Political Analysis: A PSUsers’ Manual

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Foreword

As a product of a third year seminar in political analysis, this student team has written a series of brief chapters for each of the analytic tools we investigated. By the end of the semester, students could all determine among question types, appropriate ways to investigate questions, and reasonable tasks associated with those investigations.

They are passing their product on to future PSU students as their legacy. It’s a great resource for students who are new to the research process, or need a “taste-test” among methods they think they might like to try for a project or paper in their classes. Better even than cliff notes, students here came up with real-world applications to these methods, and included job sites where PSU students can go on to work with the particular skills they learned.

Good political science is almost never about establishing truths. It’s much more concerned with arriving at the best possible answers for current critical questions. Since so many of our questions have more than one good answer, we have to know how to tell when we’ve done the best we can, and when we’re taking the easy way out.

Political analysis is this process of weeding out the too-easy answers, avoiding answers that are more complicated but not better, and arriving at the best possible response. The political analyst understands a whole range of concepts, frameworks (how we arrange the concepts), variables (what we use to measure the concepts) and quantitative analysis (how we check to see if concepts do what we think they might). Political analysis is the business of doing political science. The better we get at analysis, the better our answers get; better answers build a new foundation for a next round of questions. The growth of political science as a field is entirely dependent on how good a job we do.

These students did a great job, and they are sharing their work with you, as they move into their own careers, and use the skills they learned here. Enjoy, and prosper!

Required Reading, from which students drew for their chapter contributions:


PART ONE  INTRODUCTION TO THE ENTERPRISE OF POLITICAL SCIENCE AS A SCIENCE

Introduction: The Craft of Our Science ................................................................. Krisan Evenson
  Toolkit, Ch 1, “Thinking About Thinking”
  The Science of Political Science Analysis, Ch 1 “Introduction”
  On Science Envy Analysis, Ch 2, “Political Science As a Science”
  How Do You Solve a Problem Like Maria? Toolkit, Ch 2, “Insights Into Problem Solving”

PART TWO  HOW TO GET GOING IN THE ENTERPRISE

Learning To Drive, and Moving Violations ......................................................... Krisan Evenson
  Analysis, Ch 4, “Building Blocks: Hypotheses, Concepts, Variables”
  Giovanni Sartori, “Concept MisFormation”
  Use Your Directionals at All Times Toolkit, Ch 3, “Problem Restatement” ............. Chris Gautreau
  My Car is Cooler than Your Car. I think. Analysis, Ch 6, “Building Blocks: Measurement”... Chris Gautreau
  Tune-Ups, or Maintenance Care? Toolkit, Ch 4, “Pros-Cons-Fixes” .................. Markus Auwaerter
  Reading the Road Toolkit, Ch 7, “Causal Flow Diagramming” ....................... Markus Auwaerter
  Reading the Road Toolkit, Ch 9, “Decision/Event Trees” .................... Markus Auwaerter

PART THREE  ENGAGING IN THE ENTERPRISE

Coping with the Back Seat Driver Toolkit, Ch 5, “Divergent/Convergent Thinking” .... Brendan Wyman
  Commuter Lane, Passing Lane, or Entire Road? Analysis, Ch 9, “Sampling” ........ Chris Gautreau

PART FOUR  RUNNING BAREFOOT THROUGH THE DATA

S/He Said, But I Saw Analysis, Ch 7, “Empirical, Direct/Indirect Observations” .... Brendan Wyman
  Who’s On First, What’s On Second? Toolkit, Ch 6, “Sorting, Chronologies, Timelines” ... Beth Porter
  Knowing What We Want, and What We Win If We Get It Toolkit, Ch 14, “Utility Tree” ... Kristyn Cornell
  Listening to the Masses Analysis, Ch 10, “Survey Research” .................. Beth Porter
  Knowing Just One Thing Very Well Analysis, Ch 11, “Univariate Analysis” .......... Chris Gautreau

PART FIVE:  WHAT TO DO WITH ALL THIS DATA

Some Stuff Is Just More Important Toolkit, Ch 10, “Weighted Ranking” ............ Brendan Wyman
  What Were We After, Again? Did It Work? Toolkit, Ch 11, “Hypothesis Testing” .... Kristyn Cornell
  Taking Two To Tango Analysis, Ch 12, “Bivariate Crosstabulation Analysis” .... Brendan Wyman
  Taking Two To Tango Analysis, Ch 12, “Bivariate Regression” .................. Beth Porter
  Thinking in Tables Toolkit, Ch 8, “The Matrix” ..................................... Kristyn Cornell
  How Many Roads to Rome? Toolkit, Ch 15, “Utility Matrix” .................. Kristyn Cornell

PART SIX:  CONCLUSIONS

Conclusions: So Many People, So Little Time ............................................ Krisan Evenson

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Political analysis is about thinking – not about statistics, not about research methods. The bulk of the work we do as thinkers occurs before we engage in the actual research process. Students often skip all this pre-research work, and that’s why their papers get confusing, research questions get buried, and the grade gets lowered as a result.

We’re here to change all that. This manual introduces you to the basic tasks involved with approaching questions in political science. Political science is a subcategory of the social sciences, itself a subset of Science. Regardless of your major, you’ll need to organize yourself in a coherent way in order to produce work worthy of college-level appreciation. If you do that well, you are likely to excel in your careers post-graduation too.

To lay the groundwork for analytic tools, we began the course with four chapters which served to level the playing field, and prepare the mind for the analytic task. Here are some highlights from them.

Thinking About Thinking (Toolkit Ch1). It’s not your fault that analysis is hard work. Human beings are noteworthy for the thinking mistakes that we make. Bias, instinct, and irrational behavior lead us astray all the time. In fact, there are 7 mental problems we all share:

1. We use emotion to relate to the world. That’s a bad idea when it comes to objective science.
2. Our mental shortcuts determine what we examine scientifically, and limit the field of possibilities by our habits.
3. We see patterns everywhere! If there is no pattern, we’ll make one up, and maintain it at all costs.
4. We rely on biases and assumptions, those ultimate shortcuts. When we bundle our biases all together, it’s a mindset, known to choke new ideas.
5. We spin theories even when there aren’t any, or when they’re wrong! We cling to them like life preservers.
6. We do “on-line processing”: we keep what fits, and toss out what doesn’t. As a result, we throw out important stuff, and keep useless clutter.
7. We cling to false beliefs despite evidence. “We prefer to believe what we prefer to be true.”

Needless to say, these 7 traits serve as a checklist of behaviors to avoid when you engage in good science. During our course, we called them the Seven Deadly Mental Sins.

The Science of Political Science (Analysis Ch2). Good science has seven characteristics—an antidote to the Seven Deadly Mental Sins we all commit. Here are those characteristics:

First, we recognize science for its empirical verification: we accept a statement is true if we observe it to be true. This observation has to be objective, lest we stray toward bias.

Second, good science is explanatory: our conclusions are derived from rules and specified beginning propositions, and we use these to build more knowledge about something we’re interested in.

Third, science is general: it’s not good for just one case, but works with many cases. That’s why we need the rules—we show others how to get the same results we did.

Fourth, science is non-normative: it is centered in facts and/or objective determinations. “Normative” refers to ethical or cultural statements that have no business in science.

Science is, fifth, predictive: if we’re good with the rules, science has a roadmap quality that allows correct guesses as to future instances of similar events.

Sixth, science is provisional: it is only good until we learn something new. We accept this because we know that we’ll build more knowledge later.

Finally, science is transmissible: our methods are made clear enough to be repeated by others.
Know Before You Go: What Research Products Look Like *(Analysis, Ch14).* Since the science of political science is well-organized, the end-products of research projects also share a family resemblance. If you look in the professional social science journals, you’ll find that those articles all have the following general frame:

I. Introduction
II. Literature Review
III. Model to be examined, Data to Seek, Methods to Use
IV. Results
V. Discussion
VI. Conclusion

*Every paper you write should have this general frame:* the closer you can match this, the better you’ll be at making sure you’ve done a full job of the research.

How Do You Solve a Problem Like Maria? *(Toolkit, Ch2).* Insights into problem solving take a whole range of forms, as you’ll see when you read through the following pages. But the main thing is to structure your analysis of any given problem. Our course focused here because that’s the biggest advantage you can take onto the job market in the social sciences. Structuring analysis is one of the best ways you can defeat the tendency to engage in one or another of the seven deadly mental sins, meet the characteristics of good science and maximize the results of your specific research problem. There are 5 ways to do this.

*First,* whenever you get a new assignment to research, don’t go to the library right away—make and maintain first a list of the major factors involved in your problem area, and issues related to researching it. You can add/delete as you need to, but use your brain first.

*Then,* be able to get broader AND more specific at any point in your research. We call it diverging and converging, respectively. Frequently, researchers must do this because answers are easier to find at one level than they are at another. Flexibility is the name of the game.

*Third,* beware the judgment conclusion—just because you think it’s true doesn’t make it so (remember that deadly mental sin, that we prefer to believe what we prefer to be true). One way to ensure your conclusion is carefully considered is to convey the degree of confidence you (and the rest of the field you are entering) have in it. Facts and judgment are inversely proportional: the more you have of one, the less you see of the other. The degree of confidence and the chance of error are also inversely proportional: the more you have of one, the less chance of the other occurring.

*Fourth,* always include a “sanity check” at the end of whichever process you choose to analyze your question. We had a running joke about this in class, but essentially, if your conclusion seems weird, it’s worth checking your work.

*Finally,* the group is always larger than the sum of its parts. Consensus is a better way, generally, to get accuracy than a succession of agreements. If you’ve been watching the news over the past few years, the debates about the series of intelligence reports (as opposed to consensus) leading up to our current military engagements are a case in point. As a corollary, this is the point of peer review in science: we come to consensus even about the newest research in our field. It’s how our knowledge grows judiciously rather than quickly.
LEARNING TO DRIVE, AND MOVING VIOLATIONS:  
ANALYSIS, CH4: BUILDING BLOCKS: HYPOTHESES, CONCEPTS, VARIABLES; AND  
SARTORI, GIOVANNI, “CONCEPT MISFORMATION IN COMPARATIVE POLITICS,” AMERICAN POLITICAL  
SCIENCE REVIEW 64:4 (DEC 1970)

As new analysts get started, they often jump into topics of interest, hunt down a mountain of information, put it  
together into an organized mass, and call it a paper. Alas, this is further from social science than we want you  
to be!

Making the transition from writing “about” things to writing analysis requires that you have some frames to  
your work. We name these framing tools by the jobs they are required to do for us. With them, we build the  
analysis. With good analysis, we are licensed to drive in social science research neighborhoods.

Hypotheses are the statements (theses) under which (hypo) we operate during the course of the project. The  
point of the analysis is to check out one specific statement at a time. Remember that science is provisional (see  
above), so we sometimes find that these statements under which we operate can not be supported. Any result,  
expected or not, is still a result.

Concepts delineate discipline-specific ideas and research developments. Concepts are used as factors that  
surround whatever you’re interested in analyzing, and they are one way to check out the topic that you’re  
interested in, without relying on mountains of random information to guide your way. YOU are in the driver’s  
seat, and you get to say how you think these ideas are related. When you do, you put more than one concept  
together in a relationship, and that sentence you describe it with is your hypothesis.

Concepts are great in the thinking process, but if you’re doing analysis, you need one more step, and that’s to  
spell out how you’ll demonstrate this concept in action. No matter how abstract your concept is, you’ve got to  
be able to point to it, in order to test whether your hypothesis can be supported or not. In science, we do this  
through the use of variables. Variables are measurable phenomena that stand in for the concept, as close as we  
can manage it. If we see a change in the variable, we have support for a change in the concept behind it. The  
closer the variable is to the concept we’re looking at, the better we can support our hypothesis.

Analysts are famously bad at this sometimes. The students read the classic article above by Giovanni Sartori to  
learn more about the ways that we can go wrong without meaning to. For example, two people can use the  
same concept in their work, but define it differently, giving you the idea that their research is working on the  
same thing when it’s not. Some concepts are so ill-defined that it’s hard to know exactly what’s being studied  
in the first place. And Sartori even pointed out that analysts are lazy, and quicker to make up new concepts than  
they are at getting to an in-depth agreed-upon definition. Under this view, some of the growth in our science is  
due to laziness rather than energy—exactly the opposite of what we want!
The following pages present many of the tools that students delved into during the course of the semester. Each of these tools has an introductory section that lays out the approach, its history and relevance, how it is used, and then offers some actual, real-life job sites where you can work if you have the skills they show you.

Their efforts were successful enough that seniors did end up working in the field of their dreams, and were prepared to enter the job market with the right preparation. They think you should too.
PART ONE: RELEVANCE

SUMMARY: The quality of the solutions that we find, are based on the analysis of the problem - Or to be more precise, the quality of the analysis that we do. Problem restatement forces us to look at scenarios from other avenues.

PURPOSE: To overcome narrow thinking and delve into a divergent mode of thinking. Bias has a tendency to creep in, so we want to be as objective as we can.

DEVELOPMENT AS A SOCIAL SCIENCE TOOL: The pitfalls in defining problems can impinge themselves into a social science research project, so we use tools such as: Paraphrasing- 180 Turnaround- Broaden the Focus- Redirection.

POSITIVE TRAITS, DRAWBACKS: Everything about problem restatement speaks to thoroughness, simplicity, and exhaustion. The only negativity would be if we applied problem restatement to a corrupt abstract of which the participants would be revealed.

PART TWO: PRACTICAL APPLICATIONS FOR PSU STUDENTS

RELATIONSHIP BETWEEN MAJOR AND TECHNIQUE: Keeping things simply defined, and approaching a question from another angle, whether it’s a tax problem or an accounting policy issue, gives a broader and more complete construct.

IMPORTANT QUESTIONS BEST SERVED BY THIS TOOL: To solve problem statement misdirection. Our ultimate goal however is not to solve the problem, but to expand our thinking about the problem.

ACTUAL SCENARIO TO ILLUSTRATE THE TOOL:
There are four ways to restate problems so that we can shift our focus. Sometimes they help our client/employer as well. Following are some quick one-liner definitions, and an example of each.

