SoDA 496 Introduction

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1/11/23

Three Big Ideas

1. Data generating processes can be modeled.
2. There are intrinsic limits to what can be inferred from a model.
3. Your ideas are only as good as your marketing.

Why?

Why is this important?

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- Why does this matter for society?

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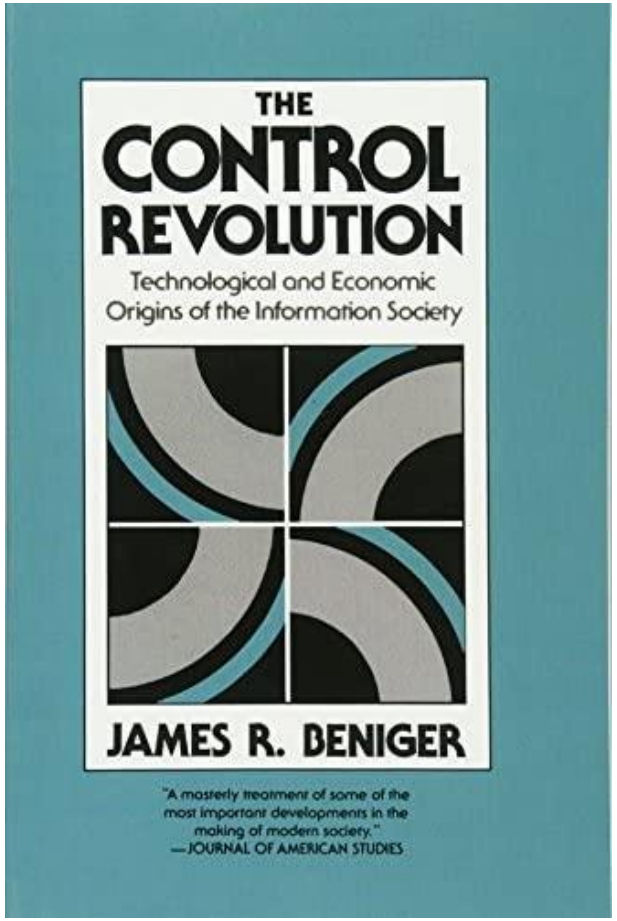
- Why does this matter for society?
- Why does this matter for science?

The Control Revolution

- The industrial revolution created a “crisis of control.”



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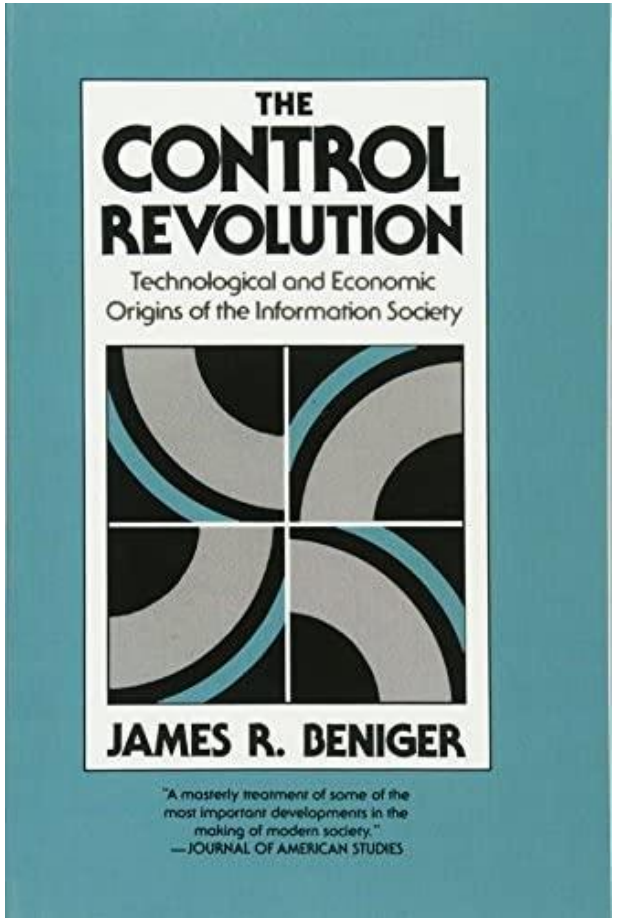

