Handout 1

Science and B.S. (Baseless Science)

A basic science FAQ (frequently asked questions):

1. What is science?
   It's a way of gaining knowledge about the world, "founded on the conviction that experience, effort, and reason are valid." It does not rely on hope, belief, faith, authority, or magic. *Science is a set of methods used to gain knowledge about anything that can be verified.*

2. Are scientific conclusions *proven facts*?
   No. *Proven* implies 100% certainty, and nothing in science is 100% certain. Science arrives at conclusions, and conclusions can be verified, but there's no 100% guarantee. If a researcher's conclusions are verified by other, independent or even skeptical researchers, then we start to think the conclusions are correct. But they are always subject to further, and better research. Science is always a work in progress. We don't *prove* things; we *find support for* our claims. Science is a field of *probabilities*, not certainties.

3. Aren't scientific findings really just fancy opinions?
   No. Opinions are ideas about things that come from one's head, and not one's work. Science *works* to dig up information (by gathering *evidence*) and works to see how facts relate (incorporating all the evidence). Scientific findings or theories rely on real evidence that can be verified by others. These findings stand and fall on *evidence*, not on persuasive arguments or opinions.

4. Are there some things science just can't investigate?
   Sure. Anything that's not *falsifiable*. That means anything we *can't* gather empirical evidence on to establish as wrong *if it's wrong*. Any claim that we might refute with evidence (*if* the claim is wrong) is falsifiable, and therefore something to look at scientifically.

5. Isn't psychology a soft science?
   Psychology is a science, and it operates on the same principles as any other science. Its subject matter is people, so it's called a *social* science. Doing social science well is hard.

6. How can I tell the difference between good science and pseudoscience?
   By following some of the guidelines below:

   a. Be skeptical. Look for real *evidence*. Don't fall for things that only *look* scientific (e.g., big words). Find out if studies were published in *peer-reviewed* trade journals, or if they were just in-house "publications" or equally bad, popular mass-market publications. If they don't show you the source of whatever studies they claim were done, they don't want you to know.

   b. The value of anecdote and personal experience is nil. Pseudoscience often tries to convince with compelling personal tales. These are as valid as fishermen's stories.

   c. Look for control groups or baseline comparisons. We need control groups, placebos, and baselines to make sure that whatever happened wouldn't happen to everyone anyway.

   d. Remember that "correlation is not causation." (A predictive relationship is not a cause-effect relationship. Pseudoscience often makes causal suggestions from correlational information.)

   e. Look for "risky tests": those that have a high risk of showing the hypothesis to be wrong. For example, it's riskier to predict future occurrences than to fit an explanation to past events.

   f. If an argument rests on the authority of some person, then it's weak. Science rests on *evidence*, not on the authority of scientists, academic titles, or gurus.

   g. Don't fall for "ancient wisdom." (Unless you would prefer to live in an ancient society where life expectancy is 40 years, illness runs uncontrolled, inequality thrives, violence rules, etc.)

   h. Keep an eye out for supernatural claims and promises of the impossible. Science doesn't rely on miracles, spirits, mysterious human powers, or gods; and science doesn't make claims that violate what we *know* about the world (exceeding the speed of light, 100% infallibility, oversimplified solutions to complex problems, inherited memories, etc.) Scientists seek to know more about the world, but until we achieve that knowledge, we keep our claims realistic.

Handout 2

Personality

Most theories of personality attempt to provide a functional description of what motivates people to act as they do, and what organizes a large part of their actions. Some theories (attempting to explain what personality is and where it comes from) suggest that our personalities (the basic structures motivating and organizing our actions) are formed within the first few years of life. Other theories suggest that our personalities are constantly changing as a result of the social environments that we are repeatedly exposed to. (We cover psychoanalysis in class because of its historical importance; it's *not* scientific.)

1. According to *psychoanalysis*, what is the id? Where does it come from? Does it ever change? What is the basic conflict faced by all humans (i.e., according to psychoanalytic theory)? Is it necessary to manage or transform id impulses? Why?

