

An Introduction to *Perusall*

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Harvard University

¹GaryKing.org

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- **Perusall**: students do >90% of the reading

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- Extrinsic motivation (no instructor effort): Automated grading

How does it work?

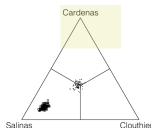
How does it work?

Dominguez and McCann in the first place: the electoral outcome itself. In particular, if every voter thought the PRI was weakening, which candidate would have won the presidency? To answer this question, we coded each voter as thinking that the PRI was weakening and let other characteristics of the voter take on their true values. Then we used the predicted value algorithm to simulate the vote for each person in the sample and used the votes to run a mock election. We repeated this exercise 100 times to generate 100 simulated election outcomes. For comparison, we also coded each voter as thinking the PRI was strengthening and simulated 100 election outcomes conditional on those beliefs.

Figure 3 displays our results. The figure is called a "ternary plot" (see Miller 1977; Katz and King 1999), and coordinates in the figure represent predicted fractions of the vote received by each candidate under a different simulated election outcome. Roughly speaking, the closer a point appears to one of the vertices, the larger the fraction of the vote going to the candidate whose name appears on the vertex. A point near the middle indicates that the simulated election was a dead heat. We also added "win lines" to the figure that divide the ternary diagram into areas that indicate which candidate receives a plurality and thus wins the simulated election (e.g., points that appear in the top third of the triangle are simulated election outcomes where Cárdenas receives a plurality).

In this figure, the o's (all near the bottom left) are simulated outcomes in which everyone thought the PRI was strengthening, while the dots (all near the center) correspond to beliefs that the PRI was weakening. The figure shows that when the country believes the PRI is strengthening, Salinas wins hands down; in fact, he wins every one of the simulated elections. If voters believe the PRI is weakening, however, the 1988 election is a toss-up, with each candidate having an equal chance of victory.

FIGURE 3 Simulated Electoral Outcomes



Coordinates in this ternary diagram are predicted fractions of the vote received by each of the three candidates. Each point is an election outcome drawn randomly from a world in which all voters believe Salinas' PRI party is strengthening (for the "o"s in the bottom left) or weakening (for the "."s in the middle), with other variables held constant at their means.

question by estimating a censored Weibull regression (a form of duration model) on a dataset in which the dependent variable, Y_i , measures the number of years that leader i remains in office following the onset of war. For fully observed cases (the leader had left office at the time of the study), the model is

$$Y_i \sim \text{Weibull}(\mu_i, \sigma)$$

$$\mu_i = E(Y_i | X_i) = (e^{X_i \beta})^{-\sigma} \Gamma(1 + \sigma) \quad (6)$$

where σ is an ancillary shape parameter and Γ is the gamma function, an interpolated factorial that works for continuous values of its argument. The model includes four explanatory variables: the leader's pre-war tenure in years, an interaction between pre-war tenure and democ-

number of battle deaths per 10,000 inhabitants, a variable indicating whether the leader won. The authors find that leaders who waged forced to lose their grip on power at home, but leaders with a long pre-war tenure were in office longer than others.

Mesquita and Siverson discuss the merits of their explanatory variables by computing "hazard rates" associated with each variable. Hazard is a traditional method of interpretation in the understanding this requires considerable knowledge. Simulation can help us calculate

What are the advantages of using a Weibull model as opposed to kinds we have discussed in class (like Poisson, Normal, etc)? Feb 26 6:18 pm

As it notes, the Weibull is a time to event model (a duration model), so it's a natural fit for looking at years someone remains in office following a war. More broadly, it's related to the Exponential distribution, which is typically what you think of when you're trying to model time. But unlike the Exponential, the Weibull has a shape and scale parameter (whereas in the Exponential the shape is always presumed to be 1). Feb 26 11:35 am

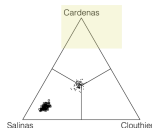
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All comments -



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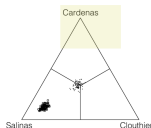


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How does it work?

Perusall



All comments -



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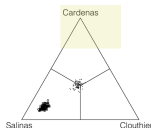


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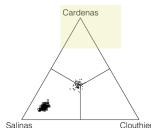


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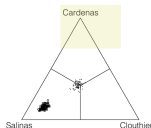
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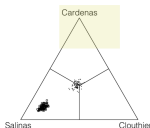
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- When students figure it out together: Learning is deeper and remembered longer

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- Go through the topics, recognizing students with good questions or comments

Example Student Confusion Report

Example Student Confusion Report

Perical

Advanced Quantitative Research Methodology, Gov2001

Settings

Gradebook

Router

Confusion report for Making the Most of Statistical Analyses, Entire document

Confusion 1

Making the Most of Statistical Analyses:
Improving Interpretation and Presentation

Gary King
Michael Tomez
Jason Tienberg

Harvard University
Harvard University
Harvard University

Social scientists rarely take full advantage of the information available in their statistical results. As a consequence, they miss opportunities to present quantities that are of greatest substantive interest to their research and represent the appropriate degree of certainty about their quantities. In this article, we offer an approach, built on the technique of statistical simulation, to extract the currently overlooked information from any statistical model used to interpret and present a quantitative research question, which we try to provide herein, but its application should extend to the results of quantitative analyses more informative and transparent. To facilitate our recommendations, we replicate the results of several published studies, illustrating in each case how this approach can be used to improve the presentation of statistical results.

