered that patients improved if he could get them to talk about their problems. Over the years, he developed this therapeutic technique into psychoanalysis and proposed the associated psychoanalytic theory. This theory's emphasis on the unconscious level is the basis of many modern-day social policies, as well as today's psychodynamic therapies.

William James (1842–1910). An American psychologist who, with his 1890 textbook *The Principles of Psychology*, introduced scientific psychology to many university students and faculty. Although he was not a researcher, he was an outstanding philosopher and writer, well versed in psychological findings from around the world. He was adept at combining his knowledge of psychology with his personal observations to bring psychology alive to his readers.

Ivan Petrovitch Pavlov (1849–1936). A Russian physiologist who won the Nobel Prize for his research into the physiology of digestion; in the course of his research, he observed that pairings of certain events led to responses to new stimuli. From these observations and later experimentation, he founded the field of classical conditioning. Although he spent the rest of his career studying conditioned reflexes, he denied to the end that he was a psychologist.

Burrhus Frederic (B. F.) Skinner (1904–1990). An American psychologist who many consider to be the father of operant conditioning; his first major book, *The Behavior of Organisms*, was published in 1938. He also wrote *Walden Two*, a fictional treatment of a utopian society based on reinforcement, and *Beyond Freedom and Dignity*, a book considering the uses of reinforcement for social engineering. Skinner's early work on schedules of reinforcement formed the basis for modern behavior therapies.

John Broadus Watson (1879–1958). An American psychologist who became uncomfortable with introspection as a research technique and, following Pavlov's lead, founded the school of psychology known as behaviorism, which he introduced in a 1913 article entitled "Psychology as the Behaviorist Views It." Behaviorism then became the dominant paradigm of psychology for more than 50 years, and the only subject matter deemed appropriate for study became behavior, rather than the mind.

Wilhelm Wundt (1832–1920). A German psychologist who is generally considered to be the father of experimental psychology; in 1879, he converted his demonstration laboratory into the first psychological laboratory for collecting empirical data. This laboratory served as a model for psychology and led psychology from being a discipline based in philosophy to one based in science.

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Internet Resources:

Cosmides, Leda, and John Tooby, Center for Evolutionary Psychology, University of California—Santa Barbara. "Evolutionary Psychology: A Primer." http://www.psych.ucsb.edu/research/cep/primer.html. An article by two of the founders of evolutionary psychology that gives a nice overview of the field.

Drugstory.org, http://www.drugstory.org/drug_stats/druguse_stats.asp. This website has several sources of the most up-to-date drug-use trends.

HaidtLab: Research on Morality, Emotion, and Culture. http://www.people.virginia.edu/~haidtlab/. From this page you can link to articles by Jonathan Haidt of the University of Virginia, including one discussing the moral emotions. There are many other interesting articles on this site as well.

Human Behavior and Evolution Society. http://hbes.com. This website offers an introduction to the field of evolutionary psychology, including videos and a book chapter, and allows one to participate in Web-based research.

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Psychology of Human Behavior

Part III

Professor David W. Martin

THE TEACHING COMPANY ®

David W. Martin, Ph.D.

Professor of Psychology, North Carolina State University

David Martin received a B.A. in psychology from Hanover College in Indiana, where he also finished the necessary coursework for a major in physics. He received an M.A. in experimental psychology and a Ph.D. in engineering psychology from The Ohio State University.

Professor Martin began his professional career in 1969 as an assistant professor at New Mexico State University. He progressed through the ranks, becoming a professor in 1983. During this time, Professor Martin contributed to developing a prominent Ph.D. program in engineering psychology. During his final 11 years at NMSU, he was also head of the department. At NMSU, Professor Martin taught courses in introductory psychology, perception, research methods, and human performance; was selected as an outstanding professor by graduating seniors; was named a master teacher; and received a Roush Award for Teaching Excellence. In 1992, Professor Martin assumed his current position as professor and head of the Psychology Department at North Carolina State University. In addition to his administrative duties, he regularly teaches a psychology survey course, an honors seminar, and an evolutionary psychology seminar. He was named to the Academy of Outstanding Teachers at NC State in 1997.

Professor Martin's areas of research in engineering psychology and ergonomics include attention in visual search, particularly in human-computer interaction; operator workload; and cognitive modeling, particularly of human decision making. He has written more than 75 publications and papers. He is the author of *Doing Psychology Experiments*, an experimental methods text currently adopted by more than 100 colleges and in its sixth edition. Dr. Martin has also engaged in considerable professional consulting.

Professor Martin is a member and fellow of the American Psychological Association and a member of the American Psychological Society, the Psychonomic Society, and the Human Factors and Ergonomics Society (HFES). He is a past president of the Rocky Mountain Psychological Association and past president of both the Rio Grande Chapter and the Carolina Chapter of HFES. He has also served for many years on the national committee that designates doctoral psychology programs.

Professor Martin lives in Cary, North Carolina, with his two teenage sons.

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Psychology of Human Behavior
Part III

Psychology of Human Behavior

Scope:

This course of 36 lectures examines the breadth of modern psychology from both clinical and experimental perspectives. After an introduction to the precursors and early history of psychology in Lecture One, we discuss the research methods used in scientific psychology in Lectures Two and Three. Particular emphasis is given to the logic and procedures of the quantitative methods of experimentation, as well as correlational and quasi-experimental design. Consideration is also given to the qualitative designs of ethnography, naturalistic observation, and case history. Following a brief introduction to the scientific theory of evolution in Lecture Four, we discuss a less scientific theory in Lecture Five, that is, psychoanalytic theory as introduced by Sigmund Freud.

In Lectures Seven through Eleven, the topic of abnormal psychology is introduced, and we make a comprehensive examination of the various classifications of mental illness with reference to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR™). For each disorder, we look at the set of defining symptoms and, where known, the causes and prognosis of the illness. In Lectures Twelve through Seventeen, we explore three therapy classifications. For physical therapies, we discuss the various psychopharmacological approaches for each of the disorders, including discussion of electroconvulsive shock therapy and psychosurgeries. Psychotherapies are also covered, with an emphasis on psychoanalysis and humanistic and cognitive therapies. Behavior therapies are also examined, both those based on classical conditioning and those based on operant conditioning.

In Lectures Eighteen through Thirty-One, we examine the standard content areas of experimental scientific psychology. The lecture on motivation emphasizes the biologically based homeostatic model, in which the goal of behavior is the return to an optimal state, although a brief discussion of Abraham Maslow's self-actualization model is also included. The first lecture on motivation emphasizes the difficulty in measuring a private event, such as emotion, and examines the largely unsuccessful attempts of using facial expressions, self-report, and physiological measures, such as the polygraph, pupil size, and vocal tremors. In Lecture Twenty, we consider several theories of emotion, including the James-Lange theory, the Cannon-Bard theory, and Stanley Schachter's cognitive-labeling theory. Lectures Twenty-One and Twenty-Two provide an overview of various psychoactive drugs, including their classifications and behavioral effects.

In Lectures Twenty-Three and Twenty-Four, we introduce the broad area of social psychology, then cover in detail the mechanisms that influence us to behave in automatic ways, as put forth by Robert Cialdini in his book *Influence*. In the next three lectures, Twenty-Five through Twenty-Seven, we examine two forms of simple learning. Classical conditioning involves the pairing of an unconditioned stimulus with a conditioned stimulus, which eventually causes the conditioned stimulus to bring about a conditioned response. Operant conditioning involves repeatedly reinforcing a voluntary response, which increases the probability of the response recurring. For both forms of learning, we detail the time course of learning and the conditions under which learning takes place. In the final learning lecture, we look at progressively more complex forms of learning, such as avoidance learning, probability learning, and concept formation, and consider whether these could be explained as combinations of classical and operant conditioning.

In Lectures Twenty-Eight and Twenty-Nine, we look at memory. First, we consider how the various ways of assessing memory influence how good our memories seem to be. Then, we use an exercise in illusory memory to demonstrate how the modern view of memory is that of constructing memories from cues rather than calling up detailed snapshots. Finally, we review some research that demonstrates how this constructive process can lead to false memories. In the second memory lecture, we learn about some memory aids that can help us improve our memories, and we discuss three theories of forgetting: decay, interference, and consolidation. Perception is covered in Lectures Thirty and Thirty-One. In the first lecture, we use a series of visual illusions to convince ourselves that we are not in direct contact with the external world but that we use cues to form one or more external models that are sometimes in error. In the second lecture, we discuss three schools of thought about how we use cues to form internal models, and we then use the process of depth perception to illustrate what kinds of cues we employ. Finally, we look at evidence supporting the proposition that perception is built in or learned.

Lectures Thirty-Two through Thirty-Four examine modern thought regarding evolutionary psychology. In Lecture Thirty-Two, we discuss the requirements for evolution to take place and some of the myths about evolution. Then, we give a rough timeline of human evolution and look at evolved behavior from the perspective of Desmond

Morris's historical book *The Naked Ape*, particularly with respect to why we are naked, why we are sexy, and why human aggression is such a problem. The second evolution lecture examines the topics of altruism and mating. Altruistic behavior includes our behavior toward our kin and reciprocal behavior toward non-kin. Our discussion of mating includes the different behavioral strategies used by men and women related to differences in parental investment in their offspring. In the third evolutionary lecture, aggression is considered, along with parenting and eating behaviors. Evolutionary theory makes specific predictions about the kinds of family conflicts found even in today's families. The reasons we overeat to the point of obesity are also understandable from evolution.

In Lecture Thirty-Five, we look at the applied field of engineering psychology and consider how this field, which is concerned with the design of human-machine-environment, is integrated with other disciplines, such as industrial engineering. We also examine the types of recommendations engineering psychologists can make in the design of displays and controls. In the final lecture, we review where we have been, then briefly discuss a few topics not previously covered, including neuropsychology, cognitive modeling, and developmental psychology. Finally, we consider the future of psychology, with particular emphasis on genetic therapies for mental illnesses and the application of scientific psychology to practical societal problems.

Lecture Twenty-Five
Simple Learning—Classical Conditioning

Scope: One type of basic learning is *classical conditioning*, which was discovered by Ivan Pavlov as he was studying glandular processes in dogs. An *unconditioned stimulus* (UCS) that automatically produces an *unconditioned response* (UCR) is paired with a *conditioned stimulus* (CS) a number of times until the CS by itself produces the *conditioned response* (CR). Examples of the process include dogs salivating in response to bells, children showing fear in response to white rats, daughters showing fear in response to lightening storms, and skin conductivity changing in subjects due to a tone. As the strength of the response increases with repeated pairings of the UCS and CS, *acquisition* takes place. When the CS is repeatedly presented without the UCS, the response dies out and *extinction* occurs. After some time passes, the response will again occur with presentation of the CS alone, indicating *spontaneous recovery*. *Stimulus generalization* occurs when some level of response is made to stimuli that are similar to the CS. *Stimulus discrimination* occurs after various stimuli are presented, but only the CS is paired with the UCS. Some behavior therapies are based on the basic principles of classical conditioning.

Outline

I. One of the major movements in psychology was behaviorism, in which learning was a central concept, and many behaviorists believed that only a few general-purpose learning mechanisms were necessary to explain all learned behaviors.

- **A.** The discovery of one form of learning, called *classical conditioning*, is usually attributed to Ivan Pavlov, a Russian physiologist.
- **B.** While studying the chemical composition of saliva in dogs, Pavlov used equipment that would click and whir while blowing meat powder into the dog's mouth. Pavlov discovered that the dog would continue to produce saliva to the equipment noise even when the meat powder had run out.
- **C.** He postulated that over time, the dog had learned to associate the equipment noise with the meat powder, such that the noise was sufficient to produce salivation.
- **D.** This serendipitous finding led Pavlov to change his research focus and found the field of classical conditioning.
- **E.** In classical conditioning, a previously neutral stimulus, the *conditioned stimulus* (CS, equipment noise or a bell), is paired repeatedly with an *unconditioned stimulus* (UCS, the meat powder) that automatically evokes an *unconditioned response* (UCR, saliva production), until the CS by itself produces a *conditioned response* (CR, saliva production).
- **F.** Classical conditioning typically occurs for involuntary responses, such as salivation, fear, skin conductivity, and so on.
- **G.** In another example, if a white laboratory rat (CS) is presented to a child, then cymbals are crashed behind the child (UCS), the child will come to show fear and cry at the sight of the rat (CR) as it does to the cymbals (UCR).
- **H.** In an everyday situation, if there is a lightening storm (CS) and mom runs around the house screaming and yelling (UCS), then little Susie will develop fear of lightening (CR), just as she shows fear to mom's behavior (UCR).
- **I.** In the laboratory, if a mild electrical shock (UCS) that produces a change in the galvanic skin response (UCR) is paired with a 1000-Hz tone (CS), the tone by itself will come to produce the change in galvanic skin response (CR).

II. Classical conditioning does not typically occur in one trial but requires multiple trials.

- **A.** As the UCS is paired with the CS, the strength of the CR increases, a process called *acquisition*.
  1. Acquisition typically takes about 10 to 20 trials to build to full strength.
  2. Typically, an initial steep increase in response strength is seen, followed by a more gradual subsequent increase.

B. After acquisition, if the CS is repeatedly presented alone, the CR will gradually decrease to zero, a process called *extinction*.

C. Following extinction, if some time passes and the CS is again presented, the CR will return at nearly full strength, a process called *spontaneous recovery*.

1. However, extinction will again recur if the CS is repeatedly presented by itself.

2. Spontaneous recovery can also recur, but its strength will decrease each time it is repeated until spontaneous recovery itself undergoes complete extinction.

III. Classical conditioning occurs not only to the CS but, to some extent, to stimuli similar to the CS, a process called *stimulus generalization*.

A. For example, in the case of the child who was conditioned to fear a white rat, the CR may also occur to some extent in response to white powder puffs and white beards.

B. In the example of the subjects conditioned by pairing a 1000-Hz tone with a shock, we would find that there would be a moderate CR to 500- or 5000-Hz tones and a small CR to 200- and 10,000-Hz tones.

