

## 9.00 EXAM 1 NOTES

### KOSSLYN CHAPTER 1 – Introduction to the Science of Psychology: History and Research Methods

Psychologists use science to try to understand not only why people behave in abnormal or self-destructive ways but also why and how people think, feel, and behave in “normal ways.

#### THE SCIENCE OF PSYCHOLOGY: GETTING TO KNOW YOU

*What is Psychology?*

Psychology – the science of the mind and behavior

- Science – uses objective evidence to reason about possible causes of a phenomenon; tests the resulting ideas by collecting additional facts that will either support the ideas or refute them
- Mind – what the brain does when you are thinking or feeling
  - To collect objective facts about the mind, we often work backward
    - Ex: observe what people do on the outside, and infer what could be going on inside
  - Another method: brain-scanning → show physical changes of brain at work and relate those to the mental events they produce
    - Ex: amygdala activation suggests strong emotional reactions
- Behavior – the outwardly observable acts of a person, alone or in a group
  - Physical movements

“Layers upon layers” → an individual’s mental state depends on brain functioning, and mental events affect his or her behavior, and – at the same time – these events are affected by the surrounding group (the members of which, in turn, have their own individual minds and behaviors).

Research in psychology: describe / explain AND predict / control mental events and behavior!!

*Levels of Analysis: The Complete Psychology*

1. Level of the brain – events that involve the activity, structure, properties of the organ itself – brain cells and their connections, the chemical solutions in which they exist, and the genes
2. Level of the person – events that involve the function (mental processes) and content (mental content) of the mind
  - a. Mental contents – knowledge, beliefs (including ideas, explanations, and expectations), desires (such as hopes, goals, and needs), and feelings (such as fears, guilts, and attractions)
    - Ex: visualizing the letter “n” in your head
  - b. Mental processes – sets of operations that work together to carry out a function, such as attention, perception, or memory
    - Ex: rotating the letter “n” in your head

Note: the brain and the mind are not the same thing!

3. Level of the group – events that involve relationships between people (such as love, competition, and cooperation), relationships among groups, and culture
  - a. How other people affect an individual’s mind and behavior
  - b. Distinct identities of groups (ex: culture – language, beliefs, values, norms, behaviors, and even material objects that are passed from one generation to the next)

It is important to relate each level of analysis to the physical world that surrounds all of us!!

Events at the different levels are also constantly interacting:

- Events at each level modify and trigger events at the other levels.

This “levels” view of psychology lets you see how different types of theories and discoveries illuminate the same phenomenon but also lets you see how these theories and discoveries are interconnected – and thus how the field of psychology as a whole emerges from them.

*Please pardon any spelling errors or typos!*

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#### PSYCHOLOGY THEN AND NOW

##### *The Evolution of Science*

The roots of psychology lie in:

- Philosophy (the field that relies on logic and speculation to understand the nature of reality, experience, and values)
  - Psychology borrowed theories of the nature of the mind / behavior
  - Descartes – distinction between mind and body / relation between the two
  - Locke – all human knowledge arises from experience of the world / reflection about it; what we know about the world is based on how it is represented in the mind
- Physiology (the field that studies the biological workings of the body, including the brain)
  - Psychologists learned to recognize the role of the mind in giving rise to mental events and behavior; acquired scientific approach to studying brain function / how it produces mental events and behavior

##### *Early Days: Beginning to Map the Mind and Behavior*

Early psychologists were interested in understanding the operation of perception (the ways in which we interpret information from our eyes, ears, and other sensory organs), memory, and problem solving

Structuralism – the school of psychology that sought to identify the basic elements of consciousness (the state of being aware) and to describe the rules and circumstances under which these elements combine to form mental *structures*

- Began with the work of Wilhelm Wundt
- First organized “school of thought” in psychology
- Consciousness itself occurs at the level of the person, but this process relies on brain function
  - Wundt’s research led him to characterize 2 types of elements of consciousness:
    1. Sensations
    2. Feelings
- Edward Titchener (student of Wundt) – broadened structuralist approach to apply it to the nature of concepts and thinking in general
- *Primary research tool: introspection* – the technique of observing your mental events as, or immediately after, they occur
  - Ex: What is the nature of mental images? What factors are emphasized when making decisions?
  - *Problems with introspection:*
    1. How do you prove that mental images actually exist and that objects can indeed be visualized?
      - Mental images are not “universal.”
    2. A considerable amount of mental contents / mental processing cannot be accessed via introspection.

