A Practical Approach to the Introductory Political Science Statistics Course

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Abstract

The methodological pluralism of the political science discipline presents unique challenges to the design of an introductory research methods and statistics course. Conventional approaches to social science statistics education stress statistical concepts and applications that are often of little practical use to students in their subsequent coursework or careers.

Political scientists typically use numerical data in their research and writing in one of two ways that traditional methods courses do not teach. They present and interpret political and social indicator data, often time series data, in tabular or graphical format, or they use some form of multiple regression.

This presentation describes an approach to a statistics course more relevant to the actual practice of political science. It begins by teaching students how to obtain, interpret and present political and social indicator data, skills involving a variety of applications across even "non-quantitative" fields of political science. It ends by trying to get students to the point where they can at least understand the regression-based research of quantitative political science.

Political Science Methodology in Turmoil

Perhaps the first place to begin considering what to teach in an introductory undergraduate political science research methods course would be with the question: "What is political science methodology?" Unfortunately, the discipline lacks a clear consensus on the question and recent events have thrown the issue into considerable dispute.

In the spring of 2000, an email message written under the nom de guerre "Mr. Perestroika" initiated an attack on what was seen as the "hegemony" of hard science methodology and the suppression of case study and qualitative analyses in the discipline's journals and many of its graduate programs. The most serious charges were that the emphasis on hard quantitative science in the discipline's most prestigious journals and many of its graduate programs did not reflect the diversity or pluralism of the discipline and that the research often addressed only apolitical and trivial subject matters, those most amenable to the hard methodology. In political science "hard science" stood to mean two somewhat disparate research enterprises: quantitative research in the form of increasingly econometric research and statistics approach, and formal modeling (a.k.a public choice theory, rational choice, or disparagingly, "Rat choice").

In just a few years, Perestroikans were elected to the American Political Science Association executive council, a new APSA journal was launched and journal editors pledge to reform and to recognize the pluralist research methodology of the discipline.

The dissatisfaction with the discipline's methodology, however, was not limited to the Perestroikans. While the Perstroikans called for a pluralist model, those on the hard science side of the generally see pluralism as something that has to be overcome.[1] The hard scientists have not been unaware of the weaknesses of their methodology and have at various times proposed new approaches that would unify the discipline, and make it more like, say, economics (King 1989; King Keohane and Verba 1994, Granato and Scioli 2004).

Whatever the merits of the Perestroikan claim that hard-science hegemony pervades the discipline's journals and some of its graduate programs, there is little evidence of its influence in the discipline's undergraduate programs, where formal modeling remains almost nonexistent and students confront regression based quantitative methods only occasionally. Students do see plenty of quantitative data in their undergraduate courses, but only in a few courses are they likely to be exposed to the kinds of regression based analyses that comprise most of what is called quantitative methods and that occupy perhaps half of the discipline's premier journals. As a result, the introductory political science research methods course, although often a required course for political science majors, is often the only political science course where

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[1] Consider that the three journals published by the American Political Science Association employ three different citation methods

students will be exposed to systematic quantitative research.

For political science undergraduates, the research methods course thus provides few analytic skills to be applied in their other course work. Over the past two years I have served as the coordinator for the Illinois State University Conference for Students of Political Science. Graduate and undergraduate students representing political science programs at 32 colleges and universities submitted 76 papers to the two conferences; none employed formal modeling methods and just 5 used some form of the statistical analyses that are commonly taught in undergraduate methods courses.[2]

Two Kinds of Quantitative Political Science.
Nevertheless, the conventional understanding of the methodology of political science as expressed both in the debates over the Perestroika movement and in introductory research methods textbooks (including those that cover qualitative methods) excludes from consideration a whole realm of quantitative data analysis common to almost every substantive field in the discipline. For a want of a better term, I'll call it "soft quantitative" methodology: the use of quantitative data as statistical evidence to support arguments about politics and public policy.

Soft quantitative analysis embraces almost all of the defining characteristics of scientific political science. It involves the articulation of a theory and the definition of abstract concepts. It involves quantitative measurement and requires assessments of measurement reliability and validity. It involves assessing causation, often with the use of experimental, quasi-experimental and non-experimental research designs.