C. Stimulus generalization can be decreased by a process called *stimulus discrimination*.

1. In the case of the tone and shock, if the 1000-Hz tone (CS) continued to be presented in some trials, along with the other tones in other trials, but only the CS was paired with the shock, we would find that after a while, there would still be a significant response to the CS, but responses to the other tones would undergo extinction, thereby producing stimulus discrimination.

2. In each of our examples, stimulus discrimination can reduce the effects of stimulus generalization if training occurs in which the CS is paired with the UCS, but other similar stimuli are presented without the UCS.

IV. We can now relate classical conditioning back to Lecture Sixteen, which discussed behavior therapies.

A. You will recall that one form of behavior therapy we discussed was systematic desensitization.

1. The idea is that some problem, such as a fear of dogs, occurred at some point as a result of a classical-conditioned pairing of a stimulus, such as a vicious dog, with fear of injury.

2. The fear of that particular dog then transferred to other dogs by stimulus generalization, so that now the client has a generalized dog phobia.

3. Systematic desensitization involves the process of gradually pairing mental images or real stimuli of anxiety-producing events with a relaxed state.

4. This pairing can be considered either an extinction process, whereby the CS is extinguished, or a stimulus discrimination process, whereby a stimulus that should be feared, the CS, maintains its strength, but similar stimuli that should not be feared are extinguished.

B. Thus, systematic desensitization, as well as flooding and implosion therapies, relies on the basic principles of classical conditioning.

V. There is a problem with the notion that the principles of classical conditioning can explain all behaviors relating emotional responses to stimuli or situations.

A. John Garcia has done work on conditioned taste aversions that seem to violate the principles of classical conditioning.

1. I hate ravioli because when I was in high school, I once ate two cans of ravioli at one sitting and became sick to my stomach.

2. Classical conditioning is also not supposed to occur unless the CS and UCS occur close in time, usually on the order of seconds, but 20 minutes or more passed in this case.

3. Most classical conditioning requires repeated pairings of the CS (taste of ravioli) and the UCS (sickness), but in my case, the learning took one trial.

B. Garcia studied these processes in the laboratory, conditioning rats to avoid saccharin when they had been mildly poisoned after having drunk saccharin, and confirmed that the usual rules of classical conditioning do not apply.

C. Evolutionary psychologists believe that there are multiple learning modules besides classical conditioning, each associated with various learning problems that occurred during ancestral times.

Essential Reading:
Paul Chance, *Learning and Behavior*.

Supplementary Reading:
Daniel Todes, *From the Machine to the Ghost Within*, pp. 947–955.

Questions to Consider:

1. Can you think of an everyday case of classical conditioning (e.g., cats and electric can openers, hot showers and flushing toilets)? If so, identify the UCS, CS, UCR, and CR for this case.
2. Can you think of any instances in which there is involuntary learning similar to classical conditioning, but in which the rules of classical conditioning, such as close timing of the UCS and CS and multiple-trials learning, do not seem to be necessary?

Lecture Twenty-Six
Simple Learning—Operant Conditioning

Scope: *Operant* (or *instrumental*) *learning* occurs when a voluntary response is followed by a reinforcement. B. F. Skinner is considered the father of operant conditioning and did much of the early work, in which laboratory rats in operant chambers were reinforced with a food pellet for pressing a lever. *Shaping* occurs when successive approximations to the desired response are reinforced. As reinforcement continues, an organism makes increasingly more responses, and *acquisition* occurs. After acquisition, if reinforcement is no longer given, the organism stops responding, and *extinction* is said to take place. After some time passes, responses sometimes reappear even without new reinforcements, a process call *spontaneous recovery*. If reinforcements are given on the basis of a fixed number of responses having been made, a *fixed-ratio reinforcement schedule* is in effect. If a response is reinforced only after the passage of a fixed amount of time, a *fixed-interval schedule* is being used. If reinforcements are given based on the number of responses made, but the specific number is unpredictable, a *variable-ratio schedule* is being used; when this schedule is used, the learning is very resistant to extinction. Gambling games are based on variable-ratio schedules. If reinforcements are given for a response occurring after an unpredictable passage of time, a *variable-interval schedule* is in effect.

Outline

I. One form of simple learning proposed by the behaviorists as a general-purpose learning mechanism is *operant* (or *instrumental*) *conditioning*.

A. In this form of learning, a response is made that is followed by a reinforcement, which makes the response more likely to recur.

1. This form of learning is called operant conditioning because the organism *operates* on the environment, which results in the reinforcement. It is sometimes called instrumental conditioning because the response is *instrumental* in bringing about the reinforcement.

2. B. F. Skinner is considered by most psychologists to be the father of operant conditioning; during his entire career, he did research and wrote extensively on the topic. In his controversial book *Beyond Freedom and Dignity*, Skinner claims that we are not really free to choose how we live; we are "dealt" our lives, based on reinforcements we experience as we grow up. Because we do not have real freedom to begin with, Skinner argued, it would be better if society controlled the reinforcements—Skinner supported the idea of social engineering.

3. The behavior (response) in operant conditioning is usually a voluntary (or skeletal) behavior, unlike classical conditioning, in which the behavior is involuntary (or autonomic or visceral).

4. In a somewhat circular way, a reinforcement is defined as something that makes the response more likely.

B. The classic laboratory paradigm for operant conditioning is a white rat in an operant-conditioning chamber, sometimes called a *Skinner box*, having a lever on one end that can be depressed in order to deliver a food pellet to a trough next to the lever.

1. Even though the rat is interested in food, having been deprived of food for a day, it does not immediately rush over and press the lever because it has not learned the contingency of the lever press leading to the food pellet.

2. In order to speed up the acquisition of lever-pressing behavior, the experimenter uses a process called *shaping*, in which successive approximations to the response are reinforced.

3. First, the rat might get pellets for being on the side of the box with the lever; then, in order to get a pellet, it might be necessary for the rat to get up on its hind legs; then, to be within an inch of the lever; then, to touch the lever; and finally, to press the lever.

4. We naturally use shaping on each other, such as when mom praises three-year-old Susie for putting on her shoes, even if they are on the wrong feet, but later praises her only if they are put on correctly.

II. As was the case for classical conditioning, certain terms are used to describe the time course of events as conditioning takes place; although the operations are different for the two forms of conditioning, the terms are the same.

A. If the frequency of responses per unit of time is plotted after the first correct reinforced response, the number of responses made increases rapidly until the number flattens out at some maximum possible level. This process is called *acquisition*; the rat (or person), by being reinforced, has acquired the response.

B. Following acquisition, if reinforcements are no longer given, the response will continue for a time but will eventually completely cease. This process is called *extinction*, or it is said that the response has extinguished.

C. Following extinction, if the person or animal is removed from the environment and some time passes, when put back into the environment, the organism will again begin making responses, even though no reinforcement has been given since extinction. This process is called *spontaneous recovery*.

D. With no reinforcements, the responses will again extinguish, and although some spontaneous recovery will recur, it will also eventually die out.

E. Learning to drive a car with a stick-shift and clutch illustrates the time course of events for operant conditioning in a human context.

1. As the student is in the car with the driving instructor, the instructor (as well as other drivers, who may honk when the student stalls the car) reinforces clutch-pressing behavior until acquisition has taken place and the clutch is pressed reliably whenever the car stops.

2. The student flies off to Grandma's house, rents a car with an automatic transmission, and discovers that whenever she stops, she slams her left foot on the floorboard, seeking the nonexistent clutch, but because this behavior is not reinforced, extinction takes place and it dies out.

3. After a night's sleep, the next morning, the student jumps into the rental car and, at the first stop sign, again goes for the clutch because spontaneous recovery has occurred.

III. When discussing reinforcements up to this point, I have implied that a reinforcement is given every time a response is made, but other reinforcement schedules are possible.

A. When a *fixed-ratio schedule* is used, a reinforcement is given every time a fixed number of responses has been made.

1. The example of the rat in the Skinner box getting a food pellet every time the lever is pressed is an example of fixed ratio, in which the ratio is 1:1.

2. Other ratios can be used, such as 5:1 or 10:1, particularly if the goal is to increase the number of responses for a given cost, such as paying $1.00 for every 10 widgets instead of for every widget.

B. With a *fixed-interval schedule*, a reinforcement is given after a response but only after a fixed interval of time has passed.

1. For example, the Skinner box might be set up so that after the lever is pressed and a food pellet is given, 20 seconds must pass before a response will elicit another pellet.

2. After a fixed-interval schedule has been learned, if a plot is made of the number of responses over time, a scalloped function will appear, in which there are bursts of responses just as each interval is about to expire but few responses at other times.

3. Workers who are paid weekly are technically on a fixed-interval schedule, although the fact they can be fired for not working on days other than Fridays will attenuate their end-of-interval response bursts.

C. With *variable-ratio schedules*, reinforcements are based on the number of responses, as was the case for fixed-ratio schedules, but the number required varies from trial to trial.

1. For example, the Skinner box may be set up to deliver a pellet, on average, every 5 lever presses, but on successive trials, the number required might be 3, 8, 6, 4, 4, 7, and so on.

2. The most interesting characteristic of learning that has occurred using variable-ratio schedules is its high resistance to extinction.

3. Gambling games, such as slot machines, are based on variable-ratio schedules, which is why players continue to play even after not having been reinforced for a while.

4. Some of the people we know who are difficult to get out of our lives also have us on variable-ratio schedules.

D. With *variable-interval schedules*, responses are reinforced only after the passage of an interval of time, but in this case, the interval is variable.

Essential Reading:
Paul Chance, *Learning and Behavior*.

Supplementary Reading:
B. F. Skinner, "Can Psychology Be a Science of Mind?" *American Psychologist* 45, no. 11 (1990), pp. 1206–1210.

Questions to Consider:
1. Imagine that you are a rat who has been trained to press a lever for a food pellet under a variable-ratio schedule, and now the experimenter, unbeknownst to the rat, has turned off the food pellets and started extinction. If you were to anthropomorphize and climb into the rat's brain, what thoughts do you think the rat would be having about the likelihood of getting another food pellet? Does that help you to understand why organisms are so resistant to extinction when trained on variable-reinforcement schedules?
2. In this lecture, I made the claim that operant conditioning is usually effective only for voluntary (or skeletal) responses. However, in Lecture Seventeen, dealing with behavior therapies, we discussed one form of therapy for which this statement is not true. What was that therapy and what were the responses involved?

Lecture Twenty-Seven
Complex Learning

Scope: This lecture describes several forms of *complex learning* and argues that complex learning cannot simply be constructed from the building blocks of classical and operant conditioning. In *avoidance learning*, a stimulus allows the organism to act to avoid a negative consequence. Avoidance learning has characteristics of both classical and operant conditioning, is very resistant to extinction, and is how phobias are maintained. *Probability learning* occurs when, through experiencing events, we learn the probabilistic structure of those events. While probabilities are learned, when asked to make predictions, humans match the probabilities, which is not optimal. *Concept formation* occurs when a person has to learn the defining dimensions of a concept by experiencing instances that confirm and disconfirm that concept. People can learn very complex concepts, and this type of learning is what allows us to learn vocabulary. Although B. F. Skinner argued that he could explain language learning simply using principles of operant conditioning, Noam Chomsky gave convincing arguments that a cognitively sophisticated transformational grammar is required to learn language.

Outline

I. In the previous two lectures, we discussed two simple forms of learning, classical conditioning and operant conditioning, and in this lecture, we will discuss several forms of more complex learning and try to determine whether complex learning is assembled out of the building blocks of simple learning.

II. Imagine a white rat in a box about the size of a shoebox with an electrified grid for a floor and a wall in the middle that the rat can climb over; in the wall is a light that can be seen from both sides of the box. The rat is in the left side of the box when the light is illuminated, and one second later, the floor on the left side is electrified, but the rat can climb over the wall to the other side, which is not electrified.

- **A.** The rat in this situation is forced to engage in *avoidance learning*, to learn to avoid the shock by climbing over the wall whenever the light comes on.
- **B.** Under these conditions, the rat quickly learns the avoidance behavior. In addition, there are several other notable things about this task.
  1. In part, the task resembles classical conditioning, the pairing of the light with the shock, in that the rat apparently comes to associate the light and the shock. In part, it also resembles operant conditioning, the reinforcement of not getting shocked for the behavior of climbing over the wall.
  2. Avoidance behavior is not only quickly learned, but it is highly resistant to extinction, because whenever the light occurs, the rat self-reinforces by climbing over the wall; thus, it never realizes that the shock has been turned off.
  3. Although phobias are established by classical conditioning, they are usually maintained by avoidance learning, which is why they are so difficult to unlearn; the claustrophobic person self-reinforces whenever he avoids the closed space.
- **C.** Although a case could be made that avoidance learning is made up of the building blocks of classical and operant conditioning, that case may be more difficult for the other complex learning tasks that we will discuss.

III. In a moment, I will read you a list made up of the letters R and L. After I read each letter, I want you to predict by writing down, or if you cannot do that by saying aloud, whether the next letter in the list will be an R or an L. (L,R,R,R,R,L,R,R,R,R,L,L,R,R,R,L,R,R,R,R,L,R,R,L,R,R,R,L,R,R,R,L,L, R,R,R,L,L,R,R…)

- **A.** Look at your last 10 predictions and count how many Rs and how many Ls you predicted; if you are like most people, you predicted an average of about 7 Rs and 3 Ls.
- **B.** The learning that occurs in this task is called *probability learning*. The list was generated by drawing and replacing slips of paper from a hat, 7 slips labeled R and 3 labeled L; the point is to learn the probabilistic structure of this environment.
  1. We can infer that because people match their guesses to the probabilities, a process called *probability matching*, they are good at probability learning.

2. Note, however, that if the goal is to guess correctly with the highest frequency, an optimal strategy would be to guess R on every trial as soon as you know there are a preponderance of Rs, because that strategy results in being correct 70% of the time, whereas any other strategy is correct less frequently.
3. People probably engage in matching rather than using the optimal strategy because they value predicting the lower-frequency event more than predicting the higher-frequency event.
4. If I paid you a dollar for every correct prediction in this task, you would have quickly predicted R on every trial.

C. Although B. F. Skinner would probably give it a try, it is difficult to argue that probability learning is just a form of operant conditioning.