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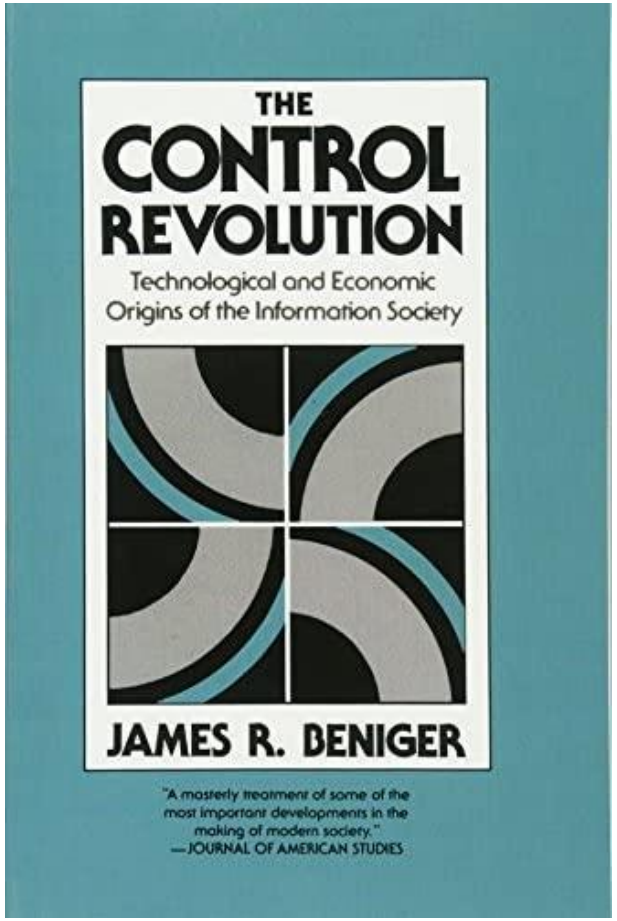

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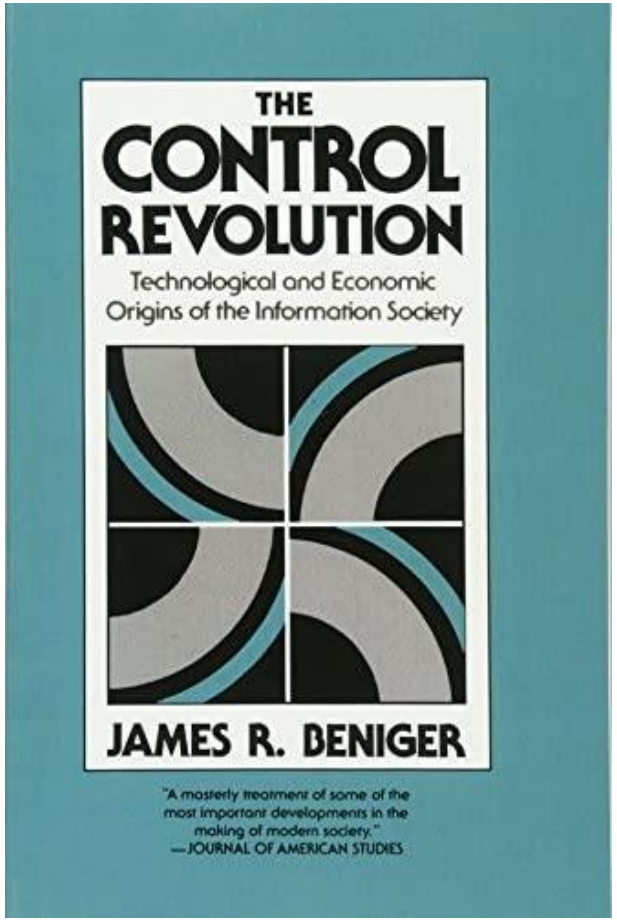
- **Control:** Purposeful influence toward a predetermined goal.
- The increased speed and scale of society brought logistic and trust problems.
- A society’s ability to maintain control will be directly proportional to the development of information technologies.



Scientific Advancement

- For most of human history our ability to collect and model data on human behavior was relatively limited

What is causing polarization?