Soft quantitative analysis differs from what is usually referred to as quantitative analysis in many respects. Soft quantitative analysis involves descriptive statistics and very little use of inferential statistics. The approach relies less on regression analysis, or formal statistical procedures of any type, and is particularly less concerned with statistical issues having to do with sampling error. The statistics reported are rarely more complex than a correlation coefficient and for the most part represent percentages and averages in the form of social indicators and survey trends. Where most of what is called quantitative analysis relies on the analysis of a single dataset to address a narrow hypothesis, soft quantitative analysis often involves compiling all the statistical evidence from multiple data sources to address research questions. As an analogy consider the difference between a DNA expert analyzing a piece of evidence for a trial and the attorney who seeks to compile all the evidence to make a case. The DNA expert uses hard science to reach a narrow conclusion. The

attorney uses reason, inferential logic and evidence to make a case.

Falling falls somewhere between quantitative methodology and qualitative methodology, soft quantitative political science is found throughout almost all fields of political science (political theory and constitutional law being primary exceptions), most prominently in books written for broad audiences and also in the great majority of the discipline's textbooks. It is the primary mode of quantitative analysis in policy analysis, the kind of policy analysis government employees do all the time. It is the only way to address many of the empirical questions political scientists deal with in their research, particularly questions concerning social and political trends, such as:

- Are the rich getting richer?
- Is social capital in decline?
- How big is the gender gap? , or
- How much control does hard science have over the discipline's journals?

For this last question, consider the Perestroikan's own attack on "hard" political science: a Perestroikan-sponsored symposium in the American Political Science Association's newsletter-journal, *PS, Political Science and Politics* contained 5 essays decrying the hegemony of quantitative research (and its companion non-quantitative formal modeling). And every one supports its argument with reference to quantitative data derived from systematic empirical surveys of the discipline's journals and graduate program curricular requirements. The results are presented bar charts and time series charts (Bennett, Barth, and Rutherford 2003, 375-6) and tabulations (Shwartz-Shea 2003, 380-5) and in the textual discussions, such as this from Yanow (2003, 397):

> From 1991–2000, research based on statistics and modeling accounted for 74% of all published articles (53% and 21% respectively), political theory garnered 25% of journal space, and qualitative research captured 1% (one article each in 1992, 1993, 1995, 1996, 1997).

Clearly, Perestroikans are not opposed to the use of quantitative data per se. Soft quantitative analysis characterizes many of the most important works of political science. Robert Putnam's *Bowling Alone* (2000), a work that has probably inspired more conference papers and journal articles across more of the discipline's subfields than any other piece of political science, is a good example of soft quantitative analysis. Almost all of Putnam's analysis is grounded in some kind of presentation of quantitative data, from a wide variety of sources, and presented in charts and graphs. Putnam describes his strategy as attempting to "triangulate among as many independent sources of information as possible" based on the "core principle" that "no single source of data is flawless, but the more numer-

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[2] Forty papers can be viewed at the conference website: http://www.politicsandgovernment.ilstu.edu/conference/

ous and diverse the sources, the less likely that the could all be influenced by the same flaw" (415). Although almost all of the data are based on public opinion surveys, the data presentations rarely require the use of measures of statistical significance and are presented as illustration of the general theory rather than statistical tests of hypotheses. An earlier political science work that had a similar impact on the discipline, and that features a much better graphical data display is Nie, Verba and Petrocik's *The Changing American Voter*.

The contrast between the hard and soft approaches to quantitative analysis is illustrated in one of the most contentious scholarly disputes in political science, concerning the salience of racism to American political behavior. The work of the two lead authors in the dispute, Donald Kinder and Paul Sniderman, follow two strikingly different research paradigms.

