Design and Analysis of Sample Surveys

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Class 11a: Ideal-point modeling

Some applications of ideal-point modeling

- Roll-call voting
- Ability testing
- Ranking
- Public opinion

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The basic ideal-point model

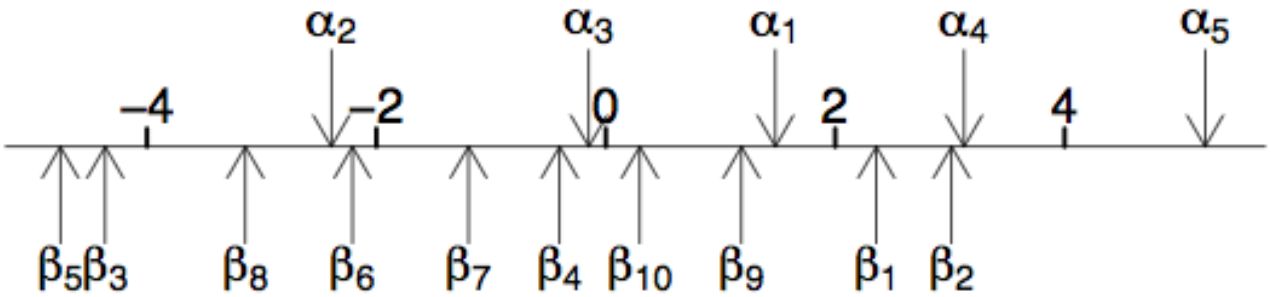

Figure 14.13 *Illustration of the logistic item-response (Rasch) model,* $\Pr(y_i = 1) = \text{logit}^{-1}(\alpha_{j[i]} - \beta_{k[i]})$*, for an example with 5 persons* j *(with abilities* α_j*) and 10 items* k *(with difficulties* β_k*). If your ability* α *is greater than the difficulty* β *of an item, then you have a better-than-even chance of getting that item correct. This graph also illustrates the nonidentifiability in the model: the probabilities depend only on the* relative *positions of the ability and difficulty parameters; thus, a constant could be added to all the* α_j*'s and all the* β_k*'s, and the model would be unchanged. One way to resolve this nonidentifiability is to constrain the* α_j*'s to have mean 0. Another solution is to give the* α_j*'s a distribution with mean fixed at 0.*

The basic ideal-point model

$$\Pr(y_{jk}=1) = \text{logit}^{-1}(\alpha_j - \beta_k),$$

$$y_{jk} = 1 \text{ if person } j \text{ gets item } k \text{ correct}$$

Parameters:

- α_j: the *ability* of person j
- β_k: the *difficulty* of item k.

Alternative expression:

$$\Pr\left(y_i=1\right) = \text{logit}^{-1}(\alpha_{j[i]} - \beta_{k[i]}).$$

Ideal-point models: Statistical elaborations

$$\Pr(y_{jk}=1) = \text{logit}^{-1}(\alpha_j - \beta_k)$$

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- Adding a discrimination parameter:

$$\Pr(y_{jk}=1) = \text{logit}^{-1}(\gamma_k(\alpha_j - \beta_k))$$

- Allowing random error ("guessing," etc.)
- Multiple dimensions
- Adding regression predictors
- Time variation
- Balanced and unbalanced data; selection of cases

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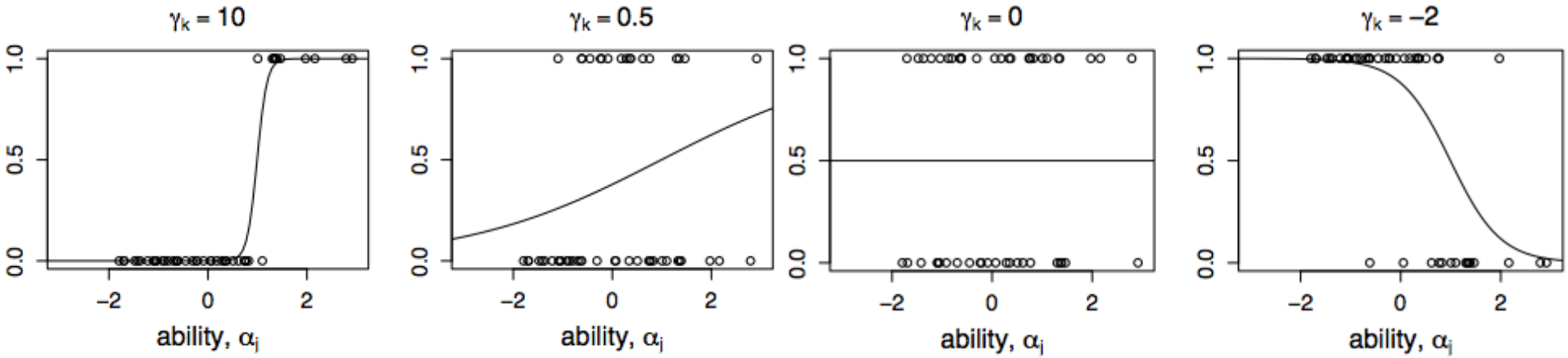
Ideal-point models with discrimination parameters