Paraphrase: Restate the problem using different words without losing the original meaning.
Initial Statement: How can we stop fraud in the EITC tax credit program?
Paraphrase: How can we keep fraud from growing in the EITC tax credit program?

180 Degree Turn: Turn the problem on its head.
Initial Statement: How can we get taxpayers to come to the IRS free tax help centers?
180: How can we discourage taxpayers from coming to the IRS centers for free tax help?

Broaden the focus: Restate the problem in a larger context.
Initial Statement: Should I change jobs?
Broaden focus: How can I achieve job security?

Redirect the Focus: Boldly, consciously change the focus:
Initial Statement: How can we boost sales?
Redirected focus: How can we cut costs?
PART THREE: LOOKING AHEAD TO YOUR CAREER

FIVE JOB SITES WHERE YOU NEED THIS TOOL

JOB SITE A. U.S. Treasury Department
   TYPE OF ORGANIZATION: U.S. Government
   WEBSITE: www.ustreas.gov.
   RELEVANT POSITION NAME: Analyst
   WHY YOU NEED THIS SKILL/TOOL HERE: Derive comparatives and attributes of internal spending/cost control. Identifying alternatives is crucial and necessary.

JOB SITE B. Cantor Fitzgerald, Inc.
   TYPE OF ORGANIZATION: Bond Finance
   WEBSITE: www.cantor.com
   RELEVANT POSITION NAME: Bond Analyst
   WHY YOU NEED THIS SKILL/TOOL HERE: Search for alternative investments.

JOB SITE C. Morgan Stanley Brokerage.
   TYPE OF ORGANIZATION: Stock Brokerage Firm.
   WEBSITE: www.MorganStanley.com
   RELEVANT POSITION NAME: Stock Analyst.
   WHY YOU NEED THIS SKILL/TOOL HERE: To construct portfolios through relevant allocations, and with the objectives of the client.

JOB SITE D. Citizens Bank
   TYPE OF ORGANIZATION: Retail Banking
   WEBSITE: www.citizensbank.com
   RELEVANT POSITION NAME: Auditor
   WHY YOU NEED THIS SKILL/TOOL HERE: To build scenarios and models by rephrasing audit questions thus broadening the focus.

JOB SITE E. Abbott Laboratories
   TYPE OF ORGANIZATION: Pharmacology Research
   WEBSITE: www.abbottlabs.com
   RELEVANT POSITION NAME: Principal Research Statistician
   WHY YOU NEED THIS SKILL/TOOL HERE: To apply methodology, analysis, and protocols to processes related to experimental and controlled drug experimentation.
MY CAR IS COOLER THAN YOUR CAR. I THINK. *Analysis, Ch6,*

**BUILDING BLOCKS OF SOCIAL SCIENTIFIC RESEARCH: MEASUREMENT**

Analyst: Chris Gautreau
Major: Business Management
Minors, concentrations, academic interests, etc.: Finance – US Stock Indexes---The TV show “The Apprentice.”
Prospective PSU graduation date: May 2007
PSU Email: cjgautreau@mail.plymouth.edu

**PART ONE: RELEVANCE**

**SUMMARY**
Building blocks are just that- tools that we use to understand some of the issues and subsequent questions we are focusing on, that we can measure with some degree of certainty.

Technique: Using an Index to form a composite measure of what you are interested in.

An index is simply a grid with individual items- usually questions, listed on rows with the corresponding subjects listed on the columns. Typically a scale is used i.e., 1-0 with 1 representing a “yes” answer, and 0 representing a “no” answer. However, you can use whatever scale scenario that fits.

**PURPOSE**
Indexes are used to give the researcher some indication or indicator as to where subjects rate in regards to the phenomenon being tested. Ex: If we are trying to see if the Earned Income Tax Credit is helping to get people out of poverty, we would devise a set of questions to address some corresponding activities or issues. Now we can simply add up the columns and tally the highest score.

**DEVELOPMENT AS A SOCIAL SCIENCE TOOL**
The social science community has deemed this type of measurement as valid to the degree that the technique is impartial, relevant, and has measurement “value.”

**POSITIVE TRAITS, DRAWBACKS**
Positive aspects are:
1) Simplicity in design and analytical structure.
2) Relatively straightforward and direct.

Negative aspects are:
1) Does not cover every aspect or indicator that we could measure.
2) Does not use a “weighing” factor i.e., multiplying formula to item scores and importance factors.

**PART TWO: PRACTICAL APPLICATIONS FOR PSU STUDENTS**

**RELATIONSHIP BETWEEN MAJOR AND TECHNIQUE**
I am interested in this technique because it is an easy method to use and provides instant analysis based on the results. I think this construct helps to guide us in the direction that we are trying to focus on, thus giving us an early indicator of how the respondents are thinking or reacting such as the ability to improve social status or quality of life in this example.

**IMPORTANT QUESTIONS BEST SERVED BY THIS TOOL.** Questions that I feel are best served by this approach, are questions that seek to measure attitudes and phenomena in conjunction with the core question. This type of survey can help to eliminate the “noise” and thus the commotion of irrelevant questions or feelings.
ACTUAL SCENARIO TO ILLUSTRATE THE TOOL

Here is a quick and dirty scenario based on the index approach:

1= yes
2= no

<table>
<thead>
<tr>
<th>Questions</th>
<th>Family A</th>
<th>Family B</th>
<th>Family C</th>
<th>Family D</th>
<th>Family E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filed for EITC in last 3 years?</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Issued food stamps after EITC?</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Family has received UI after EITC?</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Does not have IRA/ 401k?</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

**Index Score**

<table>
<thead>
<tr>
<th>Index Score</th>
<th>2</th>
<th>4</th>
<th>3</th>
<th>3</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; = not helping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; = helping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Although you can structure your questions any way you like, be careful of the 7 Deadly Sins and of including biases in your questions. The sample shows that Family B has the highest ranking - i.e., not helping, with a score of 4; Family C and D are tied with a score of 3, and so on. We could infer based on these results that the EITC IS NOT helping to pull families B, C, & D out of poverty. We know that the EITC is a refundable poverty credit and is tied to Federal statistics for mean income based on family size and tied to the poverty rate income guidelines. We could also infer that the EITC has helped Family E with a score of 0, or some other explanation has attributed to this “healthy” score!

**Summary:** We would need a much larger sample to determine whether this credit is actually helping to pull families off the poverty roster, but we can see that the results seem discouraging based on the questions that were put forth, and the families that were sampled.

PART THREE: LOOKING AHEAD TO YOUR CAREER

FIVE JOB SITES WHERE YOU NEED THIS TOOL

**JOB SITE A.** Dept of Health and Human Services

- **TYPE OF ORGANIZATION:** U.S. Government
- **WEBSITE:** www.hhs.gov
- **RELEVANT POSITION NAME:** Cost Benefit Analyst
- **WHY YOU NEED THIS SKILL/TOOL HERE:** To review and contrast the different benefit plans for year-end statistical reporting.

**JOB SITE B.** U.S. Treasury Department

- **TYPE OF ORGANIZATION:** U.S. Government
WEBSITE: www.ustreas.gov
RELEVANT POSITION NAME: Analyst
WHY YOU NEED THIS SKILL/TOOL HERE: Derive comparatives and attributes of internal spending/cost control.

JOB SITE C.  Cantor Fitzgerald, Inc.
TYPE OF ORGANIZATION: Bond Finance
WEBSITE www.cantor.com
RELEVANT POSITION NAME: Bond Analyst
WHY YOU NEED THIS SKILL/TOOL HERE: Analyze bond indentures.

JOB SITE D.  Bank of America
TYPE OF ORGANIZATION: Banking
WEBSITE: www.bankofamerica.com
RELEVANT POSITION NAME: Mortgage Lending
WHY YOU NEED THIS SKILL/TOOL HERE: Compare rates and attributes of other banks.

JOB SITE E.  Muriel Siebert & Co., Inc
TYPE OF ORGANIZATION: Private Discount Broker.
WEBSITE: www.msiebert.com
RELEVANT POSITION NAME: Quant
WHY YOU NEED THIS SKILL/TOOL HERE: To develop and compare relationships between price/risk behavior of individual stocks.
The Problem:

We humans are negative in general. That is why decision making is sometimes so very reckless. We perceive everything by what we understand. In other words our ignorance impairs our ability to make sound decisions. Weather we are ignorant to all the facts or are unwilling to accept that something knew/radical could change our way of thinking we will always most likely be very skeptical and go with what we feel is right, no matter how flawed that decision is.

The Cure:

To understand a situation, our minds always create a pros and cons list. We also try to fix our list so that we can balance out the pros and cons. After we accomplish this small feat we make a decision. This happens thousands of times a day, which way to work or what to order for lunch. Those examples are obviously dummed down problems, the decisions wont break us, maybe make us late for work or forget our appetite, but when it comes down to the big decisions its always easier to sit down and write out the problem. Its not math but you can find a functioning formula that will help you solve problems. One of the best techniques is Pros-Cons-and-Fixes. The 6 step process will help us to evaluate and put a value behind a yes or no answer. Pros-Cons-Fixes rely on the facts and only the facts and with that information it helps weigh our answers.

History:

This system of pros and cons is rather old. The technique in itself has not gone under radical change for years yet it is still used as a foundation for understanding problem solving. In reality the pros-cons-and-fixes approach fulfilled its role by organizing “the elements of the problem in a logical way so that each element can be analyzed separately, systematically and sufficiently” (Jones, 77) Jones in his book goes on to explain that using the basics established by the pros-cons-and-fixes approach makes understanding new techniques of parceling up a problem and then solving it easier to use. Today this technique is used to help others understand a situation, like a flat tax. What are the cons and what are the pros, after reading this the reader is able to make there own educated decision. Today pros-cons-and-fixes are not used as an evolutionary step in problem solving as it is intended but its basic purpose still exists.

Positive and Negative Aspects: (kind of like pros and cons)

Positive: Use of pros-cons-and-fixes allows you to evolve your problem solving making the use of more complicated techniques easier to use.

Negative: Today the technique is less used. Maybe because more approaches exist today that help in problem solving in a more concise way.

The 6 Steps to Pros-Cons-and-Fixes: We will simulate this technique by coming up with a problem. Let’s look at Small business; a major decision is to employ part time workers. We don’t need to know what industry or commercial aspect this business is in. Rather this is an exploratory approach on the pros and cons of part time workers.
Step 1:
We list the pros. Pros are the “positives, benefits, merits and advantages” (Jones, 73)

<table>
<thead>
<tr>
<th>Pros</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Flexible Hours (under 40 hrs week)</td>
</tr>
<tr>
<td>2 Usually paid less</td>
</tr>
<tr>
<td>3 Overtime can be managed much more easily</td>
</tr>
<tr>
<td>4 Not entitled to Company Benefits</td>
</tr>
<tr>
<td>5 wider array of employees to choose from</td>
</tr>
<tr>
<td>6 Temporarily offer specialized skills</td>
</tr>
</tbody>
</table>

Step 2:
We list all the cons to our question. These are the items that could potentially discourage us from choosing part time workers.

<table>
<thead>
<tr>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Employee loyalty (multiple jobs)</td>
</tr>
<tr>
<td>2 Employee turnover problem</td>
</tr>
<tr>
<td>3 Still counted as employees for determining liability</td>
</tr>
<tr>
<td>4 Training Needs</td>
</tr>
<tr>
<td>5 Moral Issues</td>
</tr>
<tr>
<td>6 Reliability</td>
</tr>
<tr>
<td>7 Theft issues</td>
</tr>
<tr>
<td>8 May leave if offered a fulltime position else ware</td>
</tr>
</tbody>
</table>

Step 3:
We review our cons. This could involve group discussion (at the risk of groupthink) or just your self making the process much easier. We do this by merging and eliminating unnecessary cons or if there seem to be duplicates.

<table>
<thead>
<tr>
<th>Cons</th>
</tr>
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<tbody>
<tr>
<td>1 Employee loyalty (multiple jobs)</td>
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<td>7 Theft issues</td>
</tr>
<tr>
<td>8 May leave if offered a fulltime position else ware</td>
</tr>
</tbody>
</table>

Theft issues could be added to moral issues.
Leaving when offered a fulltime position else ware, could be added to Employee Loyalty
Step 4:
You continue to eliminate as many cons as you can, it may seem redundant but assuredly it is not. At this step you will also approach your cons and ask can any of these be turned into pros, using our example there may be a con that can be turned into a pro.

<table>
<thead>
<tr>
<th>New Pro</th>
<th>Old Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The need for training could be examined and then perfected making a cost effect training program with the best optimal output of trained employees.</td>
<td>• Training Needs</td>
</tr>
</tbody>
</table>

Step 5:
You now have a completed pros-cons-and-fixes table. This table now can be looked at to evaluate the need for part time workers. We obviously see that pros have a few more bonuses and the cons have lost a few. But take into account what is left in the cons column; those are the heavy hitters, the major deterrents. Step 5 ask you the researcher to evaluate based on what you know and what you have learned what the right choice is.

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Flexible Hours (under 40 hrs week)</td>
<td>1. Employee loyalty (multiple jobs)</td>
</tr>
<tr>
<td>2. Usually paid less</td>
<td>2. Employee turnover problem</td>
</tr>
<tr>
<td>3. Overtime can be managed much more easily</td>
<td>3. Still counted as employees for determining liability</td>
</tr>
<tr>
<td>5. wider array of employees to choose from</td>
<td>5. Reliability</td>
</tr>
<tr>
<td>6. Temporarily offer specialized skills</td>
<td></td>
</tr>
<tr>
<td>7. Training Needs</td>
<td></td>
</tr>
</tbody>
</table>

Step 6:
You make a choice. Simple and to the point, you have accomplished everything you have needed to do in the pros-cons-and-fixes technique.

As a political science major this is a great technique to use in basic problem solving, like issues you face when deciding how you choose your paper topics. How you then decided what to report on with-in your topic. There are so many directions you can travel in and with pros-cons-and-fixes you are able make a list and see the most important parts while eliminating non essential parts. A question I would ask and then use this technique for would be if the United States was right in going to war in Iraq. This topic has many pros and cons and with some quick work you could come up a comprehensive evaluation with topics you need to do more research in.