IV. I am going to present you with some figures that vary in size (large or small), color (red or blue), and shape (circle or square), and I want you to learn what a *dag* is from my telling you whether the shape I am showing is a dag or not: large, blue, square = no; large, red, circle = no; small, blue, circle = yes; small, red, square = no; small, blue, square = no, large, blue, circle = yes; small, red, circle = no; small, blue, square = no; large, red, circle = no; large, blue, circle = yes….

A. If you were paying careful attention, you could probably tell me that a dag is blue circle regardless of its size.

B. The learning occurring for this task is called *concept formation* because you were learning what the concept of a dag is.

1. People are pretty good at learning concepts in this manner, although they usually take more trials than the formal rules of logic would predict.
2. Although this task was fairly easy, I could have made it much more difficult by employing a rule such as: A grack is a large blue square or a small red square.
3. Most psychologists would contend that much of verbal vocabulary learning occurs through concept formation by repeated trials. For example: Yes, that is a rose; no, that is not a rose.
4. If you think this type of concept formation is easy, consider what it would take to describe the difference between a Ford and a Chevrolet or what a strike is in baseball.

C. Especially because our subjective experience during concept formation is one of mentally testing hypotheses, it is difficult to argue that this form of learning is nothing more than operant conditioning that is being reinforced by being right or wrong.

V. One of the more complex forms of learning that humans do is the learning of language, including both vocabulary and the grammatical structure of language.

A. Skinner argued that a child learns language properly because the adults around the child reinforce correct language: "No, Johnny, we don't say, 'they is'; we say, 'they are.'"

B. Linguist Noam Chomsky argued that children could not possibly learn language as quickly and efficiently as they do if they relied solely on operant conditioning, that we learn a transformational grammar that provides us the rules to form proper sentences.

C. Chomsky's arguments held sway in the scientific community, and partly because of this outcome, the behaviorists lost much of their theoretical clout in psychology and gave way to the cognitive revolution.

Essential Reading:
Paul Chance, *Learning and Behavior*.

Supplementary Reading:
Noam Chomsky, *Knowledge of Language*.

Questions to Consider:
1. How do you think that I learned to write this sentence given that I have never written this sentence before?
2. How do you think we go about doing probability learning? Do we just keep a running frequency count in our head, or is something else going on here?

Lecture Twenty-Eight
Memory—Characteristics

Scope: There are many ways to assess how much we remember of what we have learned. In *free recall*, a person is simply asked to re-create the original material with no constraints or prompts. Recall typically shows rather rapid forgetting. With *recollection*, some old material and some new material is presented, and the person must indicate which items have been previously experienced. Recollection can still be high even when recall has faded. Even after recollection shows that little of the original learning remains, relearning the material a second time can often show that some material is still remembered. We demonstrate in the lecture and cite research findings indicating that *false* or *illusory memories* are possible. False memories suggest that the conception of memory as a fading version of an original high-fidelity recording is incorrect. The modern conception of memory is that the original memory activates cues of the event, and when asked to remember, we use these cues to construct a representation of the original event. Because it is possible for subsequent cues to be added and for cues to be forgotten, false memories are possible.

Outline

I. In the last three lectures, we considered how we learn things, but after something is learned, then it has to be remembered; what is the nature of memory?

A. First, I will give you some words to learn, and later in the lecture, I will ask you to write down or say aloud as many of the words from this list as you can remember in any order you wish: slumber, tired, rest, night, dark, comfort, sound, eat, bed, snore, dream, awake.

B. Typically when I give this lecture, I would have, a few days earlier, had students learn this list of 12 words over repeated trials until they could write the list down perfectly.

1. In this lecture, I would then have the students get out a sheet of paper and write down as many words as they could remember from that list in any order they wished.

2. I would then plot a function, with percent remembered on the vertical axis and time since learning on the horizontal axis.

3. At time 0, on average, students can recall nearly 12 words, because, on average, they have learned them perfectly at that point. After about 4 days, they can recall about 6 words; thus, the function decreased rather rapidly at first, then tended to flatten out as more time passed.

4. Next, I would read a list of 12 words containing 6 words from the original list and 6 new words and ask the students to write these down and put a checkmark next to all of the "old" words.

5. In this case, students, on average, put the checkmark next to 5.5 to 6 of the original words, indicating that they remembered about 90% of the list; a function with a much slower drop-off could be plotted on the graph.

6. Thus, how much is remembered has a great deal to do with how memory is assessed; *free recall* shows that about half has been forgotten after 4 days, and *recognition* shows that only about 10% has been forgotten.

7. Even if recognition indicated that there was nothing left, relearning, i.e., the number of trials to relearn the material compared to the number of trials during original learning, might indicate that something had been retained.

8. Fortunately, in many cases, such as for these lectures, the type of memory we are expecting is more of the relearning kind than the recall kind.

II. Now I want you to write down or say aloud as many of the words from the list I read you at the beginning of lecture as you can.

A. When I do this demonstration in class and call on students to tell me what words they recall from the list, a strange thing happens; one of the words they recall is *sleep*, and *sleep* was not on the list. (Was it on yours?)

B. The finding that a false memory has been created is called *illusory memory*, because it is an illusion that the memory is real, much like a visual illusion.

C. If *sleep* was not on the list I read you, how was it recalled as being on the list?

1. You will notice that many of the other words on the list are high associates of *sleep*, such as *slumber*, *rest*, *dark*, *dream*, and so on.
2. It may be that as I read the words to you, nodes in your memory were being activated for each of the words, as well as for other words associated with those words; then, when I asked you to recall words, you went looking for the most highly activated memory nodes.
3. In other words, a process called *spreading activation* caused *sleep* to be activated each time an associated word was read; thus, *sleep* ended up being as activated as the original words.

D. Characterizing memory in this way is quite different from the usual characterization of memory.

1. Most people consider memory to be like a snapshot or a tape recording of the original event that leaves a memory trace in the brain.
2. With the passage of time and, perhaps, interfering events, the trace may degrade in certain ways and even eventually be lost, but it should never have new details added to it.
3. However, modern memory researchers now consider the retrieval of items from memory to be a constructive process.
4. The original event, rather than laying down a high-fidelity recording, simply activates nodes in the brain that provide cues related to the original event.
5. When the person tries to retrieve the memory, a search occurs for as many of these original cues as can be found in order to construct a memorial representation as nearly like the original event as possible.
6. We then pretend the memorial representation is the original event, and sometimes we are wrong if false cues have been added or errors have occurred in the construction.

E. Elizabeth Loftus (a psychologist and expert in eyewitness testimony who has testified in many famous trials) has studied false memories extensively and has concluded that they are not as rare as we might believe.

1. For example, in the laboratory, subjects were asked to watch a video of an accident; some were then asked whether they saw children getting on the school bus, when there was no school bus shown. A week later, when the subjects were asked whether they saw a school bus on the tape, those who had been asked the earlier question were more likely (26%) to report that they had seen the bus than those who had not been asked the question (6%).
2. When asked to judge the speed of a car that hit another car, those who were asked the speed of the car that *smashed into* the other car gave a higher estimate than those who were asked the speed of the car that *hit* the other car.
3. Loftus even discovered that she could get some people to believe that completely false events from their childhood occurred if she embedded these in true events and if she gave elaborate details of the false events, particularly if she implanted the false memory and then waited a week or more before asking whether it really occurred.
4. Loftus's findings fit nicely into the constructive interpretation of memory, in that details implicit in questions and suggestions from others can be picked up and, when added as cues to our real existing cues, can lead to false memories.

Essential Reading:

Daniel Schacter, *Searching for Memory: The Brain, the Mind, and the Past*.

Ian Neath and Aimee Surprenaut, *Human Memory*, 2nd ed., chapter 12.

Supplementary Reading:

Elizabeth Loftus, "Our changeable memories: Legal and practical implications." *Nature Reviews Neuroscience* 4 (2003), pp. 231–234.

Elizabeth Loftus, "Creating False Memories," http://faculty.washington.edu/ eloftus/Articles/sciam.htm.

Questions to Consider:

1. Given what we have been discussing about adult memories, how do you think children's memories in child abuse cases ought to be handled?
2. When we give tests in courses to find out what students remember, various formats can be used, such as essay, fill-in-the-blank, true-false, and multiple-choice tests. Which of these should indicate that the most material has been remembered, and which do you think would be most appropriate for which kind of learning?

Lecture Twenty-Nine
Memory—Memory Aids and Forgetting Theories

Scope: Memory aids, called *mnemonics*, have been around for many centuries, and some of these have been proven effective by modern memory research. *Chunking* or *clustering* is a mnemonic that groups items so that the natural limits of short-term memory can be overcome. Even greater memory gains can be made if chunks can be organized into *hierarchies*. Memory can also be improved by using *imagery*, forming mental pictures of the material, because humans have evolved to better remember images than abstractions. *Mediation* can be used to link items together by bringing another item between the items to be remembered. This lecture demonstrates these mnemonic techniques by having students learn some names and a grocery list. Three theories of forgetting are also discussed. *Decay theory* attributes forgetting to the passage of time. *Interference theory* asserts that we forget as a result of the interference of material learned after or before the memory. *Consolidation theory* says that the passage of some time is required before a memory trace has consolidated enough that it is less likely to be subject to interference.

Outline

I. There are ways of improving memory, called *mnemonics*, that have been around for many centuries.

A. A well-known book on the subject is *The Memory Book* by Jerry Lucas and Harry Lorayne.

B. Before printing presses and modern devices for storing information, it was necessary for scholars, balladeers, and others to remember information, and memory systems based on mnemonics were taught as a means for improving memory, particularly for oral material.

C. Modern research has shown that most of these mnemonic devices are effective at improving memory and helping to circumvent some of our cognitive limitations.

D. One mnemonic is to *chunk* or *cluster* information by grouping items.

1. One of the most famous articles published in psychology was by George Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information," which referred to the inability of human short-term memory to store more than about seven items of information.

2. Although short-term memory can store only about seven items, an item can be a chunk of other items.

3. Because we realize this limitation, we naturally chunk or cluster items when possible to improve memory.

4. For example, suppose I were to ask you to remember the following list in any order you wished: tuna, oak, rose, pansy, cod, willow, trout, tulip, pine, elm, azalea, bass. I would find that you chunk together items from the categories of fish, trees, and flowers (e.g., tuna, cod, trout, bass) because that strategy allows you to remember only four items in each of three categories.

5. One of the best experts at remembering long strings of numbers was found to be chunking the numbers as track running times and then learned to form hierarchies out of these chunks.

6. One of the best ways to try to remember a lecture, or the contents of a book, or a speech you have to give is to make a hierarchical tree with chunks of items at each level.

7. For example, in this lecture, I am talking about memory aids, and I will discuss only three of these; then, I will talk about theories of forgetting, which will be another three items. At the next level down under each of these topics, I will make fewer than three points; thus, at any level, there are no more than three items in a chunk or three chunks at each level.

E. Another mnemonic device is *imagery*, which is the forming of a mental picture of the item to be remembered.

1. Probably because as our ancestors evolved, they had to remember scenes long before having to remember words, we are naturally better at remembering images than such abstract concepts as words.

2. If you have ever had someone show you hundreds of pictures of a vacation and one picture was accidentally repeated, you may have discovered how good you are at remembering pictures.

3. Those who teach memory systems recommend that the more bizarre the picture, the easier it is to remember, although there are mixed findings in laboratory research concerning the advantages of bizarreness.
4. When I teach my classes, I give a demonstration in which I learn the first names of 15 or so students within a minute or two using imagery and linking the student to a person whose name is famous in history or show business or is a personal acquaintance.

F. A third mnemonic device is *mediation*, the bringing of an item between two items you are trying to remember in order to help form an associated pair.

G. To illustrate the use of imagery and meditation in a practical task, suppose we wanted to go to the grocery store and buy a list of 10 items in order: milk, bread, cookies, ice cream, carrots, steak, cereal, pizza, butter, cheese.

1. First, we would want to recall a nursery rhythm or song we learned that goes: "One is a bun, two is a shoe, three is a tree, four is a door, five is a hive, six is sticks, seven is heaven, eight is a gate, nine is wine, and ten is a pen." (Your version may be a bit different from mine.)
2. We will use that poem through mediation to associate one, which is already associated with bun because of the poem, to an image of the first item on the list, milk.
3. We might (using bizarreness) form an image of a bunch of buns floating in a sea of milk.
4. As soon as this image is recorded, we do not have to rehearse it; it will not disappear, sort of like trying not to picture a pink elephant.
5. Now we can go through the other items on the list, pairing them up through an image with the poem (e.g., a shoe stuffed with bread, a tree with cookies hanging from it, and so on).
6. Without any rehearsal and with little effort, you will discover that you can recall all 10 items in order and that these will stay with you for quite a while.

II. Three theories of forgetting have been proposed to explain why and under what conditions we forget what we have learned.

A. *Decay theory* says that when we learn something, a memory trace is laid down in the brain, and because of the passage of time, the trace decays or fades away.

1. We know by plotting the percentage of material remembered over time that forgetting does occur as a function of time.
2. We also know that other things besides the passage of time can affect the amount of material remembered.

B. *Interference theory* says that we forget what we have learned only because other things we learn can interfere with the memories.

1. If we have one group of subjects learn a list of words, List A, to criterion, and then learn a second list, List B, to criterion, these subjects will recall List A more poorly than a group who learned List A and then rested for the same amount of time it took the first group to learn List B.
2. Because the same amount of time passed for both groups between learning List A and being tested on List A, decay theory cannot explain this result; thus, the difference in performance must be attributable to List B interfering with List A for the first group.
3. Interference can also be demonstrated if List B precedes List A rather than following it.
4. Unfortunately, it is not possible to do the critical experiment to determine whether it is just interference that causes forgetting or whether forgetting is also partially due to time, because we cannot have interfering activity without the passage of time nor the passage of time without interfering activity.

C. *Consolidation theory* says that the passage of some time is required before the memory trace has consolidated enough, that is, has been well enough ingrained, that it is less likely to be interfered with.

