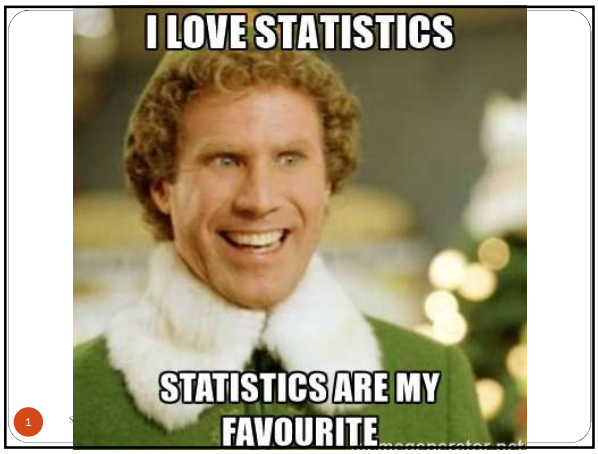

1

Admin Basics Direction Measures Variation Choices Next

SOC424 – Statistics w/ Dr. Ellis Godard

Terms, Direction, & Levels

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Admin Basics Direction Measures Variation Choices Next

Announcements

- Questions?
- No lab today
- Do Intake ASAP!
- Send Headshot ASAP!
- Golden Quiz Banana
- Trick to the class is *B-a-b-y S-t-e-p-s…*
- *Follow the path!*

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#	Date	Read (5th)	Due	Area	Lecture Topic	Lab #	Lab Assignment	T Lab	R Lab
1	Tue Aug 26			*Orientation*	Welcome & Orientation	-		-	-
2	**Thu Aug 28**	1.1 to 1.4			**Basic Terms**	-		-	-
3	**Tue Sep 2**	2.1 & 2.5			**Measurement Issues**	1	Levels / Age 3x	1	-
4	**Thu Sep 4**	3.1			**Data Reduction**	2	Heaven & Hell		1, 2
5	**Tue Sep 9**	-	**HW1**	*Description*	**Display & Analysis** (Excel & SPSS)	3	Total Miles	2, 3	
6	**Thu Sep 11**	3.2 & 3.5			**Central Tendency**	4	CT		3, 4
7	**Tue Sep 16**	3.3 & 3.4			**Dispersion**	5	Dispersion	4, 5	
8	**Thu Sep 18**	3.7			**Indices & Data Cleaning**	6	Music index		5, 6
9	**Tue Sep 23**	4.2		*Inference*	**Probability & Z Scores**	7	Standardizing Scores	6, 7	
10	**Thu Sep 25**	4.3	**HW2**		**Zs & Ps**	8	Table A		7, 8
11	**Tue Sep 30**	3.6 & 5.1			**Parameters & Pt Estimation**	9	Distances	8, 9	
12	**Thu Oct 2**	2.2 to 2.4 & 4.3			**Sampling (Issues, Methods, Effects)**	10	Sampling		9, 10
13	**Tue Oct 7**	4.4 to 4.6			**The Central Limit Theorem**	11-EC	CLT/World (EC)	10, 11*	
14	**Thu Oct 9**	5.3		*Estimation*	**Confidence Intervals**	12	CI for Intervals		11*, 12
15	**Tue Oct 14**		**HW3**		**CIs for Proportions**	13	**CI for Proportions**	12, 13	
16	**Thu Oct 16**	6.1 & 6.4			**Hypotesting & Zs**	14	Writing Hypotheses		13, 14
17	**Tue Oct 21**				**Hypotesting for Large ns**	15	Two Tests	14, 15	
18	**Thu Oct 23**	6.3 & 6.8	**HW4**		**The "t" test, for small ns**	16	CI & Test Ages		15, 16
19	**Tue Oct 28**	5.4			**Sample Size Estimation**	17	Estimating n Needed	16, 17	
20	**Thu Oct 30**	7.1, 7.3, & 10.1		*Covariation*	**Differences in Means**	18	Comparing Means		17, 18
21	**Tue Nov 4**	7.2	**HW5**		**Differences in Proportions**	19	Comparing Proportions	18, 19	
22	**Thu Nov 6**	12.1			**Analysis of Variance**	20, 21-EC	ANOVA (+ MODELS EC)		19, 20, 21*
	Tue Nov 11				(Veteran's Day)				
23	**Thu Nov 13**	9.4 & 9.5			**Scatterplots & Correlation**	22	Grade Correlations		22
24	**Tue Nov 18**	9.1 to 9.3	**HW6**		**Regression**	23	Regression Lab	20,21*,22,23	
25	**Thu Nov 20**	10.2 & 11.1			**Multiple Regression**	24-EC	Multiple Reg (EC)		23, 24*
26	**Tue Nov 25**	8.1	**HW7**	*Association*	**Crosstabulations**	25	TBA (any)	24*, 25	
	Thu Nov 27				(Thanksgiving)				
27	**Tue Dec 2**	8.2 & p 233			**Dependence**	26, 27-EC	TBA (SCU) (& 27-EC)	26, 27*	
28	**Thu Dec 4**	pp 238 to 243	**HW8**		**Association**	28-EC	Measures of Assoc (EC)		25,26,27*,28
	Tue Dec 9				(no lecture - work session only)			28*	
	Thu Dec 11				(no lecture - work session only)				
	Thu Dec 18	-	**HW9**		(no meetings - deadline only - 10am, firm!)				