Job Opportunities

Political Affairs for the UN: Political Affairs Officer, Chief of the Decolonization Unit, Human Rights Officer

United States State Department: Foreign Service Specialist, Civil Service employee

All require a semblance of problem solving and organization using Pros-Cons-and-Fixes is an excellent approach to both.
Introduction

Each of us can look at a problem and try to solve it in different ways. Many times you will get answers that may make no sense or is in fact the correct answer using a flawed approach. Remember how you got to your answer, it must be replicated and tested by different approaches. The ability for a random person to take your problem and come to the same conclusion is so very important. It helps prove your work, so the more tests you use to help define and refine your problem makes it much easier for you to test, prove and replicate. “What is causing this problem? How are the major factors interacting to produce this result?” (Jones, 95) Causal Flow Diagramming answers these questions, it is a structuring technique designed to help refine your problem while providing a test. With causal flow diagrams you are able to see relationships of major factors while answering questions similar to, are they stable and interact well? Are they unstable and a cause for re-examination?

This type of structural analysis allows social scientist’s to start putting things on paper. It becomes an initial step towards completing a project. When you do research you are usually asked to come up with supporting evidence, you are also usually required to include all your notes, this means all the steps you took to get to you final experiment. You can also use causal diagramming at anytime during your experiment. The reason you would try out one of these during your test phase would be if something does not seem right in the process, you can use causal flow diagramming as a trouble shooting device.

Positive and Negative Aspects

Positive

Trouble Shooting
Brings in the Main Factors

Negative

If you are ignorant to a few facts flaws might show themselves
Define “major factors”

Example (our test)

We begin this example by first stating the 5 steps we need to take to complete a causal diagram.

Step 1: Identify major factors.
Step 2: Identify cause-and-effect relationships
Step 3: Characterize the relationships as direct or inverse
Step 4: Diagram the relationships
Step 5: Analyze the behavior of the relationships as an integrated system

Step 1: We choose a problem, in this example we look at peacekeeping and the affects it has on a village once occupied by afore mentioned peacekeeping troops. Let us assume also that the region this deployment occurred is hostile.

Four major factors are:

Decision to act (this is actually deciding to intercede in a conflict to bring peace)
Peace Keeping (this is actual deployment)
Securing the Village
Militia attacks (against civilian and Peace Keeping forces)
Step 2: This next step requires us to make a “Cause-and-Effect Table”. This will help us identify the cause and effect relationship.

This is the example of a Cause-and-Effect Table”. You will always show the Causal Factor on the left while the Affected Factor is on the Right. Arrows are used to express the relationship or “linkage” between the two.

<table>
<thead>
<tr>
<th>Causal Factor</th>
<th>Affected Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision to act</td>
<td>Peacekeeping</td>
</tr>
<tr>
<td>Peace Keeping</td>
<td>Securing the</td>
</tr>
<tr>
<td></td>
<td>Village</td>
</tr>
<tr>
<td>Securing the</td>
<td>Militia Attacks</td>
</tr>
<tr>
<td>Village</td>
<td>Decision to act</td>
</tr>
<tr>
<td>Militia Attacks</td>
<td></td>
</tr>
</tbody>
</table>

Decision to act happens at the Security Council of the United Nations, approval occurs. As a result the peacekeeping force is put together by volunteer nations and is sent to the village. The mission is to secure the village, establish law and order and provide needed aid. While securing the village a militia moves in and begins systematic attacks against civilians and the Peacekeeping force. These militia attacks causes the United Nations to reevaluate there position.

Step 3: We now must specify if there is a direct action or an indirect action in the relationship of the causal and affected. Direct action is denoted by a D and an indirect action has an I. Direct action indicates a linkage of direct influence on the factors. While Indirect show an affect that occurs only because of the sequence and can usually close the circle.

<table>
<thead>
<tr>
<th>Causal Factor</th>
<th>Affected Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision to act</td>
<td>Peacekeeping</td>
</tr>
<tr>
<td>Peace Keeping</td>
<td>Securing the</td>
</tr>
<tr>
<td></td>
<td>Village</td>
</tr>
<tr>
<td>Securing the</td>
<td>Militia Attacks</td>
</tr>
<tr>
<td>Village</td>
<td></td>
</tr>
<tr>
<td>Militia Attacks</td>
<td>Decision to act</td>
</tr>
</tbody>
</table>

The above example is not only an example of causal and affected relationships it is also considered a self-stabilizing feedback loop. It is defined as such because “the causal flow interactions increase and decrease cyclically.” (Jones, 99) In another sense one could say that all the variables have been accounted for while the situation is handled correctly, a positive outcome is likely.

Let’s say a militia element did not exist until the peacekeepers arrived this now affects the decision to act directly. By directly we mean that the Security Council will react by either adding more troops which then has the problem of repeating this cycle until it ultimately fails. The same can be said if these surprise attacks are occurring and was unexpected the UN Security Council may decide to pull out the peacekeepers causing a failure. If all you have are Direct actions then you will ultimately have an “unstable feedback loop, a dynamo that drives and powers the cause-and-effect system.” (Jones, 98)
Step 4: Now the final part we get to actually use a causal flow diagram. The previous steps have all been used to get to the actual diagram. Remember you can only get to this part as long as you don’t have an unstable feedback loop.

Step 5: Troubleshoot the problems. We also analyze the behavior of the system put together as a whole. What we are looking for when we do this is to see what facts are the most influential. This can also include problems; they are most important overall, once you find a problem you begin to eliminate factors, create new ones, modifying factors or any combination of the three. There is a double check process to see if you actually have a working cycle. It might look complicated but its actually really easy. Your goal is to maintain zero. But you must go through the cycle, so on your first run everything has a cause and affect so one is added to each. The last item the militia attack will now indirectly affect the decision to act because of this you add a -1 this then affects the rest of the major points, when repeated for the third time you should be getting plus signs again if not then there are issues. If you have numbers growing negatively or positively this is a big indicator that something needs to be adjusted. You have created the evil, “unstable feedback loop”. This can be repeated many times.

<table>
<thead>
<tr>
<th></th>
<th>First Cycle</th>
<th>Second Cycle</th>
<th>Third Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision to act</td>
<td>+1</td>
<td>-1</td>
<td>+1</td>
</tr>
<tr>
<td>Peacekeeping</td>
<td>+1</td>
<td>-1</td>
<td>+1</td>
</tr>
<tr>
<td>Securing the Village</td>
<td>+1</td>
<td>-1</td>
<td>+1</td>
</tr>
<tr>
<td>Militia Attack</td>
<td>+1</td>
<td>-1</td>
<td>+1</td>
</tr>
</tbody>
</table>

As Political Science majors, we are exposed to multiple types of tests. These tests assist us in our everyday problem solving be it part of the job or life. These types of causality tests aid us in the development and refinement of greater research tools. The idea that political scientists can prove their theories with test and matrixes brings a better respect for the field.

What Political Science career would use causal flow diagramming?
1. Senior Research Fellow in Global Governance
2. Senior Analyst/Research Assistant Professor
4. Humanitarian Aid worker
5. Development strategist, United Nations

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These Jobs are all in the research sector utilizing political science as a building block in the career. They all will use a causal diagram at some point. The need for you the researcher to actually catalogue all your information, to show how you made your conclusions will and should include your notes and anything you did before your actual test. In those notes or during the actual test phase you will see causal flow diagrams being used to prove a point, help understand what’s going on and to act as a checks and balance to your experiment.
Another example of a structuring technique is using a decision/event tree. The purpose of this structure is to show choices and all the possible outcomes. Here it is another way, remember what cause and effect is? Well the event tree it lets us see all the possible outcomes. A cause can have multiple effects those effects now become causes with multiple effects coming of them. This is repeated till you find the solution or ending. There are two things to remember when looking at decision/event trees, mutually exclusive and collectively exhaustive. Mutually refers to the person who is making the decisions, when they choose door one or door two. Now once having chosen that door you are unable to turn back, you have made the decision and are now moving further along the decision/event tree. Collectively exhaustive is essentially the end of the line where you have “exhausted” all possible choice and have made the last decision. This is the end of the line, a solution.

The reason we use this technique is to dissect a scenario into its sequential parts. It will then show very clearly the cause and effect relationships which help us understand what decisions or events we should follow. The tree will also show us what decisions and events are dependant on while also showing the strongest and weakest link. But the most important thing a decision/event tree will do is show us alternatives we had not thought about before. That’s why this approach appeals to Political Scientists and Social Scientists.

**Positive Negative Aspects**

Positive:
1. It makes a great visual aid.
2. Can help solve problems by showing you effects that may not have been thought of before.

Negative:
1. You may overlook an option that will affect your decision/event tree. That is why it’s best to be used as a check or a troubleshooting device when you run into problems.
2. Less insightful than a matrix

**Let’s Construct our Decision/Event Tree**

**Step 1:** Identify the problem
**Step 2:** Identify the major factors/issues and address them in the analysis
**Step 3:** Identify alternatives for each of these factors/issues
**Step 4:** Construct a tree portraying all important alternative scenarios

**Step 1** We are going to look at a very simple problem, remember we are just getting an idea how these form. One you have the knowledge of this then you will understand and be able to undertake a much more complex decision/event tree. In our example, we will take a look at what occurs once you commit a crime the eventual steps you take and possible outcomes. Let’s also assume this is not murder but maybe shoplifting. We have established our problem, you committing the crime.

**Step 2** This step involves finding the decisions and events that will be addressed in the analysis. We have committed a crime, what do we do? The police have been called by the victim. The major factors in this example are our ability to try and escape by running or wait and face arrest.
Step 3: Knowing the major factors (Running or Arrest) will cause more affects, like ripples. These will consist of getting away, Arrest and then the eventual option that could occur to you at court. All simple steps as long as you take your time. Find all the events and decisions.

Step 4: Now we construct our tree, our actual hands on visual aid. This will help us in understanding how the decisions are arranged down the line. The tree shows us our options and the consequences of our actions.

Example: Mutually exclusive—once you run, you can’t go back.
Example: Collectively Exhaustive -- each branch now incorporates all possibilities.

We can show alternative scenarios:
1. Commit Crime – Arrested – Court (minimal amount of jail time or just a fine)
2. Commit Crime – Run – Get Away
3. Commit Crime – Run – Arrested – Court (because you ran you go to jail no chance of fine)

We have 3 different scenarios that spring from our major factors.

A basic Matrix

<table>
<thead>
<tr>
<th>Prediction</th>
<th>Outcome 1</th>
<th>Outcome 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prediction 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prediction 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What you can do next is actually use a pros-cons-and-fixes approach to eliminating the undesirable branches of the tree. This is a matter of opinion and what your overall goal will be, but with a list of pros and cons it will make it easier to eliminate the branches that just won’t work for you in whatever situation you are in.

Should you use a Matrix or a Tree?
In most cases you can use both. As discussed before in a previous chapter on matrixes they are a clear method for sorting a wide variety of information into groups. The Matrix accomplishes many things like separating elements of a problem, categorize information comparative aspects and the ability to show some form of correlation.

Example: The Matrix

One rule that would be important to follow is when deciding if you want to use a tree or matrix is to understand what two-dimensional means, and that it is really on practical if you have a two dimensional tree to convert that into a matrix. Going beyond two-dimensions can lead to a complicated diagram.

As a Political Science major this technique is fun to use. The set up is so simple and so versatile, you can add and take away, you can refine until the finished product can be applied to a pros-cons-and-fixes approach. With interests in human rights and localized conflicts you can apply this method in multiple ways, examples would be establishing refugee camps (locations), determining peacekeeping force sizes.

What— you can use this in your career? YES!

Consultant with the American Enterprise Institute for Public Policy Research
Academic Researcher for the American Foreign Policy Council

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Think tanks would be ideal for using decision/event tree’s or matrixes since they aid in research.

United Nations Children’s Fund (UNICEF)
Project Officer - where they would need you: Bujumbura, Burundi
World Bank
Financial Management Specialist- where they would need you Burkina Faso
Operations Analyst – where they would need you Tbilisi, Georgia

Aide agencies like the world bank and UNICEF have many job opportunities that rely on the ability to problem solve, so yes decision/event tree’s are probably common place in there problem solving approach.
COPING WITH THE BACK SEAT DRIVER TOOLKIT, CH5, “DIVERGENT/CONVERGENT THINKING”

Analyst: Brendan Wyman
Major: Political Science
Prospective PSU graduation date: Dec 2007
PSU Email: bjwyman@mail.plymouth.edu

Relevance:

Summary:

Addressed here is an understanding as to how convergent/divergent thinking is used within the analytic process. These two different modes are used throughout the entire analytic process. Neither one is better than the other except that both modes should be pursued at some point during the analytic process. First we need to address how these modes are used in our thinking, and then answer the important question as to why. Following, we would touch on why the social science community has determined it to be considered important in our field and label some positive and negative aspects of using these approaches.

The first matter to discuss about is what divergent and convergent thinking is all about. These two thinking styles should be addressed as two different modes which we are always in at separate times during the analytic process. While in the divergent mode, one would focus their mind from starting off of a specific point such as a specific problem and then “diverge” away from that point towards broader perspectives such as reanalyzing the evidence of the problem or even looking for new evidence or other causes of the problem. To think in a convergent manner, one would shift their attention from numerous facts of an issue and “converge” onto the specific issue or problem, this is ultimately narrowing one’s view of the problem.

Purpose:

These issues are important since while we are within the entire analytical process we are either in a divergent mode or convergent mode of thinking and because of these, social science community have determined this to be important to understand. Based on how important it is to distinguish one way of thinking about a problem from the other way.

Positive and Negative Aspects:

Finally some positive aspects of this thinking are that we can shift from proper brainstorming to finding solutions of problems. Some negative aspects are that many say divergent thinking does not come naturally to us while convergent thinking generally does, and because of that, this technique is generally not practices as effectively as it should be.