Kinder and his coauthors (who argue that symbolic racism and racial resentment play a major role in white voting behavior) typically follow the hard science approach, using factor analysis and regression models. On the other side, Sniderman and his co-authors (arguing that white voters' policy preferences are not primarily a manifestation of racism), consistently follow a softer approach. Thus, in their analysis of 1986 American National Election Study (ANES) data, Kinder and Sanders (1996) construct a 6-variable measure of racial resentment, and evaluate its reliability using a variety of methods (cross-item correlations, cross panel correlations, and confirmatory factor analysis). The index is then included in several regression equations that measure the effect of racial resentment on opinions concerning 6 race policies (and later, even more regressions for non-racial policies). The index is then shown to have a significant effect on each of the policy measures, even when controlling for a 6-question index of individualism. The conclusion is that racial resentment shapes white voters' policy choices independent of their commitment to individualism.

Think of Sniderman as John Henry versus the steam drill. Addressing a similar research question but using a variety of different surveys and data, Sniderman and his co-authors (Sniderman and Hagen 1985; Sniderman and Piazza 1993, 2002; Sniderman and Carmines 1997) avoid regression analysis almost entirely, and rely almost entirely on bivariate bar charts, line charts and times series charts for their data presentation. Many of these charts report the results of split-sample experiments, but without (largely unnecessary) tests of statistical significance. Where multiple regression is used (in Sniderman and Piazza 2002), the tabulations display the bare minimum of statistics (just the parameter estimates and p-value asterisks).

Sniderman typically follows a strategy of finding, compiling and presenting all the quantitative evidence that he can find to illustrate and elaborate his overall theory. With a simple bar chart, Sniderman shows that in the case of one of the questions Kinder uses to measure racial resentment, blacks and whites have almost identical responses; and both blacks and whites respond to the question in the same way when the question is reworded to measure hostility to European immigrants instead of blacks (see figure 1).
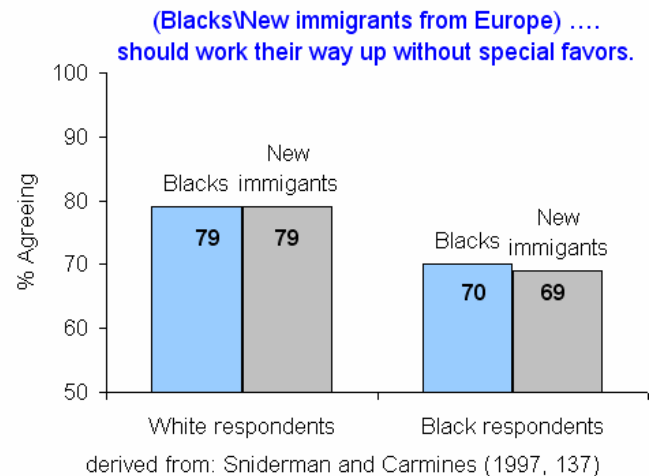
Figure 1. **Sniderman's split sample experiment**

Although Sniderman's approach has many advantages, particularly in its accessibility to a broader audience, each approach to quantitative data analysis serves distinct functions. The two approaches to analyzing data best compliment each other in public policy research where hard scientific analyses of the minimum wage, negative income experiments, studies of school and class, bilingual education and school vouchers are complimented by more general soft quantitative analyses such as Charles Murray's *Losing Ground*, Stephen and Abigail Thernstrom's *No Excuses*, Kevin Phillips, *The Politics of Rich and Poor*, Andrew Hacker's *Two Nations*, or, even Bjorn Lomborg's *The Skeptical Environmentalist,* all of which present broad and strong social policy arguments and analysis grounded in quantitative evidence presented in tables and charts. These – and not the hard science research studies – are the books we assign in our classes and that shape public policy debate. And while these books often draw on the evidence of the narrower and more scientific research studies they do much to shape and inspire that research agenda.

A Practical Approach: Goals

The empirical research methods course[3] I have developed is a required course for all political science majors at Illinois State. The course is unusual for the department in that it is four credit hours, including a weekly 1-hour computer laboratory session. The course has two over-arching goals: to get students to the point where they can

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[3] The course website: http://lilt.ilstu.edu/gmklass/pos209/ ; a supplemental "Presenting Data" website: http://lilt.ilstu.edu/gmklass/pos138/datadisplay/

find, interpret, and present statistical evidence in term papers, senior theses and other research projects, and to be able to interpret multiple regression analyses in published research articles.