Functionalism – the school of psychology that sought to understand how the mind helps individuals to adapt to the world around them, to function effectively in it

- Why humans think, feel, and behave as we do?
- Addressed events at the level of the person and at the level of the group
- Wanted to gather knowledge that could be put to immediate use
- Studied the methods by which people learn; how goals and beliefs are shaped by environments
- Strongly influenced by Charles Darwin; applied his theories to mental characteristics
  - Ex: William James – studied the ways in which being able to pay attention can help an individual survive and adapt to an environment

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- Theorized that human psychology (at least some of it) is related to the psychology of animals
  - Led to the study of animal behavior that can provide clues about characteristics of human mind and behavior
- Focus on social issues – ex: improving methods of education

Gestalt Psychology – an approach to understanding mental events that focuses on the idea that the whole is more than the sum of its parts

- Interested in consciousness, particularly as it arises during perception (the organizing and interpreting of sensory information)
- Focus on the levels of the brain and the person
- Led by Max Wertheimer – noted that much of the content of our thoughts comes from what we perceive, and further, from inborn tendencies to structure what we sense in certain ways
- Developed >100 perceptual laws (principles) that describe how our minds organize the world
  - *Perceptual unit* – a whole formed from individual parts
    - Ex: flock of birds
- Why Gestalt Psychology is important – perception is the gateway to the world
  - If our perceptions are not accurate, our corresponding thoughts and feelings will be based on distorted views of reality.
- The research of the Gestaltists addressed how mental processes work, and this work in turn led to detailed studies of how the brain gives rise to such mental processes and how mental processes influence mental contents.

*Psychodynamic Theory: More Than Meets the Eye*

*Sigmund Freud*

- The mind is not a single thing, but has separate components
- Some of these components are unconscious – outside conscious awareness and not able to be brought into consciousness at will
  - Sexual (aggressive) urges arise from unconscious mental contents / mental processes
- A child absorbs their parents' and culture's moral standards, which then shape the child's (and later, the adult's) goals and motivations.
- We often find our urges unacceptable and so keep them in check, hidden in the unconscious.
  - These unconscious urges build up until, eventually and inevitably, they demand release as thoughts, feelings, or behaviors.
- Focus on the level of the person, also relies on the level of the group
- AKA psychodynamic theory – a theory of mental events that specifies the continual push-and-pull interaction among conscious and unconscious thoughts and feelings and specifies how such interactions affect behavior
- *Problems:*
  - The guiding principles of psychodynamic theory do NOT rely on results from objective scientific studies, but instead rest primarily on subjective interpretations of what people say and do.
  - Very intricate, complicated → can easily explain opposite observations as well
  - Difficult to test
- *Legacy:*
  - Complex behavior is driven by mental processes operating on mental contents
  - Some mental contents and processes are hidden from awareness
  - Attention to previously ignored types of behavior (ex: dreams, slips of tongue)
  - New approaches to treating psychological problems (ex: identifying underlying causes, not just treating symptoms)

*Behaviorism: The Power of the Environment*

Behaviorists believed that psychologists should study the mind, not unseen phenomena.

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Edward Lee Thorndike, John B. Watson, Clark L. Hull, B.F. Skinner – psychology should concentrate on understanding directly observable behavior

Behaviorism – the school of psychology that focuses on how a specific stimulus (object, person, or event) evokes a specific response (behavior in reaction to the stimulus)

- *Stimulus-response associations*
- Focus on events at the level of the person
- Key idea: *reinforcement* – a desirable consequence that occurs after an individual responds to a stimulus in a particular way
  - Ex: rewards, payment for a job
  - If the consequence of a response is reinforcing, we are likely to repeat the response when we encounter the stimulus. If a response produces an undesirable consequence (“punishment”), we are less likely to do it again.
- Developed important principles that describe the conditions (i.e.: history of reinforcement) in which particular responses are likely to occur or not occur
- Emphasis on controlled, objective observation
- Unfortunately, many of the behaviorists’ objections to the study of mental contents and processes have not stood the test of time.
  - We *can* study mental contents and mental processes!
  - Consequences alone cannot account for behavior.