A common answer:

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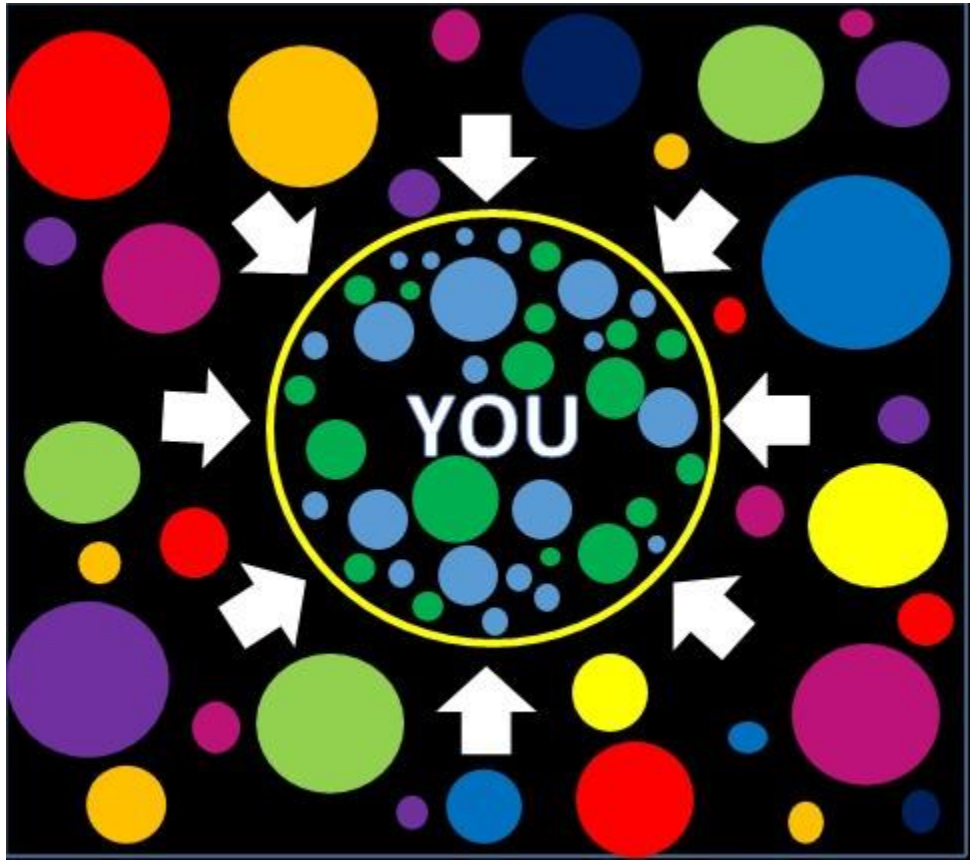

However…

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- Further, data from around the world suggests that while social media use is a global phenomenon, polarization is not (Boxell, Gentzkow, & Shapiro 2021). Why?

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- It isn't clear that echo chambers are polarizing. Some research suggests that it is, but other research suggests that it's exposure to different views that polarize (Bail et. al. 2018).
- Further, data from around the world suggests that while social media use is a global phenomenon, polarization is not (Boxell, Gentzkow, & Shapiro 2021). Why?
- This doesn't necessarily mean that social media has no impact on polarization, but it does imply that the popular model is wrong.

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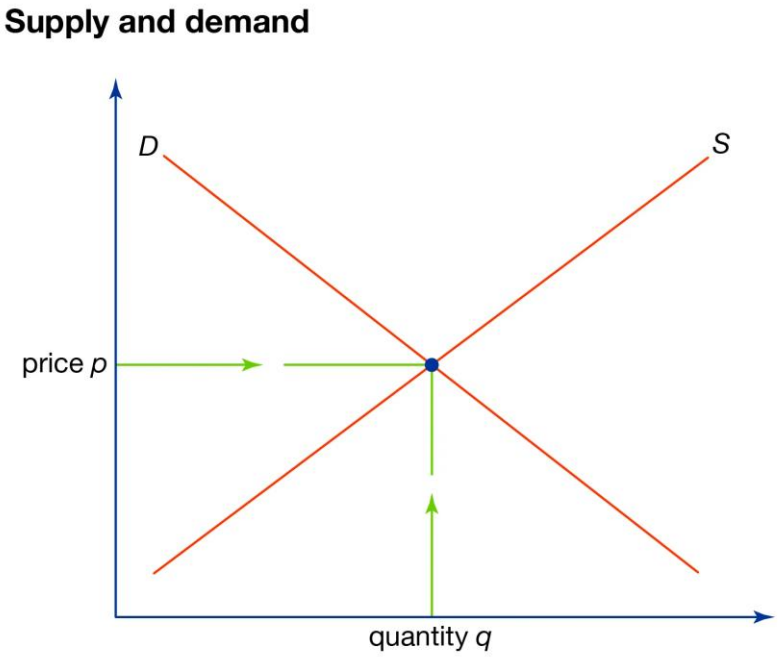