The two goals are interrelated in that the soft quantitative skills taught in the first half of the course will, I hope, provide the students a level of statistical literacy that will facilitate their understanding of regression. Meeting these two goals ought to serve other ends as well: providing students with skills they can use in their future career, providing students who will pursue more advanced graduate study in the social sciences with a good foundation for more advanced statistics courses, and developing the students' general statistical literacy skills. Note that in this respect the course differs from the traditional approach where concepts of null hypothesis testing, and nominal and ordinal measures of association (Lambda, Somer's D, gamma, Kendall's tau) and statistical significance provide the foundation for moving on to interval level bivariate and multivariate analysis.

The more specific goals related to the soft quantitative analysis skills that the course addresses involve measurement, analysis and interpretation, and presentation of data. Each of these are addressed throughout the first two thirds of the course and in the students' main term paper assignment. The "data profile" term paper assignment is a research project involving at least ten tables and charts and at least ten pages of text addressing a defined political science research question.

Measurement.
The traditional approach to the introductory statistics course often treats issues of operationalization and measurement as mostly a choice between nominal, ordinal and interval level of measurement and tends to gloss over things that students find very problematic. If students are to make any effective use of quantitative data in their own research, they first must be familiar with the use of fundamental political and social indicators of political science writing and they must know where to find the best kinds of data to address their research questions.

Familiarity with key indicators. In the fields of economics, psychology and education there are fundamental statistical indicators that all students should be familiar with. So, too, in political science. Loosely these measures fall into three categories: political, economic, and public policy. The key political indicators would include measures of voter turnout, political poll data such as the Gallup presidential approval measure and the transparency index. Economic variables would include measures of economic development and quality of life, government expenditures, national debt and deficit, income and wealth inequality, poverty and unemployment. Finally students should be familiar with the use of at least some key policy perform-

ance indicators such as measures of education achievement (NAEP scores), or crime rates.

For example, consider the data shown in figure 2, a time-series trend of US Federal budget surpluses and deficits (OMB 2005). A political science student ought to know or be able to figure out: a) where to get these data, b) that the years represent fiscal years, c) that president Bush's first deficit is represented by the FY 2002 data, and d) that the estimates of declining future deficits are probably wishful thinking. Most importantly, a student ought to be able to use these data in a coherent argument about presidential administrations and fiscal policy. And he or she should know that other data might lead to different conclusions: using a GDP deflator would not exaggerate the current administration's deficits as this measure does, and there are advantages to using measures of annual change in the total federal debt instead of deficits.
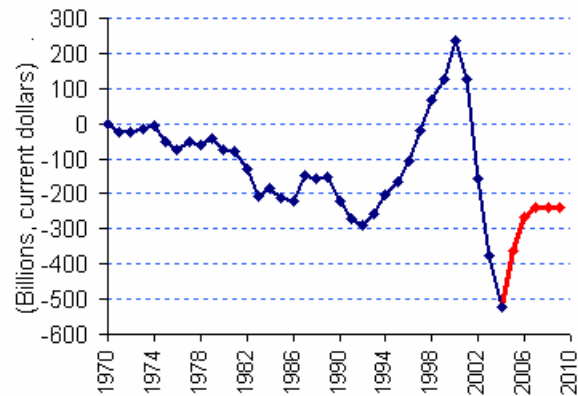

Figure 2: Federal Surplus\Deficit 1970-2009

Finding the data. Often, the key to finding the right data is being aware of what data might be available. Through a combination of in-class illustration, lab exercises, a term-paper length "data profile" project and student presentations on their topic the course familiarizes students with a wide range of different types of data on a political science topics.

Students should have a general idea of the wide range of statistical data that is available on these and other subjects, almost all of it, now, through the Internet. Students who will take courses in comparative politics and international relations ought to be familiar with OECD, World Bank and UN data. Those who take American government, public policy and public administration courses ought to be familiar with the data available through the various federal government statistical agencies such as the Bureau of Justice Statistics, the National Center for Educational Statistics, and the Bureau of Labor Statistics. Students who take courses in areas related to gender, racial and ethnic inequality ought to be aware of the sources of data commonly used in the research and debates over the policy issues these courses addresses. They should be able to access on-line survey data, particularly resources that

provide time series polling trends. They should understand how the Census works, both the decennial census and the Current Population Survey.