Humanistic Psychology – the school of psychology that assumes people have positive values, free will, and deep inner creativity, the combination of which allow them to choose life-fulfilling paths to personal growth

- Emerged as a reaction to Freud and behaviorism
- Abraham Maslow
- Focus on the level of the person
- All individuals and their unique experiences should be respected
- *Carl Rogers* – developed a therapy based on the humanistic approach → *client-centered therapy*
  - Human nature leads each of us to want to develop to our fullest potential, and the therapist’s job is to help us to do so.
  - Therapists should be unconditionally supportive and provide a positive environment to help the client overcome obstacles and develop to their full potential.
- Emphasis on humans as active agents who can formulate plans and make decisions.
- Led to the emergence of *positive psychology* – area of psychology that focuses on “the strengths and virtues that enable individuals and communities to thrive.”

#### *The Cognitive Revolution*

- Late 1950s, early 1960s – use of computer as a model for the way the human mind works
- mid 1970s – led by Herbert A. Simon, Alan Newell, Noam Chomsky

Cognitive Psychology – the approach in psychology that attempts to characterize the mental events that allow information to be stored and operated on internally

- The mind is like the software (with stored data) on a computer, and the brain is like the hardware (the machine itself)

Computers showed why it is important that there be a science of the unobservable events that take place in the head.

- If someone is acting oddly, we must go beyond the essential step of noticing unusual behavior; we also need to think about what is happening inside and consider what is causing the problem

The cognitive revolution led to new ways of conceptualizing and treating mental disorders.

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Cognitive Neuroscience – the approach in psychology that blends cognitive psychology and neuroscience (the study of the brain) when attempting to specify how the brain gives rise to mental processes that store and process information

- Discover the nature, organization, and operation of mental events by studying the brain
- Goal: distinguish among different sorts of mental processes by showing that different brain areas give rise to those processes
- Considers events at 3 levels of analysis, primary focus on the brain

Evolutionary Psychology – the approach in psychology that assumes that certain cognitive strategies and goals are so important that natural selection has built them into our brains

- Addresses events at all 3 levels of analysis, but primary focus on the levels of the person and group
- Lida Cosmides, John Tooby, David Buss, Steven Pinker
- Ex: lying
  - More devious ancestors had more children who survived than did their nonlying contemporaries and their lying children, who inherited this ability in turn had more children, etc., until the ability to lie was inborn in all members of our species
- Compare human abilities with those of other animals, especially non-human primates
- Evolutionary theories are difficult to test because we don't know what our ancestors were like / how they evolved

→ See p. 14, Table 1 for summary of Schools of Psychological Thought

*The Psychological Way: What Today's Psychologists Do*

*Clinical and Counseling Psychology: A Healing Profession*

Clinical psychologist – the type of psychologists who is trained to provide psychotherapy and to administer and interpret psychological tests

- Psychotherapy – the process of helping people learn to change so they can cope with troublesome thoughts, feelings, and behaviors

Counseling psychologist – the type of psychologist who is trained to help people with issues that naturally arise during the course of life

Psychiatrist – a physician with special training in treating mental disorders; can prescribe drugs

Social worker – a mental health professional who may use psychotherapy to help families (and individuals) or help clients to use the social service systems in their communities

Psychiatric nurse – a nurse with a master's degree and a clinical specialization in psychiatric nursing who provides psychotherapy and works with medical doctors to monitor and administer medications

*Academic Psychology: Teaching and Research*

Different types of academic psychologists focus on different types of research questions

- *Cognitive psychologist* – studies thinking, memory, related topics
- *Social psychologist* – studies how people think and feel about themselves and other people and how groups function
- *Personality psychologist* – studies individual differences in preferences and inclinations

Research is an important part of psychology!!

*Applied Psychology: Better Living Through Psychology*

Applied psychologist – psychologists who use the principles, findings, and theories of psychology to improve products and procedures and who conduct research to help solve specific practical problems

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- *Human factors psychologist* – professional who works to improve products so that people can use them more intuitively and effectively
- *Developmental psychologist* – researches and teaches the development of mental contents and processes, as well as behavior, with age and experience
- *Physiological psychologist* – studies the brain and brain-body interactions
- *Social psychologist* – researches and teaches how people think and feel about themselves and other people and how groups function
- *Personality psychologist* – researches and teaches individual differences in preferences and inclinations
- *Industrial/organizational (I/O) psychologist* – focuses on using psychology in the workplace
- *Sport psychologist* – applies psychology to improve athlete performance
- *Educational / school psychologist* – applies psychology to improve cognitive, emotional, and social development of schoolchildren

#### *The Changing Face of Psychology*

Increasing numbers of women are making major contributions in all areas of psychology.