Practical Applications for PSU Students:

Relationship between Major and Technique:

As many other political science majors probably already know, this specific major, on one hand, lacks in specific training or knowledge for certain occupations which further advanced study is needed, but it does provide a wide array of insight which other areas lack in. It is the latter part which has drove me to pursue this degree in political science. I am thankful for being able to acquire an academic experience which has prepared me to examine issues in problems on a much broader scale than your average citizen. I am now able to take that extra step and lead groups of people towards proper measures which solve problems in an effective manner. Having a degree
in political science not only identifies this quality within me but also as well within all other political science majors out there. One of the specific traits that political science majors are generally able to perform better at than other majors, is an ability to differentiate between appropriate use of both divergent and convergent thinking as it may pertain to problem solving issues.

**Important Questions Best Served by this Tool:**
This direction now shifts to address which important questions this technique serves me best towards. I do believe that within any situation which requires problem solving, this approach is best suited. It does a great job under this situation because it requires appropriate brainstorming which later is progressed upon in order to solve the issue. The best way to understand this aspect even further is by placing it within a specific problem. While first applying it to a specific problem we need to keep in mind the first step is brainstorming issues of a problem. This is known as *divergent thinking*, and since divergent thinking is thought to be harder for us to perform, here are four rules to keep in mind when doing this step.

1. Remember that the more ideas you have the better off you would be.
2. You should attempt to build one idea upon another.
3. Do not disregard wacky ideas as not being good enough to use.
4. Bare in mind the Golden Rule which would allow us not to evaluate ideas during this process.

Alright after brainstorming is down we would arrange our ideas which we generated by the brainstorming and form a categorical list. This practice would be convergent thinking because it allows us to focus on the broad ideas and to place them into a smaller category. The final step involved not including the actually selection of the best idea is to select the practical and promising ideas by also using convergent thinking. In summary the practice uses this process:

- **Step 1 (divergent):** Brainstorm
- **Step 2 (convergent):** Categorize and cluster the ideas
- **Step 3 (convergent):** Select the practical and promising ideas to use

**Actual Scenario to Illustrate the Tool:**
The only other step to use in fully understanding this technique is to see this practice in use. Take the example of four roommates living in an apartment and it seems that the same two people are always washing everyone’s dishes. In order to solve this problem we should first brainstorm ideas of a solution to use in order to solve this problem so that everyone does their share of dishes.

1. Require that everyone does their dishes immediately after using them.
2. Award 24 hours to do dishes after using them.
3. Take all dishes out of cabinets and use only paper products
4. Watch over the roommates who do not wash them and call them on it.
5. Increase peer pressure so that others feel obligated to participate.
6. Damage roommates’ property until they conform to participating.
7. Continue to wash other people’s dishes without making an issue.
8. Continue to ask roommates to do their own dishes and not leave them.

Now that we have brainstormed, let’s categorize the ideas.
Involving rules:
  Require that everyone does their dishes immediately after using them.
  Award 24 hours to do dishes after using them.

Using peer pressure:
  Watch over the roommates who do not wash them and call them on it.
  Increase peer pressure so that others feel obligated to participate.
  Continue to ask roommates to do their own dishes and not leave them.

Illogical solutions:
  Take all dishes out of cabinets and use only paper products.
  Damage roommates’ property until they conform to participating.
  Continue to wash other people’s dishes without making an issue.
  Move out of apartment.

Final step is to use list which are practical to use.
  Agree upon a 24 hour leeway opportunity for washing our own dishes. Encourage
  everybody to clean up after themselves and to be accountable for their duties within the
  apartment.
  Speak to roommates immediately as they use dishes.

Looking Ahead to Your Career:

1. Public Administrator
   Type of Organization: Government
   Website: http://www.jobtarget.com/c/job.cfm?site_id=631&jb=1461196
   Relevant Position Name: Town Manager
   Why You Need This Skill Here: In order to assist a town or city to make rational decisions a
   Town Manger would use this skill when working in groups or any other form of decision
   making.

2. Policy Analysis
   Type of Organization: Non Profit, Africa Action
   Website: http://www.africaaction.org/about/jobs.php
   Relevant Position Name: Director of Department of Policy Analysis
   Why You Need This Skill Here: All decisions made by this position would require the process of
   convergent and divergent modes of thinking.

3. Business Managers
   Type of Organization: Private business
   Website: http://www.rayjobs.com/campus/Job_Search.html
   Relevant Position Name: Summer Internship business development
   Why You Need This Skill Here: Here you will make decisions which require you to branch out
   with brainstorming and then converge onto one idea.

4. Public Relations Specialists
   Type of Organization: Private business or public organization
   Website: http://marketing.about.com/od/exploremarketingcareers/l/blpublicrels.htm
   Relevant Position Name: Public Relations Specialists
   Why You Need This Skill Here: One would have to judge which perspective the organization
   should address and by doing so this skill will be used.

5. Human Resource Personal
   Type of Organization: Public, State of New Hampshire
   Website: http://www.state.nh.gov/hr/index.html
   Relevant Position Name: Human Resource Personal
   Why You Need This Skill Here: By working within an organization HR Personal would have to
   judge situation and by doing so they would use this skill.
**SUMMARY**

**DATA COLLECTION THROUGH:**
- Controlled experiments: does aspirin help reduce the risk of heart attacks?
- Observational Studies: what is George Bush’s approval rating?

**Summarizing and Interpreting Data**
- Grade distribution for this class.
- Analysis of our experimental results and observational studies.
- RBI, GAA.

**SAMPLING**
What is it?

Any *subset* of units collected in some manner from the **population**.

The *subset* IS the *sample*!!

The **population** is a collection of things, or the ENTIRE group about which information is sought, not how many people are living in a particular area.

Population: ALL PSU Students
Subset: PSU Students eating lunch in the HUB.

**PURPOSE**
We are mainly interested in characteristics of a population that are measurable such as **averages, differences and relationships**. These traits that can be quantified as a number are called population parameters.

**DEVELOPMENT AS A SOCIAL SCIENCE TOOL**

**Why** use a sample?? Instead of a whole **population**?

Too difficult to undertake to obtain information about the whole **population**, so we **sample** so we can make estimates or inferences about the population.

So a sample statistic is a number calculated from sample data about a characteristic or attribute of a population that focuses on an element, or a unit of analysis, being studied.

Elements are often individuals, but they can be almost any subset i.e., political speeches, wars, countries, etc…… BUT NOT ALL OF THEM!!!

**TYPES OF SAMPLES:**
1) SRS- Simple Random Sample
2) Systematic Samples
3) Stratified Samples
4) Cluster Samples
5) Nonprobability Samples
POSITIVE TRAITS, DRAWBACKS
The ability to sample using different techniques is an extremely good and inexpensive way to determine if a relationship exists. I have not found any drawbacks to sampling although some of the many different techniques have a certain amount of error.

PART TWO: PRACTICAL APPLICATIONS FOR PSU STUDENTS

RELATIONSHIP BETWEEN MAJOR AND TECHNIQUE
We use the technique of sampling in many applications whether to advance a policy or nix it- we sample our colleagues and institutions.

IMPORTANT QUESTIONS BEST SERVED BY THIS TOOL
Because scientific knowledge is based upon empirical research i.e., relying or based on observation or experience, we must understand the mechanics of measurement that we apply to our sample.

ACTUAL SCENARIO TO ILLUSTRATE THE TOOL
SRS—the Stratified Random sample.
The most common and easiest sampling to undertake in is the SRS- Simple Random Sample. Each element and combination of elements has an equal chance of being selected. See the example on the following page, presented on the next page as a spreadsheet.

Our example:
Chris’ tax preparation business has fifteen clients. Suppose we want to randomly interview five of these clients as a way to test for quality of service.
We can throw numbers in a hat, and pick them out one by one, or we can use random numbers!!
The table below illustrates the following discussion.
Random picks for a random selection:

<table>
<thead>
<tr>
<th>Class</th>
<th>ACT</th>
<th>SAT</th>
<th>HSK</th>
<th>GEP</th>
<th>PES</th>
<th>NSPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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</tr>
<tr>
<td>5</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Sample size:
- Liberal Arts: 200
- Engineering: 100
- Business: 200
- Total: 600

Proportion of students by major:
- Liberal Arts: 0.125
- Engineering: 0.025
- Business: 0.025
- Total: 0.25

Survey size:
- Client 07: 0.09
- Client 06: 0.08
- Client 05: 0.07
- Client 04: 0.06
- Client 03: 0.05
- Client 02: 0.04
- Client 01: 0.03

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Chirp Tax Preparation business example
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Keep in mind the distinguishing differences between randomization and a random sample. Randomization is a process: assigning individuals randomly to groups; and is something an investigator does. A random sample, by contrast, refers to how small a subject is selected from a larger “population.”

**Systematic Samples:** Elements are selected from a list at predetermined intervals. This is sometimes easier to apply however the elements are chosen from the list systematically vs. randomly. Every nth element on the list will be selected.

Ex: Every 3rd response will be selected for analysis from our sample:

1 agree
2 disagree
3 disagree
4 agree
5 agree
6 agree
7 agree
8 disagree
9 agree

**Stratified Samples:** This is when a sample in which elements share one or more characteristics are grouped, and elements from each group in proportion to the group’s representation in the total population.

**Excel**

**Cluster Samples:** Used mostly when we have no list of elements in the target population. Groups or clusters are identified and listed as sampling units. Then elements are identified and sampled for the sampled units.

**Nonprobability Samples:** A sample for which each element in the total population has an unknown probability of being selected.
Researchers sometimes feel that they can learn more by studying carefully selected and perhaps unusual cases than by studying representative ones.

**MEASURES OF CENTRAL TENDENCY**

Mean: The sum of the numbers divided by (n).
Median: The very middle number - not the average
Mode: The number appearing most frequently.

**MEASURES OF DISPERSION**

Characteristics of a set of data may not be evident if we only look at mean, median, and mode, so we also have to look at how widely scattered, or dispersed the data are.

**Range:** Difference between the largest and smallest numbers.

**Standard deviation:** The spread of the mean. How far from the mean does the data go? Usually its 3 standard deviations - but in finance we can go out to **FIVE** standard deviations which is more than 99.7%.
68-95-99.7 Rule
68% of the data will fall within 1 standard deviation of the mean.
95% of the data will fall within 2 standard deviations of the mean.
99.7 5 of the data will fall within 3 standard deviations of the mean.

PART THREE: LOOKING AHEAD TO YOUR CAREER

FIVE JOB SITES WHERE YOU NEED THIS TOOL

JOB SITE A. The Internal Revenue Service- IRS
TYPE OF ORGANIZATION: Dept of the Treasury
WEBSITE: www.irs.gov
RELEVANT POSITION NAME: Revenue Agent
WHY YOU NEED THIS SKILL/TOOL HERE: To analyze a myriad range of historical and current data and trends associated with each.

JOB SITE B. GAO- (Government Accounting Office)
TYPE OF ORGANIZATION: U.S. Government
WEBSITE: www.ustreasury.gov
RELEVANT POSITION NAME: Analyst
WHY YOU NEED THIS SKILL/TOOL HERE: To accurately produce statistics and relationships between them.

JOB SITE C. Plymouth State University
TYPE OF ORGANIZATION: Education
WEBSITE: www.plymouth.edu
RELEVANT POSITION NAME: Professor
WHY YOU NEED THIS SKILL/TOOL HERE: To teach students the relationship and techniques used in reference to quantitative and qualitative data.

JOB SITE D. Goldman Sachs
TYPE OF ORGANIZATION: Brokerage
WEBSITE: www.gschachs.com
RELEVANT POSITION NAME: Stock Trader
WHY YOU NEED THIS SKILL/TOOL HERE: To analyze the risk/reward factor of stocks/bonds/mutual funds.

JOB SITE E. Raytheon Company
TYPE OF ORGANIZATION: Private Defense Contractor
WEBSITE: www.raytheon.com
RELEVANT POSITION NAME: Engineer
WHY YOU NEED THIS SKILL/TOOL HERE: To manufacture missile defense systems with accuracy.
PART FOUR  RUNNING BAREFOOT THROUGH THE DATA

S/HE SAID, BUT I SAW Analysis, CH7, “EMPIRICAL, DIRECT/INDIRECT OBSERVATIONS”

Analyst: Brendan Wyman
Major: Political Science
Minors, concentrations, academic interests, etc.: Finance – US Stock Indexes ---The Apprentice.
Prospective PSU graduation date: Dec 2007
PSU Email: bjwyman@mail.plymouth.edu

Relevance:

Summary:

Two terms which are considered to be a part of empirical research are:

Indirect observation: which is are observed physical traces of behavior.
Direct observation: which consists of actual observation of behavior as it refers to an occurrence.

Indirect observation tends to be less common in social science research when compared to the hands on approach of direct observation. Next up to mention is the different ways in which data collection can be administered. First off there is interview data which would be performed by an analysts would use inductive observation when determining the fact of the phenomenon at hand. Another data collection piece is document analysis where the analyst would review past document in order to determine a greater insight into the phenomenon. Followed by the witness approach where the analyst would try to observe an occurrence in order to understand it greater. The last couple of terms to mention are different forms of physical trace measurement. One of which being erosion measurement which is when a form of wear is observed on some kind of material over a period of time. The other is accretion measurement which is when an analyst would use the deposition and accumulation of materials in order to compile their research towards the study.

Purpose:

This form of research collection and observation is used in the social science field because it identifies the different manners in which scientists can use their sources. Even worth noting that source identification is extremely important when it is involved with prioritizing sources into levels of importance.

Development as a Social Science Tool:

This study has developed within the field because it is used by a whole array group of researchers ranging from police officers, historians, and forensic scientists.

Positive Traits:

Some positive aspects of using this system are that it can be more accurate. By examining the sources of evidence along with identifying the how these sources were used, one would be able to determine a more confident result once they reach their conclusion.

Drawbacks:

Some negative aspects are that this approach can take more time and some evidence which a researcher may believe to be important, may actually not be that reliable in the end.