In addition to Internet links to these data sources, I also provide the students on-line access to the most recent version of the US Statistical Abstract CD-Rom. The CD-Rom contains pdf files of the entire Abstract, but also a spreadsheet data file for each table in the Abstract, and these files often contain much more data than is shown in the printed copy. In addition, each table is accompanied by an internet link to the original source of the data. As such, the CD is one of the best places to go to initiate as data search on many political science topics.

Time series public opinion data are essential to many political analyses. Unfortunately many major polling websites – Zogby, Rasmussen and Gallup -- require subscriptions to access their best data. Fortunately, using a web interface, it is possible to access time series crosstabulations from both the American National Election Survey and the NORC General Social Survey.

Finding reliable cross national data is a bit more problematic. The OECD is an excellent source for political, economic and social indicators for developed nations, although some of their data require subscription. United Nations, World Bank and other sources of data for developing countries are often more difficult to access.

Several constraints often make the data less accessible than is optimal. Many datasets are available only in Adobe pdf format (rather than spreadsheet or comma delimited files) and copying data from Adobe to MS\Excel presents many challenges. Data in HTML tables is more easily converted into spreadsheet format, if one is copying from the Internet Explorer (rather than Netscape) browser or by opening the web URL directly with the Excel File | Open commands.

Some statistics sites, such as the Bureau of Transportation Statistics, the NCES's National Assessment of Educational Progress (NAEP) Data Tool and the OECD's SourceOECD" provide data portals that permit users to extract data in a variety of formats from larger databases. The portals, however, require a level of familiarity with the data definitions that is beyond the novice user.

Choosing the right measures. Choosing the right statistical measures is a skill that often comes so naturally to statisticians that they do not appreciate how problematic it can be for students.

Do you use the percentage of men who voted Democratic or the percentage of Democratic voters who are men? What's the difference between an abortion rate and an abortion ratio? What does it mean to index two different time series trends to an initial value of 100? What's the difference between a percentage change and a net change

in a percentage? Students should understand that a statement that "unemployment has gone up ten percent" can mean several different things.

Students need to be shown that percentage, mean, rate and ratio measures (or "per capita" and "% of GDP") are better than aggregate totals (e.g. to use the murder rate rather than the number of murders across cities).

Often student papers address issues concerning the magnitude and manifestations of social problems that often require an imaginative uses of data. A published example of this is Kevin Phillip's, *The Politics of Rich and Poor*. Most of Phillips argument details the rising inequality of the Reagan years and is supported by an imaginative variety of different types of data. His final tabulation, for example, merely displays the soaring prices for different types of artwork sold at auctions.

Reliability and Validity. Assessing the reliability and validity of statistical measures, and understanding the distinction between these two standards of measurement is a critical quantitative competency. Among the things not stressed when textbooks address measurement reliability and validity is an understanding how the data were originally collected and by whom. For example, in the U.S. two different measures of the crime rate are commonly reported: The National Criminal Victimization Survey data and the rates from the FBI's Uniform Crime Reports. Knowing that the later is based on reports to and from local police agencies and the former is based on a personal household survey is critical to the use of these data.

Sampling error is but one of several aspects of measurement reliability (it can be treated as a matter of both measurement reliability and as an aspect of a study's external validity, discussed below). It tends to be over-taught in research methods texts to the detriment of a great many other sources of measurement unreliability such as response rate, differences in question wording or methods of data collection, and the use of sampling adjustments as in the case of surveys of "likely voters". And for the vast majority of political science applications, a simplified sampling error former suffices quite nicely:

$$s.e. = \frac{1}{\sqrt{N}} * 100$$

Analysis and Interpretation.
Soft quantitative analysis often involves an assessment of causal relationships. While the student's data profile assignments often begin with an analysis general trends or cross national comparisons, the core of the paper involves addressing causal inferences. Often this begins by identifying a crucial bivariate relationship, such as racial inequalities in unemployment, education, poverty or voting. From there students go on to analyze the relationship with

other data, assessing spurious and confounding relationships, controlling, perhaps, for education or family status.

