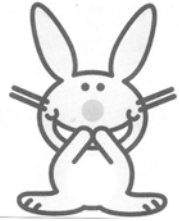


Welcome to Psyc941



Psyc941 prepares you for your dissertation, which is also required!



The purpose of this class is for you to continue to acquire the “**common sense**” of the research communities you intend to join -- “Common Sense” has a couple of parts...

Knowledge held in common by a research community

- What do the researchers & practioners in a certain community “all know”?
- This starts with “knowing the jargon” so you “sound like you know what you’re talking about”
- You must know both the “topical words” and the “research words”

Values & Concerns held in common by a research community

- What do the researchers & practioners in a certain community “all care about” what is considered “right”?
- This starts with “knowing the alternatives” and “knowing the history”
- This is captured in ideas of “validity” (way more later!)

Th “**common sense**” of quantitative behavioral science research communities which has 5 parts...

1. Public nature of psychological study & knowledge
 - any properly trained & equipped psychologist can replicate the findings of another
2. Empirical nature of psychological study & knowledge
 - evidence is derived from experiment or observation
3. Statistical nature of psychological study & knowledge
 - empirical evidence is quantitatively represented & evaluated
4. Hypothesis Testing nature of psychological study & knowledge
 - Specific provisional ideas are evaluated based on public, empirical, statistical evidence
5. Convergent programmatic research methods and results

If I had to identify the very core of what empirical quant research is all about – what do we do that produces useful knowledge ...

Representation

- Can't get "every behavior, from everybody, everywhere, every time" that we want to learn about
- Have to sample (who, where, doing what, with what, when?)
- This is a different and broader use of "sampling" than you are probably used to – I hope you'll see why as we go along!!

Inference

- Will draw conclusions from the sample
- Will then infer that the conclusions drawn from our sample tell us about more than our sample
- Is the relationships among variables in the sample strong enough to conclude the represent relationships in the pop???

The better our sampling, and so, the better our representation, the better our inference & the more useful knowledge we'll get!

What are the ways that we need to be able to apply representation and inference ?

Evaluate the "quality" of completed research

- Understand the choices the researcher made
- Evaluate the consequences of those choices for the usefulness of the knowledge gained

Evaluate the "quality" of proposed research

- Understand the choices the researcher has proposed
- Evaluate the consequences of those choices for the usefulness of the knowledge to be gained
- Generate alternatives to those choices
- Evaluate the advantages & disadvantages of the alternatives

Perform creative & contributive ("high quality") research

- Make the right choices
- Defend those choices as the best alternative
- Carry out those choices to produce useful knowledge

So, what are the kinds of things we need to know how to do to get all this done ???

Measurement

- If we can't collect data about behaviors & characteristics we can't be quantitative empiricists
- Most important thing – usually last thing you'll study seriously

Research methods

- Have to be able to make the who, what, what, where & when decisions based on "best practices" of research community

Data Treatment & Analysis

- Have to be able to turn measures into data and data into results from which we can draw conclusions to make inferences

Content Knowledge

- "best practices" of measurement, research methods and data analysis differ across content areas
- "Have to be a researcher first and a methodologist second!" IHB

Quantification of Behavior & Statistics

“Quantifying behavior” just means to tell a story about behavior in terms of the “how much & how many” of that behavior.

Example: The “Freshman 15” – first year undergraduate students “gain 15 pounds during their first semester”

Gaining 15 pounds in 15 weeks is gaining 1 pound per week

Gaining 1 pound a week is about 3500 extra calories a week

3500 extra calories a week is 500 extra calories a day

500 extra calories a day is 1 extra ladle of Ranch Dressing a day

Statistics are used to organize, express, and show relationships among these quantifications of behavior.

About Statistics, Data Analysis & Arithmetic

Statistics is a mathematical discipline

- statisticians work mostly with the Calculus to develop theories and formulas about how to manipulate, organize & represent data
- they use axioms, theorems, & proofs to generate these formulas

Data analysis is a tool used by Psychological researchers and practitioners to represent and test hypotheses about data

- arithmetic formulas and/or statistical analysis software are used

In Psyc941 we will study data analysis...

This course is more like “drivers education” and not like “mechanical engineering”

The statisticians “build” the statistics, but we have to know how to “drive” them properly



Lies, Damn Lies & Statistics !!!

Lies are “lies of fact”

The only way to avoid being lied to is to know more than the liar – gotta “do the work”

- Seek out “both sides” -- “**read & read more**”
- Know enough history – really a new idea?? (did it rock or suck the first time?)
- Learn where to double check (both sides)
- Expect “advocacy” (both sides)
- Know the arguments for and against (both sides)
- Separate “what is said” from “what you’re supposed to hear”
- Do the math!!

Domino's 2-minute Guarantee!!



Let's enlarge the "fine print"



There are lots of ways to define "delivery time" ...