Ideal-point modeling for roll-call voting

- Congress
  - Difficulty: interpreting long-term trends
- State legislatures
- Aligning voters with Congress
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Aligning voters with Congress

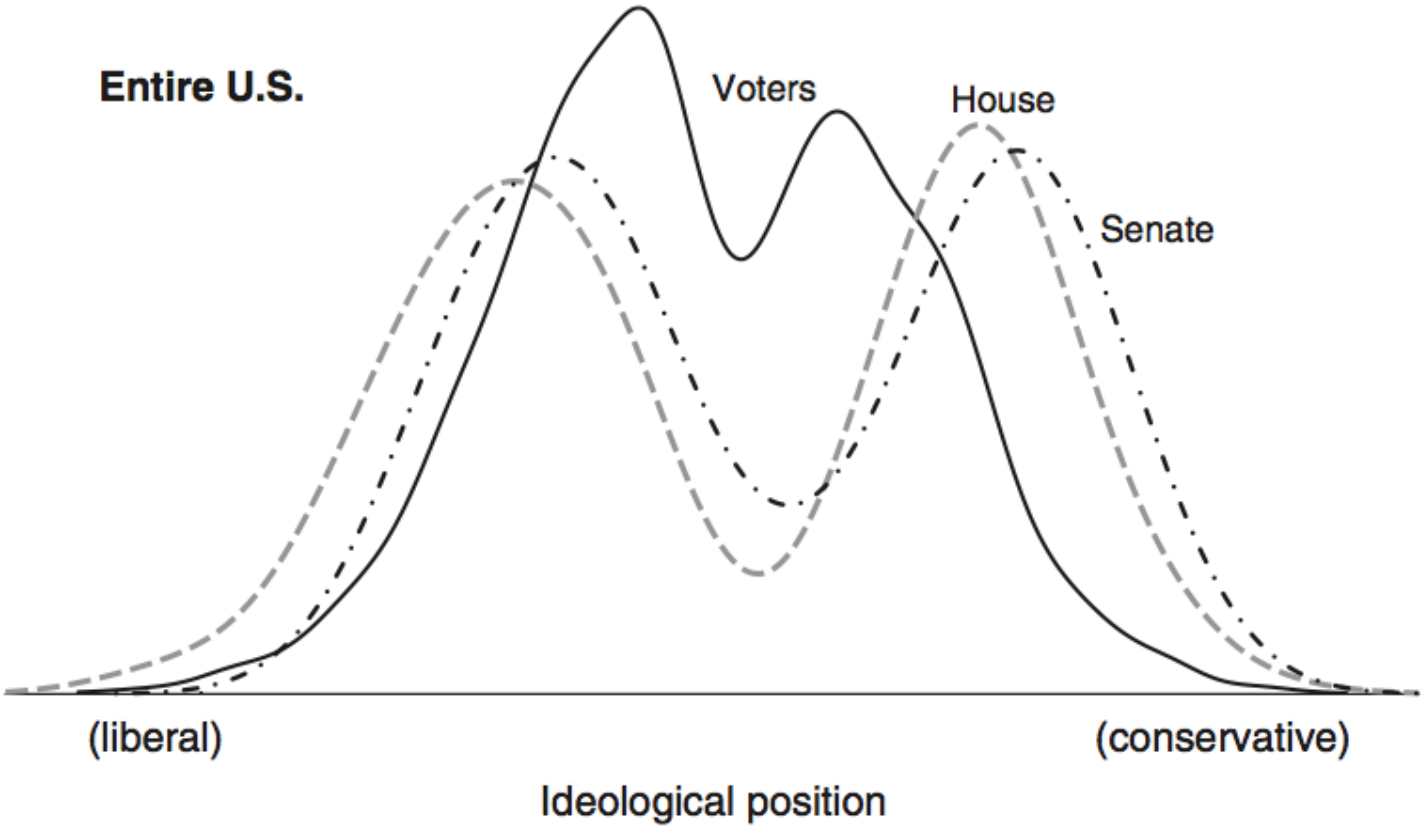
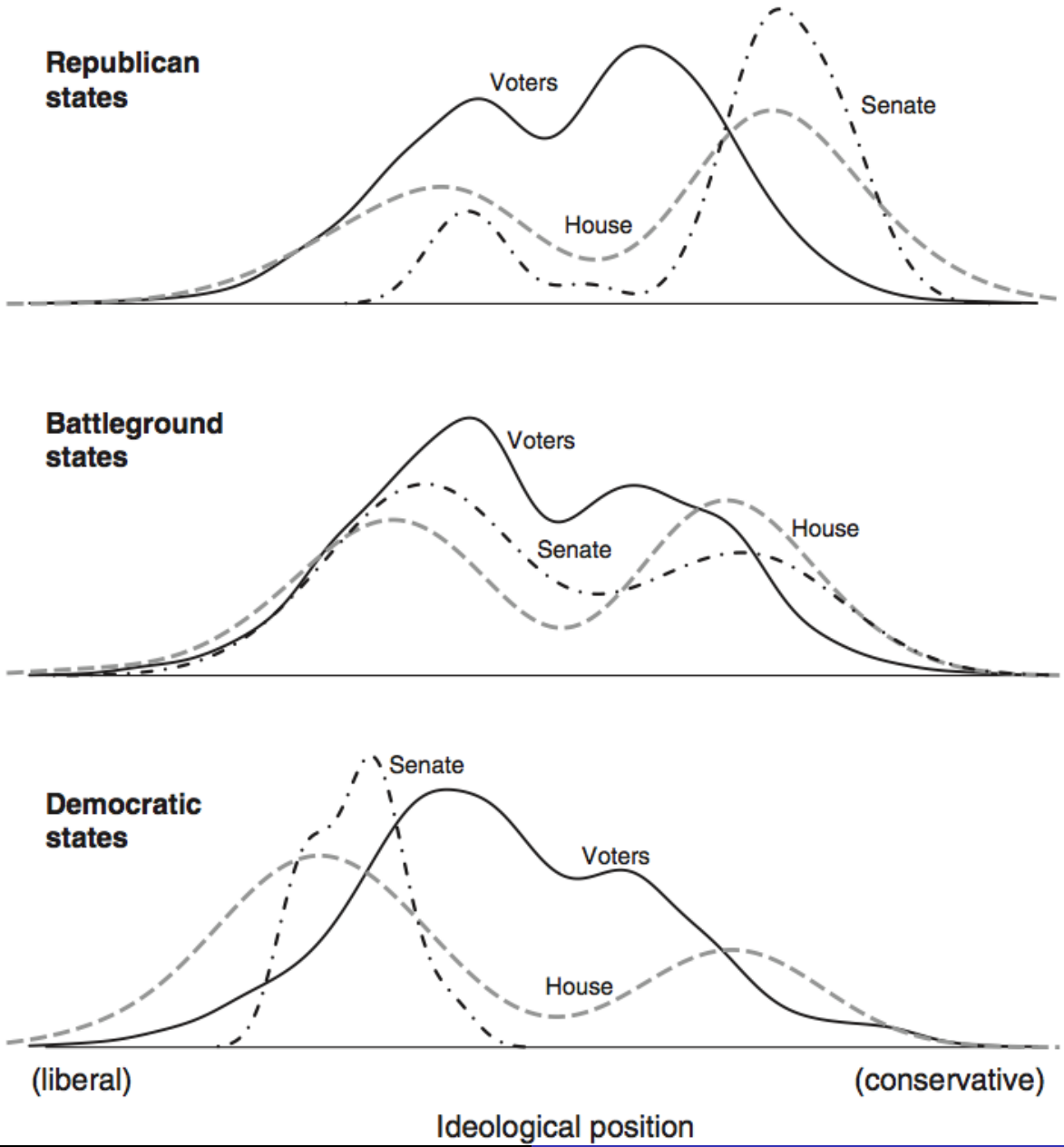


Figure 8.8: Michael Herron's estimate of ideological positions of voters (solid line) and congressmembers (dashed lines) after the 2006 midterm elections, on a common left–right scale. The median position of the voters is not far from the medians of the House of Representatives and the Senate, but the distributions are clearly different, with voters in general being closer to the center and congressmembers being more extreme (Democrats on the left and Republicans on the right).