Donald T. Campbell's (1969, Campbell and Ross, 1970) threats to internal and external validity provide an excellent framework for the analysis of graphical representations of causal relationships. The principles apply equally well to experimental, quasi-experimental, and nonexperimental research designs. Although Campbell originally presented these concepts in the context of quasi-experimental design, the principles serve as well for evaluating data derived from pure experiments (only external validity is at issue here) and later in evaluating nonexperimental regression analyses.

Simpson's paradox and ecological fallacy are forms of internal and external invalidity[4] (respectively) that are not addressed in the Campbell framework deserve additional attention.

Presenting data.
Many political science research methods texts have a section addressing graphical display of data, often showing how data are displayed in bar charts, pie charts and scattergrams. Few even begin to address fundamental principles of graphical display, even though it is a political scientist, Edward Tufte, who has done the most to articulate these principles. The tabular and graphic display of quantitative data involves both art and science.

The past two decades have seen the development of a substantial literature on the art and science of data presentation, much of it following Tufte's *The Visual Display of Quantitative Information*, (1983). With his admonitions to "show the data," "minimize the ink-to-data ratio," avoid "ChartJunk", Tufte established many of the basic rules and principles of graphical design, stressing the graphical minimalism in data presentation. Howard Wainer (1984, 1996, 1997) extends Tufte's minimalist standards, with a somewhat greater focus on tabular displays of data. Wainer is most insistent on the importance of appropriate data sorting, condemning "Austria First!" and "Alabama first!" data presentations. William Cleveland (1985) is a more scientific treatment of the display of science data that summarizes much of the research on the visual perception of graphic representations. Walgrens et. al. (1996) provide the most useful guide through the many options and choices offered by the graphics software packages, illustrating graphic design principles with a great number of examples.

Students should be instructed in four general principles of data display: clarity, meaningful comparison, truthfulness and efficiency. Clarity stresses that each data element of a chart or table ought to be defined unambiguously. Mean-

ingful comparison, that a display ought to make a significant point. Truthfulness deals mostly with issues of graphical data distortion, such as those famously depicted in Darrel Huff's *How to Lie with Statistics*. The simple hypothetical example shown in figure 3 demonstrates one of the most common graphical distortions. The efficiency standard is the application of Edward Tufte's data-to-ink ratio: Pie charts are bad. Three-D pie charts, worse. Comparing multiple pie charts, an unmitigated evil.
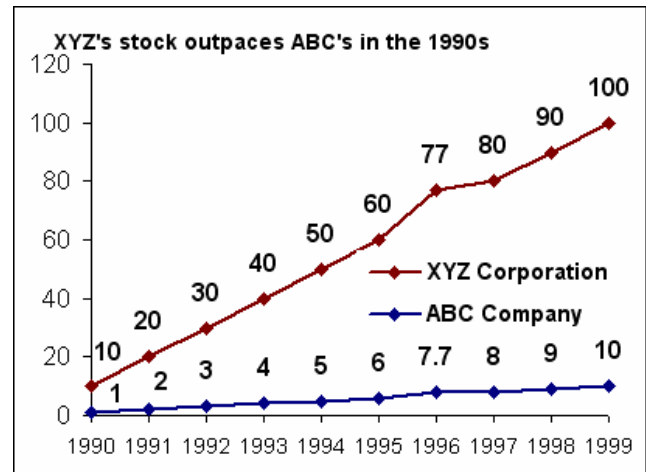
Figure 3: Graphical distortion of data

I teach my course entirely with the Microsoft Excel spreadsheet program even though a) there are much better graphical software packages available and b) the Excel data analysis program has serious shortcomings. Two critical shortcomings of the Excel charting software are the lack of a boxplot chart and a simple method of adding data labels (for example, state codes) to scatterplots. These shortcomings can be corrected with various macros and add-ins available on the Internet (which students cannot install in their computer labs).

