

MODULE 4 – The Need for Psychological Science

Hindsight Bias	<ul style="list-style-type: none"> - Hindsight Bias is the tendency to believe, after learning an outcome, that one would have foreseen it <ul style="list-style-type: none"> - shows why we need psychological research – people’s common sense more easily describes what has happened than what will happen - Common psychological fallacies: <ul style="list-style-type: none"> - Traumatic experiences are repressed - Infants recognize their reflection in a year - Fears of harmless objects are just as easy to acquire as fears of dangerous ones
Overconfidence	<ul style="list-style-type: none"> - Humans tend to think we know more than we do - Knowing answers makes us overconfident - Philip Tetlock found that of 27,000 expert predictions of world events made with 80% confidence, less than 40% were correct <ul style="list-style-type: none"> - those who erred maintained that they were “almost right”
Perceiving Order in Random Events	<ul style="list-style-type: none"> - We are prone to perceive patterns in our desire to make sense of the world - Seeing faces on the moon, hearing messages in music, finding order in random data <ul style="list-style-type: none"> - random sequences often don’t look random and are overinterpreted - In actual random sequences, patterns/streaks occur more often than we expect <ul style="list-style-type: none"> - HHHHHH, HHHTTT, HTTHTH all have the same probability - Some things seem so extraordinary that we can’t conceive a chance-based explanation - Hindsight bias, overconfidence and perceiving patterns often lead us to overestimate our intuition, but scientific inquiry helps to sift reality from illusion
The Scientific Attitude: Curious, Skeptical and Humble	<ul style="list-style-type: none"> - Underlying all science is curiosity, a passion to explore and understand without misleading or being misled - No matter how sensible/wild an idea, a smart thinker asks “<i>Does it work?</i>” - To sift sense from nonsense requires a scientific attitude: Skeptical but not cynical, open but not gullible - Psychologists approach behavior with curious skepticism: “<i>What do you mean? How do you know?</i>” - Requires humility, an awareness of our own vulnerability to error and an openness to surprises and new perspectives
Critical Thinking	<ul style="list-style-type: none"> - Critical thinking examines assumptions, assesses the source, discerns hidden values, confirms evidence and assesses conclusions - “<i>How do they know that?</i>”, “<i>What’s their agenda?</i>”, “<i>Is their conclusion based on evidence?</i>”, “<i>Does the evidence justify a cause-effect conclusion?</i>”, “<i>What alternative explanations are possible?</i>”

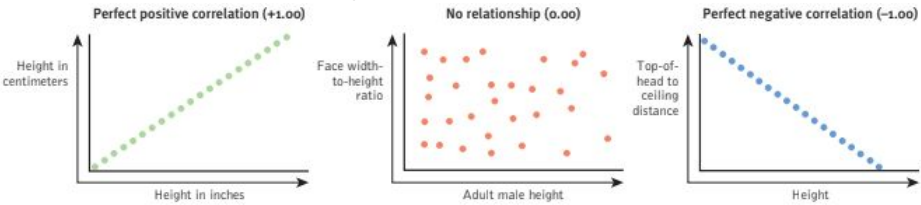
	<ul style="list-style-type: none"> - Critical thinkers consider the credibility of sources, recognize multiple perspectives that challenge their preconceived ideas - Surprising Finds: <ul style="list-style-type: none"> - Massive losses of brain tissue in early life have minimal long-term effects - Newborns recognize their mother's odor and voice - After brain damage, a person can learn new skills without knowing - Diverse groups report comparable levels of happiness - Debunked Ideas" <ul style="list-style-type: none"> - Sleepwalkers don't act out dreams - Past experiences are not recorded verbatim in brains - Hypnosis can't relive buried or repressed memories - Most people don't have really low self-esteem - Opposites don't attract
--	---