2. How are id impulses transformed? Which part of the person does the work of transforming them? Is it a conscious process? What is *repression*, and why is repression such an important component of personality, according to psychoanalysis? Is it safe to say, "according to Freud, the history of man is the history of his repression"? What does this statement (from H. Marcuse) mean? Can repression be the only thing we do in transforming the impulses of the id? Or is repression alone insufficient?

3. Which is more likely a real part of the basic psychoanalytic conflict: wanting for a moment to kill someone who cuts you off in traffic, or unknowingly wanting to kill your otherwise loving father? Which of these desires has been repressed?

4. Besides repression, what other *defense mechanisms* does the ego have to help transform or manage the impulses coming from the unconscious? How did you choose which ones to use? When did you choose which ones to use?

5. Why are the most meaningful conflicts faced throughout early life called *psychosexual*? What's so sexual about them? How were the conflicts perceived through the baby's or child's mind that we had when growing up? Who were the authority figures that demanded initial repression of the id's desires? Are our relations to them forever strained? How did we learn to separate the unconscious from conscious material? Did we do a good job?

6. Is psychoanalysis a scientific theory? Are its propositions falsifiable? What are some alternative views of personality? Is *personality* still a useful construct?

7. How can your set of personality *traits* be measured? What does the MMPI measure? Have you seen any other personality inventories that have attempted to assess your personality traits? (For example, have you been exposed to the Myers-Briggs Type Indicator? What use is it intended for? Does it matter?)

8. What are the "*big five*" personality trait dimensions?

9. How useful is *personality*? Can it help us to predict a person's behaviors? If so, given which constraints?

Handout 3

Abnormal and Clinical Psychology

1. What is normal? What is abnormal? What is an illness? What is a *mental* illness? Is atypical behavior in itself an illness? How might atypical behavior *become* an "illness"?

2. How might the following be involved in determining whether a person is normal or not (or mentally ill or not): the job market; school rules; family life; residential communities; mass media; law; the self-help industry; pharmaceutical companies; responsibilities? Do these factors point more to a *medical model* of mental disorders or a *bio-psycho-social perspective*?

3. What are the consequences of being *labeled* with a mental disorder?

4. What are some of the major categories of mental disorders, according to the DSM? What, for example, are anxiety disorders? What are some specific anxiety disorders? What are mood disorders? What are the major mood disorders? How is a person with so-called "multiple personality" categorized? Is schizophrenia a single disorder?

5. Besides the organic disorders, which of the well-known disorders are possibly a medical illness? Which evidence points in the direction of an illness model?

6. How are the various disorders thought to have developed within a person? Are they genetic in origin? Diseases? Caused by injuries? Poor choices? Bad mental habits? Odd learning experiences?

7. How are they treated once they are brought to the attention of clinical psychologists or psychiatrists? Who is more likely to take a biomedical approach? What does a biomedical approach to treatment involve? Who is more likely to use behavior modification in dealing with abnormalities? How would a psychoanalyst approach a patient with mood or anxiety disorders? What do cognitive therapists try to treat? Can something like the Psychic Hotline be of any help? Who are clinical psychologists? Who are therapists? Which therapies have the best track records? How can we tell if a therapy is effective?

8. What's the difference between *suppressing symptoms*, *changing behaviors*, and *curing illness*? Which occurs with the abnormalities we've been discussing?

Handout 4

The Brain

1. What are neurons? Where are the neurons of the central nervous system (CNS) located?

2. How are most neurons structured? What are the various parts, and what are those parts responsible for? What are dendrites? How many does a neuron have? What are axons? How many does a neuron have? What's myelin? What is myelin used for? What are terminal branches and terminal buttons? How many might there be? What's inside the buttons?

3. How does information travel *within* a neuron? What is the information that is "travelling"? What form does it take? Where does it come from? How does it start? Where does it go? What does it do when it gets there? What are "potentials"? What's the *resting potential* of a neuron? What's an *action potential*? What's the threshold that triggers an action potential? How does the neuron reach threshold?

