

# CSSS 569 · Visualizing Data and Models

## Problem Set 1

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Winter Quarter 2025

Due by class time on Monday, 27 January 2025;

Turn in problem 2 early if possible

General instructions for homeworks: Homework can be handwritten or typed. For any exercises done with R or other statistical packages, you should attach your code at the end of the document. All other materials should be collated in order by problem. The most readable and elegant format for homework answers incorporates student comments and graphics into a seamless narrative, as one would see in an article or textbook.

### Problem 1: Critique a Visual Display of Scientific Information (VDSI)

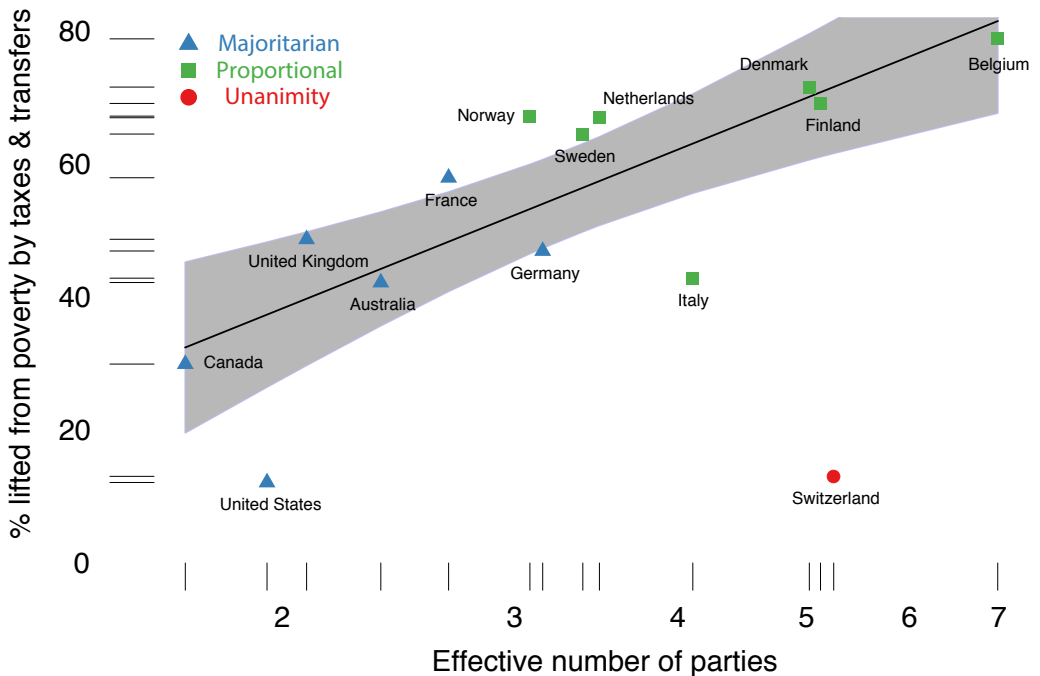
Select a specific visual display of scientific information from an article or book published in a social science field (if you work outside the social sciences, you may, of course, use visuals from your own field). The VDSI should exemplify some virtues of good design, but have at least one significant flaw or limitation.

- a. Provide a copy of the display and an explanatory paragraph to allow the general reader (e.g., your instructors) to understand and evaluate the scientific findings of the original paper.
- b. Critique the display, using (any combination of) the principles of good design discussed in lecture or your readings. You are free to disagree with the principles espoused by any authority in the course, so long as you explain your disagreement (e.g., formulate an alternative standard, explain why an exception is war-

ranted, or navigate a controversy over display techniques). Your critique should point out both virtues and flaws of the VDSI.

- c. Propose an improved VDSI, drawing on examples and ideas from class and your own creativity. Your proposals should rectify at least the most important flaw cited above.

The proposal can take the form of explanatory sketches done free-hand or via computer, or, if you can easily obtain the original data, you may find it easier to rework the graphic using the software of your choice, though I discourage you from using an inflexible package like Excel.



**Figure 1.** *Electoral systems and redistribution.* Source: Torben Iversen and David Soskice, 2002, "Why do some democracies redistribute more than others?" manuscript, Harvard University; redrawn.

## Problem 2: Graphical Skills Test

Using your existing skills and the software of your choice (but not Excel!), reconstruct as much of the Iversen & Soskice scatterplot as you can. The goal is to spend no more than an hour or two to see what you can do (or learn to do) in that time. If you use R or another programming language, attach your code. Otherwise, describe how you made the graphic, step by step.

Elements of the scatterplot you might try to replicate:

- a. Log scaling
- b. Intelligible axis titles and tick labels
- c. Points labeled by country and color coded/marked by party system
- d. An embedded, simple legend
- e. Rugs showing marginal distributions
- f. Linear, preferably robust, fits
- g. Confidence intervals around fitted lines

I don't expect you to be able to integrate all of these in an hour or two. Do your best; if you take this problem seriously, you will receive full credit. The collective performance of the class will help me pitch coming lectures on graphical programming at the level that helps the most students.

The Iverson & Soskice data are available on the course website in a comma-separated variable (csv) file, `iverRevised.csv`. This is my preferred format for sharing data. After setting R's working directory to the folder to which you have downloaded the dataset, you may read it using the command:

```
data <- read.csv("iverRevised.csv", header=TRUE)
```

csv files can also be easily loaded in many other packages.

The data are also reproduced here:

country	povertyReduction	effectiveParties	partySystem
Australia	42.16	2.38	Majoritarian
Belgium	78.79	7.01	Proportional
Canada	29.9	1.69	Majoritarian
Denmark	71.54	5.04	Proportional
Finland	69.08	5.14	Proportional
France	57.91	2.68	Majoritarian
Germany	46.9	3.16	Majoritarian
Italy	42.81	4.11	Proportional
Netherlands	66.93	3.49	Proportional
Norway	67.17	3.09	Proportional
Sweden	64.48	3.39	Proportional
Switzerland	13.02	5.26	Unanimity
United Kingdom	48.66	2.09	Majoritarian
United States	12.1	1.95	Majoritarian

where

country	country as a string
povertyReduction	% of impoverished persons lifted from poverty by redistribution
effectiveParties	the effective number of parties
partySystem	three-category coding of party systems