MODULE 5 – The Scientific Method and Description

The Scientific Definition	<ul style="list-style-type: none"> - A theory explains behaviors or events by offering ideas that organize what we have observed - A good theory produces testable predictions called hypotheses which specify which results would support or cast doubt on the theory and cause it to be revised - Our theories can bias our observations, so psychologists use operational definitions when reporting their studies <ul style="list-style-type: none"> - e.g, "sleep deprived" is defined as "X hours less than normal" - these definitions allow anyone to replicate the research - A good theory: <ul style="list-style-type: none"> - organizes a range of self-reports and observations - leads to clear hypotheses others can use to check the theory - stimulates research leading to a revised theory - We can refine theories in several ways: <ul style="list-style-type: none"> - <i>Descriptive</i> methods describe behaviors, often using case studies, surveys or naturalistic observations - <i>Correlational</i> methods associate different factors or variables - <i>Experimental</i> methods manipulate variables to discover effects
Description	<ul style="list-style-type: none"> - Case studies examine one individual or group in depth in the hope of revealing things true about all of s - They often suggest directions for further study - Individual cases may mislead us if the individual is atypical, leading to mistaken judgements and false conclusions - Anytime a researcher finds something, people offer contradictory anecdotes which command attention and are easily remembered, but misleading - Individual cases can suggest fruitful ideas, what's true of all of us can be glimpsed in any one of us - Naturalistic observations don't explain behavior, they describe it, but they can be revealing - Often pave the way for later studies - They can illuminate human behavior: <ul style="list-style-type: none"> - We laugh 30x more in social than solitary situations - Offers snapshots of everyday life without controlling variables - Surveys look at many cases in less depth, and help to estimate, from a

	<p>representative sample, the attitude/behavior of an entire population</p> <ul style="list-style-type: none"> - Subtle changes in the order/wording of questions can have major effects <ul style="list-style-type: none"> - “aid the needy” is less controversial than “welfare” or “preferential treatment” or “affirmative action” - Critical thinkers should reflect on how phrasing a question might affect people’s expressed opinions - There’s a strong temptation to ignore sampling bias and pick a few vivid, unrepresentative cases which don’t make a representative sample - A random sample should represent an entire population, so everyone should have an equal chance of participating - Large representative samples are better, but small representative samples are better than large unrepresentative ones
--	---

MODULE 6 – Correlation and Experimentation

Correlation	<ul style="list-style-type: none"> - Naturalistic observations and surveys often show that one trait is related to another, so we say the two correlate <ul style="list-style-type: none"> - the correlation coefficient helps figure out how closely two things vary together, and how well they predict each other - scatterplots are very revealing in these cases - a correlation is positive if two scores rise/fall together  <ul style="list-style-type: none"> - saying a correlation is negative says nothing about its strength or weakness, it just means the scores relate inversely - we often fail to see a relationship with tabulated data, making us even less likely to notice it in everyday life - It’s a common thinking error that an association proves causation, but no matter how strong the relationship, it does not <ul style="list-style-type: none"> - correlation only indicates the <i>possibility</i> of a cause-effect relationship, <i>but does not prove such</i> - Correlation coefficients make visible relationships we might otherwise miss - A perceived but nonexistent correlation is an illusory correlation <ul style="list-style-type: none"> - when we believe a relationship exists, we’re more likely to notice and recall instances that confirm our belief - We’re especially to notice events that occur in sequence, helping explain many superstitious beliefs and why we perceive pattern whether or not they’re there
Experimentation	<ul style="list-style-type: none"> - To isolate cause and effect, researchers can experiment, allowing them to specify the effects of one or more variables by: <ul style="list-style-type: none"> - manipulating variables of interest - holding constant (controlling) other variables - experimental and control groups are often created - To minimize preexisting differences, researchers randomly assign people to the two conditions so that we can surmise that treatments have effects if the groups differ at the experiment’s end - No single experiment is conclusive

- To determine the effect of a remedy, we must control for other variables
- During drug treatments, one group gets a drug and one gets a placebo, but all participants are **blind** about which they are receiving
 - If the study is **double-blind**, neither the participants nor researchers know which group receives which treatment
- The **placebo effect**: thinking you're receiving a treatment can have actual effects
- The experimental factor is the **independent variable** (we can vary it independently) while factors like intelligence, age etc. are called **confounding variables** (accounted for by random assignment)
- The **dependent variable** is a measurable behavior measured by scientists
- **Validity** is a key goal of experimental design (the experiment tests what it is supposed to test)

Research Method	Basic Purpose	How Conducted	What Is Manipulated	Strengths	Weaknesses
<i>Descriptive</i>	To observe and record behavior	Do case studies, naturalistic observations, or surveys	Nothing	Case studies require only one participant; naturalistic observations may be done when it is not ethical to manipulate variables; surveys may be done quickly and inexpensively (compared with experiments)	Uncontrolled variables mean cause and effect cannot be determined; single cases may be misleading
<i>Correlational</i>	To detect naturally occurring relationships; to assess how well one variable predicts another	Collect data on two or more variables; no manipulation	Nothing	Works with large groups of data, and may be used in situations where an experiment would not be ethical or possible	Does not specify cause and effect
<i>Experimental</i>	To explore cause and effect	Manipulate one or more variables; use random assignment	The independent variable(s)	Specifies cause and effect, and variables are controlled	Sometimes not feasible; results may not generalize to other contexts; not ethical to manipulate certain variables