4. How is the electrical activity of the action potential created? What is depolarization? What are ions? What are the gates in the axon? Where do the ions go? How do they move? What does it look like is going on?

5. How is information transmitted from one neuron to another neuron? (Where in the body is this taking place?) What are neurotransmitter chemicals? How are they released? Where do they go once released? What *is* the synapse? What is an *excitatory* synapse? What is an *inhibitory* synapse? How do neurotransmitter chemicals create an excitatory message? How do they create an inhibitory message? What happens on the dendrites of the receiving neuron? What is the lock-and-key hypothesis with respect to neurotransmitters and receptor sites?

6. What are the different nervous systems in the body? What are their general functions?

7. How can we tell what goes on in the brain? What are the different observational techniques that can be used to monitor brain activity? How is each used?

8. What are the lower-level brain structures and what goes on in them? What is the limbic system and what goes on there?

9. What are the different lobes of the cerebral cortex, and what kind of information is each responsible for?

10. Where is language processed in the brain? How would reading, or better yet, reading aloud work? Which areas of the brain are involved in this seemingly simple task?

11. What does brain plasticity refer to, and how "plastic" is the human brain? Are adult brains as plastic as developing brains?

12. Is the left-brain/right-brain difference a big deal? For whom would it be a big deal? What does brain localization mean for a functioning creature? When might localization be a big deal?

Handout 5

Research Methodology

"Method has to do with how to ask and answer questions with some assurance that the answers are more or less durable" – C. W. Mills.

1. What are the basic premises of science (return to handout 1)? What kind of evidence is valid for use in science, and how is evidence obtained?

2. Why is *probability* a big word in science? Why don't we use the word "prove"?

3. What's the role of a *theory*? What is a *hypothesis*? How do you know if a hypothesis is *falsifiable*? What role do *facts* play in all of this?

4. What are the basic steps of the process of doing scientific research (the steps of the scientific method)? Where is background information found for questions in psychology? What are *operational definitions*? What's the difference between descriptive and experimental designs? Are statistics really important (or can you get by without taking those stats classes)?

5. What is a *correlation*, and how do we look for correlations? Can they verify causes? What do correlations tell us?

6. How is an *experiment* conducted? What are some of the basic components of experimental research? What is a *population*? What is a *sample*? How is the sample selected?

7. How many groups do you need in an experiment? How many groups do you need in an experiment with two *independent variables* (IVs)? What's the difference between an experimental group and a control group? When do you use a *placebo* group in an experiment? Do you have to make sure the people in the different groups are matched on various qualities?

8. What is the *dependent variable* (DV) in an experiment? What is being compared when you compare the results of groups in an experiment?

9. What are *confounding variables*? How can confounding variables be eliminated by using *double-blind* methods and *deception*? Why is it usually better to do an experiment in a laboratory? Do lab studies still have *external validity*?

10. What are ethical issues with respect to research and why do we have to think about the ethics of doing research? How much power does the researcher have? How easy is it to abuse power? Are there ethical issues involved in research with non-human subjects?

11. What's the purpose of doing research that doesn't seem to have any immediate applicability?

Handout 6

Memory

1. How many memory systems do people have? Are they each independent of one another?

2. What are some of the components involved in the *encoding* of information into memory? Where is information being encoded to? Does most information get encoded intentionally (with effort) or incidentally (automatically)?

3. Where is the information stored once encoded? Is the serial position effect an encoding phenomenon or a retrieval phenomenon? What do we mean when we refer to forgetting as an encoding failure? How does chunking increase the amount of information that can be encoded into STM?

4. How long does sensory storage last? How long does STM last? How long does LTM storage last?

5. What's the difference between an *implicit* use of memory and an *explicit* use of memory? What are *declarative* and *nondeclarative* memories? What is *metamemory*?

6. How are neural pathways involved in retrieving memories? Can a memory be triggered without a retrieval cue? How does a retrieval cue based on *associative strength* work? How does a retrieval cue based on *encoding specificity* work? Which form of retrieval is more likely at the base of the mood-congruence effect?