### THE RESEARCH PROCESS: HOW WE FIND THINGS OUT

*The Scientific Method* – a way to gather facts that will lead to the formulation and validation (or refutation) of a theory

1. Systematically Observing Events
  - a. All science ultimately begins with observations. Scientists want to know the facts.
  - b. Facts are established by collecting data – careful descriptions or numerical measurements of a phenomenon.
2. Formulating a Question
3. Forming a Hypothesis
  - a. Hypothesis – tentative idea that might explain a set of observations; specifies a relationship between two or more variables (often proposing that one variable causes another)
    - i. Variable – an aspect of a situation that can vary, or change; specifically, a characteristic of a substance, quantity, or entity that is measurable
4. Testing the Hypothesis
  - a. The key concepts of a hypothesis must be specific enough to test.
  - b. Operational definition – a definition of a concept that specifies how it is measured or manipulated
  - c. Need 2 types of observations:
    - i. Those that directly address the object of study
    - ii. Those that indirectly address the object of study
5. Formulating a Theory
  - a. Theory – concepts or principles that explain a set of research findings; focuses on the underlying reasons why certain relationships may exist in data
6. Testing the Theory
  - a. Theories must be able to explain previous observations after the fact and also predict new ones.

#### *The Psychologist's Toolbox: Techniques of Scientific Research*

##### *Descriptive Research: Tell It Like It Is*

Some research is devoted to simply describing “things as they are.”

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Naturalistic Observation – collected from real-world settings, observing events as they naturally occur

- Often the first step of the scientific method because it is difficult to use to test specific hypotheses for a finding

Case Studies – scientific studies that focus on a single participant, examining his or her psychological characteristics (at any or all of the levels of analysis) in detail

- *Goal*: discover underlying principles that can be applied to all similar people
- *Limitations*: must be cautious generalizing from a single case

Surveys – set of questions that people are asked about their beliefs, attitudes, preferences, or activities

- Inexpensive way to collect a lot of data quickly
- Popular among psychologists who study personality, social interactions
- *Limitations*: some require respondents to introspect about their feelings (people may not be capable of reporting accurately all such information); people may not always respond honestly; some people who are asked may not respond to the survey → it is difficult to know whether the responses obtained are actually representative of the whole group that the survey was designed to assess
- *Design considerations*: survey questions must be carefully worded so that they don't lead the respondents to answer in a certain way

*Correlational Research: Do Birds of a Feather Flock Together?*

Researchers can use methods that rely on correlation to study the relationships among variables.

Correlation – relationship in which 2 variables are measured for each person, group, or entity, and the variations in measurements of one variable are compared to the variations in measurements of the other variable.

Correlation coefficient – a number that ranges from -1.0 to 1.0 that indicates how closely interrelated 2 sets of measured variables are; the higher the coefficient (in either the positive or negative direction), the better the value of one measurement can predict the value of the other. Also simply called a correlation.

- Positive correlation: correlation value falls between 0 and 1.0
- Negative correlation: correlation value falls between -1.0 and 0
- No correlation: no relationship between the 2 variables

Correlational research has 2 steps:

1. Obtaining measurements of 2 variables
2. Examining the way that 1 set of measurements goes up or down in tandem with another set of measurements

*Advantages*: allows researchers to compare variables that cannot be manipulated directly

*Disadvantages*: correlations indicate only that values of 2 variables tend to vary together, not that values of one *cause* the values of the other

→ *Correlation does not imply causation!*

*Experimental Research: Manipulating and Measuring*

Independent Variable – the aspect of the situation that is deliberately and independently varied while another aspect is measured

Dependent Variable – the aspect of the situation that is measured as the values of an independent variable are changed; in an experiment, the value of the dependent variable is expected to depend on the value of the independent variable

By examining the link between independent and dependent variables, a researcher hopes to discover exactly which factor is causing an effect: the difference in the value of the dependent variable that arises from change in the independent variable

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Demonstrating that changes in an independent variable are accompanied by changes in the dependent variable is usually not enough to confirm a hypothesis. In most cases, it's relatively easy to offer more than one interpretation of a relation between an independent and a dependent variable, and hence additional research is necessary to understand what this relation means.

Researchers can narrow down the explanations by testing additional groups or conducting separate experiments. Only by eliminating other possibilities can researchers come to know why varying the independent variable produces an effect on the dependent variable

Confounding variable – any aspect of the situation that varies along with the independent variable (or variables) of interest and could be the actual basis for what is measured

- Confounds lead to results that are ambiguous, that do not have a clear-cut interpretation.

