Complete your Mission like a Ninja: Analyzing and Using Survey Results

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Never doubt. 
Never fear. 
Never overthink.
True Ninja Skills
Review Kahoot! Follow the instructions on the screen - Play on your own or in a small team.
Review

- Major challenges in effective survey implementation requires strategic attention to the total survey design.
- Be clear about why you want to do a survey.
- Use a theoretical foundation and define the constructs you seek to measure.
- Develop items that all respondents will interpret the same way, respond to accurately, be willing to answer, and are suited for your data collection method.
- Likelihood of response greater when they trust the rewards for responding are greater than the anticipated cost.
Today’s Session:
• Strategies for analyzing survey data
• Strategies for using survey data to inform decisions
• Wrap-up and concluding thoughts
Analyzing your survey data
Too many choices!

- All the work you did from session one on writing out your survey purpose in 15 words is about to pay off!
- If you know WHY you did your survey, your analysis should be designed to address that purpose!
It will be IMPOSSIBLE to effectively analyze your survey data if you don’t clearly understand the purpose of the survey – there are simply too many analysis choices.
Additional Considerations: Audience

- Who will be reading your report?
- Why should they be interested?
- What message do you want to convey?
- What report format will be most effective?
- How many charts, graphs, images are appropriate?

Florida Marlins Delay Game Until Their Fan Shows Up

SPORTS NEWS
August 13, 2010
VOL. 46 ISSUE 53
Sports - Ecstasy Of Defeat - Baseball - Sports Year In Review 2010

MIAMI—The Florida Marlins delayed the start of their game against the St. Louis Cardinals last Sunday when Steve, their fan, failed to show up at Sun Life Stadium by the scheduled 1 p.m. start time.
Additional Considerations: Temptation to overanalyze

▪ “If you torture the data long enough, they will confess”

▪ The ease of statistical analysis is also a curse because many statistically significant findings are not meaningful

▪ At an $\alpha = 0.05$ level, if you do 100 statistical tests, at least 5 will be significant just by chance – but they may not mean anything, so use caution when interpreting results!

▪ Always consider multiple sources of information
Additional Considerations: What tools and resources are available to you?

- Can you find someone to help you with your analysis?
- Can you get training on how to use an analysis tool?
- How much time do you have to put toward the analysis?
Typical steps in data analysis:
1. Data cleaning (checking your data for accuracy)
2. Population checking to see if weighting is needed (e.g., if your respondents are 70% female but your population is only 50% female)
3. Calculating and checking any scale scores that will be used
4. Descriptive statistics (summary statistics)
   a) Descriptive statistics by group (for groups of interest)
   b) Descriptive tables / charts
5. Inferential statistics and hypothesis testing
6. Reaching conclusions and writing report
Survey Novice:
• Runs a bunch of statistical tests until something comes up “statistically significant”
• Exhaustively reports every item, creating a vast array of charts, graphs, tables, and detailed in-depth statistical analyses
• Celebrates every little finding or data point even if it isn’t meaningful or relevant

Survey Ninja:
• Focuses the analysis on the questions and topics that were of interest – why was the survey done in the first place?
• Reports the findings that are relevant for the audience in a way that can be easily understood
• Interprets the findings that are meaningful and relevant
Example: Selecting the best color to paint your classroom

Survey Novice:
- In the following 248-page report, you will note results broken out by every demographic category and the results from each one of the 378 statistical tests included in the analysis. To summarize, more research is needed.

Survey Ninja:
So, probably “blue”
Tools for Data Analysis
Selecting the Right Tool for the Job

▪ There is no perfect tool!
▪ Knowing what you want to produce should determine your choice of tool
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<thead>
<tr>
<th>Data Analysis</th>
<th>Visualizations</th>
<th>Reporting</th>
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<td>Excel</td>
<td>Adobe Illustrator / Inkscape</td>
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<td>SPSS</td>
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<td>Survey Software</td>
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<td>Online tools</td>
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<td>By hand</td>
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Generating Reports in Qualtrics

[Image of Qualtrics interface with options for Survey, Distributions, Data & Analysis, Reports (Results, Printed Reports), and filters for Initial Report]
Export the default Qualtrics report as PDF, Word, PowerPoint, or Excel file.

Includes frequencies of responses and basic descriptive statistics.
Can also generate basic graphs using the “Visualization” feature in the interactive reports in Qualtrics.
Can filter reports by data from your contacts (which could include demographic variables)

OR

by responses on other questions in your survey
E.g., “in which department is your primary employment”
I don’t typically use the Qualtrics reports – instead I prefer to download the data and create my own reports.