7. Why do we say that memories coming from LTM are always *constructed*? Are memories anything more than stories we tell ourselves in the languages we speak? How valid are our memories? How valid are testimonies? Does a person's own confidence about a memory tell us anything about the memory's validity? What is a *source misattribution* error? How hard is it to create *false memories* in a person's mind?

8. What are *retrieval errors*? How is interference involved in forgetting information from LTM? What is *response competition*? What is *cue-dependent forgetting*? Does information from LTM decay with time?

Handout 7

Thinking

1. How does a word become a concept? Was the concept in your mind before the word that names it? If so, how did it get there? If not, what does that tell us about concepts? What do concepts do? Can we think without them?

2. What are *prototypes*? Is it easier to think of a prototype or a non-prototype when asked to think about some category?

3. When solving problems, or making decisions, we usually make use of a variety of *heuristics*. What are some of the most common heuristics that we use? Do these heuristics help us or do they get in our way?

4. What are some of the other barriers to clear thinking that people experience? What is a *fixation*? How do we avoid the *confirmation bias*? Do we **all** suffer from *overconfidence*? Why do we tend to have such a stable *belief bias*?

5. What do these problems in thinking/decision-making/problem-solving tell us about the way the human mind works?

6. What is *deductive logic*? What is *inductive logic*? What are *premises*? What is the basic structure of a logical *argument*?

Handout 8

Intelligence

1. Why is there controversy surrounding the measurement of intelligence? What is the I.Q. test? What does it predict? Is it internally valid? Does it have content validity? Is it reliable? Is it fair? Are there alternatives to the I.Q. test to measure cognitive abilities? Why was such a test developed in the first place? How does it get *standardized* over time or between cultures?

2. What are some of the issues regarding the singularity or multiplicity of intelligence? What is *g*?

3. What *are* the different types of intelligence (assuming there is more than one)? Is there a difference between a talent and intelligence?

4. Is there really an emotional intelligence? If so, what is it?

5. When it comes to intelligence, the nature–nurture controversy isn't just an argument — there are facts to support some of the positions. What is the role of heredity in explaining individual differences in intelligence? (What is heritability?) What is the role of the environment? Which environmental factors seem to play the biggest role in determining intelligence?

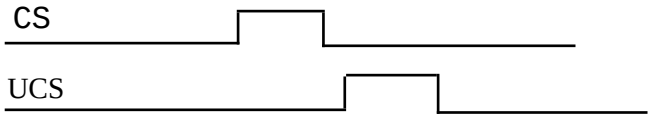
6. What are some of the possible explanations for group differences in I.Q. test scores? Are there gender differences in intelligence? Are there racial or ethnic differences? In each case, do they outweigh individual differences?

Handout 9

Learning

1. What is learned through the process of *classical conditioning*? What role do *reflexes* play here? What is stimulus–stimulus *contiguity*? What is an unconditioned stimulus (UCS)? How is a UCS related to an unconditioned response (UCR)? What is a conditioned stimulus (CS) *before* learning takes place? What does the CS become once classical conditioning has taken place? What is a conditioned response (CR)?

2. What does the following diagram represent?



3. What is extinction? What did Pavlov think about why extinction took place? How do his tests of *spontaneous recovery* (or *disinhibition*) support his thoughts about what goes on in the brain during extinction?

4. Why does stimulus *generalization* not have to be learned? Why does stimulus *discrimination* have to be learned? How do we teach an organism to discriminate between two otherwise similar CSs in classical conditioning?

5. Does the CS become an automatic (stamped in) trigger, or is it a source of information? What kind of information?

6. What have *you* learned through classical conditioning?

7. What's the difference between *classical* conditioning and *operant* conditioning? Is contiguity sufficient for operant conditioning? Are reflexes? What is an operant response? Which consequences of behavior are we interested in here?

8. According to Skinner, all behavior is subject to *reinforcement contingencies*. What are these? Does it matter if the behavior is emitted or elicited? What do the laws of operant conditioning and of extinction say? Is reinforcement, in Skinner's view, a state in the organism or a stimulus?