Aligning voters with Congress



Item response theory: Ideal-point modeling for ability testing

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  - Standardized tests
  - College grades
  - Primate intelligence
- Similarities and differences between item response theory and ideal-point modeling

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  - Example: the size of the stimulus package
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  - Ph.D. programs
- How are these examples similar, and how are they different?

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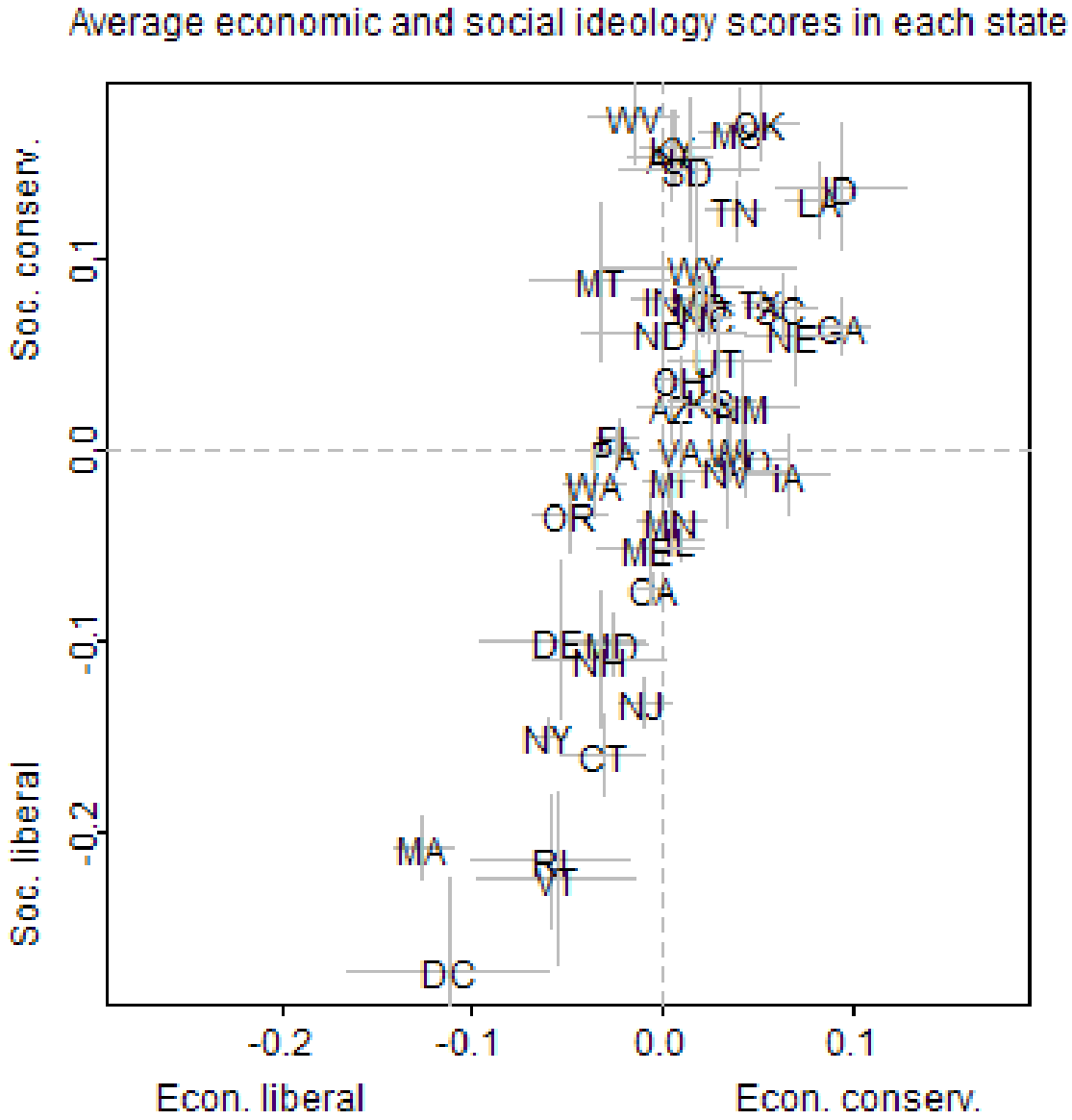
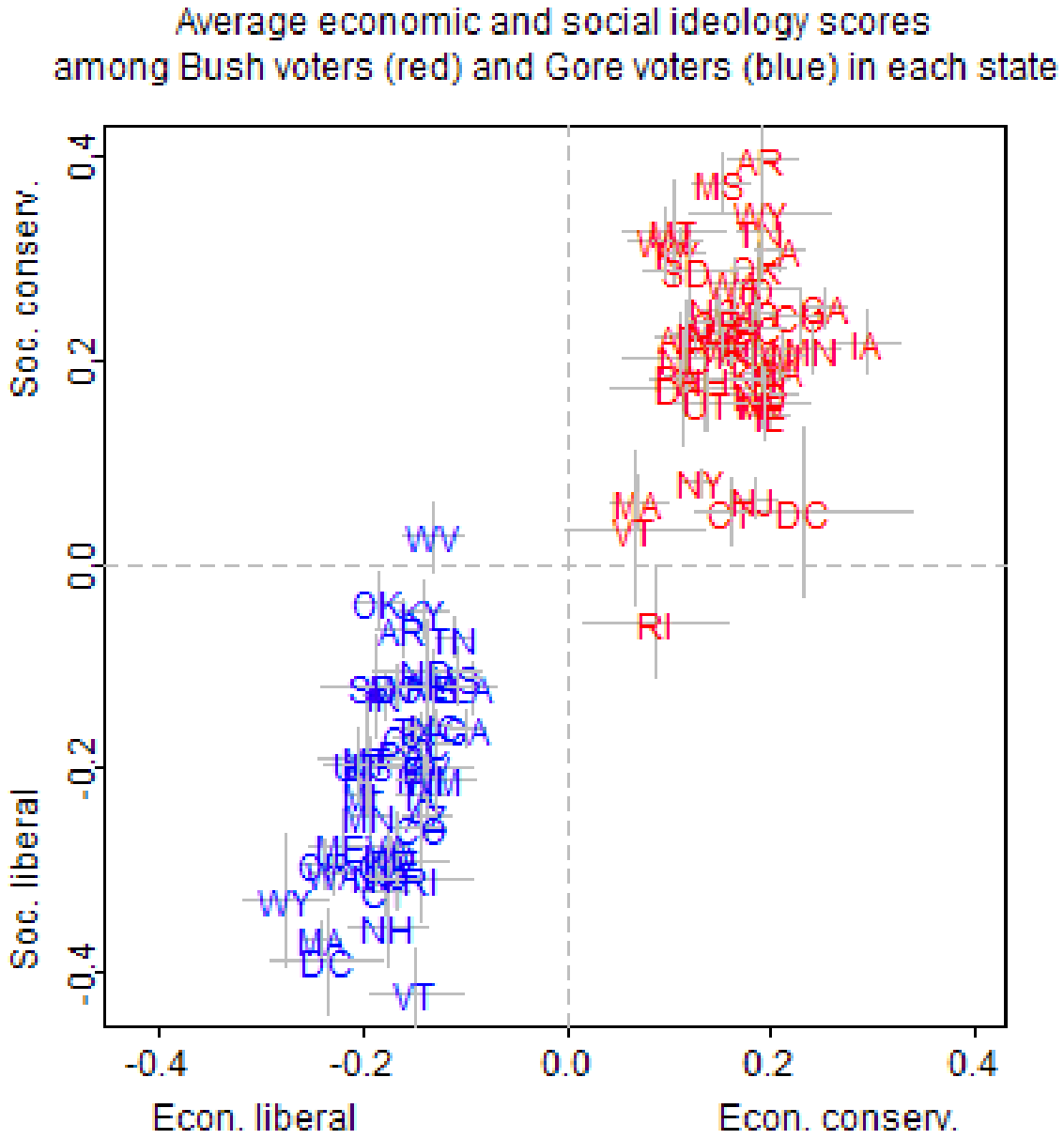
Economic and social ideology by state



Democrats and Republicans separately



Annenberg rolling cross-section poll, 2000

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