

# Visualizing Model Inference and Robustness

Short Course · 25–27 March 2015

Universität Konstanz · Konstanz, Germany

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**Overview.** Visual displays are an integral part of most social science presentations and can make or break a paper. Good visuals help researchers uncover patterns and relationships they would otherwise miss. Ever more sophisticated statistical models cry out for clear, easy-to-understand visual representations of model findings. Yet social scientists seldom put as much care into designing visual displays as they devote to crafting effective prose. This 9-hour short course takes the design of graphics and tables seriously, and explores a variety of visual techniques for summarizing statistical results and efficiently representing the robustness of those results to alternative modeling assumptions. Emphasis is placed on the implementation of recommended techniques using the R packages `tile` and `simcf`.

**Website.** Consult <http://faculty.washington.edu/cadolph> for free software, additional examples, and further teaching materials, including a full ten week course on data visualization.

## Suggested Readings

On visualization

Cleveland, William S. 1993. *Visualizing Data*. Hobart Press.

Gelman, Andrew. 2004. “Exploratory data analysis for complex models (with response and rejoinder).” *Journal of Computational Graphics and Statistics* 13(4).

Gelman, Andrew, Cristian Pasarica, and Rahul Dodhia. 2002. “Let’s practice what we preach: Turning tables into graphs.” *The American Statistician* 56(2).

King, Gary, Michael Tomz, and Jason Wittenberg. 2000. “Making the Most of Statistical Analyses: Interpretation and Presentation” *American Journal of Political Science* 44(2): 341–355.

Murrell, Paul. 2011. *R Graphics*. Chapman & Hall. 2nd Edition.

Tufte, Edward R. 2001. *The Visual Display of Quantitative Information*. Graphics Press. 2nd Edition.

Ware, Colin. 2012. *Information Visualization*. Morgan Kaufman. 3rd Edition.

Zuur, Alain F., Elena N. Ieno, and Erik H.W.G. Meesters. 2009. *A beginner’s guide to R*. Springer.

Examples of model visualization using `tile+simcf`

Adolph, Christopher. 2013. *Bankers, Bureaucrats, and Central Bank Politics: The Myth of Neutrality*. Cambridge: Cambridge University Press.

Greer, Scott, Christopher Adolph, and Elize Massard da Fonseca. 2012. “Allocation of Authority in European Health Policy.” *Social Science and Medicine* 75(9): 1595–1603.

Shih, Victor, Christopher Adolph, and Mingxing Liu. 2012. “Getting Ahead in the Communist Party: Explaining the Advancement of Central Committee Members in China.” *American Political Science Review* 106 (1): 166–187.

## Course outline

The lectures are self-contained, but reading the assigned selections in advance will help attendees get more out of attending the course. Attendees not familiar with the R statistical environment are strongly encouraged to look at the readings from Zuur and Murrell before the course. Readings providing examples are marked with a † and the kind of model visualized is noted in *italics*; attendees should feel free to choose among these examples based on their interests.

Attendees interested in discussing visualization strategies for their own data analyses may submit at the end of Session 2 a one-page summary of their project and their ideas or problems for visualization. We will discuss a selection of submitted visualization challenges during the workshop (Session 6). Students may also submit their data and/or estimated models for possible inclusion as instructor examples in Session 6.

### Wednesday, 25 March 2015

#### Session 1: Effective Visual Display of Data: Principles and Problems

*Readings:* Tufte, skim  
Cleveland, skim  
Ware, skim ch. 4, 5

#### Session 2: Concepts for Visualizing Model Inference

*Readings:* King, Tomz, and Wittenberg  
Gelman, Pasarica, and Dodhia  
Zuur, Ieno, and Meesters, ch. 1–6 (for R novices)  
Murrell, ch. 1–3 (for R novices),  
ch. 6–7 (for experienced R users)

### Thursday, 26 March 2015

#### Session 3: Tools for Visualizing Model Inference

*Readings:* †Adolph, *BBC*, ch. 3, *panel data*  
†Adolph, *BBC*, ch. 4, *ordered choice models*

Session 4: Concepts for Visualizing Model Robustness

*Readings:* Gelman, “Exploratory data analysis for complex models”

†Adolph, *BBC*, ch. 6, *interactive specifications*

Friday, 27 March 2015

Session 5: Tools for Visualizing Model Robustness

*Readings:* †Shih, Adolph, and Liu, *rank data*

†Adolph, *BBC*, ch. 8, *compositional data*

Session 6: Workshop on Visualizing Model Inference and Robustness

*Readings:* †Adolph, Greer, and Massard, *multinomial choice*

†Adolph, *Bankers, Bureaucrats*, ch. 9, *event history*