Other shortcomings of the Excel data analysis package are that it does not deal well with missing data and that the regression program only allows for unstandardized regression. Altman and McDonald's review of the software (2002) give the package average grades for most statistical applications, but identify problems with its standard deviation algorithm. Nevertheless, Excel is the graphics and statistics package that students are most likely to have installed on their own computers and are most likely to have on their office computers after they graduate.

Unfortunately Tufte's books, and some of the others, tend to be too expensive for state university students and they do not specifically address many of the presentation issues that arise with the use of spreadsheet charting. There are many handbooks on Excel charting but these are often geared to the presentation of business data and they often instruct in charting techniques (such as 3-D Pie Charts) that violate many of Tufte's principles.

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[4] Depending how you think about it: ecological fallacy could also be considered an issue of internal validity.

In the absence of a single text that would a) present Tufte's principles, b) provide assistance with Excel, c) contain links to the critical source of political science data and d) contain many examples of political science data display, I have resorted to constructing a "Presenting Data" website[5] designed to serve these purposes.

Transitioning to Regression Analysis
In most statistics courses, the coverage of crosstabular data analysis provides students with a good understanding of the basic principles of causation and the use of control variables.

In some respects, however, the grounding students get in graphical data display – most of which involves interval level data or categorical data aggregated to the interval level – and the issues of confounding variables that students confront in there analysis of these data serves as a good foundation for introducing multiple regression. Dealing with multiple regression from this perspective naturally involves more stress than is customary on interpreting unstandardized parameter estimates than on statistical inference.

The scatterplot marks the transition from soft to hard data analysis. The particular chart shown in figure 4 provides a good initiation in that it has the additional advantage of suggesting to students who hate statistics that their negative attitude towards the course may not prove detrimental in the end. Many of the students' data profile assignments and a specific lab assignment involve constructing a scatterplot, usually with American state data.
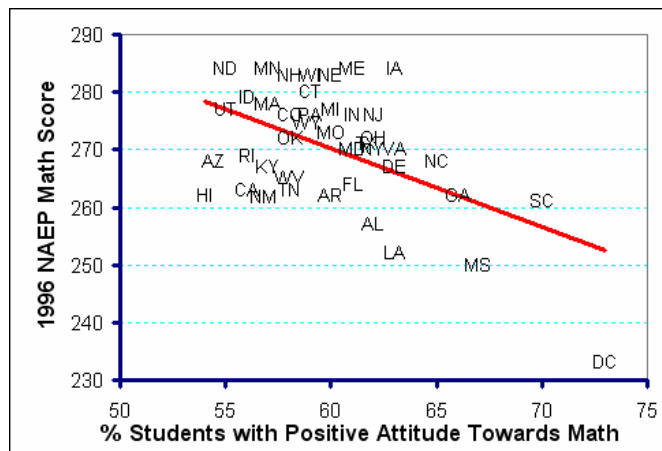

Figure 4: State 8th Grade NAEP Math Scores and Student Attitudes

A lab assignment, but in most cases not the data profile paper, is used to have the students actually do their own multiple regression analysis using Excel. I supplement the regression analysis instruction with a heavy use of a number of regression tabulations from published research

articles. Interpreting parameter estimates that involve dummy independent variables, sometimes in elaborate combinations is a skill not often addressed in the text-books.

Unfortunately, the lack of consistent standards in quantitative political science methodology, and in this case, across the social sciences, doesn't make this easy. Although most quantitative political science is based on some form of regression analysis, the discipline has yet to adopt consistent standards for presenting regression results. OLS regression results are likely to be reported in a variety of different ways using various combinations of standardized and\or unstandardized coefficients, t-ratios and\or standard errors. Some articles use in-text equations; others use tables. There is no agreement in the discipline on the use of the term "beta", or even the symbol used to represent it. The problem is compounded by the increasing prevalence of regression procedures more complicated than ordinary least squares. If only political scientist were more like economists, who all think alike.

Summary:
Political scientists prize pluralism in politics, but they know its inherent weakness: pluralism often serves narrow special interests to the detriment of common public interests. So too, with methodological pluralism.

The particular advantage of the approach to teaching the introductory methods course described here is that it addresses data analysis skills common to most of the discipline's subfields where students learn practical applications that they can use in their subsequent course work and in their future careers. In addition, the introduction to regression analysis, combined with the statistical literacy skills students will acquire provides a good foundation for those students who will go on to take more advanced methods courses in their graduate studies.