9. What is the difference between *positive* and *negative* reinforcement? What is the difference between negative reinforcement and punishment? Does it help to think in terms of positive and negative punishment? (What would these be?)

10. What are the differences between ratio and interval schedules of reinforcement (including fixed vs. variable)? How do they affect different *rates* of responding? Which schedules of reinforcement establish behaviors that are easier to lead to extinction? Which lead to more difficult extinction?

11. What are some of the problems associated with using punishment in daily life? Why is the act of inflicting punishment actually reinforcing the act of punishing? What kind of reinforcement is this?

12. How can cognition be involved in learning? What advantages do humans have that other organisms might not have? Can reinforcement be *anticipated*? Does it work? What are some of the components involved in our ability to learn through observation?

Social Psychology

Social psychology is perhaps the broadest field within psychology (and sociology). It represents the attempt to comprehend *social* behavior, which includes all of the variables that might be influencing a person's interactions with other people.

1. What are the various topics that social psychologists are interested in? What is *social cognition*? What might be involved in a study of *interpersonal relations*? How do personality and individual differences fit in the study of social psychology?

2. What is the interest of someone who studies person perception, or "social thinking"? How are *schema* involved in person perception? What kind of schema are there? What is an *attribution theory*?

3. What kind of attributions *can* people make, according to Kelley's model of attribution (the theory of causal attribution)? What is an *internal (or dispositional)* attribution? What are *external (situational)* and *mixed* attributions? What kind of information is the observer's mind taking into consideration when calculating the likelihood of internal or external causes? How do *consensus* information, *consistency* information, and *distinctiveness* information work in this calculation? What are some of the common attribution *biases (or errors)*? Do we ever make completely unbiased attributions? (What can this tell us about the need for using careful research methods when doing work in psychology?)

4. What are attitudes? Do we always act in accordance with our attitudes? How can our actions lead to the formation of certain attitudes? When do we change our attitudes? How does *cognitive dissonance* influence when we might change attitudes?

5. What causes *aggression*? Are some of us hard-wired or chemically-predisposed to aggress more often? What are the components of a social learning interpretation of aggression? What do *aggressive cues* do as far as *priming* the mind to think aggressively? Can attributions play a role in making an aggressive response more or less likely? How are reinforcements (i.e., learning) involved in the likelihood of aggression? What counts as an *aversive stimulus*? Can situational norms influence the likelihood of a person making an aggressive response? How? And where does a person's history of learning come into play? What contributes to a person's ability to inhibit aggressive reactions?

6. Why does mere proximity lead to attraction? Are there some cross-cultural similarities in perceptions of physical attractiveness (or is beauty only in the eye of the beholder)? What kind of similarities are important factors influencing one person's attraction to another? Does the arousal in experiencing passionate love have to be caused by the target person? What is *excitation transfer*? How is self-disclosure related to intimacy?

Handout 11

Developmental Psychology

1. Nature and nurture... what is meant by an interaction between genes and the environment? How can the gene vs. environment issue be researched scientifically?

2. The nature–nurture controversy often results in an examination of different environments: What do we mean by shared environments and non-shared environments? Why do we look at siblings in this context?

3. What do studies with twins (those raised together and raised apart) tell us about the relative influence of genetics and environment? What are some of the criticisms of twins-raised-apart studies where the twins seem uncannily similar?

4. How can an understanding of evolution help us to explain some of the patterns of behaviors that people grow up to exhibit?

5. Do parents matter? What shows us that they *don't*? What shows us that they *do*?

6. What are genes, anyway? How many of them do we actually share with one another? With our parents? With our siblings? What is *heritability*?

7. What did Piaget's research do to our conception of mental development? What different stages did Piaget describe as showing mental ability differences in the developing person? What are the implications (for cognitive abilities and moral judgments) of each?

8. Where does *attachment* come from, and what are some possible attachment styles? What are some of the consequences of different styles of attachment?