Practical Applications for PSU Students:

© Krisan L. Evenson, 2007  PO3660_PolAnalysis_PSUsersManual_Evenson_Sp07 32
Relationship between Major and Technique:

As a political science major I am drawn to this technique by a number of ways. Perhaps the most important one is that I feel a need to use the best sources available when I perform a research project. When I am not able to use the best sources, I feel that my final conclusion would be weaker in the end. These sources of empirical data are extremely important to understand because so much of the work that goes on in the field represents this kind of measure.

Important Questions Best Served by This Tool:

Some more generic questions which are addressed by this approach are such as, how is the data collected within this study? Or, which measures would I use while setting up this research design? Along with, how accurate is this example here that we observed the subject in this specific setting? All of these questions among many other can and would be used in empirical research. As long as it refers to labeling and compiling of research through the different means of conducting that research, you would be most likely referring to some form of empirical research.

Actual Scenario to Illustrate the Tool:

A good example to use here when referring to empirical research would be an assassination of a foreign leader from ten years ago. We can look at this example from many different angles. One of which would be to determine which would be indirect observation and direct observation. Some forms of indirect observation would be to start out by analyzing documents written by the CIA and other government agencies who would have investigated this assassination. This technique, which is quite common, is called document analysis. By performing this task one would not be able to control which information they are able to look at because this information was written for another purpose, but because this approach uses observations of the evidence it can be considered indirect observation. Another form on indirect observation would be to visit the scene where the assassination took place and visualize the setting and try to see under what conditions this act took place. Now for an example of direct observation, an analyst could watch a video of the occurrence in order to observe the actual behavior of the act as it took place. That scenario would be a situation where both direct observation and indirect observation would be performed.

Looking Ahead to Your Career:

1. CIA Intelligence Collector
   www.cia.gov . In order to collect together information for the research studies department there must people who can decipher between different research methods.

2. Police Officer in Hanover, NH
   http://www.hanovernh.org/stories/storyReader$953 . By being first on the scene of a crime a police officer would have to conduct interviews and examine evidence in order to be research at a later date.

3. Public Historian
   http://www.publichistory.org/employment/index.asp . A historian would have to determine between different sources of information in order to best determine the exact truth of an occurrence which may have happened years ago.

4. Environmental Protection Agency Researcher
   http://www.epa.gov/careers/stuopp.html#grograd . In order for the EPA to know the truth as to what is going on out in their jurisdiction, they would have to have someone who could use empirical research in order to find that information.

5. Marketing Coordinator/ Floor Planner
   http://www.careerbuilder.com/JobSeeker/Jobs/JobDetails.aspx . A floor planner would perform studies in order determine which products are sold more often when placed in certain positions in isles.
WHO'S ON FIRST, WHAT'S ON SECOND? TOOLKIT, CH6, “SORTING, CHRONOLOGIES, AND TIMELINES”

Analyst: Beth Porter
Major: Interdisciplinary
Minors, concentrations, academic interests, etc.: Anthropology, Sociology, Political Science
Prospective PSU graduation date: May 2007
PSU Email: baporter@mail.plymouth.edu

PART ONE: RELEVANCE

SUMMARY
Sorting, Chronologies and Time-lines are three tools in which to organize data in a sensible manner. They are just like how they sound as well, and you’ve probably used them before in your everyday life. Sorting is like a big umbrella over chronologies and time-lines because they are both types of sorting. To sort something is to put it in some kind of sensible order. Time-lines and chronologies are two steps to sorting information. Constructing a chronology or time-line is done in two steps, first starting off with a jumble of dates, then taking those dates in the second step, and putting them in the appropriate ascending or descending order.

PURPOSE:
The purpose of sorting is to see any gaps in our information. It also is a visual tool to aid us in understanding how the information is organized, and we can make inferences from our observations. This in turn aids us in the analysis of our information.

DEVELOPMENT AS A SOCIAL SCIENCE TOOL
These strategies have developed, in our own brains, and also in the social sciences. The need to visualize, and interpret data has developed this tool, and take it out of the context of the everyday (in our brains) and put it in to the social sciences.

POSITIVE TRAITS, DRAWBACKS
The positive aspect is that this tool helps us see the data, and understand where some is missing. Although this is basic, it’s an integral aspect to interpret our data.
The drawback is that it is so basic. More tools need to be involved to make sense of the data along with these tools.

PART TWO: PRACTICAL APPLICATIONS FOR PSU STUDENTS

RELATIONSHIP BETWEEN MAJOR AND TECHNIQUE (what drew you in)
For my major chronologies help when trying to understand when a certain event happened in recent history. For example, a paper written in social stratification needed much historical information, but I needed to be sure that the information, especially with laws, were chronological. It wouldn’t make sense to say that one law was passed before another to try to prove a point in a paper; this is where sorting/chronologies/timelines come in hand.

IMPORTANT QUESTIONS BEST SERVED BY THIS TOOL

ACTUAL SCENARIO TO ILLUSTRATE THE TOOL

PART THREE: LOOKING AHEAD TO YOUR CAREER
FIVE JOB SITES WHERE YOU NEED THIS TOOL

JOB SITE A. Summer Archeologist Positions
   TYPE OF ORGANIZATION: P-III Associates, Inc.
   RELEVANT POSITION NAME: Archaeologist
   WHY YOU NEED THIS SKILL/TOOL HERE In archaeology it is necessary to understand the
time-line in which you are conducting research in. Dirt strata is also a time line, the top being the earliest, and
deeper being older.

JOB SITE B. Dept. of the Air Force
   TYPE OF ORGANIZATION: Air Force
   WEBSITE http://federalgovernmentjobs.us/jobs/Historian-906832.html
   RELEVANT POSITION NAME: Historian
   WHY YOU NEED THIS SKILL/TOOL HERE It’s pretty obvious why you need it here, its
necessary to understand when events happened throughout history.

JOB SITE C. Brooklyn Public Library Director
   TYPE OF ORGANIZATION: Brooklyn Public Library
   RELEVANT POSITION NAME: Library Director
   WHY YOU NEED THIS SKILL/TOOL HERE It’s needed here for sorting books, and making sure
they are in the order of the Dewey decimal system.

JOB SITE D. U.S. Census
   TYPE OF ORGANIZATION: U.S. Census Statistician
   WEBSITE http://www.census.gov/hrd/www/jobs/ssdmstat.html
   RELEVANT POSITION NAME: Statistician
   WHY YOU NEED THIS SKILL/TOOL HERE Understanding numbers, sorting numbers, and
making sense of data is all needed at this job. When putting this data in to chronologies statisticians can
visualize data and see if some is missing.

JOB SITE E. Jack Henry & Associates
   TYPE OF ORGANIZATION: Business
   WEBSITE: www.jackhenry.com
   RELEVANT POSITION NAME: Business Analyst
   WHY YOU NEED THIS SKILL/TOOL HERE This is job has uses for these tools because of the
data that they have to analyze. Putting it in order and making sense of it for their projects for their customers.
Utility Analysis

According to Jones’ Toolkit, from the analytic point of view, utility means the benefit a person has received from a situation. There are three fundamental ingredients of utility analysis. They are options, outcomes, and perspectives.

Options are the choices that you as a researcher have to choose between. Let us say that a researcher is studying the best way to stimulate a struggling economy in a capitalist country via national income tax rates. The researcher’s final options are raising taxes (to put into the economy), lowering taxes (with the idea that the excess money would be reinvested in the market), or keeping taxes as they are (to see if things turn around on their own).

An outcome is what happens as a result of selecting the option chosen. Using the example of the tax options, the outcomes of choosing the above options are the economy stabilizing or continuing to struggle.

In utility analysis perspectives are points of view with respect to the outcomes. Perspectives are vital in studying the utility of the outcomes. The perspective in the tax case would be a more stable economy.

Utility-Tree Analysis. There are eight steps to completing a utility-tree.

1. Find all the options (raising taxes, lowering taxes, keeping them the same) and outcomes (to be analyzed)
2. Find the perspective of the analysis (a more stable economy)
3. Create a set of decision/event trees that show the options and outcomes (because there are three options there are three trees).

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<tr>
<th>Perspective: A more stable economy</th>
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<tbody>
<tr>
<td>Options</td>
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<tr>
<td>Raising taxes</td>
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<tr>
<td>Lowering taxes</td>
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<tr>
<td>Same taxes</td>
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<tr>
<td>Outcomes</td>
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<tr>
<td>Stable Economy</td>
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<tr>
<td>Struggling Economy</td>
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</tbody>
</table>

4. Giving a utility value to each option and outcome combination.

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<tr>
<th>Perspective: A more stable economy</th>
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<tbody>
<tr>
<td>Options</td>
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<td>Same taxes</td>
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<td>Outcomes</td>
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<td>Stable Economy</td>
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<td>Struggling Economy</td>
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<td>Utility</td>
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<td>15 billion</td>
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<td>25 billion</td>
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5. What is the probability of this outcome? I have assigned the probabilities for this example (the probability of an option must equal 1.0).

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<thead>
<tr>
<th>Perspective: A more stable economy</th>
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<tbody>
<tr>
<td>Options</td>
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<td>Outcomes</td>
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<tr>
<td>Stable Economy</td>
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<tr>
<td>Struggling Economy</td>
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<tr>
<td>Utility</td>
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<td>Probability</td>
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</table>
6. Find the expected value for each outcome (EV = Utility \times Probability). You then want to combine the EV’s of each option for a total EV.

<table>
<thead>
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<th>Perspective: A more stable economy</th>
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<tbody>
<tr>
<td><strong>Options</strong></td>
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<td>Raising taxes</td>
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<tr>
<td>Lowering taxes</td>
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<tr>
<td>Lowering taxes</td>
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<tr>
<td>Same taxes</td>
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<td>Same taxes</td>
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7. Rank the options based on the total expected value.

<table>
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<tr>
<td><strong>Options</strong></td>
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<tr>
<td>Lowering taxes</td>
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<td>Same taxes</td>
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8. “ Sanity Check”! Does this make sense? Is it rational? What do you think?

**Using Utility Trees in the Field.** Utility trees are necessary tools for the political science world. They help map out the result that will benefit the perspective best.

**Job Opportunities**

1. **CIA Political Analyst:**
The Central Intelligence Agency's Directorate of Intelligence has particular needs for analysts who specialize on China, North Korea, the Middle East, and South Asia and have more limited openings for specialists on Europe, Latin America, and Africa. Political analysts support US policymakers by evaluating the goals and motivations of foreign governments and entities.

A utility tree would be very useful in the initial research stage where you need to find out how something benefits a certain country or group of people.

Website: [https://www.cia.gov/careers/jobs/political_analyst.html](https://www.cia.gov/careers/jobs/political_analyst.html)

2. **IRS Policy Analyst:**
As a Policy Analyst, you will plan and coordinate research initiatives to review and revise tax administration practices, programs and policies.

An IRS Policy Analyst would use utility trees to see how a policy or practice benefits the agency.

Website: [http://jobs.irs.gov/car_other_research.html#POA](http://jobs.irs.gov/car_other_research.html#POA)

3. **IRS Artificial Intelligence Specialist:**
As an Artificial Intelligence Specialist, you will apply artificial intelligence techniques and other advanced computing skills to solve IRS business problems.

Utility trees would be used to find out how to solve business problems in the most beneficial way to the company.

Website: [http://jobs.irs.gov/car_other_research.html#POA](http://jobs.irs.gov/car_other_research.html#POA)
LISTENING TO THE MASSES: ANALYSIS, CH10, “SURVEY RESEARCH”

Analyst: Beth Porter
Major: Interdisciplinary: Anthropology, Sociology, Political Science
Minor: Spanish
Graduation: May 2007
Email: baporter@mail.plymouth.edu

Part I Relevance

Summary: Survey research is a tool used by many in the social sciences to reveal social phenomenon. Typically a survey is done in the form of an interview, whether it be in the form of a phone interview, a mass mailed survey, or opinion polling, they are all kinds of survey research. There are four important aspects to take in to account when performing a survey.

1. How are the questions worded? The wording of a question is important because if it is done correctly the results will be unbiased, however if it is leading or improperly administered it can throw off the results completely.

2. What types of questions should be used? Typically in a mass mailed survey, which will be statistically analyzed, it is far easier to implement close ended questions, those with a finite number of answers i.e. yes or no. In a more in depth interview, when depth and richness of information is desired, it would be more practical to use open-ended questions in which there can be a vast number of answers expressed.

3. What order should questions be placed in? For all kinds of surveys it follows some simple rules: easy “ice breaker” questions start off the survey. These can be just skimming the top of what your research question is. These are followed by the more elaborate, in depth questions that might take some time to answer. The survey is wrapped up with questions about demographics i.e. age, class standing, gender.

4. Is the design of the survey important? Yes, especially if it is one that is mass mailed, or handed out. The goal of the survey is its ability to extract a good amount of information from people, so it needs to be easily finished, not too long and self-explanatory.

Purpose: This method of data gathering is very common in the social sciences and other disciplines, such as marketing and business management. Surveying, used in conjunction with sampling this process surveying makes the gathering of social data amongst a large group of people relatively easy. This data can be used to determine sentiment about foreign policy among a population, or whether or not the specific populations likes “your” brand of hair care products.

Development as a social science tool: Surveying has developed out of the necessity to gather accurate information from a large population of people. The census is possibly one of the oldest forms of surveys as a social science tool. This was, and still is used to gather demographic information from the nation as a whole. With this information they can accurately infer the data on to the population of the US as a whole.

Positive Traits:

- close-ended questions are quick and easy to answer
- respondents are more willing to answer close-ended questions
- open-ended questions evoke more informative answers
- survey research is a good way of getting a lot of information from a sample population
- when set up correctly survey research can be a great tool to infer about a population
Drawbacks:

- double-barreled questions
  - eg. Do you agree that PSU should become a dry campus?
- ambiguous questions
  - eg. Do you like your job?
- leading question
  - eg. Don't you think George Bush should be impeached?
- Close-ended force a choice, even if the respondent does not feel that way.
- question wording may bias response
- open-ended questions may get too much information or too little information in return

Part II Practical Applications for PSU students

Relationship between major and technique: For any major in the social science department survey research is a great skill to have and maintain. As for specifically anthropology and sociology students, this skill is required of you to graduate. In Methods of Social Research and Anthropology/Sociology Seminar classes it is required to complete your senior thesis project.