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[5] http://lilt.ilstu.edu/gmklass/pos138/datadisplay/

References:

Altman, Micah; and Michael McDonald. 2002. "Choosing Reliable Statistical Software," *PS: Political Science and Politics 24*(3): 681-8

Bennett, Andrew, Aharon Barth, Kenneth R. Rutherford. 2003. "Do We Preach What We Practice? A Survey of Methods in Political Science Journals and Curricula." *PS: Political Science and Politics 36* (July): 381–386.

Campbell, Donald T. 1969. "Reforms as Experiments," *American Psychologist* 24, 409-429.

Campbell, Donald T. and H. Laurence Ross. 1970. "The Connecticut Crackdown on Speeding: Time Series Data in Quasi-Experimental Analysis," in Edward R. Tufte, ed., *The Quantitative Analysis of Social Problems* (Reading, MA.: Addison-Wesley).

Gill, Jeff. 1999. "The Insignificance of Null Hypothesis Significance Testing." *Political Research Quarterly 52* (Sept.), 647-674.

Granato, Jim, and Frank Scioli. 2004. "Puzzles, Proverbs, and Omega Matrices: The Scientific and Social Significance of Empirical Implications of Theoretical Models (EITM)." Perspectives on Politics 2:313–323.

Hubbell, Larry. 1994. "Teaching Research Methods: An Experiential and Heterodoxical Approach." *PS: Political Science and Politics 27*, (March): 60-64.

Jones, Gerald E. 2000. How to Lie With Charts (iUniverse.com)

King, Gary 1989. Unifying Political Methodology: The Likelihood Theory of Statistical Inference (University of Michigan Press).

King, Gary, Robert O. Keohane, and Sidney Verba 1994. Designing Social Inquiry: Scientific Inference in Qualitative Research (Princeton University Press).

Kinder, Donald R., and Lynn M. Sanders. 1996. *Divided by Color: Racial Politics and Democratic Ideals*. Chicago: University of Chicago Press.

Kosslyn, Stephen M. 1994. *Elements of Graph Design* (NY: W. H. Freeman).

Kevin Phillips. 1990. *The Politics of Rich and Poor: Wealth and the American Electorate in the Reagan Aftermath* (Basic Books).

Manheim, Jarol B., Richard Rich and Lars Willnat. *Empirical Political Analysis: Research Methods in Political Science*, (5th edition) New York: Longman, 2002

Putnam, Robert D. 2000. *Bowling Alone*. New York: Simon and Schuster.

Schwartz-Shea, Peregrine. 2003. "Is This the Curriculum We Want? Doctoral Requirements and Offerings in Methods and Methodology." *PS: Political Science and Politics 36* (July): 373–380.

Sniderman, Paul M. and Edward G. Carmines. 1997. *Reaching Beyond Race*. Cambridge: Harvard University Press.

Sniderman, Paul M., and Michael Gray Hagen. 1985. *Race and Inequality*. New York: Chatham House.

Sniderman, Paul M., and Thomas Piazza. 1993. *The Scar of Race*. Cambridge: The Belknap Press of Harvard University.

Sniderman, Paul M., and Thomas Piazza. 2002. *Black Pride and Black Prejudice*. Princeton: Princeton University Press.

Tufte, Edward. 1983. *The Visual Display of Quantitative Information* (Cheshire: Connecticut: Graphics Press).

Wallgren, Anders, et. al. 1996. *Graphing Statistics & Data* (Sage Publications)

Wahlke, John. 1979, "Pre-behavioralism in Political Science" *The American Political Science Review*, Vol. 73, No. 1. (Mar), pp. 9-31.)

Wainer, Howard. 1997. Improving tabular display: with NAEP tables as example and inspirations. *Journal of Educational and Behavioral Statistics* 22, 1-30.

Wainer, Howard. 1997. Visual Revelations: *Graphical Tales of Fate and Deception from Napoleon Bonaparte to Ross Perot* (Mahwah, NJ: Lawrence Erlbaum Associates).