1. In the laboratory, rats that are taught a maze and then receive a severe shock are less likely to remember the maze than rats that learn the maze and are not shocked until 20 minutes have passed. This finding indicates that it takes about 20 minutes for the memory trace to consolidate to the point that it cannot be interfered with.
2. Real-world examples of consolidation include amnesia cases in which recent memories are lost, but more distant memories are retained.

Essential Reading:
Ian Neath and Aimee Surprenaut, *Human Memory*, 2nd ed., chapters 6, 15.

Supplementary Reading:
George Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information."

Harry Lorayne, "Memory Training and Memory Improvement," http://www.harrylorayne.com/.

Questions to Consider:
1. Besides rote rehearsal, what memory aids have you found to be helpful when you have tried to remember a speech?
2. Can you think of a way to determine experimentally whether forgetting is due just to interfering material or whether the passage of time has any influence on forgetting?

Lecture Thirty
Perception—Forming Internal Models

Scope: Humans are not in direct contact with the external world but pick up cues as to what is in the external world and form internal models from these cues. Because this process is so automatic, we need to be reminded of this fact through parables and perceptual illusions. One reason our internal models are different from the external world is that we have sensory limitations. We are good at picking up rather subtle cues to form our internal models. When there are ambiguous cues, we can entertain more than one internal model, and our active perceptual system can alternate these models, overriding our conscious control. In some cases, our internal models are not in correspondence with external reality, and we see visual illusions, such as lines of different lengths when the lines are equal, squares of different grey shades when the shades are the same, and curved lines when lines are straight.

Outline

I. Because humans are so successful at interacting with the external world, we usually do not consider the fact that we are not in direct contact with the external world.

- **A.** What we do is pick up cues as to what is out there and form an internal model. We are very good at using subtle cues to form this model, although for ambiguous cues, we can form more than one internal model, and sometimes, our internal models are wrong.
- **B.** The early philosopher Plato asked us to imagine a young child who had been captured by an enemy tribe and kept in a dimly lit cave throughout his early life; in the cave, there were only flat, gray surfaces and shadows undulating across these surfaces.
  - **1.** When his home tribe defeated the enemy and released the now adult man from the cave, what do you think his perceptual experiences were?
  - **2.** Did he look around the world and see it as we do, or did he "freak out" from all of the perceptual experiences that were missing in the cave?
- **C.** Although humans are usually unaware of it, because of the limitations of our sensory systems, we are like the fellow in the cave, in that we are tuned to only a part of the external world.
  - **1.** For example, we are tuned to only a small part of the electromagnetic frequency spectrum, which we egocentrically call *light*.
  - **2.** Imagine if someone turned on the rest of the spectrum, so that you now saw infrared light, ultraviolet light, radio waves, and microwaves, and you were experiencing all radio stations, TV stations, cell phone calls, and so on at the same time.
  - **3.** Likewise for sound, we are sensitive to sound waves only in the 20,000-Hz to 200-Hz range. We do not hear dog whistles, bat radar, and similar sounds.
  - **5.** For smell, we can pick up only some of the chemicals floating around in the air; egocentrically, we say that the rest are odorless.
  - **6.** All these examples illustrate that at a sensory level, the cues we pick up about the external world are limited, and there is a lot going on out there of which we are unaware.
- **D.** In a similar way, once the sensory system does pick up information, the perceptual system must combine these cues to try to construct an internal model, which is a crude representation of the external world.

II. The cues we use to form our internal model can be pretty subtle.

- **A.** For example, in your course guidebook, you will see a figure composed of a horizontal flattened oval with two black dots above it and two smooth, leaf-shaped objects above the black dots, which most people immediately identify as a cow's face, much as we see a smiley face in a circle, two dots, and an arc.
- **B.** Even though computers are getting better at pattern recognition, they still have a long way to go to approach the human ability to identify objects and scenes from subtle cues.

III. When the cues we sense are ambiguous, the human perceptual system keeps actively trying to form internal models and, sometimes, can entertain multiple internal models.

A. In your course guidebook is a picture of a Necker Cube that looks like a two-dimensional rendition of a cube made of wires or Plexiglas, in which the front face and back face reverse so that the cube can be seen from two different perspectives.

B. While at first the cube looks perfectly fine from one perspective, once the second perspective is perceived, the cube will switch back and forth as your perceptual system keeps looking for alternative interpretations of the external world.

C. You may also have seen other standard visual illusions, such as the faces and vase illusion or the old-woman, young-woman illusion, all of which illustrate the competition of two internal models.

D. There is even an illusion involving a Necker Cube that allows the viewer to entertain six different internal models; the cube can be seen as in front of a wall with holes in it, behind the wall, or passing through the holes in the wall.

IV. The largest class of visual illusions includes those in which the internal model is out of correspondence with external reality.

A. In your course guidebook is a picture of the Muller-Lyer illusion, in which there are two horizontal lines having the same length, but at the end of one of the lines, there are outward-pointing arrow heads, and at the end of the other, there are inward-pointing arrowheads.

1. The inverted arrowheads make that line look as if it is considerably longer than the other line.

2. One explanation for this illusion is that the normal-appearing arrowheads form a three dimensional angle similar to the far corner of a room, while the inverted arrowheads are similar to the shorter near corner of a structure.

3. A problem with an interpretation that this effect is the result of having learned the characteristics of a room is that some of the effect is present even in cultures that have no experience with cubic rooms.

B. In another set of illusions, a false internal model is formed because of context.

1. In your course guidebook is a picture of two squares, one white and one black, each containing a smaller grey square within it, and one grey square looks considerably darker than the other, even though they are the same shade of grey.

2. An interpretation of the illusion is that the contrast of the context of black and white colors changes the interpretation of the brightness of the grey squares.

3. Another illusion of context shown in the guidebook looks like two lines passing behind a spoked wagon wheel that makes the lines look as if they are bowed outward rather than straight, when they are actually straight.

4. The website by Dale Purves cited at the end of this lecture contains several illusions both of shading and color that can be interpreted as the result of context effects, although as we will discuss in the next lecture, these illusions may be due to more than context.

5. Illusions of touch and sound are also possible.

V. The point of all these illusions is that they can convince us that we are not in direct contact with the external world, thus we pick up cues and form internal models that are sometimes wrong.

Essential Reading:
Stanley Coren, Lawrence Ward, and James Enns, *Sensation and Perception*, 6th ed.

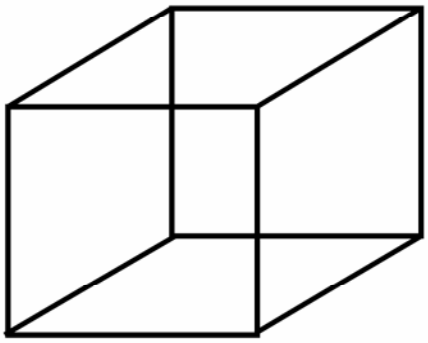
Supplementary Reading:
Dale Purves and R. Beau Lotto, *Why We See What We Do: An Empirical Theory of Vision*.
Purves-Lab, Laboratory of Dale Purves, M.D., Center for Cognitive Neuroscience, Duke University, www.purveslab.net.
Visual Cognition Laboratory, University of Illinois, Viscog.beckman.uiuc.edu/ djs_lab/demos.html.

Questions to Consider:

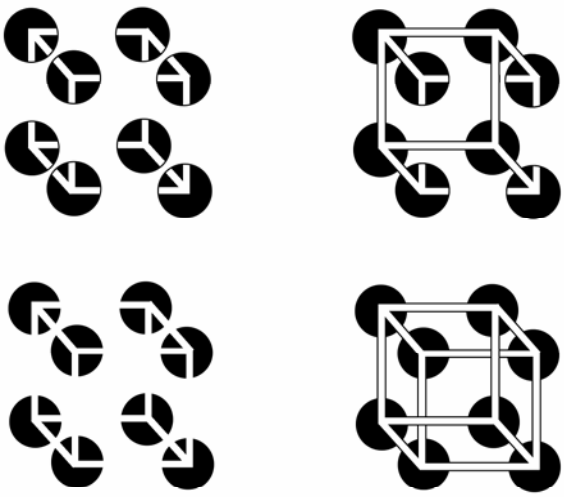
1. Can you think of many examples in your life in which your internal model was in error with respect to the external world?

2. If our internal models are sometimes wrong about the external world, why do we not get into more trouble perceptually than we do?

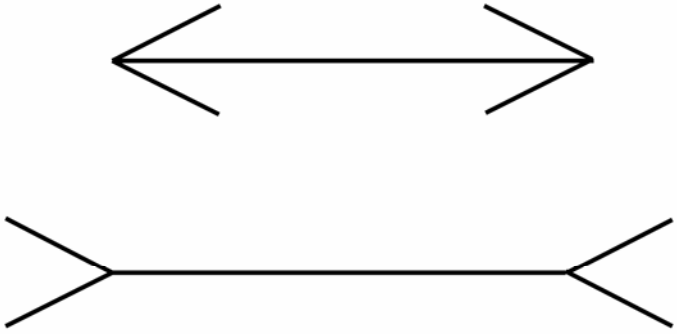
Cow Face



Necker Cube

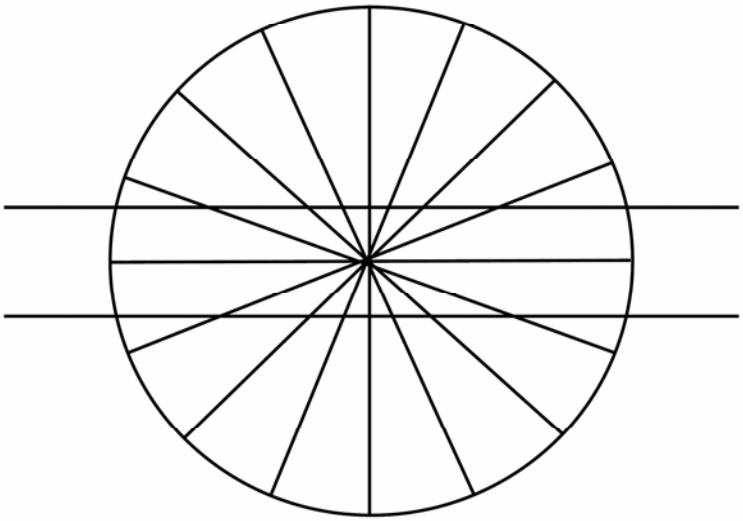


Necker Cube Variation



Muller-Lyer Illusion

Grey Contrast



Spoke Illusion

Lecture Thirty-One
Perception—Finding and Organizing Cues

Scope: Three schools of thought have suggested ways that we organize cues from the external world to form our internal models. The *Gestalt school* says that we have built-in principles, such as the principles of *proximity*, *similarity*, *closure*, and *good figure*, that allow us to form objects out of parts. The *perceptual constancy school* says that early in life, we learn that certain properties of solid objects are invariant, such as size, shape, brightness, and color, and we assume these constancies as we form our internal models. Dale Purves suggests that because of evolution, humans have certain built-in perceptual modules based on the statistical properties of the environment that become fine-tuned by learning. The cues of depth perception include *monocular cues*, such as relative size, interposition, accommodation, and relative movement, and *binocular cues*, such as retinal disparity and convergence. Some of the evidence indicating that perception is built in includes newborn babies' preferences for stripes, avoidance of cliffs by animal and human babies, and single-cell recordings of visual cells. Some evidence that perception is learned is found in the fact that people adjust rather quickly to inverting lenses and in the difficulty the blind have with sight recovery. Apparently, humans have basic built-in perceptual equipment and programs, but these have to be tuned by experience.

Outline

I. Historically in psychology, there have been several schools of thought about how we organize perceptual cues from the external world to form internal models.

A. The *Gestalt school* says that we have several built-in principles we use to organize these cues.

1. According to the principle of *proximity*, we organize things that are geographically close to form objects, as in the case of a line formed by pairs of dots in which we see the dots as pairs.

2. According to the principle of *similarity*, we organize items that are similar into objects, as in the case of a line formed by pairs of dots and pairs of open circles or of dots having different shades in a half-tone newspaper photograph.

3. According to the principle of *closure*, we complete incomplete objects, as in the case of a circle with a small gap or of letters with missing pieces.

4. According to the principle of *good figure*, we organize stimuli to form good figures, such as circles, squares, or lines, as in the case of an overlapping circle and square being seen as a circle and square rather than as two irregular figures.

5. A problem with the Gestalt school is that although it had convincing demonstrations, there was not much proof that the principles were built in and there was not much theory that would suggest experimentation.

B. A second school of thought holds that we organize the world by learning early in life that there are certain properties of stimuli that remain invariant, called *perceptual constancies*.

1. *Size constancy*, for example, is the assumption that solid objects tend to retain their size as they or we move around in the world; thus, if an object is changing size, it is probably changing its distance from us.

2. *Shape constancy* is the assumption that solid objects retain their shapes; thus, if an object is changing shape, it is likely to be changing its orientation.

3. Similar assumptions are made for brightness and color constancies.

4. Although perceptual constancies can explain some illusions, they cannot explain all of them.

C. A third school of thought has recently been proposed by Dale Purves at Duke University.

1. Purves says that as humans evolved perceptual modules that are built in and take advantage of the statistical properties of the world around them—for example, the perception that objects are lit from above—they fine-tuned these modules and use the information contained in them to analyze stimuli.

2. Thus, Purves's theory suggests that some of perception is built in and some of it is learned.

3. Purves's theory can explain quite a few of the visual illusions that other theories have difficulty with, particularly those that have to do with our ability to match shades and colors.

II. To illustrate the cues we pick up from the external world that we use to form our internal models, let's consider the case of depth perception—how it is that we know a particular object is close or far away from us.

A. These cues can be organized into *monocular cues*, those that can be used with just one eye, and *binocular cues*, those that require two eyes.

1. One monocular cue we have already mentioned is *relative size*: that closer objects are generally larger.

2. A second monocular cue is *interposition*: the fact that closer solid objects tend to cover up distant objects.

3. A third monocular cue is *accommodation*, or *focus*: the fact that the internal muscles of the eye that change the shape of the lens to keep objects in focus send this information to the brain.