Important questions best served by this tool: There are a million questions that are best served by survey research. The idea, however is to have a broad (not too broad) topic with multiple hypotheses to test for. The hypotheses become the base for the questions that are asked in the survey.

Actual scenario: The above sections are best demonstrated by my own personal experience. Being a part Anthropology/Sociology major I am required to participate in the Seminar class. My broad topic is: Causes of Political Participation on the PSU Campus. My hypothesis from which my questions are derived are the media’s effect on youth, lack of accurate, relevant information, group think’s effect on youth, and that the age and level of schooling also effects youth’s political participation. Example of the questions I used in my survey follows the rules stated in the summary and they are as follows:

Relevant information:

1. Where do you get a majority of the information on current events from? (check only one)
   - Television
   - Internet
   - Newspaper
   - Word of mouth
   - Professors

Media:

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

e. I do not participate in political activities because the media does not provide me with reliable information.
Group Think:

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>a. I form opinions about politics based on what I hear others discussing.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Age:

2. What is your age group:

☐ under 18
☐ 18-19
☐ 20-21
☐ 22-23
☐ 24-25
☐ over 25

Part III Looking Ahead to Your Career

Five job sites where you need this tool:

Job Site A
Type of Organization: US Dept. of Labor
Website: http://www.bls.gov/oco/ocos055.htm
Relevant Position Name: Economist
Why you need this skill here: To research inflation, interest rates, energy costs, and write up reports on this research using other research techniques.

Job Site B
Type of Organization: University of VA Center for Survey Research
Website: http://www.coopercenter.org/CSR/JOBS%20@%20CSR/
Relevant Position Name: Telephone Interviewer
Why you need this skill here: Understand and conduct social science research phone interviews.

Job Site C
Type of Organization: The Gallup Organization
Website: http://www.gallup.com/content/?CI=17569
Relevant Position Name: Survey Research Analyst
Why you need this skill here: Manage the research process that will be performed.

Job Site D
Type of Organization: MDRC
Website: http://www.mdrc.org/jobs_list.html
Relevant Position Name: Survey Research Assistant
Why you need this skill here: Creating, participating in and compiling research data are all aspects of this job.
**PART ONE: RELEVANCE**

**SUMMARY:** We are searching for relationships - or the lack of, when testing hypothesis about political phenomena of a sample.

**PURPOSE:** Requires the systematic study of two or more variables. The summary measurements are known as descriptive statistics that we analyze from. We gather the raw data by: Gathering, Organizing, Sorting, and Condensing. We can set-up our data matrix now in arrays of rows and columns that will store all our values, i.e., raw data.

**DEVELOPMENT AS A SOCIAL SCIENCE TOOL:** Statistical analysis has been used extensively in all areas of science, and particularly social science. We use charts, diagrams, matrices, and boxplots, among others, to analyze the results of our study.

**POSITIVE TRAITS, DRAWBACKS:** The best qualities pertaining to statistical analysis, is the vast “toolbox” that we have at our disposal. The only drawbacks that I can see might be the training required to compose and analyze the data, depending on the method used.

**PART TWO: PRACTICAL APPLICATIONS FOR PSU STUDENTS**

**RELATIONSHIP BETWEEN MAJOR AND TECHNIQUE:** All of the techniques that have been described are used extensively in my field of accounting and finance. We can, for example, construct a table of historical stock prices and extract some important data through statistical analysis. This analysis allows me to determine whether to buy, hold, or sell a particular stock.

**IMPORTANT QUESTIONS BEST SERVED BY THIS TOOL:** How does our sample data compare with the population? We use these methods to compare a sample with our hunches, or hypothesis. Sometimes we have zero hunches, so we sample and draw inferences from the population that we are studying.

**ACTUAL SCENARIO TO ILLUSTRATE THE TOOL:** Here are a few samples that I have chosen to be relevant:

![Histograms](image)

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This table and graph below represent two stocks, NSR, SYK, being allocated in different proportions in each of the 5 portfolios. As we see the efficient frontier extending outwards in the graph, we can conclude that to minimize our risk and maximize our return, we would invest with Portfolio #2. The graph represents a hyperbola. Our units of analysis are: (k) returns, and (σ) standard deviation.

<table>
<thead>
<tr>
<th>Percentage Allocation</th>
<th>100/0</th>
<th>75/25</th>
<th>50/50</th>
<th>25/75</th>
<th>0/100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio #</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Std Deviation</td>
<td>0.0100</td>
<td>0.0088</td>
<td>0.0098</td>
<td>0.0124</td>
<td>0.0159</td>
</tr>
<tr>
<td>Annual Returns</td>
<td>18.64%</td>
<td>19.98%</td>
<td>21.33%</td>
<td>22.69%</td>
<td>24.04%</td>
</tr>
<tr>
<td>Normalized (A) NSR</td>
<td>125</td>
<td>93.75</td>
<td>62.5</td>
<td>31.25</td>
<td>0</td>
</tr>
<tr>
<td>Normalized (B) SYK</td>
<td>0</td>
<td>52.5</td>
<td>105</td>
<td>167.5</td>
<td>210</td>
</tr>
</tbody>
</table>

**NSRGY-SYK PORTFOLIO**

**Internal Revenue Collections by type of Tax.**
PART THREE: LOOKING AHEAD TO YOUR CAREER

FIVE JOB SITES WHERE YOU NEED THIS TOOL

JOB SITE A. U.S. Treasury Department
   TYPE OF ORGANIZATION: U.S. Government
   WEBSITE: www.ustreas.gov
   RELEVANT POSITION NAME: Analyst
   WHY YOU NEED THIS SKILL/TOOL HERE: Derive comparatives and attributes of internal spending/cost control.

JOB SITE B. Cantor Fitzgerald, Inc.
   TYPE OF ORGANIZATION: Bond Finance
   WEBSITE: www.cantor.com
   RELEVANT POSITION NAME: Bond Analyst
   WHY YOU NEED THIS SKILL/TOOL HERE: Analyze bond indentures

JOB SITE C. __Morgan Stanley Brokerage.
   TYPE OF ORGANIZATION: Stock Brokerage Firm.
   WEBSITE: www.MorganStanley.com
   RELEVANT POSITION NAME: Stock Analyst.
   WHY YOU NEED THIS SKILL/TOOL HERE: To construct portfolios through relevant allocations, and with the objectives of the client.

JOB SITE D. Citizens Bank
   TYPE OF ORGANIZATION: Retail Banking
   WEBSITE: www.citizensbank.com
   RELEVANT POSITION NAME: Auditor
   WHY YOU NEED THIS SKILL/TOOL HERE: To build scenarios and models, of which are based on a statistical framework to successfully audit the books.

JOB SITE E. Abbott Laboratories
   TYPE OF ORGANIZATION: Pharmacology Research
   WEBSITE: www.abbellabs.com
   RELEVANT POSITION NAME: Principal Research Statistician
   WHY YOU NEED THIS SKILL/TOOL HERE: To apply methodology, analysis, and protocols to processes related to experimental and controlled drug experimentation.
PART FIVE: WHAT TO DO WITH ALL THIS DATA

SOME STUFF IS JUST MORE IMPORTANT TOOLKIT, CH10: WEIGHTED RANKING

Analyst: Brendan Wyman
Major: Political Science
Prospective PSU graduation date: Dec 2007
PSU Email: bjwyman@mail.plymouth.edu

Relevance:

Summary:

A summary of this method would be to compose a measure for us to take in order to order and rank items into a level of importance while minimizing a risk of biasness and instinctual preferences. There are nine steps of this process which Morgan Jones has laid out in his book, The Thinker’s Toolkit. There are as follows:
1. List all of the major criteria for ranking.
2. Pair-rank the criteria.
3. Select the top several criteria and weight them in percentiles. (Their sum must equal 1.0)
4. Construct a Weighted Ranking Matrix and enter the items to be ranked, the selected criteria, and criteria weights.
5. Pair-rank all of the items by each criterion, recording in the appropriate spaces the number of “votes” each item receives.
6. Multiply the votes by the respective criterion’s weight.
7. Add the weighted votes for each item and enter the sums in the column headed “Total Votes.”
8. Determine the final rankings and enter them in the last column, headed “Final Ranking.” The item with the most votes I ranked highest.
9. Perform a sanity check.

Purpose: The purpose of this method as mentioned before is to allow the participant performing the method to rank in preference multiple items based on an assortment of criteria so that the level of priority given to a specific item can be scientifically justified.

Development as a social science tool: Within the field of social science, a common practice used in many studies or analysis reports is to prioritize items into a rank with one item being either better or more important than other items. In order to ensure the most scientific results of these lists the weighted ranking system was created, which allows a more systematic method of categorizing the priority of each item during the ranking.

Positive Traits: This shows the person who examines the ranked list after being published the exact reasons for what criteria each item was judged by. It gives a more in depth look into the value of the rankings. Also for the person performing the ranking, they can avoid using an instinctual ranking system in their head which may be nonproductive.

Drawbacks: The biggest drawback which would always be debatable is that even though this method is more productive than single instinctual ranking, it still would always hold some level of biasness. This would always be present in any sort of determinant ranking system.

Practical Applications for PSU Students:
**Relationship between major and technique:** What drew me into learning more about weighted ranking as a political science major was that I first considered weighted ranking to be an example of a bias technique which I inevitably thought was a great example of how Political Science is not a scientific study. I learned while examining it further that through this specific technique, it comes as close as humanly possible to rank items in a scientific manner.

**Important questions best served by this tool:** The first and most important question served by this tool is when someone asks, to what criteria were these items held against. That question would by far be the most common one heard when showing a ranked list to the public or other colleagues.

**Actual scenario to illustrate the tool:** Ranking Varieties of Beer

Initial list of beers:
- Pale Ale
- Indian Pale Ale
- Stout
- Lager
- Pilsner
- Belgian
- Hefenweizen
- Light
- Porter

**Step 1:** List all of the major criteria for ranking.
- Bitterness
- Hops
- Flavor
- Smoothness

**Step 2:** Pair-rank the criteria
Here we use what is called a pair rank method where we judge the first category and pair it up to the second category and judge which one is better. From there we pair the first category with the third category and judge as well. Then we pair the first category with the fourth category and so on until all of the categories have been compared with each other.
- Bitterness
- Hops
- Flavor
- Smoothness

This is how we determined it:
- Bitterness>Hops, Bitterness>Flavor, Bitterness>Smoothness, Hops>Flavor,
- Hops>Smoothness, Flavor>Smoothness

**Step 3:** Select the top several criteria and weight them in percentiles.
- Bitterness .3
- Hops .5
- Flavor .2
- Smoothness

Because Smoothness did not score during the pair ranking we withdrew it from our method because it is no longer considered a determining factor.

**Step 4:** Construct a Weighted Ranking Matrix and enter the items to be ranked, the selected criteria, and criteria weights (see below).
<table>
<thead>
<tr>
<th>Type of Beer</th>
<th>Hops</th>
<th>Bitterness</th>
<th>Flavor</th>
<th>Total Votes/ Final Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pale Ale</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indian Pale Ale</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stout</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lager</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilsner</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgian</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hefenweizen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Step 5:** Pair-rank all of the items by each criterion, recording in the appropriate spaces the number of “votes” each item receives.

<table>
<thead>
<tr>
<th>Type of Beer</th>
<th>Hops</th>
<th>Bitterness</th>
<th>Flavor</th>
<th>Total Votes/ Final Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pale Ale</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Indian Pale Ale</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Stout</td>
<td>8</td>
<td>8</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Lager</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Pilsner</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Belgian</td>
<td>5</td>
<td>3</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Hefenweizen</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Porter</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Step 6:** Multiply the votes by the respective criterion’s weight.

<table>
<thead>
<tr>
<th>Type of Beer</th>
<th>Hops</th>
<th>Bitterness</th>
<th>Flavor</th>
<th>Total Votes/ Final Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pale Ale</td>
<td>2*.5=1</td>
<td>2*.3=.6</td>
<td>2*.2=.4</td>
<td></td>
</tr>
<tr>
<td>Indian Pale Ale</td>
<td>1*.5=.5</td>
<td>1*.3=.3</td>
<td>1*.2=.2</td>
<td></td>
</tr>
<tr>
<td>Stout</td>
<td>8*.5=4</td>
<td>8*.3=2.4</td>
<td>3*.2=.6</td>
<td></td>
</tr>
<tr>
<td>Lager</td>
<td>6*.5=3</td>
<td>7*.3=2.1</td>
<td>4*.2=.8</td>
<td></td>
</tr>
<tr>
<td>Pilsner</td>
<td>3*.5=1.5</td>
<td>4*.3=1.2</td>
<td>6*.2=1.2</td>
<td></td>
</tr>
<tr>
<td>Belgian</td>
<td>5*.5=2.5</td>
<td>3*.3=.9</td>
<td>8*.2=1.6</td>
<td></td>
</tr>
<tr>
<td>Hefenweizen</td>
<td>4*.5=2</td>
<td>5*.3=1.5</td>
<td>7*.2=1.4</td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>9*.5=4.5</td>
<td>9*.3=2.7</td>
<td>9*.2=1.8</td>
<td></td>
</tr>
<tr>
<td>Porter</td>
<td>7*.5=3.5</td>
<td>6*.3=1.8</td>
<td>5*.2=1</td>
<td></td>
</tr>
</tbody>
</table>

**Step 7:** Add the weighted votes for each item and enter the sums in the column headed “Total Votes.”

<table>
<thead>
<tr>
<th>Type of Beer</th>
<th>Hops</th>
<th>Bitterness</th>
<th>Flavor</th>
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<td></td>
</tr>
<tr>
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<td></td>
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<td></td>
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<td>4*.3=1.2</td>
<td>6*.2=1.2</td>
<td></td>
</tr>
<tr>
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<td>3*.3=.9</td>
<td>8*.2=1.6</td>
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<tr>
<td>Hefenweizen</td>
<td>4*.5=2</td>
<td>5*.3=1.5</td>
<td>7*.2=1.4</td>
<td></td>
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<tr>
<td>Light</td>
<td>9*.5=4.5</td>
<td>9*.3=2.7</td>
<td>9*.2=1.8</td>
<td></td>
</tr>
<tr>
<td>Porter</td>
<td>7*.5=3.5</td>
<td>6*.3=1.8</td>
<td>5*.2=1</td>
<td></td>
</tr>
</tbody>
</table>

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### Step 8: Determine the final rankings and enter them in the last column, headed “Final Ranking.” The item with the most votes I ranked highest.