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Admin Basics Direction Measures Variation Choices Next

Outline

- **Basics**
  - Statistics, Measurements, & Errors
- Looking Ahead
  - **Direction**, Warnings, Key Ideas
- Variation in Measurement
  - **Science**
  - **Measures**
  - **Variation**
  - **Choices**

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Admin Basics Direction Measures Variation Choices Next

Why Study Stats?

- **Better student**
  - Understand material in other classes better
  - Understand course structure/pedagogy (curving?)
- **Marketable Skills**
  - Part-time job and build toward a career, on skills from this class alone (SPSS) and/or 497 (survey design)
  - Better job prospects; emphasize rigor & clarity
- **Better Citizen**
  - Understand polling data
  - Question claims politicians make
- **Better Consumer**
  - What varies & how can it be measured?
  - What's most closely associated with price?
    - Strong assoc = price driver (processor?); weak= bargain (bigger HD)

Admin Basics Direction Measures Variation Choices Next

Basis of Stats is Measurement

- **Studying social life** – being *scientific* about sociology
- **That means being systematic & careful in…**
  - Deciding what to measure
  - Deciding how to measure it
  - Actually taking the measurements
  - Recording and compiling them
  - Analyzing and summarizing them
- **Keep a focus on that set of ideas…**
  - Like a ruler, speedometer, scale, etc.
  - But aspects of social life – behavior by, among, & between people

Admin Basics Direction Measures Variation Choices Next

Three Basic Elements…

- **Case:** some individual instance that's studied
  - Persons, aggregates, *or* objects
    - e.g. professors, classrooms, colleges, cities, etc.
  - Whatever *unit of observation* is being studied
    - May differ from the *unit of analysis* (e.g. gangs vs members)
    - Could observe individuals, but analyze aggregates only
- **Observation:** single piece of recorded data about a case
  - Some characteristic (a "**value**") for one thing measured (a "**variable**") for one instance of what's being studied ("case")
- Get those straight – **case**, **value**, **variable**!

Admin Basics Direction Measures Variation Choices Next

Who/What is Measured?

- **Sample**: just the cases observed
- **Population**: all potential cases
  - Larger than sample – inc. (many?) unobserved cases
  - Don't typically study a full population
    - Costly, Time-consuming, & May be unknown
  - Don't *need* to, with statistical theory ☺
- Variations:
  - **"Sample population" - meaningless** ☹
    - Like "slice pie", "bite meal", "verse song", "part whole", "example everything"
    - Using that phrase (and some will) illustrates you don't understand either word
  - **"Population of interest" must be defined**
    - What's *your* interest? To whom are you trying to generalize?

Admin Basics Direction Measures Variation Choices Next

What *are* Statistics?

- Numbers? Procedures?
  - But not just numbers & math. Important difference:
- **Parameters**
  - Aspects of the full population
  - What you really want to know
- **Statistics**
  - Aspects of a sample only – what you *can/do* know
  - One *estimate* of a population parameter
  - Always an element of uncertainty

Admin Basics Direction Measures Variation Choices Next

How Wrong are They?