4. A fourth monocular cue has to do with objects that are closer to us moving past us faster than objects at a distance, as we move around in the world; this is called *relative motion* or *movement*.

B. Binocular cues include *retinal disparity*, the increasing difference in the images on the retinae with distance of objects, and *convergence*, the turning in of the eyeballs as objects get closer.

C. Our perceptual model for depth perception is amazing both in terms of its accuracy and its speed of functioning.

III. Although nature-nurture debates are naïve and, as we will see, are not necessarily dichotomous, it is instructive to look at evidence for the process of perception being built in or learned.

A. Evidence for perception being built in comes from investigating newborns, young animals, and children, and from physiological measures.

1. Newborn babies only one day old can tell the difference between grey surfaces and surfaces with broad stripes.

2. Newborn sheep and babies who have just started to crawl will avoid the steep side of a "visual cliff."

3. Single-cell recordings from electrodes implanted in cells very near the retina have been found to be sensitive to line slant, object size, and orientation of motion.

B. Evidence for perception being learned comes from ease of relearning the environment and from sight recovery of the blind.

1. People can adjust within a week or so to wearing inverting lenses that turn the world over.

2. When congenitally blind people receive surgery to gain their sight, they usually find it very difficult to use that information and are often quite distraught.

C. Thus, it appears that the basics of perception are built in to us, but unless we use learning to fine-tune these mechanisms, our perceptual systems will not work properly.

Essential Reading:
Stanley Coren, Lawrence Ward, and James Enns, *Sensation and Perception*, 6th ed.

Supplementary Reading:
Dale Purves and R. Beau Lotto, *Why We See What We Do: An Empirical Theory of Vision*.

Questions to Consider:

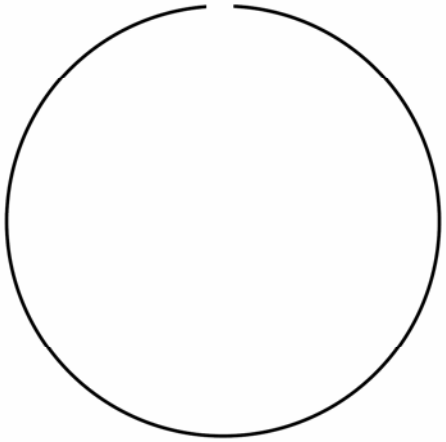
1. What cues do you think we pick up with our auditory system to form an internal model of depth perception for sound?

2. If there were no ethical considerations and you could do any research you wanted to determine whether perception was built in or learned, what would be the most convincing experiment you could do?

Proximity

Similarity

Closure



Good Figure

Lecture Thirty-Two
Evolutionary Psychology—Basic Concepts

Scope: Because of the behaviorists, who believed that learning primarily determines human behavior, it is only recently that the theory of evolution has had much impact on psychology. In the 1990s, the subfield of evolutionary psychology was founded, and it is now having a major impact. Charles Darwin identified three requirements for evolution to take place: heritability of genetic material, variability of genetic material through mutation or sexual reproduction, and selection. We can identify several common myths about evolution: that we can inherit acquired characteristics; that humans cannot evolve behavioral characteristics; that if an adaptation is built in, it cannot be modified by the environment; and that built-in characteristics are natural and should prescribe human behavior. Mammals evolved about 200 million years ago, primates about 85 million years ago, and apes about 35 million years ago; about 10 million years ago, the forests began to disappear, and our ancestors had to change in order to compete with the plains animals. These changes included *neoteny* (birth at an early developmental stage), increased brain size, and the development of pair bonding, hunting, and a territorial existence. Desmond Morris suggests that human ancestors lost their hair to make cooling during hunting more effective, that many physical and behavioral changes occurred to make sex more pleasurable in order to hold the pair bond together, and that modern problems with human aggression are due to the impossibility of quickly evolving behavioral inhibitions against the use of our technologically developed killing weapons on each other.

Outline

I. For more than a century, the theory of evolution has been the most widely accepted explanation for how all forms of life came to be the way they are, but evolution was largely ignored in psychology until almost the end of the 20th century.

A. Some of the early psychological thinkers, such as William James and Sigmund Freud, acknowledged the role of evolution in humans, but shortly thereafter, the behaviorists held sway in psychology and considered learning to be the primary shaper of human behavior—this is the concept of the blank slate.

B. In universities, psychology grew out of philosophy, was nurtured by education, and was grouped with sociology and anthropology as a social science; thus, biology has had less influence on psychology than it should have.

C. It was not until the cognitive revolution took place in psychology, and zoologists, such as Desmond Morris, and biologists, such as Edward O. Wilson, began including humans in their evolutionary models, that psychologists begin to take a more evolutionary approach to human behavior. In this way, the field of evolutionary psychology came into existence.

II. In 1859, Charles Darwin published *On the Origin of Species*, which outlined the three simple requirements for evolution to take place.

A. The first requirement is *heritability*.

1. *Heritability* refers to the fact that living forms contain genetic information that is passed down to offspring through asexual cell splitting or through sexual reproduction.

2. Actually, Darwin ignored or was unaware of Gregor Mendel's work on genetics and, thus, did not understand that inheritance is a particulate process rather than a blending process.

B. A second requirement of evolution is *genetic variability* achieved either through mutation or through sexual reproduction.

C. A third requirement is *selection*.

1. Selection can occur by artificial means, as in breeding.

2. Darwin originally proposed that selection usually occurs through survival of the fittest and later added sexual selection.

D. There are several common myths about evolution.

1. A myth that has historically plagued geneticists is that it is possible to inherit acquired characteristics.

2. Another common misconception is that although physical characteristics can evolve, behavioral characteristics seldom do, especially in humans.
3. Another false belief, genetic determinism, is that behavior is either due to nature—it is built in—or it is learned, when most behaviors are the result of the interaction of nature and nurture.
4. A myth called the naturalistic fallacy says that if a behavior is built in, that is what is natural and the way we should behave.

III. To provide a context for this and the next two lectures, we need to consider the origin of modern humans as we understand it from the paleontological, genetic, and archeological record.

A. Mammals evolved about 200 million years ago, and about 85 million years ago, some of these evolved into primates.

1. These primates lived largely in the forests and probably led a nomadic life, moving as food supplies were depleted.
2. About 35 million years ago, apes evolved.
3. About 10 million years ago, the forests began to disappear and our ancestors had to change in ways that allowed them to compete successfully with the plains animals that were highly evolved to fit that environment.
4. Between 5 and 4 million years ago, our ancestors evolved the ability to walk on two legs; among the many reasons why this adaptation might have been advantageous is to free up the hands.

B. During the evolution of our ancestors, many changes apparently took place to make them competitive with the plains animals.

1. One important change is called *neoteny*, the process by which birth occurs much earlier in the development of the organism, allowing the brain and behavior to develop according to the requirements of the environment.
2. The brain size increased markedly.
3. Pair bonding of a man and woman also had to develop in order to rear the inept offspring.
4. As meat replaced some of the vegetarian diet, cooperative hunting by the men was required.
5. The nomadic way of life was also apparently replaced with a territorial existence.

IV. In his 1967 book *The Naked Ape*, Desmond Morris emphasizes several adaptations that must have taken place within the context of the evolution of humans.

A. He asks the question: "Why are we the only naked [relatively] ape?"

1. There are several hypothesized possibilities, including problems with cleanliness and even possibly diseases carried by fleas.
2. Another possibility is that nakedness led to more satisfying sex.
3. A third possibility is that there was an aquatic phase during which fur would have been problematic.
4. The most widely accepted version is that the loss of hair led to our ancestors' ability to cool down as they engaged in the long-distance running required to chase down game during hunting.

B. Morris also asks why we are the sexiest of the apes.

1. He suggests that although sex is, of course, necessary for reproduction, the vast majority of sex engaged in by humans occurs when impregnation is not possible; thus, it must be for the purpose of holding the pair bond together.
2. The development of many physical features, such as breasts, lips, and earlobes, along with face-to-face sex, led to enhanced sexual pleasure.
3. Behavioral changes also led to a strengthening of the pair bond, such as the constant receptivity of women and the privacy of the sex act.
4. Problems come about today because of a mismatch of our current environment with evolved tendencies, such as the constant exposure of men and women to members of the opposite sex who give off strongly evolved sexual signals.

C. Morris also asks why modern humans have used their aggression to push themselves to the brink of annihilation.

1. He suggests that aggression, particularly for animals with strong male competition, is inevitable.
2. However, in animals with killing weapons, such as teeth and claws, as the killing weapons evolved, there also evolved behavioral inhibitions about using these weapons on members of their own species.

3. In humans, our most effective killing weapons are products of technology rather than evolution, and the time span during which they were developed is far too short for behavioral inhibitions against their use to have evolved.

D. Although Desmond Morris had less impact on psychology and on the academic world in general than might be expected, I believe he is one of the people who set the stage for the founding of modern evolutionary psychology, which will be the subject of the next two lectures.

Essential Reading:

David Buss, *Evolutionary Psychology: The New Science of the Mind*, pp. 1–67.

Supplementary Reading:

Desmond Morris, *The Naked Ape*, new edition.

Steven Pinker, *The Blank Slate: The Modern Denial of Human Nature*.

David Williams, "The Desmond Morris Information Page," http://www.desmond-morris.com/.

Leda Cosmides and John Tooby, Center for Evolutionary Psychology, University of California—Santa Barbara, "Evolutionary Psychology: A Primer," http://www.psych.ucsb.edu/research/cep/primer.html.

Questions to Consider:

1. It is sometimes said that humans are on the highest branch of the evolutionary tree. Is there really a "higher" or a "lower" level on the evolutionary tree?
2. If Desmond Morris is correct that humans are naturally aggressive and that we have just not had the time to develop behavioral inhibitions to go along with our killing weapons, how do we refrain from wiping out our species before these behavioral inhibitions develop?

Lecture Thirty-Three
Evolutionary Psychology—Altruism and Mating

Scope: Darwin had a difficult time explaining altruistic behavior because, by definition, that behavior puts an individual's survival at risk without a reproductive gain. However, William Hamilton put more emphasis on the survival of the genetic material and proposed that some altruistic behavior is the result of *inclusive fitness*, that is, behaving in ways that improve the survival and reproduction of all our relatives, not just our children. Support for Hamilton's rule, $c < rb$—we will act if the cost to ourselves is less than our relatedness to the other person times the benefit to the other person—is found in research on the warning behavior of ground squirrels, human wills, and human helping behavior. Differential parental investment, the much greater time, effort, and resources devoted by the woman to a child, helps explain the different mating strategies of men and women. Men have a mixed strategy of both trying to impregnate as many women as possible and establishing a more permanent relationship with a high-quality mate and devoting resources to the resulting offspring. Women primarily follow the latter strategy. The differences in these strategies predicts the findings of much research, including the fact that men are much more agreeable to casual sex, desire sex with more partners, are more upset by sexual infidelity than romantic infidelity, and are more interested in fertility, as exemplified by youth and physical beauty, and less interested in financial prospects of mates than are women.

Outline

I. One of the behaviors Darwin found difficult to understand from an evolutionary perspective was *altruism*, why an organism would put itself at risk for the sake of another organism.

A. One of the problems is that Darwin overemphasized the individual as the evolutionary unit, rather than the genetic material.

1. If the function of evolution is the survival of the fittest individual, and altruism, by definition, risks the individual's fitness, then it is understandable that altruism would be difficult to explain.

2. However, the real function of evolution is the survival of the genetic material; the individual is just a temporary life-support system that the genetic material lives in while it tries to replicate itself in order to become immortal.

3. Thus, evolutionary theory should put more emphasis on reproduction than on survival.

B. William Hamilton, while working on his dissertation in the 1960s, proposed a concept called *inclusive fitness theory* that helped revolutionize the theory of evolution and explain one way that altruism could work.

1. Hamilton proposed that behaving in a way to maximize the number and success of our direct offspring is only one way for our genes to become immortal.

2. While about 50% of our genes are carried by our children, other relatives, such as siblings, nieces, nephews, and grandchildren, also carry our genes, and our behavior should be tuned to maximizing the probability of these relatives surviving and reproducing in direct proportion to their relatedness.

3. Hamilton's formula, $c < rb$, says that we should act to help others when the cost to ourselves (c) is less than the degree of relatedness (r) times the benefit (b) to the other person.

4. A great deal of research supports inclusive fitness, such as studies of ground squirrels calling out to warn their relatives about predators and humans leaving their possessions to relatives in their wills. In the latter case, the amount of possessions bequeathed has been shown to relate directly to the genetic relatedness of the kin and to their reproductive value. Further, inclusive fitness figures in the helping behavior of humans, which is also influenced by genetic relatedness and the reproductive value of those being helped.

II. Not surprisingly, because reproduction is so important in evolutionary theory, a great deal of research in evolutionary psychology has dealt with mating behavior.

A. Most of the differences found in mating strategies of different species and of male and female organisms can be explained by differential parental investment.

1. In humans, the minimum male investment in becoming a parent is relatively tiny—several minutes and the expenditure of sperm from a nearly unlimited supply.
2. A woman's parental investment is quite large, including a 9-month gestation period, a 3- to 4-year lactation period, and another 5- to 6-year rearing period.
3. Research across species has shown that the parent with the heaviest investment is the choosiest and the one with the lesser investment is the more competitively aggressive.
4. In humans, then, the male can be successful in reproducing using two different strategies: a short-term mating strategy of trying to impregnate as many women as possible using the least amount of resources and a long-term strategy of providing resources for a few quality children produced with a committed mate.
5. Although there may be some mixture of strategies for a woman, her primary strategy is to choose a high-quality mate and devote all of her resources to the production of a few high-quality children who are likely to succeed and to reproduce as adults.