<table>
<thead>
<tr>
<th>Type of Beer</th>
<th>Hops</th>
<th>Bitterness</th>
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<td>2*2=.4</td>
<td>2 =2</td>
</tr>
<tr>
<td>Indian Pale Ale</td>
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<td>1 =1</td>
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<tr>
<td>Stout</td>
<td>8*5=4</td>
<td>8*3=2.4</td>
<td>3*2=.6</td>
<td>7 =8</td>
</tr>
<tr>
<td>Lager</td>
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<td>7*3=2.1</td>
<td>4*2=.8</td>
<td>5.9 =6</td>
</tr>
<tr>
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<td>4*3=1.2</td>
<td>6*2=1.2</td>
<td>3.9 =3</td>
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<td>3*3=.9</td>
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<td>5 =5</td>
</tr>
<tr>
<td>Hefenweizen</td>
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<td>4.9 =4</td>
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<tr>
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<td>6.3 =7</td>
</tr>
</tbody>
</table>

### Step 9: Perform a sanity check. I am surprised that Stouts ended up so high on the list. Perhaps I should have included the smoothness category after all. Other than that all seems to have met my expectations.

### Job Opportunities:

**Job Site: Political Consultant**

*Type of Organization:* Political Campaign  
*Relevant Position Name:* Campaign Manager  
*Why You Need This Skill:* In order to determine which issues a candidate should be stronger towards, a political consultant would use weighted ranking.

**Job Site: Advocacy Analyst**

*Type of Organization:* Stateside Associates  
*Relevant Position Name:* Environmental Regulatory Analyst  
*Why You Need This Skill:* In order to determine which issues an advocacy group would focus on during a week to week basis an analyst would use Weighted Ranking.

**Job Site: Public Relations Specialist**

*Type of Organization:* Girl Scout Counsel of Our Nation’s Capital  
*Relevant Position Name:* Public Relations Specialists  
*Why You Need This Skill:* By working with the public a relations specialist would need to use weighted ranking in order to determine which information their organization should address on a daily basis.

**Job Site: Foundation Advisor**

*Type of Organization:* Tulsa Community Foundation  
*Website:* [http://www.tulsacaf.org/advisors_management.asp](http://www.tulsacaf.org/advisors_management.asp)  
*Relevant Position Name:* Project Management  
*Why You Need This Skill:* In order to determine which applicants would receive funds from a foundation, an advisor would use weighted ranking to determine which applicants are better than others.

**Job Site: Food Critic**

*Type of Organization:* Internet Website Journalist  
*Relevant Position Name:* Food Writer  
*Why You Need This Skill:* By judging qualities of food, a food critic would use weighted ranking by incorporating all of the methods laid out by Jones.
Hypotheses

According to Jones’ Toolkit a hypothesis is a declarative statement that has not been established as true. If it were established as true it would not be a hypothesis. A hypothesis can never be proven true, we can only disprove hypotheses.

To disprove a hypothesis evidence is needed. The evidence needs to be valid to disprove a hypothesis. Jones lists four questions to use while establishing the evidences’ validity.

1. Who or what was the source of your evidence?
2. How did your source obtain the information? Is it a reliable way to get the evidence?
3. Does the source you chose have a good reputation? Is it reliable?
4. Does it make common sense?

All competing hypotheses for your problem should be examined. To test the validity of the possible hypotheses, hypothesis testing is used. Hypothesis testing ranks competing hypotheses by the evidence. The way to look at this is by seeing which hypothesis has the least inconsistent evidence (not the most consistent). This is because the hypothesis with the most consistent evidence might also have to most inconsistent evidence.

Jones’ Eight Steps for testing hypotheses

There are eight essential steps to take while you are testing your hypotheses. Let us take the hypothetical (yet seemingly real) scenario of Plymouth State University looking at their smoking policy.

Currently PSU has the policy that no person shall smoke within twenty feet of any building on campus. The campus officials have noticed that students and staff are not adhering to this policy. They wonder why. To find out the most likely reason, the PSU officials hire somebody to come up with hypotheses and test them.

**Step 1:** Generate Hypothesis: First the hired man (Bob) wrote down all of the hypotheses that he could think of for why people are not following the new rule.
1. Everyone loves smoking.
2. Smokers do not want to get wet in the rain.
3. Receptacles for cigarette butts are still on or near the buildings.
4. People on campus are just lazy.

After coming up with an initial list Bob eliminated the unrealistic one(s). He came up with three:
Smokers do not want to get wet in the rain, receptacles for cigarette butts are still on or near the buildings, and people on campus are just lazy.

**Step 2:** Build a matrix.

<table>
<thead>
<tr>
<th>Evidence</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rain</td>
</tr>
<tr>
<td></td>
<td>Receptacles</td>
</tr>
<tr>
<td></td>
<td>Lazy</td>
</tr>
</tbody>
</table>

**Step 3:** List significant evidence in the evidence column. Be sure to include evidence that is absent.
<table>
<thead>
<tr>
<th>Evidence</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students standing in doorway in rain</td>
<td>Rain</td>
</tr>
<tr>
<td>Students throwing butts on ground</td>
<td>Receptibles</td>
</tr>
<tr>
<td>People talking and smoking in doorways</td>
<td>Lazy</td>
</tr>
<tr>
<td>People walking out the building and smoking</td>
<td></td>
</tr>
<tr>
<td>in the entrance</td>
<td></td>
</tr>
</tbody>
</table>

**Step 4:** Test evidence for consistency/inconsistency with each hypothesis.

<table>
<thead>
<tr>
<th>Evidence</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students standing in doorway in rain</td>
<td>Rain</td>
</tr>
<tr>
<td>Students throwing butts on ground</td>
<td>Receptibles</td>
</tr>
<tr>
<td>People talking and smoking in doorways</td>
<td>Lazy</td>
</tr>
<tr>
<td>People walking out the building and smoking</td>
<td></td>
</tr>
<tr>
<td>in the entrance</td>
<td></td>
</tr>
<tr>
<td>Students smoking near the building but in</td>
<td></td>
</tr>
<tr>
<td>the rain</td>
<td></td>
</tr>
</tbody>
</table>

**Step 5:** Refine matrix. Bob had to go through and see if his hypotheses needed rewording. They did not. If he did reword any he would have to add any other relevant evidence. Bob had to delete all the consistent evidence (although he kept a record of it) because it had no analytic value.

<table>
<thead>
<tr>
<th>Evidence</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students throwing butts on ground</td>
<td>Rain</td>
</tr>
<tr>
<td>Students smoking near the building but in</td>
<td>Receptibles</td>
</tr>
<tr>
<td>the rain</td>
<td>Lazy</td>
</tr>
</tbody>
</table>

**Step 6:** Get rid of any hypotheses with a lot of inconsistent evidence. Bob found that there were two with more that the third but not an overwhelming amount of inconstancies.

<table>
<thead>
<tr>
<th>Evidence</th>
<th>Hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students throwing butts on ground</td>
<td>Rain</td>
</tr>
<tr>
<td>Students smoking near the building but in</td>
<td>Receptibles</td>
</tr>
<tr>
<td>the rain</td>
<td>Lazy</td>
</tr>
</tbody>
</table>

**Step 7:** Rank the remaining hypothesis by the weakness of the inconsistent evidence. Bob found that the most likely hypotheses was that the smokers on the PSU campus are lazy.
Evidence | Hypotheses
--- | --- | --- | ---
 | Rain | Recepticles | Lazy
Students throwing butts on ground | C | I | C
Students smoking near the building but in the rain | I | C | C

**Step 8:** Check sanity. Does it all make sense? Bob thought it did!

**Positive Traits and Drawbacks**

There are a lot of positive aspects of hypothesis testing. By testing a variety of hypotheses there is more of a chance of an accurate study. It is crucial to a research project and the research report.

There is a chance that the researcher can miss a hypothesis and forget to include it in their test.

**Used in Political Science**

Hypothesis testing is crucial to political scientists. When the analysts are researching and writing reports they have to choose the best hypothesis possible so that their research is successful and their results accepted.

**Job Opportunities**

1. **CIA Political Analyst:** The Central Intelligence Agency's Directorate of Intelligence has particular needs for analysts who specialize on China, North Korea, the Middle East, and South Asia and have more limited openings for specialists on Europe, Latin America, and Africa. Political analysts support US policymakers by evaluating the goals and motivations of foreign governments and entities.

   Hypothesis testing would be used to find the best possible angle to study a research problem from. You need to know what you are studying for and if it is the most reliable one to go for.

   Website: [https://www.cia.gov/careers/jobs/political_analyst.html](https://www.cia.gov/careers/jobs/political_analyst.html)

2. **IRS Policy Analyst:** As a Policy Analyst, you will plan and coordinate research initiatives to review and revise tax administration practices, programs and policies.

   An IRS Policy Analyst would use hypothesis testing to find the best hypothesis or reasons why things are not working or why they are.

   Website: [http://jobs.irs.gov/car_other_research.html#POA](http://jobs.irs.gov/car_other_research.html#POA)

3. **IRS Artificial Intelligence Specialist:** As an Artificial Intelligence Specialist, you will apply artificial intelligence techniques and other advanced computing skills to solve IRS business problems. Hypothesis testing would be used to find the problem and be able to start working on the solution.

   Website: [http://jobs.irs.gov/car_other_research.html#POA](http://jobs.irs.gov/car_other_research.html#POA)

© Krisan L. Evenson, 2007  PO3660_PolAnalysis_PSUsersManual_Evenson_Sp07 50
Relevance:

**Summary:** This Step is taken after all of the data are collected and the analyst is able to test their hypotheses. In testing hypotheses five general questions must be addressed:

1. Is there a relationship between the independent and dependent variables in the hypothesis?
2. What is the direction or shape of the relationship?
3. How strong is the relationship?
4. Is the relationship statistically significant?
5. Is the relationship a causal one?

A cross tabulation is used in order to show the distinction between independent and dependent variables. This crosstab displays the joint distribution of values of the variables in a simple table by listing the categories for one of the variables along one side of the table and the levels for the other variable across the top. The different directional shapes of the relationships are as follows:

*Positive relationship:* low values of one variable are associated with low values of another and high values of the first are associated with high values of the second.

*Negative relationship:* low values of one variable are associated with high values of another and high values of the first are associated with low values of the second.

The strength of a relation between these two variable fall between two terms, one being a perfect relationship where the dependent variable is perfectly associated with the independent variable with no exceptions and a nonexistent relationship where there is no relationship between the two variables at all.

Two variables are *statistically independent* if and only if the chance of observing a combination of categories is equal to the marginal probability of one category times the marginal probability of the other.

**Purpose:** The purpose of using this method is to be able to express how independent and dependent variables relate to one another and so the intent of the hypotheses that the analyst made can be challenged from the data already collected. At this point the analyst can either confirm or dismiss their hypotheses and challenge a null hypothesis which would say that there is not relationship between the two variables at all.

**Development as a Social Science Tool:** This method has developed as a social science tool due to the necessity of scientifically evaluating a hypothesis after all of the data has been collected. In order for social scientists to be as thorough as possible they have needed to use this method so that consistently their methods would be accountable and understood by all other researchers in the field.

**Positive Traits:** Some positive traits of this method are that it allows data to be consistently compared to the hypotheses created. The method provides a thorough look into scientifically examining the significance of variables in any study.

**Negative Traits:** The most obvious negative trait of this method is how difficult the method is to understand and perform. In most circumstances the mathematical work done during this process is not the analyst’s expertise. They generally would try to modify this step into an easier formula while leaving out some of the necessary procedures.

**Practical Applications for PSU Students:**
**Relationship between Major and Technique:** I was drawn into this approach because I recently came from taking Statistics the semester before. I wanted to know how in social science we use the formulas and methods which I learned in that class. Once I studied this approach I could tell that in social science we use all if not more of the methods that I learned in Statistics. This is a great skill to be familiar with as a Political Science Major because this trait would better qualify anyone who is interested in pursuing a career in this field.

**Important Questions Best Served by this Tool:** The number one question best served by this method is whether or not there is a relationship between the two variables based on the data collected. In order to solve this question to the fullest and to test to see if the data collected is relevant and accurate, an analyst would use this approach.

**Actual Scenario to Illustrate the Tool:** The study here shows that less young adults have health insurance than older adults. First I will demonstrate my data by compelling it into a crosstab table.

<table>
<thead>
<tr>
<th>Independent (X)</th>
<th>Dependent (Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Ages</td>
<td>Have Coverage (H)</td>
</tr>
<tr>
<td>Young (J)</td>
<td>30</td>
</tr>
<tr>
<td>Old (O)</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>155</td>
</tr>
</tbody>
</table>

1. **Is there a relationship between the variables?** Yes, because the values of the observations for one variable are associated with or connected to the values of the other.

2. **What is the direction or shape of the relationship?** The direction is positive because as the adult ages rises (dependent variable) the amount of people with health care rise as well (independent variable).

3. **How strong is the relationship?** The strength of this relation is strong because the amount of young adults with health care is very different than the amount of older adults with health care.

4. **Is the relationship statistically independent?**
   
   \[
   p(Y=H)=\frac{155}{400}=0.3875
   
   p(X=J)=\frac{200}{400}=0.5
   
   (0.3875)(0.05)=0.19375
   
   30/300=0.1
   \]

   No, the two variables are not statistically independent.