MODULE 7 - Statistical Reasoning in Everyday Life

The Need for Statistics	<ul style="list-style-type: none"> - Accurate statistical understanding benefits everyone - you don't need to memorize complicated formulas to think more clearly and critically about data - You should doubt big, round, undocumented numbers - False alarms underscore the needs to teach statistical reasoning and transparently present statistical information
Descriptive Statistics	<ul style="list-style-type: none"> - Researchers can use descriptive statistics to meaningfully organize data, for example by converting data into a histogram - It's easy to design a graph to make a difference look big or small, depending on how you label the y-axis - Data should be summarized with a <i>measure of central tendency</i>, a single score that represents a whole set of scores <ul style="list-style-type: none"> - The mode is the most frequent score - The mean is the sum of scores over the number of scores - The median is the midpoint/50th percentile - In an evenly distributed dataset, measures of central tendency are about equal - In a skewed dataset, they can be extremely different <ul style="list-style-type: none"> - A few atypical scores can completely distort a mean - It helps to know about <i>variation</i>, how similar or diverse the scores are

	<ul style="list-style-type: none"> - averages of scores with low variability are more reliable than averages of scores with high variability - The range is the gap between the lowest and highest scores - The standard deviation measures how scores deviate from one another, and gauges whether they are packed together or dispersed - A normal curve is a bell-shaped distribution, in which 68% of cases fall within one standard deviation, and 95% within two
Inferential Statistics	<ul style="list-style-type: none"> - Inferential statistics help us determine if results can be generalized to a larger population - Three principles should be minded when deciding whether or not to generalize a sample: <ul style="list-style-type: none"> - Representative samples are better than biased samples - Less-variable observations are more reliable than those that are more variable - More cases are better than fewer - When averages are reliable measures of their respective populations, their difference is likely to be reliable as well, and when that difference is large, it may reflect a real difference in the populations <ul style="list-style-type: none"> - that difference then has a statistical significance (it's probably not due to a chance variation between the samples) - To most psychologists, proof beyond a reasonable doubt means the odds of its occurring by chance are less than 5% - Statistical significance indicates the likelihood that a result will happen by chance, but this says <u>nothing</u> about the <i>importance</i> of the result

MODULE 8 – Frequently Asked Questions About Psychology

Psychology Applied	<ul style="list-style-type: none"> - The experimenter intends the lab environment to be a simplified reality which simulates and controls important features of everyday life, and re-creates psychological forces under controlled conditions - An experiment's purpose isn't to recreate exact behaviors, but to test theoretical principles <ul style="list-style-type: none"> - it's the resulting principles, not specific findings, that help explain everyday behaviors - Psychological science focuses more on seeking general principles to explain behavior than on particular behaviors, and minimally predicts behavior for an individual compared to a group - Culture matters and shapes our behaviors <ul style="list-style-type: none"> - <i>collectivist</i> emphasize group goals, and <i>individualist</i> cultures prioritize individual goals – it's important to be aware of these differences - Gender also matters and knowing the differences can prevent conflicts/misunderstandings in everyday relationships <ul style="list-style-type: none"> - men and women, however, are overwhelmingly similar
Ethics in Research	<ul style="list-style-type: none"> - Humans aren't <i>like</i> animals, we <i>are</i> animals and share many similarities with our animal relatives - The animal protection movement protests the use of animals in psychological, biological and medical research - Around 60% of adults think medical testing of animals is “morally acceptable” but this opinion varies by culture

	<ul style="list-style-type: none"> - Our compassion for animals varies based on their perceived similarity to us, and our value of them according to their perceived kinship with us <ul style="list-style-type: none"> - primates and companion pets get top priority - APA guidelines say researchers must ensure “comfort, health and humane treatment” and minimize “infection, illness and pain” - A psychology concerned for humans and sensitive to animals serves the welfare of both - Most psychological studies are free of stress and often mild compared to, for example, reality TV like <i>The Bachelor</i> - Researches occasionally stress or deceive people, when they think it’s essential to a justifiable end - APA/BPS ethical principles <ul style="list-style-type: none"> - obtain informed consent - protect from physical or emotional harm or discomfort - keep information about individual participants confidential - fully debrief people - The IRBs of various universities screen research proposals and safeguards participants’ well-being
--	--