B. Many research findings support the sex differences predicted by differential parental investment.

1. Male college students approached on the street by an attractive women stranger and asked whether they would like to have sex answered yes 75% of the time, compared to women approached by an attractive male stranger, none of whom agreed to have sex.
2. Men report that they would like to have more than 18 sex partners in their lifetimes, compared to women, who report that they would like to have only 4 or 5.
3. When asked whether they would find it more distressing to imagine their partners forming a deep emotional attachment to someone else or imagining their partners enjoying passionate sexual intercourse with that other person, women were more upset by the former and men by the latter.
4. Across the world, in 37 cultures, with more than 10,000 people surveyed, women consistently rated preference for a good financial prospect in a marriage partner much higher than men, as would be predicted if their genes want to maximize the probability of getting enough resources to rear their children.
5. Men across cultures consistently rate youth and physical beauty as much more important than women, as would be predicted if their genes are interested in finding a fertile woman who will likely become impregnated.

C. In much of the research cited in this lecture, the effect sizes found for questions about differences in sexual behavior for men and women are in the range of 0.9 to 1.0, which is considered quite large and compares to differences in verbal skills of –0.11 and math skills of .15.

Essential Reading:

David Buss, *Evolutionary Psychology: The New Science of the Mind*, pp. 220–248, 104–185.

Supplementary Reading:

Steven Gaulin and Donald McBurney, *Psychology: An Evolutionary Approach*, pp. 199–229.

Human Behavior and Evolution Society, http://hbes.com.

Questions to Consider:

1. There are insects that commit the ultimate act of altruism in that they blow themselves up to warn their insect colony of a threat. How can that be explained in the context of evolutionary theory?
2. If it takes two to tango, how can men engage in all of this short-term mating without the participation of women?

Lecture Thirty-Four
Evolutionary Psychology—War, Family, Food

Scope: Evolutionary psychology can help explain some of the problems with aggression, parenting, and overeating in today's world. Men are by far the deadlier sex in terms of both homicides and wars. Because of competition for reproductive women, men's genes have predisposed them to be aggressive and take more risks. As predicted by the theory, unmarried and unemployed men, particularly those in their prime reproductive years, are the most likely to kill other men or be killed by them. Men kill other men because of status or jealousy and kill women because of suspected infidelity. Women's aggression tends to take the form of verbal derogation of rivals. Men exclusively engage in war by forming cooperative alliances to attain the resources for sexual reproduction. The majority of parenting is done by mothers, perhaps because fathers are uncertain of their fatherhood or because they want to devote resources to other mating opportunities. As predicted by evolutionary theory, stepfathers are much more likely to abuse or kill stepchildren than biologically related children, particularly when the children are young. Some of the conflicts in families can be explained by considering the relatedness of the various parties. The fact that our population is increasingly overweight can be partially attributed to our bodies' tendency to adjust metabolic levels to maintain weight and to our built-in taste for foods that we can store on our bodies in the form of fat. In addition, our ancestors gave us an aversion to unnecessary exercise. The unhealthy mismatch of our built-in tendencies with the current environment is an example of the naturalistic fallacy.

Outline

I. Given that violent crime and warfare are concerns in the modern world, is there anything we can learn from taking an evolutionary perspective that might help us understand these problems?

- **A.** Although both men and women are aggressive, men, by a large margin, commit more homicides than women and commit them on other men.
  - **1.** Because of differential parental investment and polygyny, evolutionary theory predicts that men will take far greater risks to compete for reproductive opportunities.
  - **2.** Every time one man has reproductive access to two women, another man completely loses out on the opportunity to make his genes immortal, and these genes tell him that he must act to correct the situation, even if it means that he might not survive.
  - **3.** As predicted from this theory, Martin Daly and Margo Wilson reported in their book *Homicide* that unmarried and unemployed men were far more likely to commit murder than were married and employed men.
  - **4.** An additional prediction is that men in their prime reproductive years will exhibit a greater tendency for aggression. This has been confirmed in that homicide victimization rates peak for men in their mid-20s and fall rapidly thereafter.
  - **5.** The leading causes of homicides by men on men are status and reputation and sexual jealousy.
  - **6.** The leading cause of homicides by men on women is, as would be predicted by evolutionary theory, sexual jealousy and suspected infidelity.
  - **7.** Women are far less likely to commit violent acts but are more likely to verbally assault other women by calling them ugly or promiscuous.
- **B.** Humans and, to some extent, chimpanzees are the only animals to form male coalitions for the purpose of engaging in warfare.
  - **1.** Warfare among men exists in cultures around the world but is nonexistent among women.
  - **2.** The goal of tribal warfare seems to be reproductive access to women, either through acquisition of resources or capture of the women themselves.
  - **3.** Even the modern warfare of neighborhood gangs seems to have goals of achieving status and, as a result, access to women.

II. Because of the relatively immature development of the human infant at birth, it is imperative to the survival of the child, and, therefore, to the parent's genetic material, that the child be provided with parental care.

- **A.** In all human societies, mothers more than fathers spend time caring for their children.

1. One reason proposed for the lower level of parental care by fathers is that they are less certain that the children are theirs; thus, they are less willing to spend time rearing children who may not be theirs.
2. According to evolutionary theory, in order to get the father to invest in the children, the mother and her relatives devote considerable effort to convincing the father that the baby resembles him.
3. A second reason for the father's lower level of parental care is that he could be spending time trying to maximize his reproductive potential outside of the pair-bonded relationship, whereas the mother has less opportunity to engage in other mating strategies.

B. Evolutionary theory would predict that parenting would be most effective for biologically related children compared to non-biologically related children.

1. Indeed, the best predictor of child abuse and the murder of children in the home is if one of the parents, more so the father, is not biologically related to the child.
2. Stepfathers are more than 40 to 100 times more likely to kill a stepchild than a biologically related child, although the actual homicide rates for both groups are less than 0.1%.
3. As would be predicted because of lowered reproductive potential during lactation, homicide by stepfathers occurs most frequently the lower the age of the child.

C. Evolutionary theory also predicts some of the classic conflicts that occur in families.

1. Because each of the children in a family is related by 50% to the parents, the parents want to share resources equally with the children, but because each child is related to himself 100% and to his siblings by 50%, each child thinks that he ought to get twice as much of the resources.
2. For the same reason, each child wants to be weaned from breastfeeding at a later date than the mother desires, because when the cost to the mother exceeds the benefit to the child, the mother is ready to get on with rearing a new baby.

III. Recent figures indicate that about two-thirds of the U.S. population is overweight and nearly one-third is obese.

A. Evolutionary theory can help explain the marked increase in weight of our population.

1. First, it is difficult to consciously control weight by dieting because evolution has built in a set point, whereby our metabolism changes in times of feast or famine in an attempt to maintain our weight.
2. Second, in ancestral times, our fat was our refrigerator and helped us store excess resources in good times, which is why women, for the purposes of pregnancy, generally carry nearly twice as much fat than men.
3. Third, our tastes are tuned so that we crave foods that are high in those things that help the success of our storage mechanisms, which is why we love fats, sugars, and carbohydrates.
4. Modern food producers are certainly aware of our tastes—they have produced meats with much higher fat contents and added refined sugar to products such that we eat about two-thirds of a cup of sugar per day.
5. For these reasons, fat and carbohydrates make up about 90% of today's diet, compared to only about 60% of our ancestors' diet.

B. A second major factor driving weight gain is physical activity levels.

1. Our ancestors of necessity were as physically fit as Olympic athletes.
2. Not only were they fit, but they had programmed into their genes (and, therefore, ours) the need to rest when physical activity was not demanded.

C. Eating, then, is a prime example of the falsehood of the naturalistic fallacy in that it shows that the "natural" behaviors that drive us to overeat and to be couch potatoes are mismatched to today's environment and produce severe health problems.

Essential Reading:

David Buss, *Evolutionary Psychology: The New Science of the Mind*, pp. 188–219.

Steven Gaulin and Donald McBurney, *Psychology: An Evolutionary Approach*, pp. 279–285.

Supplementary Reading:

Martin Daly and Margo Wilson, *Homicide.*

Questions to Consider:

1. If it is so important for men to determine whether they are the fathers of their wives' children so that they can contribute or withhold resources, why hasn't evolution built in a more consistent marker of family resemblance?
2. Can you think of a more successful way to combat our strong evolutionary messages of loving fats and sugars and hating exercise that might be more successful than current fad diets and exercise programs?

Lecture Thirty-Five
Engineering Psychology

Scope: Engineering psychology is concerned with specifying the characteristics and limitations of the human operator in a human-machine-environment system. It is part of the interdisciplinary area of *human factors* or *ergonomics*. The original impetus for the area was World War II engineering advances that produced systems, such as high-speed aircraft, that were unsafe to use. More recent growth has been in consumer industries, particularly in the area of computerized products. One of the first design considerations is which tasks to assign to the human and which to assign to the machine. Machines are good at high-speed, repetitive, and dangerous tasks and tasks requiring a high degree of strength. Humans are good at unstructured tasks requiring judgment, flexibility, and decision making. Research in engineering psychology has led to design recommendations for displays, such as dials with fixed or moving pointers, and for controls, such as knobs. In selecting displays and controls, population stereotypes and the expectations users have for the effects of their actions must be considered. Even with the backing of good research, engineering psychologists sometimes have a difficult time getting their recommendations incorporated into designs.

Outline

I. One area of psychology that many people have not heard of, but one of increasing importance, is engineering psychology, which considers the human as an engineering component in a human-machine-environment system.

- **A.** Until the Industrial Revolution, most people designed their own tools, devices, and environmental spaces to fit themselves.
  - **1.** In the early 1900s, as the Industrial Revolution got into motion, there was some concern with the design of tools, but engineers often tried to solve these problems without the help of psychologists.
  - **2.** During World War II, as the design of machines became increasingly complex and selection and training of operators reached their limits, the military decided to ask those who knew about human behavior—psychologists—about the capabilities and limitations of the human operator.
  - **3.** Although there was little research at the time on these issues in psychology, a group of psychologists found these problems interesting and founded an area called *engineering psychology*.
- **B.** Today, many psychologists are doing research into human-machine issues and applying their findings to design.
  - **1.** The design of computerized systems accounts for the sharp recent growth in the number of psychologists who specialize in consumer industries.
  - **2.** The interdisciplinary term for those who work in human-machine-environment design is *human factors* or, sometimes, *ergonomics*.
  - **3.** Although psychologists working in ergonomics are called engineering psychologists, those from industrial engineering are often called human factors engineers. There is also some overlap of ergonomics with physiology, anthropology, sociology, archeology, and even geography.

II. One of the first questions to ask in the design of such systems is which tasks should be allocated to humans and which to machines.

- **A.** In general, machines are good at doing high-speed, repetitive tasks and tasks that are dangerous or that require great strength.
- **B.** In general, humans are good at doing tasks that are unstructured, that require flexibility, or that require judgment and decision-making ability.
  - **1.** An example of something humans are particularly good at is the reading of various types of handwriting, even when each line of a document is written by a different person.
  - **2.** Although computers are now capable of reading material written by different writers, they make considerable errors when the material is not somewhat constrained (e.g., single-digit numbers).

III. Research has led to design recommendations for displays and controls.

A. For example, dials with moving pointers are recommended for check-reading, setting, and tracking tasks, although they are only moderately good for quantitative reading tasks.

1. On the other hand, digital displays, such as counters, are good for quantitative reading and setting tasks but are poor for check-reading and tracking tasks.

2. That is why digital watches may be great when used as stop watches and for quantitative readings but are sometimes aggravating for check-readings: "Is it 11:00 yet?"

3. Digital speedometers in cars were popular when they first came out, until people discovered that they were really being used for check-readings and for tracking, and the driver seldom needed to know exactly how fast the car was going.

4. Displays with fixed pointers and moving scales are not recommended for most uses and are particularly bad for check-reading and tracking tasks.

5. For example, if a knob on a heater had a fixed arrow on the body of the heater and the word HIGH stamped on the left side of the knob and LOW on the right side of the knob, it is unclear whether the knob should be turned clockwise or counterclockwise to turn the heater higher.

6. If the same knob had an arrow on it and LOW stamped to the left of the knob and HIGH stamped to the right of the knob, it would be quite clear that the knob should be rotated clockwise to turn the heater higher.

7. Even moving pointer displays are not very good if other recommendations are violated, such as having clockwise and counterclockwise pointers on the same display and having overlapping scales, both conditions present on most electrical meters.

B. Some of these recommendations are based on population stereotypes, which are the tendencies built up in certain populations for linkages between actions and results.

1. For example, in order to turn something on with a switch, most of us think that we should flip the switch up rather than down.

2. However, in Australia, where rocker switches are often used for both lights and "power points" (electrical outlets), a little red dot is displayed on the top of a rocker switch when it is rocked downward, indicating that it is on; in this case, the downward motion turns the switch on.

3. Other population stereotypes are that knobs should be rotated clockwise to move something up or to the right, and a lever should be moved to the right or upward for the same results.

C. Sometimes even with good design recommendations, manufacturers are slow to change their products.

1. A number of years ago, researchers studied the arrangement of the four knobs mounted horizontally across the front of stoves used to adjust the heat of the four burners on top of the stove. They discovered that an arrangement with offset burners (the burners formed a parallelogram rather than a rectangle) produced no errors, compared to errors ranging from 76 to 129 for other arrangements.

2. However, even 15 years after this research was reported, no manufacturers had adopted the recommended design.

IV. Ergonomists also do what is sometimes called "neck-down" research, although industrial engineers more typically do this type of work.

A. Some ergonomists study the conditions under which skeletal-muscular injuries occur from lifting or repetitive-motion activities, causing such problems as back strains and carpal-tunnel disorders.

B. Other ergonomists are interested in the measurement and design of spaces and measure the human body's ability to reach and manipulate objects.