Probably the most interesting is "how long after the order is placed until the pizza is in your hands!!

This isn't that!!

This also isn't "You will have your pizza within 2 minutes of arriving at Domino's" But this is "what you're supposed to hear!"

This is "within two minutes of closing the pizza box we'll start to head toward the door with it, if you've checked in!"

A classic from the web... "A king size waterbed holds enough water to fill a 2000 sq. ft. house 2 inches deep."

Let's do the math

2000 sq. ft of water 2 inches deep

- 2 inches is 1/6 foot, so
- 2000 square feet * 1/6 foot = 333.33 cubic feet of water

How big would a water bed mattress have to be to hold 333.33 cubic feet of water?

- a water bed mattress is usually about a foot deep
- if it were 1 foot deep and 7 feet top-bottom,
- it would have to be 47.618 feet wide (333.33 / 7) !!!

The math is simple, but you have to remember to stop & check !!!

Of course – you have to be able to do the math correctly

Damn Lies !!!

Damn lies occur when the data are collected in such a way as to produce the desired results.

- The data are "correct" (i.e., those were the data that were collected, properly expressed) but lies are being told!!!

Four major kinds.....

- "Pick your results" by picking a biased sample
- Misrepresent the groups being compared (SUV)
- The comparison doesn't match the claim (detergent)
- Using the wrong design (toothpaste)

Damn Lies via sampling !!!

If the sample doesn't represent the population, then...

the conclusions won't either!!!
Politics is an easy example....

Democrats & Republicans differ on most political topics & choices.

Ever wonder how both parties can offer poll data showing that "people prefer their position" ????

Different cities, states and regions have different mixes of Republicans & Democrats.

So, by picking certain cities, states, or regions pollsters can "determine" which party will have the majority in the sample and what will be the results.

They accurately report the results, but there was a "Damn Lie" told because of how the sampling was done.

Damn Lies via sampling !!!

Geico says people who switch to them save \$\$\$.
Progressive says people who switch to them save \$\$\$.
State Farm says people who switch to them save \$\$\$.
Allstate says people who switch to them save \$\$\$.
Can they all be telling the truth?!?!?!?!?

They're all telling the truth, but they're all telling Damn Lies !!!!!

First → They're only telling you about people who switched!! Who would switch if it costs them more to switch ?????

Second → They never say "for a comparable policy". Usually the switched-to-policy has a larger deductible, etc.!

Third → Companies target different demographics. But they let you think that all the folks who switched are just like you.

From a Subaru advertisement that ran for 3 years ...

"Subaru Forrester! Better gas mileage than any midsize SUV"

Sometimes all you get is 1 word to tip you off!!!

What 1 word is missing from this statement that should make you suspicious????

Better gas mileage than any other midsize SUV

Curious, I compiled the following. Notice anything ??

Attribute	Forrester	Best-selling Midsize SUVs			
		Explorer	Durango	Trail Blazer	
Length	175.2	189.6	200.8	191.8	14-25 inches longer
Width	68.3	72.1	73.4	74.7	4-6 inches wider
Height	65.0	72.1	76.0	72.5	7-11 inches taller
Interior volume	93.5	133.3	135.2	132.1	38-40 more cubic feet
Weight	3090	5300	6600	5600	Weights 2000+ more
Seating	5	7	7	7	Seats 2 more
horsepower	145	239	235	235	90+ more horsepower

Technically they didn't lie! But they did tell a **Damn Lie** by making an inappropriate comparison !!!!!

Tide Total Care Commercial

This is a “Damn Lie” !!!!

What’s the lie???? Critique the claim !!!!

20sec “...help keep your clothes like new...”

33sec “...help keep all your everyday essentials like new...”

What’s the problem?? Inappropriate comparison!!

25sec “...after 30 washings ... is perfect and the other ... is sad.”

What comparison should they have made???

30 Tide washings vs. NEW dress

Arm & Hammer Toothpaste Commercial

This is a “Damn Lie” !!!! Check the “design” !!!!

Dental students brush their teeth, use a “disclosing tablet” and embarrass themselves cause they clearly suck at brushing their teeth!

Give them a second chance to brush their teeth.

Think they will “try harder” and “do better” at this chance to redeem themselves??

What “causes” the difference? Toothpaste or “how hard they tried”???

Inappropriate comparison! Using different groups of dental students using the two different toothpastes would be better!

Statistical Lies !!!

Statistical lies involve incorrect or inaccurate presentations of the data

Three major kinds...

- Incorrect → questionanle measurement
- Inaccurate → misleading presentation
- Incomplete → telling only part of the storyto mislead you

The data “categories” can be “redefined” to give different results...

A Sheriff won election on a platform that, “I will reduce violent crimes in my jurisdiction!!!”

During the campaign for the election 4 years later, his adversary reported that violent crimes had risen from 2100 to 3550 , so the Sheriff should be voted out !!!