- **Every *statistic*, in every study is, in a sense, wrong**
  - Claims about a *population*, based on observations of only a *sample*
- **Difference = sampling error**
  - Pop Parameter minus Sample Statistic
    - CSUN 55% female; SOC424 is 75%; sampling error is 20%
  - Measures how unrepresentative a sample is
  - Note: Don't confuse w/ standard deviation or standard error
- **Must address in research, w/o ever knowing**
  - Almost *never* know sampling error
    - Without the population parameter, you can't subtract
  - But need some level of comfort w/ given statistics
    - Key to that inference will be *p-value* (aka significance level)
    - And the key number for understanding p is 1.96

Where are we going?

- **Start with Descriptive Statistics**
  - Summarize available data – describe a sample
  - Graphical & numerical summary of a dataset
    - Alternative is list raw cases and all values
- **Build towards Inferential Statistics**
  - Generalize from a sample to a population
  - Infer *parameters* (pop #s) from *statistics* (sample #s)
  - Will do at increasing levels
    - Univariate – one variable
    - Bivariate – two variables
    - Multivariate – more than two (or, two or more)

Things to "Get" B4U Move on!

1. **Levels of measurement**
   - Starts next week, and *everything* hinges on them!
2. **Descriptive Statistics**
   - Central Tendency & Dispersion (w/ Shape)
3. **Distributions**
   - Shapes & Types
4. **Z scores & P Values**
   - Want to observe big difference between 2 numbers
   - P value tells whether difference is big enough
   - And what's the key z score?

5. **Hypothesis Testing**
   - 5 steps, focusing on the "null" hypothesis
   - All statistical tests involve the same basic pattern
     - (Some # - Some #) / (Some form of error)
   - All result in probability of being wrong if you reject the null

Not much to it…

- **"Anyone can cook" – Gusteau in *Ratatouille***
  - The basic ideas, you did in elementary and middle school!
- **Next several weeks are *just* descriptive statistics**
  - Kinds of values and variables
    - Central to everything else!
    - Including introduction to SPSS
  - ½ way to a job as a basic statistician
    - Other basic tool: crosstabs (near or at end of semester)
- **Then: meaning & implications of p-values**
  - Far exceeds what appears in most media
  - May exceed demands of much Sociological theory
- Those skills are sufficient to apply for a job
  - E.g. analyzing data for some political or social cause

Key Aspects of Measurement

- **Purpose = Sort Observations**
  - Determine which cases (or instances) have which attributes on each variable
- **Prefaced by Conceptualization**
  - Process of defining topic you want to study
  - Typically @ a theoretical, abstract level
- **In Practice: Operationalization**
  - Translate concepts into measureable ideas
  - Narrow topic, & identify attributes (values)

Words About Which to Be Wary

1. **Majority**
   - More than half (>50%) is not just a "plurality" (aka the mode)
2. **Sample / Population**
   - One or the other; no such thing as "sample population"
3. **Random**
   - *Not* the same as *arbitrary*
4. **Prove/proof/proven/proving/proved***
   - All science (inc. stats) is tentative, probabilistic, *ceteris paribus*, & falsifiable
5. **Normal***
   - We'll get to this, but you *will never see it in SPSS output!*
6. **Accept**
   - reject the null, or can't reject; accepting it *never makes sense*

** I will typically deduct 1 point for either of these, and at least frown @ the others*

Directness of Measurements

- **Direct measures**
  - Clear/Concrete – more or less observable
    - e.g. height, hair length, % minority, etc.
  - Easier? But less interesting/challenging
- **Indirect measures**
  - Effort to make the abstract concrete
    - Love, happiness, nationalism, support for abortion
  - Use of "indicators"
    - Lots more on that in SOC497

Admin Basics Direction Measures Variation Choices Next

Clarity of Measurements

- **Quantitative**
  - Discrete: Enumerable, indivisible units
  - Continuous: Infinitely divisible to higher precision
- **Qualitative**
  - Categorical?
    - Values differ in kind (not amount)
    - But Can count & analyze any quality statistically
  - Easily overstated & confused
    - Embraces ambiguity and flexibility
    - Typically encompasses ideology (vs. science)

Admin Basics Direction Measures Variation Choices Next

Dichotomies are only a Start

- **Dichotomy = binary; two choices**
  - Allow an absolute to be present or not (off/on)
  - Works really well for some variables
    - Pregnant? Dead?
  - But variation is typically more complex
- **The world is non-binary**
  - Dichotomization is a sociological process (labelling) not a function of nature or facts themselves
  - We want to be sociological, about being scientific
    - Question measurements – *scientifically*, not politically
- **Three major *levels* of variation**
  - Nominal, Ordinal, Interval
  - Ignore ratio
  - First, issues that guide those choices