Essential Reading:

C. D. Wickens, S. E. Gordon, and Y. Liu, *An Introduction to Human Factors Engineering*.

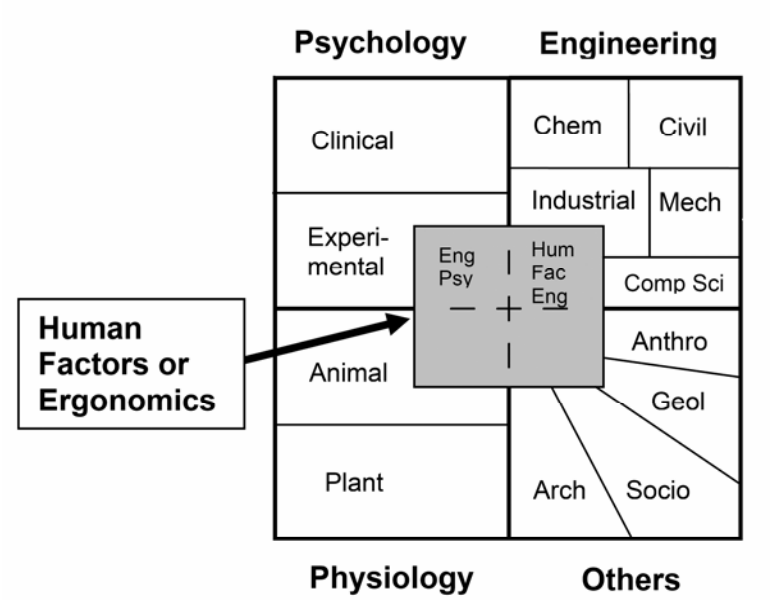
Supplementary Reading:

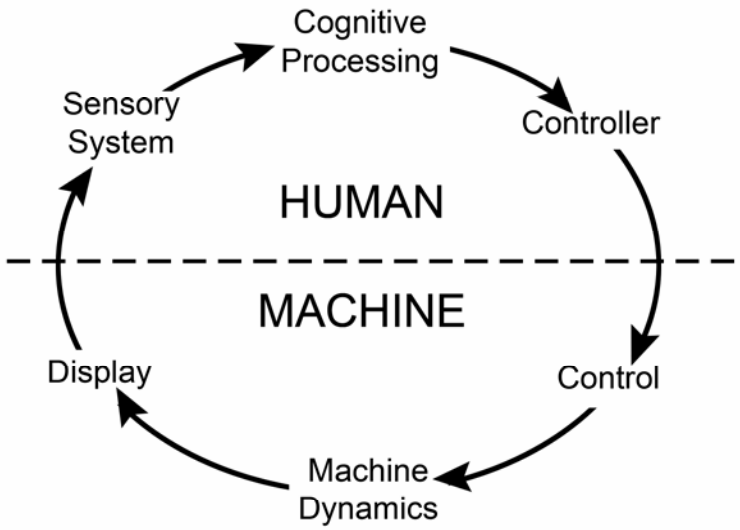
David Martin, "Engineering Psychology," in *Introduction to Applied Psychology*, edited by W. L. Gregory and W. J. Burroughs, pp. 42–74.

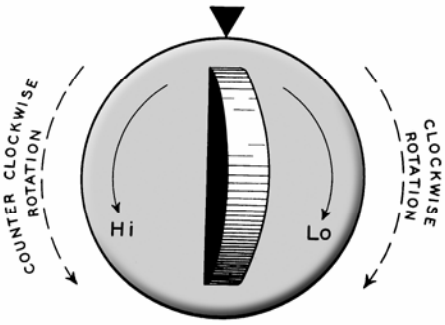
Human Factors and Ergonomics Society, http://www.hfes.org/.

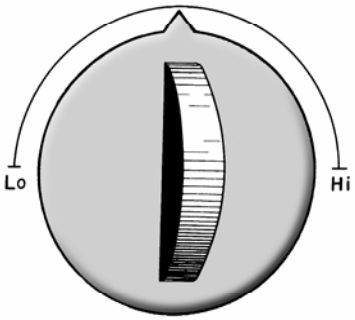
Questions to Consider:

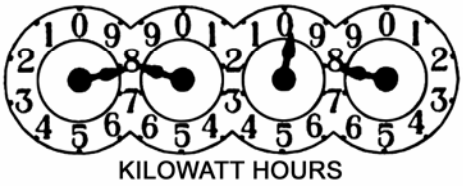
1. If engineering psychology has been around now for more than half a century, why do you think so many products are still sold that are difficult to use?
2. Can you think of examples of products that have design flaws, making them difficult to use, that might be easily corrected?











Lecture Thirty-Six
Recap, Omissions, and Into the Future

Scope: In this course, we covered most of the standard areas of psychology, with an emphasis on modern issues and approaches. The quantitative methods of experimentation, correlation, and quasi-experimental designs, as well as the qualitative designs of ethnography, naturalistic observations, and case histories were discussed. After discussing Freud's psychoanalytic theory, we discussed the various classifications of mental illness and their symptom patterns. We also discussed psychopharmacological interventions, psychotherapies, and behavior therapies. The standard areas of experimental psychology, including motivation, emotion, psychoactive drugs, social psychology, learning, memory, and perception, were covered, as well as the applied area of engineering psychology. Finally, we looked at the new area of evolutionary psychology. Because it was not possible to give coverage to all areas of psychology in the previous lectures, short overviews of neuropsychology, cognitive modeling, and developmental psychology are given in this concluding lecture. In addition, this lecture predicts that in the future, great strides will be taken in the use of genetics to cure some mental illnesses and in using knowledge from psychology to solve many of the world's behavioral problems.

Outline

I. In this course, we have discussed most of the standard areas of psychology and have attempted to emphasize the modern issues and approaches.

- **A.** In Lecture One, we talked about historical precursors, clinical versus experimental psychology, psychologists versus psychiatrists, and the history of experimental and clinical psychology.
- **B.** In Lecture Two, we talked about methods used in experimental psychology, emphasizing independent, dependent, control, random, and confounding variables and the fact that experiments allow us to infer causality.
- **C.** In Lecture Three, we talked about quantitative nonexperimental designs, such as correlational observation, and qualitative designs and noted that causality cannot be inferred from these designs.
- **D.** In Lecture Four, we briefly introduced evolutionary theory, including requirements for evolution and misunderstandings of the theory.
- **E.** In Lecture Five, we talked about Freud's psychoanalytic theory and its unconscious nature; we also talked about the parts of our personalities, including the id, superego, and ego.
- **F.** In Lecture Six, we looked at developmental stages; Oedipus and Electra conflicts; defense mechanisms, such as repression, rationalization, and projection; and how we use defense mechanisms in the face of conflict.
- **G.** In Lecture Seven, we tried to define abnormal behavior and looked at criteria used to define abnormality, such as statistics, morality, happiness, illness, and harmful behavior. We also talked about classification systems, including the *Diagnostic and Statistical Manual of Mental Disorders*.
- **H.** In Lecture Eight, we talked about anxiety and mood disorders.
- **I.** In Lecture Nine, we talked about cognitive disorders; Alzheimer's disease; somatoform, dissociative, and substance-related disorders; and sexual and gender-identity disorders.
- **J.** In Lecture Ten, we discussed schizophrenic disorders and their possible causes.
- **K.** In Lecture Eleven, we talked about disorders first diagnosed in infancy, childhood, or adolescence, as well as mental retardation and personality disorders.
- **L.** In Lecture Twelve, we began a series on therapies, including drugs, electroconvulsive treatment, psychosurgery, psychoanalysis (including the dynamics of therapy), humanistic therapies, cognitive and group therapies, efficacy studies, and behavior therapies based on classical conditioning and operant conditioning.
- **M.** In Lecture Eighteen, we talked about models of motivation.

N. In Lectures Nineteen and Twenty, we discussed measuring emotion and theories of emotion, including the common-sense, James-Lange, Cannon-Bard, cognitive-labeling, and evolutionary theories.

O. In Lectures Twenty-One and Twenty-Two, we talked about the behavioral effects of a variety of psychoactive drugs.

P. In Lectures Twenty-Three and Twenty-Four, we discussed social psychology, including triggering mechanisms, such as commitment, social proof, liking, authority, and scarcity.

Q. In Lectures Twenty-Five through Twenty-Seven, we looked at learning: simple learning, including classical conditioning and operant conditioning, and complex learning, including avoidance and probability learning, concept formation, and language learning.

R. In Lectures Twenty-Eight and Twenty-Nine, we discussed memory, including illusory and false memory, memory aids, and theories of forgetting.

S. In Lectures Thirty and Thirty-One, we moved to the topic of perception: the fact that we are not in contact with the external world but pick up cues to form internal models, which may sometimes be wrong.

T. In Lecture Thirty-Two, we talked about evolutionary principles and Desmond Morris's theories.

U. In Lecture Thirty-Three, we discussed altruism and mating.

V. In Lecture Thirty-Four, we talked about war and aggression, family behavior, and eating behavior.

W. In Lecture Thirty-Five, we talked about engineering psychology, including human factors, ergonomics, and design principles.

II. Because psychology is an extraordinarily broad field, we could not discuss all the modern trends in psychology. The following is a brief overview of some of those trends.

A. Neuropsychology refers to the interplay between our behavior and the neurological systems.

1. One of the major research areas, and one that is growing quite rapidly, is brain imaging, in which various techniques, such as functional magnetic resonance imaging (fMRI), positron-emission tomography (PET), and electroencephalography (EEG), are used to measure brain activity while certain behavioral tasks are being completed.

2. Sophisticated techniques are used to determine which parts of the brain are activated for various tasks.

3. In some cases, activation pictures can be subtracted from one another, such as subtracting the activation picture for reading a particular word from the picture for determining the meaning of the word in order to find the brain center for meaning.

4. Brain-imaging research has led to great progress in mapping the human brain and determining which areas are used for cognitive and emotional tasks.

5. An understanding of the anatomically activated brain areas has allowed some of the cognitive models of behavior to be refined.

B. A second area that we have just touched on in this course, but one of increasing importance, is the computational modeling of cognition.

1. Although the behaviorists thought that it was impossible to know what goes on in the "black box" of the brain, quite sophisticated techniques have been devised to suggest ways to model brain activities.

2. One technique called *mental chronometry* uses response times for completing various tasks to determine what processing stages must exist in order for that task to be completed.

3. For example, if a subject is searching for a target item, such as a letter, in an array of items and the response time of the subject is found to be a linear function of the number of items in the array, we can conclude that each of the items must have been examined one at a time (serial search) until the target was found, rather than all items being examined at the same time (parallel search).

4. Another type of computational modeling is called *parallel distributed processing* and uses computer models to act like a human and learn characteristics of the environment.

5. In these models, a layer of nodes can be activated by various stimuli, such as the lines, curves, and angles of various letters of the alphabet; this activation, in turn, activates nodes at higher levels, such as those that can use the letter information to form words.

6. As these parallel-distributed-processing computer models are exposed repeatedly to various environmental stimuli, they can learn to perform such tasks as identifying words, pictures, and other stimuli without ever having to be programmed to do so.

C. In this course, for the most part, we have considered only young to middle-aged adults and have pretty much ignored children's behavior and the behavior of older individuals.

1. However, developmental psychology studies human behavior across the lifespan.
2. One rapidly growing area of interest is *gerontology*, the study of older populations.
3. One particular area of interest to gerontologists is the presumed decline in cognitive abilities of the healthy aged.
4. For example, it has been found that some of the cognitive decline can be explained in terms of an unwillingness of older individuals to speed up processing if this strategy leads to more errors in a task; thus, it may be more a matter of strategic choices older individuals make, rather than an inability to process information rapidly.
5. A second area of great interest to developmental psychologists is the ability of very young children who are preverbal to process information.
6. Because they cannot yet speak, other methods must be found to determine their capabilities to perform various tasks.
7. For example, young children pay more attention to unexpected events than expected events. If they show more interest to a moving cube that passes behind a screen and comes out the other side as a sphere than one that remains a cube when it comes out the other side, we can be pretty sure that they understand something about object permanence.

III. As is the case with all sciences, psychology is evolving, and I would like to look into my crystal ball and predict what some of the trends for the future might be.

A. In the area of clinical psychology, I believe that we are not too far away from therapeutic interventions that can cure some mental illnesses.

1. You will recall that none of the physical therapies we discussed in this course was a cure; these therapies simply relieved symptoms of the illnesses.
2. Now that the human genome has been largely mapped, it will be possible to look for the genetic sites that predispose people to various forms of mental illness.
3. This will not be an easy task, because we already know that very few of the illnesses are associated with a single genetic site; they are polygenic and multiple sites are implicated.
4. However, once we know which sites are involved, we not only will have a better way to classify mental illnesses, but there will also be the possibility of intervening at the genetic level to find cures.

B. I believe that we will increasingly begin to see the scientific findings of psychology applied to solve more of the practical problems of the world.

1. If you made a list of the greatest problems facing mankind, such as war and aggression, crime, education, and health problems, including obesity and AIDS/HIV, you would find that most of these are related to human behavior, the province of psychology.
2. Especially in recent times, the science of psychology has made many discoveries that provide the data to help solve some of society's most pressing problems. I predict that future generations of psychologists not only will continue to discover new information but will become increasingly able to apply existing information to help solve these problems.

Essential Reading:
John Santrock, *A Topical Approach to Life-Span Development*, 2nd ed.

Supplementary Reading:
"A Primer of Imaging in Psychiatry." http://www.musc.edu/psychiatry/ fnrd/primer_index.htm.

Questions to Consider:
1. Can you think of areas of public policy having to do with education, crime, war and aggression, or health in which findings from psychology have had a major impact?
2. Why do you think is it important to be able to determine which parts of the brain accomplish which kinds of tasks?

Timeline

1662	René Descartes publishes *Treatise on Man*, proposing a mind-body dualism.
1690	John Locke publishes *Essay Concerning Human Understanding*, stating, "There is nothing in the mind that was not first in the senses."
1739	David Hume publishes *A Treatise of Human Nature*, claiming that the mind is a collection of sensory impressions linked by associations.
1834	Ernst Weber publishes *On Touch: Anatomical and Physiological Notes*, demonstrating the quantification of mental operations.
1871	Charles Darwin publishes *The Descent of Man*, applying evolutionary theory to humans.
1879	Wilhelm Wundt establishes the first psychological laboratory in Leipzig, Germany.
1890	William James publishes *The Principles of Psychology*, introducing the empirical science of psychology to America.
1900	Sigmund Freud publishes *The Interpretation of Dreams*, his first major work on psychoanalytic theory.
c. 1906	Ivan Pavlov discovers classical conditioning, although *Conditioned Reflexes: An Investigation of the Physiological Activity of the Cerebral Cortex* was not published until 1927.
1913	John Watson publishes an article in *Psychological Review* introducing the concepts of behaviorist psychology.
1950	B. F. Skinner publishes a paper titled "Are theories of learning necessary?" arguing that psychology should build its science only on observable behaviors.
1967	Ulric Neisser publishes *Cognitive Psychology*, arguing that mental operations can be studied scientifically.
1975	Edward O. Wilson publishes *Sociobiology: The New Synthesis*, claiming that modern evolutionary theory can explain much of human behavior.