4 years before Sheriff took office

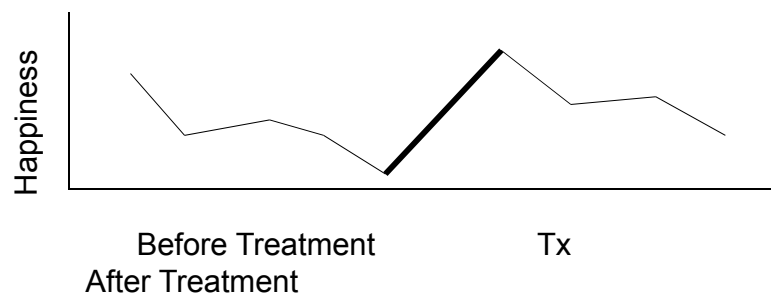
4 years Sheriff was in office

Murders	100
Assualts	800
Robbery	1200
Burglary	2400
Theft	3000

Murders	50
Assualts	600
Robbery	900
Burglary	2000
Theft	2400

What happened? Between elections, the National Crime Statistics Council redefined burglary as a violent crime!!!

Presenting part of the data is a great way to improve results !!!!



People are most likely to enter treatment for depression when they are really unhappy. So are likely to show an improvement following treatment, whether the treatment works or not!

But can't see that if only present the immediate pre-post treatment data.

But, without a doubt, here's the most common way to “lie with statistics” – telling only part of the story (the part that supports “their” claim)

Bold statement → Because behavior is complicated, many statistical analyses of behavior are “simplistic”, “incomplete” and “get things wrong”.

Imagine a criterion or outcome variable for which “more is better”. A really good sample of the two populations reveals...

	Pop1	Pop2
Means	22.5	> 20

Pop1 had a higher mean than Pop2 – time to interpret, assign cause, decide if we “like” the result, etc.

But wait, there's more...

Each of these populations can be in one of 6 different "situations" – what happens if we look at how BOTH population and situation relate to the outcome??

	Pop 1	Pop 2
Situation 1	40	15
Situation 2	20	25
Situation 3	20	15
Situation 4	25	25
Situation 5	15	20
Situation 6	15	20
	22.5	20

2 of the 6 situations show the "aggregated result" (Pop1 > Pop2)
one of them is huge & "carries" the aggregate (Pop1 > Pop2)
Notice! → 3 out of 6 of the situations have the "opposite results"! (Pop1 < Pop2)

Always consider if the results you are being shown might be only "sometimes" or "it depends" rather than "always" ! Are the results "conditional" or "unconditional" !!!

"On average" doesn't mean "all the time"!!!



Pedagogical Structure of the Course

Jargon

You gotta know the lingo



Cognitive Structure

How the words relate & integrate



Action Scripts

How to apply what you know to produce & evaluate knowledge

"looking for..." versus "looking at..."

One of the reasons for learning the jargon, organizing it into a particular cognitive structure and then learning how to apply that structure via specific action scripts is that, as cognitive and perceptual psychologists tell us, we are much better at "looking for..." specific things than "looking at..." something and noticing the details !

Here's a great example!!

Also – changing what you are looking for changes what you see!

You need to "carry around with you" a list of "what should I be looking for??" !!!

Pedagogical Structure of the Course

Jargon

You gotta know the lingo



Cognitive Structure

How the words relate & integrate



Action Scripts

How to apply what you know to produce & evaluate knowledge

This pedagogical approach can be used to make the learning of very complicated things much more reasonable !

The secret is to study how “experts” perform – what jargon they actually use, how those elements are meaningfully integrated & how they are orchestrated into actual expert performance !!!

Here’s an example of applying this approach to “make sense” out of a very complicated activity → sleight-of-hand magic

Pedagogical Structure to learn Sleight-of-hand Magic

Jargon

Seven Basic Principles of Magic:
Palm, Ditch, Steal, Load, Simulate, Misdirect, Switch



Cognitive Structure

How the principles relate & integrate:
Palm-then-Ditch, Load≈Steal+Palm, Switch≈Ditch+Steal, Simulate-to-Misdirect



Action Scripts

Combining elements & props into a “routine”

Pedagogical Structure of the Course – How it works it Psyc350

Jargon

You gotta know the lingo → Pink Things Exercises & Quiz Essays



Cognitive Structure

How the words relate & integrate → “All-the-Words Page”



Action Scripts

How to apply what you know to produce & evaluate knowledge → “Validity Net” & “Researcher Choices” pages

Instructional “Philosophy”

- S** Sell – knowing this stuff is very important
- I** Inspire – “Learn statistics and someone will feed you for the rest of your life.”
- S** Structure – curricular design & integrative instructional flow
- S** Support – web-based exercises & exam preparations, integrated laboratory experience & me
- I** Insist – I really want you to learn this stuff and will fuss, nag, cajole, lure, bribe, etc. to get you to do so