However, the Qualtrics report feature is handy and can give you a quick summary of the results without much time or effort required.
Jeremy's favs: Data analysis

SPSS or Excel
Widely available on campus! There is a learning curve but fairly easy to use
SPSS Tips

- Very powerful tool and can integrate with R (statistics program) and now allows Python language to be used for more sophisticated programs
- Departments get a much-reduced license rate for NDSU-owned computers
- Available in some computer labs on campus
- Very handy for analyzing Qualtrics data because the coding (e.g., “1=strongly disagree” etc.) automatically included
Excel Tips

- Use the “Analysis ToolPak” in Excel to simplify calculation of basis statistics
  - (In “File”, “Options,” then click “Go…” under manage to add the Analysis ToolPak)
- Charts are very easy to make in Excel
- PivotTables also a powerful tool in Excel for analyzing data
Jeremy’s favs: Data visualizations

Tableau Public (free) and Adobe Illustrator

Tableau creates online, interactive graphs and reports; Illustrator is professional-level tool to create infographics, posters, images
Tableau Public (free version)

- Create interactive charts, maps, tables to publish on the web
- Web reports allow visitors to interact with your data through filtering and download your data
- Paid versions are much more powerful but quite $$$$$
Adobe Illustrator

- Professional tool to create drawings, posters, infographics
- Extremely powerful but not the easiest thing to use
- Can get a monthly subscription to the software
- Inkscape (inkscape.org) is an open-source version, might be worth exploring if you are on a limited budget

Is it worth the gamble? Don’t let alcohol / drugs affect your future! Participate in one of NDSU’s many alcohol-free events!

www.ndsu.edu/campuslive

Data from NDSU’s Alcohol and Other Drug Abuse Prevention: www.ndsu.edu/alcoholinfo/ndsu_research
Jeremy’s favs: Reporting

Microsoft Word

Flexible, nearly universal access
Online Infographic Tools

www.visme.co

Piktochart.com

Lots of other choices, too! (https://infogr.am/, or https://www.easel.ly/)
Validity and Reliability Considerations in Data Analysis

Pfungst (1911), p. viii
“The Rain Follows the Plow”
Why should anyone believe the results from your survey project?
The more severe the consequences for the planned use, the more evidence you need for rigor!

(A ninja does not pursue a target until he / she is sure the target has been correctly identified.)
Reliability is necessary but not sufficient for validity!
Reliability

“Consistency”

Could be consistently good.
...or consistently bad
Reliability

Consistency of measurements when the procedure is repeated (Standards, 1999)

- Multiple items on same topic answered similarly
- Multiple raters score participants similarly
- Multiple forms of a survey / test produce similar results
- Administrations of the same survey at different times would produce similar results (accounting for individual growth, of course)
Good practices in survey reliability

- Carefully written items
- Test items prior to distribution
- Statistically check items for reliability (e.g., asking several similar items and seeing if respondents answer consistently)
- Look for obvious patterns for those who have answered randomly just to be entered into your drawing (e.g., a student who answers all “strongly agree” for every item)
  - Vary the way you ask questions so students would not logically answer the same way for every question
- Careful thought to the timing of the administration of a survey (e.g., a questionnaire about drinking behaviors around spring break)
- Training of raters if you will be scoring students or evaluating submitted written materials – can you use a scoring rubric?
Validity

“the degree to which evidence and theory support the interpretations of [the results] entailed by proposed use of [the results]” (Standards, 1999)

“It is the interpretations of test scores required by proposed uses that are evaluated, not the test itself” (Standards, 1999)
Example

- ACT score used to predict success in college
- ACT score used to determine who should be member of the marching band

*Results can be validated for one purpose (such as predicting college success) but not for another – the test itself isn’t “valid,” rather it is the **particular use of the results** that is validated*
Good practices in validity

If possible, use an instrument for which there is already good evidence for its validity for the population you want to use it with

- Look for instrument reviews (such as on www.buros.org) and read the technical manual for the instrument
  - Want to see good reliability data and validation studies for the target population for which you want to use the results
    - E.g.: GRE composite score was associated with first semester graduate school GPA for traditional-aged college students

- However, don’t think you can purchase validity – just because it costs money doesn’t mean it will work for your target population!
Good practices in validity (pt 2)

▪ Use multiple sources of information
  – E.g., do students who have higher perceptions of their learning have higher GPAs as well?

▪ Consider how to proactively avoid misinterpretations of your results
  – E.g., students from group ‘X’ scored lower than students from group ‘Y’ on their level of civic engagement = potential **bad interpretation**: Students from group ‘Y’ don’t care about their country
  – Yet students from group ‘X’ tend to come from a higher socio-economic status background and therefore had more opportunity to participate in, say, study abroad experiences: after controlling for this difference, there is **no major differences** between these two groups – better interpretation: how can we help more students from group ‘Y’ participate in study abroad in the future?
The higher the stakes, the higher the need for strong evidence of validity of your inferences:

- Make a small tweak to improve a program or course – low stakes, low need for strong validity evidence
- Determining which students are admitted into medical school – high stakes, high need for strong validity evidence
Using Survey Data to Inform Decisions
“the competitive advantage didn’t come from a novel theory of the game; it came from being able to act on it”
Build a coalition of interested participants to support use of your data.
As Fulcher, Good, Coleman, and Smith (2014) point out, until you assess it again it’s just a “change” and not an “improvement”
• Improve your survey and try it again!
• Identify additional questions and follow-up with an additional project (survey or non-survey)
Surveys: Easy to try, difficult to master!

Being strategic and planning ahead can be the difference between an unusually effective survey and a complete waste of time!
If you would like a certificate of completion, please send me a copy of your planned survey project along with a brief description of how you used what you learned in your survey planning.
Thank you for participating! Use what you have learned here and you truly will be a

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