5. **How does it compare to the chi-square test? Would the data reflect the target population?**

   Cell a: (30) \(\frac{155}{400}=11.625\)
   
   Cell b: (125) \(\frac{155}{400}=48.4375\)
   
   Cell c: (170) \(\frac{245}{400}=104.125\)
   
   Cell d: (75) \(\frac{245}{400}=45.9375\)

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed V</th>
<th>Expected V</th>
<th>Difference</th>
<th>(Difference) Squared</th>
<th>D/Expected V</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>30</td>
<td>11.625</td>
<td>18</td>
<td>324</td>
<td>27</td>
</tr>
<tr>
<td>b</td>
<td>125</td>
<td>48.438</td>
<td>77</td>
<td>5929</td>
<td>123.5208333</td>
</tr>
<tr>
<td>c</td>
<td>170</td>
<td>104.125</td>
<td>66</td>
<td>4356</td>
<td>41.88461538</td>
</tr>
<tr>
<td>d</td>
<td>75</td>
<td>46.936</td>
<td>29</td>
<td>841</td>
<td>18.2826087</td>
</tr>
</tbody>
</table>

- In order to reject the null we use degrees of freedom.
  
  (Columns – 1) (Rows – 1)
  
  \((2-1)=1\) \((2-1)=1\)
  
  \((1)(1)=1\) D of F=6.635 Yes, we can reject the null
Looking Ahead to your Career:

Job Site A. Government Analysis
Type of Organization: Local Government Analysis and Research
Website: [http://www.lgar.local.gov.uk/lgv/core/page.do?pageId=11457](http://www.lgar.local.gov.uk/lgv/core/page.do?pageId=11457)
Relevant Position Name: Researcher
Why You Need This Skill Here: In order to perform research for many public organizations, they would hire someone to oversee and construct research which would be used into the over all work by the organization.

Job Site B. United States Census Bureau
Type of Organization: United States Government
Website: [http://www.census.gov/hrd/www/jobs/ssdmstat.html](http://www.census.gov/hrd/www/jobs/ssdmstat.html)
Relevant Position Name: Statistician
Why You Need This Skill Here: In order to compute and analyze all of the statistics that the Census Bureau collects they need people who are experts in performing this skill so that their studies are effective.

Job Site C. Statistics Teacher
Type of Organization: University
Website: [http://www.stat.harvard.edu/?mode=Academics&page=tf_description.html](http://www.stat.harvard.edu/?mode=Academics&page=tf_description.html)
Relevant Position Name: Teaching Fellowship
Why You Need This Skill Here: In order to teach statistics to a class a person must know how to perform this step in hypotheses testing.

Job Site D. Bank of America Proposal Specialist
Type of Organization: Large Bank Company
Relevant Position Name: Proposal Specialist (within financial services industry)
Why You Need This Skill Here: A financial service specialist would need to apply data collected to hypotheses the organization has made and test to see if they work.

Job Site E. Sales Analyst
Type of Organization: Large Private Business
Relevant Position Name: Sales
Why You Need This Skill Here: In order to establish better sales for the company you would conduct studies in order to determine if your hypotheses are correct.
TAKING TWO TO TANGO: ANALYSIS, CH12: BIVARIATE REGRESSION ANALYSIS

Analyst: Beth Porter
Major: Interdisciplinary: Anthropology, Sociology, Political Science
Minor: Spanish
Graduation: May 2007
Email: baporter@mail.plymouth.edu

Part I Relevance

Summary:
Regression analysis is a tool for deciphering relationships between data sets and also testing hypotheses. These relationships can be positive, negative and none. With a positive relationship or correlation between data sets the regression line will slope upwards from the y axis, a negative relationship it will slope downward from the y axis, and with no relationship there will be no slope of the regression line. The Y axis houses the dependent variable, while the X axis houses the independent variable. The goal of regression analysis is to find a line that best fits all of the data plotted out on a typical x y axis grid. This best fitting line is the line that comes in to close proximity with a majority of the plots on the grid. From the slope of the line information can be determined that may or may not be present.

Purpose:
The purpose of regression analysis is to compare the relationships or correlations between multiple variables, or data sets. Regression analysis also uses a tool called the ‘best fit’ line which is determined through equations that it is the expected outcome of the data, how the dots are placed in relation to this line determines the level of error involved with the analysis.

Development as a social science tool:
Regression analysis has developed out of the need for an appropriate tool for analyzing multiple relationships, their correlations and any error that might be involved. This is the ‘hard science’ aspect to social research. Through regression analysis it can be determined whether or not there is a relationship between variables. If there is a relationship, hypotheses can be proven or disproved depending on their intent.

Positive Traits:
Good for determining relationships
Good for making future predictions
Can be done easily in programs such as SPSS

Drawbacks:
Not as easy as it initially seems
Drawn out calculations

Part II Practical Applications for PSU students

Relationship between major and technique:
As an anthro/soc. major regression analysis is very pertinent. It is taught in Methods of Social Research using the program SPSS, and is also taught in the math department as Statistics. It is then implemented in the Anthro/Soc. Senior Seminar class in which social research is conducted.

Important questions best served by this tool:
Hypotheses in social research are best served by this tool. A good example of this is the relationship between socio-economic status and charity giving. The Y axis would be the amount given; the X axis would be the economic status of the individual.
Actual scenario:

<table>
<thead>
<tr>
<th>Income</th>
<th>Charity Giving</th>
</tr>
</thead>
<tbody>
<tr>
<td>15000.00</td>
<td>100.00</td>
</tr>
<tr>
<td>45000.00</td>
<td>450.00</td>
</tr>
<tr>
<td>20000.00</td>
<td>250.00</td>
</tr>
<tr>
<td>110000.0</td>
<td>900.00</td>
</tr>
<tr>
<td>80000.00</td>
<td>500.00</td>
</tr>
</tbody>
</table>

Scatterplot of Data (Courtesy of EXCEL)

As we can see from the direction of the data, it is a positive relationship.

How to find the best fit line (courtesy of SPSS):

\[ y = a + BX + e \]

**Variables Entered/Removed**

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VAR00001a</td>
<td></td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. All requested variables entered.
b. Dependent Variable: VAR00002

**Model Summary**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.956a</td>
<td>.914</td>
<td>.886</td>
<td>102.45280</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), VAR00001
ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>335510.3</td>
<td>1</td>
<td>335510.274</td>
<td>31.964</td>
<td>.011</td>
</tr>
<tr>
<td>Residual</td>
<td>31489.726</td>
<td>3</td>
<td>10496.575</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>367000.0</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), VAR00001
b. Dependent Variable: VAR00002

coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>54.110</td>
<td>.82207</td>
</tr>
<tr>
<td>VAR00001</td>
<td>.007</td>
<td>.001</td>
</tr>
</tbody>
</table>

a. Dependent Variable: VAR00002

Best fit line (courtesy of SPSS):

Part III Looking Ahead to Your Career

Five job sites where you need this tool:

Job Site A
- Type of Organization: American Statistical Association
- Website: [http://www.amstat.org](http://www.amstat.org)
- Relevant Position Name: Senior Researcher/Forecaster
- Why you need this skill here: Regression techniques will be a must at this job because it involves forecasting for the future, along with developing statistics on socio-economics and land use.

Job Site B
- Type of Organization: US Dept. of Labor
- Website: [http://www.bls.gov/oco/ocos045.htm#related](http://www.bls.gov/oco/ocos045.htm#related)
- Relevant Position Name: Statistician
- Why you need this skill here: Make predictions about behaviors through the use of regression analysis. Also compare multiple data sets and hypothesis to retriever accurate information on the group being studied.
Job Site C

Type of Organization: commercial enterprise
Website: http://www.cybercoders.com
Relevant Position Name: Retail Analyst
Why you need this skill here: Regression analysis is needed to assist those in real estate determine where new businesses should open up.

Job Site D

Type of Organization: commercial enterprise
Website: http://www.crossix.com
Relevant Position Name: Data Analyst
Why you need this skill: Use regression and other statistical skills to help clients with their needs.
The Matrix. A matrix is a grid that has as many cells as required for whatever problem is being studied. Matrices are used to layout information into a clear and understandable visual.

Problem
Officials at Plymouth State University just found their dining hall covered in graffiti. The spray-painted words read “SERVING MEAT IS MURDER”. Students and Staff are getting irritated because it seems the Campus Police are not doing enough to find out who could have done this.
Evidence of leftover spray paint cans is found in the car of a known student animal rights activist. There are also empty beer cans scattered around the dining hall.

Steps
Step One: The Campus Police need to come up with all of the possible suspects of this crime
Suspects
-Susie, a student animal rights activist
-Bobby, a drunken college student
-Steve, a punk rocker

Step Two: Look through all the evidence and see which things can be eliminated.
-Steve, a punk rocker

Step Three: Construct a matrix.

<table>
<thead>
<tr>
<th>Suspects</th>
<th>Beer Cans Scattered</th>
<th>Spraypaint Cans in activist’s car</th>
<th>Animal rights words on buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susie</td>
<td>y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Bobby</td>
<td>y</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Step Four: What do you think the problem was?

Job Opportunities
1. CIA Political Analyst: The Central Intelligence Agency’s Directorate of Intelligence has particular needs for analysts who specialize on China, North Korea, the Middle East, and South Asia and have more limited openings for specialists on Europe, Latin America, and Africa. Political analysts support US policymakers by evaluating the goals and motivations of foreign governments and entities. Matrices would be very useful in organizing data that is brought in or that you gather as an analyst. Website: https://www.cia.gov/careers/jobs/political_analyst.html

2. IRS Policy Analyst: As a Policy Analyst, you will plan and coordinate research initiatives to review and revise tax administration practices, programs and policies. An IRS Policy Analyst would use matrices to organize research and the administration practices. This would be great for problem solving too. Website: http://jobs.irs.gov/car_other_research.html#POA

3. IRS Artificial Intelligence Specialist: As an Artificial Intelligence Specialist, you will apply artificial intelligence techniques and other advanced computing skills to solve IRS business problems. Matrices would be used to organize the problems and evidence to find possible solutions. Website: http://jobs.irs.gov/car_other_research.html#POA
Utility Analysis

According to Jones’ *Toolkit*, from the analytic point of view, utility means the benefit a person has received from a situation. There are three fundamental ingredients of utility analysis. They are options, outcomes, and perspectives.

Options are the choices that you as a researcher have to choose between. Let us say that a researcher is studying the best way to stimulate a struggling economy in a capitalist country via national income tax rates. The researcher’s final options are raising taxes (to put into the economy), lowering taxes (with the idea that the excess money would be reinvested in the market), or keeping taxes as they are (to see if things turn around on their own).

An outcome is what happens as a result of selecting the option chosen. Using the example of the tax options, the outcomes of choosing the above options are the economy stabilizing or continuing to struggle.

In utility analysis perspectives are points of view with respect to the outcomes. Perspectives are vital in studying the utility of the outcomes. The perspective in the tax case would be a more stable economy.

Utility-Matrix Analysis

A matrix offers a couple advantages over trees while using utility analysis. Jones’ says the first advantage is the relative differences in utility values of outcomes are more easily identified in a matrix. The second one is that the math is easier to do in a matrix rather than a tree. Using the same tax problem as before, here is an example of how utility matrices are used.

<table>
<thead>
<tr>
<th>Perspective: A more stable economy</th>
<th>Struggling economy</th>
<th>Stable economy</th>
<th>Total EV</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPTIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raising taxes</td>
<td>$1,000,000,000</td>
<td>$10,000,000,000</td>
<td>$4.6 Billion</td>
<td>2</td>
</tr>
<tr>
<td>P .6</td>
<td>P .4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EV $600,000,000</td>
<td>EV $4,000,000,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowering taxes</td>
<td>$500,000,000</td>
<td>$5,000,000,000</td>
<td>$5 Billion</td>
<td>1</td>
</tr>
<tr>
<td>P .2</td>
<td>P .8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EV $1,000,000,000</td>
<td>EV $4,000,000,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same taxes</td>
<td>$500,000,000</td>
<td>$2,000,000,000</td>
<td>$2.5 Billion</td>
<td>3</td>
</tr>
<tr>
<td>P .5</td>
<td>P .5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EV $4,600,000,000</td>
<td>EV $4,600,000,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Using Utility Matrices in the Field

Utility Matrices are a very organized way to conduct a utility analysis. They are necessary tools for the political science world.

Job Opportunities

1. CIA Political Analyst:
The Central Intelligence Agency's Directorate of Intelligence has particular needs for analysts who specialize on China, North Korea, the Middle East, and South Asia and have more limited openings for specialists on Europe, Latin America, and Africa. Political analysts support US policymakers by evaluating the goals and motivations of foreign governments and entities.
A utility matrix would be very useful in the initial research stage where you need to find out how something benefits a certain country or group of people.
Website: https://www.cia.gov/careers/jobs/political_analyst.html

2. IRS Policy Analyst:
As a Policy Analyst, you will plan and coordinate research initiatives to review and revise tax administration practices, programs and policies.
An IRS Policy Analyst would use utility matrices to see how a policy or practice benefits the agency.
Website: http://jobs.irs.gov/car_other_research.html#POA

3. IRS Artificial Intelligence Specialist:
As an Artificial Intelligence Specialist, you will apply artificial intelligence techniques and other advanced computing skills to solve IRS business problems.
Utility Matrices would be used to find out how to solve business problems in the most beneficial way to the company.
Website: http://jobs.irs.gov/car_other_research.html#POA
Conclusions: So Many People, So Little Time.................................................................Krisan Evenson

As should be fairly obvious from the preceding pages, students toiled long and hard to put together for you this manual. They feel, as do I, that you will be well-served in using it should you be in the position of having to make determinations about research tactics for your assignments. It’s hard to know, sometimes, how to get started, and that’s why we’ve included a beginning section on determining which types of research questions are in front of you. As a way of getting started in the great enterprise of political analysis—any type of social science-related analysis—we’ve included a middle section on ways to organize your approach, and then your data. Finally, there are some ways to avoid over-complicating your life and your work, and so the later sections of this work show you some ways to make judicious decisions about the types of analysis to do, in order to arrive at the best—not the most complicated—answers you seek to the questions that are in front of all of us.

My students and I wish you well in your quest. Their emails, as you no doubt noticed, are included should you have questions for them later. Look forward, too, to new editions of this manual, as new students like you join the ranks of these herein.

Happy analyzing!

Krisan L. Evenson, Ph.D.