Below the following simple statement analysis our criteria: "Other things being equal, an additional year of education would increase your annual income by \$1,000 on average, plus or minus about \$300." Any smart high school student would understand that sentence, so neither have we applied the statistical model and provided the computer used to produce it. The sentence is substantially informative because it conveys a key quantity of interest in terms the reader wants to know. At the same time, the sentence indicates how uncertain the researcher is about the estimated quantity of interest. Influences are never certain, so any honest presentation of statistical results must include some qualitative, such as "plus or minus \$300" in the present example.

MH

Maybe there are specific examples later in this paper, but I think they would help me understand what he is suggesting. Normally, I would just report an estimate for my beta coefficient with a 95% confidence interval. But this seems to be going beyond that using simulation?

PN

This is because we are not actually drawing from the population; rather, we are drawing multiple times from that one sample that we got from the population. So its more of a sampling distribution right? The sample we are simulating from could perhaps be thought of as a quasi-population.

NG

Actually, this is a key distinction that has been troubling me on this week's problem set. What exactly are the interpretive differences between theta or theta hat serving as the random variable? Would be useful to review.

Show more...

Confusion 2

IMPROVING STATISTICAL INTERPRETATION AND PRESENTATION

We applied the predicted value algorithm to predict the number of government employees in a state with million people and an 80 percent Democratic House. We used the statistical software described in the paper to estimate the log linear model and simulate one thousand replications of the model. The results are shown in Figure 1. Note, we set the mean explanatory variables as $X_1 = 10,000$ and $X_2 = 1$, but if, we could construct X_1 and compare it to X_2 , we then use the value of X_1 from the normal distribution $N(0, \sigma^2)$. If we use the value of X_1 , to transform our standard value into the actual number of government employees, a quantity that cannot seem understandable from its natural logarithm. In reporting this present 10,000 times, we generated 1000 predicted values, which we sorted from lowest to highest. The numbers in the 25th and the 75th positions represented the upper and lower bounds of a 95 percent confidence interval. Thus, we predicted with 95 percent confidence that the state government would employ between 75,000 and 100,000.

Figure 1. Probability of Voting by Age

Simulation includes 1000 replications

ER

What does a logit model look like and what makes it particularly useful in this case of binary data? Why would we know a logit model is better to use here than a normal distribution, for instance? Would we have to have some prior understanding of the nature of the data we are looking at to determine a logit model is optimal?

CC

Intuitively, I have trouble understanding exactly how simulation helps us. Are we using parameters from the data to simulate potential outcomes that give us probabilities? More generally, how does the simulation relate to the actual data?

8/10

Example Student Confusion Report

Confusion report for Making the Most of Statistical Analyses, Entire document

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We show that social scientists often do not take full advantage of the information available in their statistical results and thus miss opportunities to present quantities that could shed the greatest light on their research questions. In this article we suggest an approach, built on the technique of statistical simulation, to extract the currently overlooked information and present it in a more friendly manner. More specifically, we show how to convert the raw results of any statistical procedure into quantities that (1) convey statistically precise estimates of the quantities of greatest academic interest, (2) include reasonable measures of uncertainty about those estimates, and (3) require little specialized knowledge to understand.

The following simple statement articulates our criteria: "Other things being equal, an additional year of education would increase your earned income by \$1,000 on average, plus or minus about \$300." To cause high school students would understand that sentence, an author has implemented the statistical model and provided the computer used to produce it. The sentence is substantially informative because it conveys a key quantity of interest in terms the reader wants to know. At the same time, the sentence indicates how uncertain the researcher is about the estimated quantity of interest. Influences are never certain, so any honest presentation of statistical results must include some quantification, such as "plus or minus \$300" in the present example.

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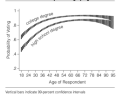
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Confusion 2

IMPROVING STATISTICAL INTERPRETATION AND PRESENTATION

We applied the predicted value algorithm to predict the number of government employees in a state with million people and an 80 percent Democratic lean. We used the statistical software described in the previous section to estimate the log linear model and simulate one year values for the coefficients β_0 and the normal random variable ϵ . Next, we set the mean explanatory variables at $X_1 = 10,000$ and $X_2 = 1$ (a 0), so we could construct \hat{Y} and compare it to Y . We then drew one value of ϵ from the normal distribution $N(0, \sigma^2)$. If ϵ was not calculated σ^2 , to transform our standard value into the actual number of government employees, a quantity that cannot seem understandable from its natural logarithm. In reporting this process 10,000 times, we generated 1000 predicted values, which we sorted from lowest to highest. The numbers in the 25th and the 75th positions represented the upper and lower bounds of a 49 percent confidence interval. Thus, we predicted with 95 percent confidence that the state government would employ between 73,000 and 119,000.

Figure 1. Probability of Voting by Age



18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80

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One page, easy to digest before class

Example Student Confusion Report

Perusal Advanced Quantitative Research Methodology, Gov2001 Settings Gradebook Roster

Confusion report for Making the Most of Statistical Analyses, Entire document

Confusion 1

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Improving Interpretation and Presentation**

Gary King Harvard University
Michael Tomez Harvard University
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Figure 1. Probability of Voting by Age

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Probability indicates Bayesian confidence interval

1) $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ when ϵ_i is constant and σ^2 is a quadratic term.

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- See confusions or engagements in context

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