*Experimental and Control Groups and Conditions* eliminate the possible influences of confounds

Experimental Group – a group that receives the complete procedures that defines the experiment

Control Group – a group that is treated exactly the same way as the experimental group, except that the independent variable that is the focus of the study is not manipulated. The control group holds constant – “controls” – all of the variables in the experimental group

Random assignment – the technique of assigning participants randomly, that is, by chance, to the experimental and the control groups, so that the members of the two groups are comparable in all relevant ways

Rather than using 2 different groups to disentangle confounds, researchers might have a single group that has 2 different conditions:

Experimental condition – a part of the study in which participants receive the complete procedure that defines the experiment

Control condition – a part of the study in which participants receive the same procedures as in the experiment condition, except that the independent variable of interest is not manipulated

In other words, the same people are tested twice, once in each condition.

Quasi-Experimental Design – includes independent and dependent variables and assesses the effects of different values of the independent variable on the values of the dependent variable, but participants are not randomly assigned to conditions and the conditions typically are selected from naturally occurring situations

- Used because it is not always possible or desirable to assign people to different groups randomly
- *Advantage:* allows the study of real-world phenomena that cannot be studied in experiments
- *Disadvantage:* cannot control relevant aspects of the independent variables

→ See p. 29, Table 3 for Summary of Research Methods in Psychology

Meta-Analysis – statistical technique that allows researchers to combine results from different studies on the same topic in order to discover whether there is a relationship among variables

- Useful when the results from many studies are not entirely consistent, with some showing an effect and some not
- Not a way to collect new data → it is a way of analyzing data that have already been collected
- By combining the samples from many studies, meta-analysis allows you to detect even subtle differences or relations among variables

*Be a Critical Consumer of Psychology*

What are other ways you can interpret the findings? Possible confounds?



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Reliability – consistency; data are reliable if the same values are obtained when the measurements are repeated

Validity – a research method is valid if it does in fact measure what it is supposed to measure

Bias – when conscious or unconscious beliefs, expectations, or habits alter how participants in a study respond or affect how a researcher sets up or conducts a study, thereby influencing its outcome

- Response bias – a tendency to respond in a particular way regardless of respondents' actual knowledge or beliefs
- Sampling bias – a bias that occurs when the participants are not chosen at random but instead are chosen so that one attribute is over- or underrepresented

Experimenter Expectancy Effects – effects that occur when an investigator's expectations lead him or her (consciously or unconsciously) to treat participants in a way that encourages them to produce the expected results

Double-design Design – the participant is "blind" to (unaware to) the predictions of the study ( and so cannot consciously or unconsciously produce the predicted results) and the experimenter is "blind" to the group to which the participant has been assigned or to the condition that the participant is receiving ( and so experimenter expectancy effects cannot produce the predicted results)

*Psychology and Pseudopsychology: What's Flaky and What Isn't?*

Pseudopsychology – theories or statements that at first glance look like psychology but are in fact superstition or unsupported opinion, not based in science

- Ex: tea-leaf reading, daily horoscopes, palm reading, etc.

One key to distinguishing psychology and pseudopsychology is the method, but just following the scientific method is not enough to ensure that a set of claims is not pseudopsychology!

Ethics: Doing It Right

*Research with People: Human Guinea Pigs?*

Informed consent – the requirement that a potential participant in a study be told what he or she will be asked to do and be advised of possible risks and benefits of the study before formally agreeing to take part

A study that uses funds from the U.S. government or from most private funding sources must be approved by an *institutional review board* at the university, hospital, or other institution that sponsors or hosts the study.

Concerns about ethical treatment of human participants lead most IRBs to insist that participants be debriefed – interviewed after the study to ask about their experience and explain why it was conducted (ensures that the participant has no negative reactions from participating and that they have understood the purposes of the study)

*Research with Animals*

Animals can't give informed consent, volunteer, decide to withdraw from the study if they experience pain or are uncomfortable. Nevertheless, the IRB still makes sure that animals are protected.

- Is it ethical to test animals at all????

*Ethics in Clinical Practice*

1. Beneficence, Nonmaleficence
2. Fidelity and Responsibility
3. Integrity
4. Justice
5. Respect for People's Rights and Dignity

*New Frontiers: Neuroethics* → focus on the possible dangers and benefits of research on the brain

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