Admin Basics Direction Measures Variation Choices Next

Continuity of Measurements

- **Discrete**
  - has an enumerable (listable) set of values (units)
    - E.g. # of children in a family, # of units in which you're enrolled
- **Continuous**
  - Infinitely divisible to higher precision
    - E.g. Age, height, weight
- **Ambiguous Cases**
  - Complex continuous attitudinal variables oft treated as discrete
    - E.g. prejudice, anomie, fatalism, self-esteem
  - Income is technically discrete, even to two decimals, but typically treated as continous
    - But not always – BE CAREFUL – often in discrete *categories*!

Admin Basics Direction Measures Variation Choices Next

Elements of Variation

- **Attribute: characteristic or quality**
  - Individuals might be blonde, Jewish, tall, rich, republican, 21yrs old, smelly, etc
- **Variables: logical sets of attributes**
  - e.g. Marital Status
    - Married, Separated, Divorced, Remarried, Widowed, Never
  - Distinct from **constants**
    - Must have >1 attribute in variable – *and sample!*
    - e.g. gender -- male vs. female
    - political party -- DP, GOP, other party, no party affiliation
  - Some do "attribute analysis" using 1 value (esp. 1 case, but not necessarily)

Admin Basics Direction Measures Variation Choices Next

Against Absolutes

- **Common errors in generalizing about reality**
  - Someone *is* violent, or generous (or not)
    - Doesn't take into account context (home/work)
  - Something *always* matters
    - Gender, race, class
  - Some pattern *always* holds
    - Surprises are where science really happens
  - Some idea, word, or concept *is* always *anything*
    - Truth? Fact? Meaning? Science? Evil? Fairness? Bah!
- **Instead, recognize that *everything varies***
  - That's Sociology's unique contribution
  - Difficult to grasp & accept fully

Admin Basics Direction Measures Variation Choices Next

Choices in Measurement

- Rarely just 1 way to measure any variable
  - "Unemployed": searched for work in last 4 weeks
    - Vs. military, school, keeping house, unable to work, not *at* work
    - All are distinct categories (values) in official statistics
  - Focus there may undercount economic problems
- How much variation should be measured?
  - How wide a range of variation?
    - Not too much; just what you want to describe/explain
  - How much variation between extremes?
    - Binary? 5-pt scale? 1-10? 100? Continuous?
  - How much *can* be measured?
    - Sometimes, value groups is enough (13-15 units)

Admin Basics Direction Measures Variation Choices Next

Critical Features of Measures

- **Equivalence**
  - Comparable values
    - vs. "female, catholic, or tall"
- **Exhaustive**
  - All cases in a category (inc. DK, NA, NAP)
    - {black, white} vs. {black, white, other}
- **Mutually Exclusive**
  - Each case is only 1 value of the variable
  - Each case falls in 1 (and *only* 1) category
    - {black, white, Hispanic} vs. {black, white, other}

Admin Basics Direction Measures Variation Choices Next

Next 4 Lectures

- **One coming *just* on levels of measurement** (LOM)
  - *Critical* that you understand the differences!
- ***First*, three on data, display, & software**
  - Data Summary
  - Data Display
  - SPSS Intro
- **Afterwards, three on differences for each LOM**
  - What's the typical case like?
  - How much do cases differ from each other?
  - What "shape" is the distribution of cases?
    - Normal, Bell, or Skewed?
    - Unimodal, bimodal, multimodal, or messy?

Admin Basics Direction Measures Variation Choices Next

Levels of Measurements

- **Nominal**
  - Values represent unorderable categories
- **Ordinal**
  - Each value is more or less of something
- **Interval**
  - Equal differences btwn consecutive levels
- ~~**Ratio**~~
  - ~~Zero is meaningful~~
  - ~~*Not important for our work*~~

Admin Basics Direction Measures Variation Choices Next

~~Bye, Felicia~~

Peace, out...

Admin Basics Direction Measures Variation Choices Next

Why Levels Matter

- **3 ways of categorizing data**
- **Each associated w/ certain statistics & approaches**
  - Appropriate statistical approach to a problem or questions depends on level of measurement
  - Each requires different u*nivariate* procedures
  - Each *combination* requires different *bivariate* procedures
- **Entire class rests on understanding them**
  - Can the values of a variable be put be in order?
  - Can the values of a variable be subtracted?