Glossary

Alzheimer's disease: A cognitive disorder usually associated with older adults, characterized by progressive deterioration of cognitive functions, particularly memory.

Anal stage: In psychoanalytic theory, the developmental stage in which psychosexual energy is focused on the anus and anal activities, such as toilet training.

Antipsychotic drugs: A category of psychopharmacological intervention used to alleviate the symptoms of psychosis; this classification includes both traditional drugs that treat positive symptoms and atypical drugs that treat negative symptoms and have fewer undesirable side effects.

Anxiety disorders: The classification of mental disorders, formerly called *neuroses*, in which the major symptom is apprehension of possible danger.

Autism: A mental disorder that begins in childhood and is characterized by a disconnect from the social world, problems with social skills and speech, and self-stimulation.

Avoidance learning: A type of learning in which a stimulus that is paired with an aversive event signals the organism, which can then behave in a way to avoid the aversive event.

Behavior therapies: A classification of therapies based on the assumption that inappropriate classical or operant conditioning has taken place, in which the goal of therapy is to set up the conditions for appropriate re-learning to occur.

Behaviorism: A school of thought in psychology having its major influence from the early 1900s through about 1970, in which the mind was ignored and only behavior was considered the appropriate subject matter.

Biofeedback: A behavior therapy in which operant conditioning is used to condition a biological response normally considered to be involuntary.

Bipolar depression: A classification of mental disorders characterized by mood swings between depression and mania.

Cannon-Bard theory: A theory of emotion proposing that a stimulus causes a change in activation of the thalamus in the brain that then simultaneously sends messages to the cortex, interpreted as emotion, and to the physiological systems.

Classical conditioning: A type of basic learning discovered by Ivan Pavlov; an unconditioned stimulus, which automatically brings about an unconditioned response, is repeatedly paired with a conditioned stimulus until the conditioned stimulus comes to evoke a conditioned response.

Cognitive disorder: A classification of mental disorders that results from brain impairments leading to disturbances of consciousness or deficits in cognition or memory.

Cognitive-labeling theory: A theory of emotion proposed by Stanley Schachter, proposing that a stimulus causes generalized physiological activation, which then, depending on the context, is labeled as a particular emotion.

Cognitive psychology: A school of thought in psychology having its major influence beginning in the late 1960s through today, in which it is considered appropriate to use various methods to determine the flow of information and processing stages in the brain.

Cognitive therapy: A classification of therapies based on the goal of helping clients understand their thoughts and feelings so that they can reprogram these to achieve greater happiness and success.

Concept formation: A type of learning in which the individual must learn the defining dimensions of a concept by experiencing instances that confirm or disconfirm that concept.

Confounding variable: In an experiment, a circumstance with levels that are correlated with the levels of the independent variable, such that any change in the dependent variable could be due either to changes in the independent variable or changes in the confounding variable.

Consolidation theory: A theory of forgetting that proposes that time is required for memory traces to consolidate, that is, to become permanent enough that they cannot be interfered with by other salient events.

Control variable: In an experiment, a circumstance set by the experimenter at a particular level and not allowed to vary.

Correlational observation: A research method in which the statistical relationship between two or more variables can be determined, but the causality of this relationship cannot be determined.

Decay theory: A theory of memory that attributes memory loss to the fading of a memory trace as a result of the passage of time.

Depressant: A psychoactive drug that has a calming effect on the user.

Developmental psychology: The branch of psychology concerned with studying behavior across the lifespan.

Diagnostic and Statistical Manual of Mental Disorders: A document published by the American Psychiatric Association that classifies the various mental disorders.

Differential parental investment: In evolutionary theory, the concept that women have a much higher investment in their offspring, because of gestation, lactation, and so on, than do men.

Dissociative disorders: A classification of mental disorders in which some parts of the self become separated from the other parts.

Ego: In psychoanalytic theory, the part of the personality that operates on a reality principle and tries to determine what an individual should realistically do while still trying to satisfy the id and the superego.

Electroconvulsive shock treatment: A physical therapy, sometimes called ECT, in which electrical current is passed through the brain; usually used to treat symptoms of depression.

Engineering psychology: A branch of psychology that is concerned with specifying the characteristics and limitations of the human operator in a human-machine-environment system.

Ergonomics: An interdisciplinary field, also sometimes called *human factors*, concerned with the design of human-machine-environment systems.

Evolutionary theory: A scientific theory first proposed by Charles Darwin in the 1800s that uses the idea of survival of the fittest to explain the wide diversity of plants and animals in the world.

Experiment: A scientific method in which an independent variable is manipulated and a dependent variable is measured while other possible variables are accounted for such that it is possible to infer causality.

Gestalt school: A German school of perceptual thought that proposes that we have certain built-in principles, such as proximity, similarity, closure, and good figure, by which we organize parts of perceptual events into wholes.

Genital stage: In psychoanalytic theory, the final developmental stage, in which a truly intimate, sharing, and caring relationship can develop.

Hamilton's rule: A formula in evolutionary theory, $c < r \times b$, that attempts to explain altruism; according to the formula, we should act if the cost to us (c) is less than our relatedness to the person we are helping (r) times the benefit (b) to the person we are helping.

Homeostatic model: A biologically based theory of motivation in which the organism has a need that leads to a drive; the drive, in turn, leads to behavior that returns the organism to an optimal state.

Humanistic therapies: A classification of therapies, such as non-directive and existential, in which the goal is to improve the client's understanding of thoughts and feelings so that the client can achieve his or her full potential.

Id: In psychoanalytic theory, the part of the personality that operates on a pleasure principle; if unchecked by the superego or ego, the id would drive us to take whatever we wanted, whenever we wanted it.

Illusory memories: Under certain conditions, people will recall events that did not actually occur; this indicates that memory is a constructive process, in which memory cues are used in an attempt to reconstruct the original memory.

Inclusive fitness: A concept in evolutionary theory proposing that organisms behave in ways that improve the chances that all kin, not just children, will survive and reproduce.

Independent variable: In an experiment, the circumstance chosen by the experimenter to manipulate in order to determine its effects on the dependent variable.

Interference theory: A theory of memory that attributes memory loss to interfering material that occurs either before or after the event to be remembered.

Introspection: A technique in early experimental psychology in which trained observers attempted to analyze the contents of their own minds by reflecting on their thoughts and perceptions.

James-Lange theory: A theory of emotion proposing that a stimulus causes both a behavioral and a physiological reaction, and it is the latter that leads to an emotional feeling.

Mental retardation: A classification of mental disorder characterized by significantly subaverage intelligence and limitations on functioning.

Mnemonics: Aids used to improve memory.

Mood disorders: The classification of mental disorders in which there is an uncontrollable, undesirable change in emotion, such as unipolar or bipolar depression.

Narcotic: A psychoactive drug usually derived from the opium plant that gives the user a rush and is highly physiologically addictive.

Non-directive therapy: A type of humanistic therapy (also sometimes called *client-centered*), in which the therapist tries to act as a mirror to reflect the clients' thoughts and feelings so that clients gain the ability to solve their own problems.

Oedipus conflict: In psychoanalytic theory, the conflict that develops during the phallic stage when little boys unconsciously want to sexually possess their mothers but find their fathers in the way.

Operant conditioning: A type of simple learning, also sometimes called *instrumental conditioning*, in which a response is more likely to recur if followed by a reinforcement.

Oral stage: In psychoanalytic theory, the first developmental stage and the stage in which psychosexual energy is focused on the mouth.

Perceptual constancies: A school of perception proposing that early in life, we learn that certain properties of objects are invariant, such as size, shape, brightness, and color.

Perceptual illusions: Situations in which our internal perceptual model of the external world is not in correspondence with reality, causing us to make mistakes in what we perceive.

Phallic stage: In psychoanalytic theory, the developmental stage especially important for little boys, in which psychosexual energy is focused on the penis and aggressive competition begins.

Phobia: A classification of mental disorders in which there is an undue fear of objects or situations.

Polygraph: A machine, also called a *lie detector*, that measures heart rate, blood volume, breathing rate, and galvanic skin response in an attempt to determine whether a person is being truthful.

Population stereotypes: The expectations that users of human-machine-environment systems have about the effect of their actions.

Prefrontal lobotomy: A surgical technique in which the connections between the prefrontal cortex and the rest of the brain are severed; this technique was used for several decades in the middle of the 20th century to alleviate the symptoms of long-term schizophrenic patients.

Probability learning: A type of learning in which the individual learns the underlying probabilistic structure of the environment.

Psychoanalysis: A psychotherapy developed primarily by Sigmund Freud, based on psychoanalytic theory, in which the goal is an analysis of the unconscious.

Psychoanalytic theory: A theory of personality proposed by Sigmund Freud in the early 1900s, in which the unconscious plays a major role in determining behavior and the parts of the personality, the id, superego, and ego, are in constant conflict.

Psychosis: Mental disorders that are characterized by a break with reality.

Qualitative design: A research design, such as ethnography, in which patterns of behavior can be studied, but these observations are not amiable to quantitative analysis.

Random variable: In an experiment, a circumstance allowed to vary in a random way such that it is uncorrelated with the levels of the independent variable.

Schizophrenia: A classification of mental disorders in which there is a psychotic break with reality and often delusions, hallucinations, and disorganized speech and behaviors.

Self-actualization: A goal proposed by Abraham Maslow in his Hierarchy of Needs model of motivation, in which people can fulfill their full potential.

Sexual disorders: A classification of mental disorders in which there is either an inability to perform sexually as desired or sexual behavior characterized by an undue sexual attraction to abnormal sexual stimuli.

Social psychology: A branch of psychology concerned with social thinking, social influence, and social relations.

Somatoform disorder: A classification of mental disorders in which there are complaints about bodily symptoms or defects.

Stimulant: A psychoactive drug that produces feelings of heightened awareness and alertness.

Stimulus discrimination: In classical conditioning, when stimulus generalization has occurred, if similar stimuli continue to be presented, but only the conditioned stimulus is paired with the unconditioned stimulus, the responses to the similar stimuli will die out.

Stimulus generalization: In classical conditioning, after acquisition takes place and the conditioned stimulus reliably evokes the conditioned response, other similar stimuli also are found to evoke some lesser level of response.

Substance-related disorder: A classification of mental disorders related to problems caused by taking a drug of abuse.

Superego: In psychoanalytic theory, the part of the personality that operates on a moral principle much like our conscience and gives us guilt when we do not follow its rules.

Systematic desensitization: A behavior therapy in which clients pair up progressively more anxiety-producing situations with relaxation in order to learn new, more appropriate responses to these situations.

Token economy: In behavior therapies based on operant conditioning, when a symbolic reinforcer is used, such as a poker chip, that can be traded for a primary reinforcer, such as food.

Tourette's syndrome: A mental disorder characterized by a continuous repeated build-up of tension that sometimes leads to uncontrollable vocal and motor outbursts.

Transmitter substance: A chemical released into the synapse between neurons that makes the postsynaptic neuron more or less likely to fire.

Unconscious level: In psychoanalytic theory, the part of the personality below the level of awareness that plays a major role in determining how we behave.

Unipolar depression: A classification of mental disorders characterized by either depressed mood or loss of interest in pleasurable activities.

Biographical Notes

Charles Darwin (1809–1882). A British naturalist who, after his 1831–1836 trip collecting plant and animal specimens, wrote the classic book *On the Origin of Species*, published in 1859. This book was the basis for the theory of evolution, including the concept of natural selection and the theory's requirements of variation, inheritance, and selection. Later, Darwin would add the concept of sexual selection to his theory and would apply the theory to humans.

Sigmund Freud (1856–1939). An Austrian physician who, while treating patients with hysteria (conversion disorder) using hypnotism, discovered that patients improved if he could get them to talk about their problems. Over the years, he developed this therapeutic technique into psychoanalysis and proposed the associated psychoanalytic theory. This theory's emphasis on the unconscious level is the basis of many modern-day social policies, as well as today's psychodynamic therapies.

William James (1842–1910). An American psychologist who, with his 1890 textbook *The Principles of Psychology*, introduced scientific psychology to many university students and faculty. Although he was not a researcher, he was an outstanding philosopher and writer, well versed in psychological findings from around the world. He was adept at combining his knowledge of psychology with his personal observations to bring psychology alive to his readers.

Ivan Petrovitch Pavlov (1849–1936). A Russian physiologist who won the Nobel Prize for his research into the physiology of digestion; in the course of his research, he observed that pairings of certain events led to responses to new stimuli. From these observations and later experimentation, he founded the field of classical conditioning. Although he spent the rest of his career studying conditioned reflexes, he denied to the end that he was a psychologist.

Burrhus Frederic (B. F.) Skinner (1904–1990). An American psychologist who many consider to be the father of operant conditioning; his first major book, *The Behavior of Organisms*, was published in 1938. He also wrote *Walden Two*, a fictional treatment of a utopian society based on reinforcement, and *Beyond Freedom and Dignity*, a book considering the uses of reinforcement for social engineering. Skinner's early work on schedules of reinforcement formed the basis for modern behavior therapies.

John Broadus Watson (1879–1958). An American psychologist who became uncomfortable with introspection as a research technique and, following Pavlov's lead, founded the school of psychology known as behaviorism, which he introduced in a 1913 article entitled "Psychology as the Behaviorist Views It." Behaviorism then became the dominant paradigm of psychology for more than 50 years, and the only subject matter deemed appropriate for study became behavior, rather than the mind.

Wilhelm Wundt (1832–1920). A German psychologist who is generally considered to be the father of experimental psychology; in 1879, he converted his demonstration laboratory into the first psychological laboratory for collecting empirical data. This laboratory served as a model for psychology and led psychology from being a discipline based in philosophy to one based in science.

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