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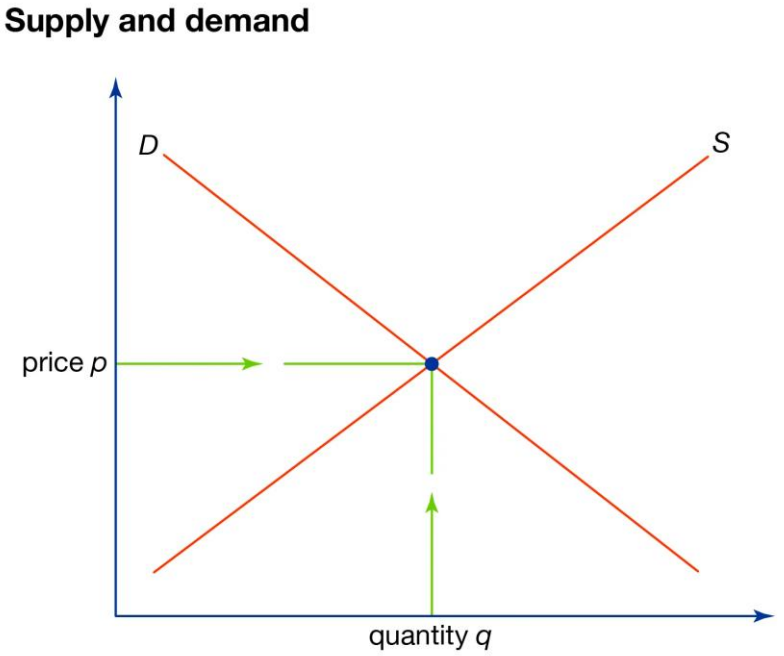

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- Examples:
  - Echo chambers
  - Minimum wage and employment
  - Immigration and wages
  - Shy Trump voters

Modeling

Modeling

- **Data Generating Process (DGP):** Real world events that generate data.
- All data has a data generating process.
- Many of these processes can be represented mathematically.
- These mathematical representations are models. They are not the only kind of model, but they are the kind we will primarily be working with in this class.
- Different kinds of data have different DGPs, and thus merit different models.

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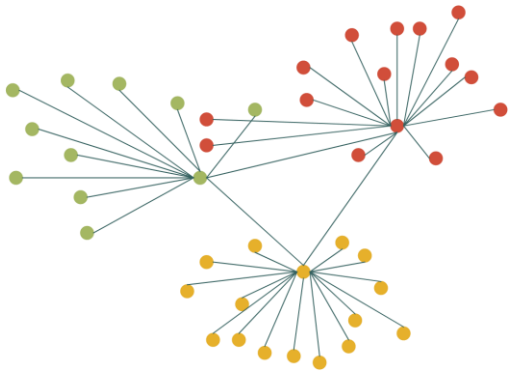

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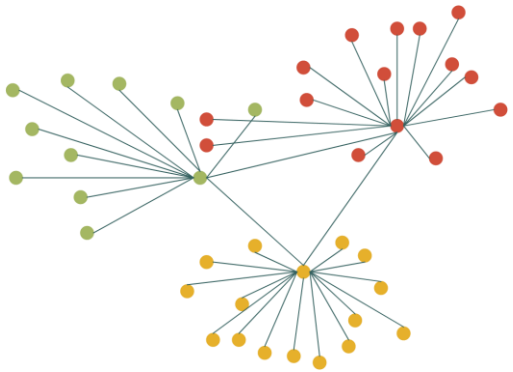

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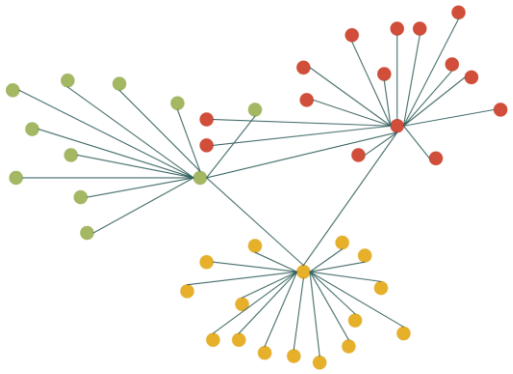
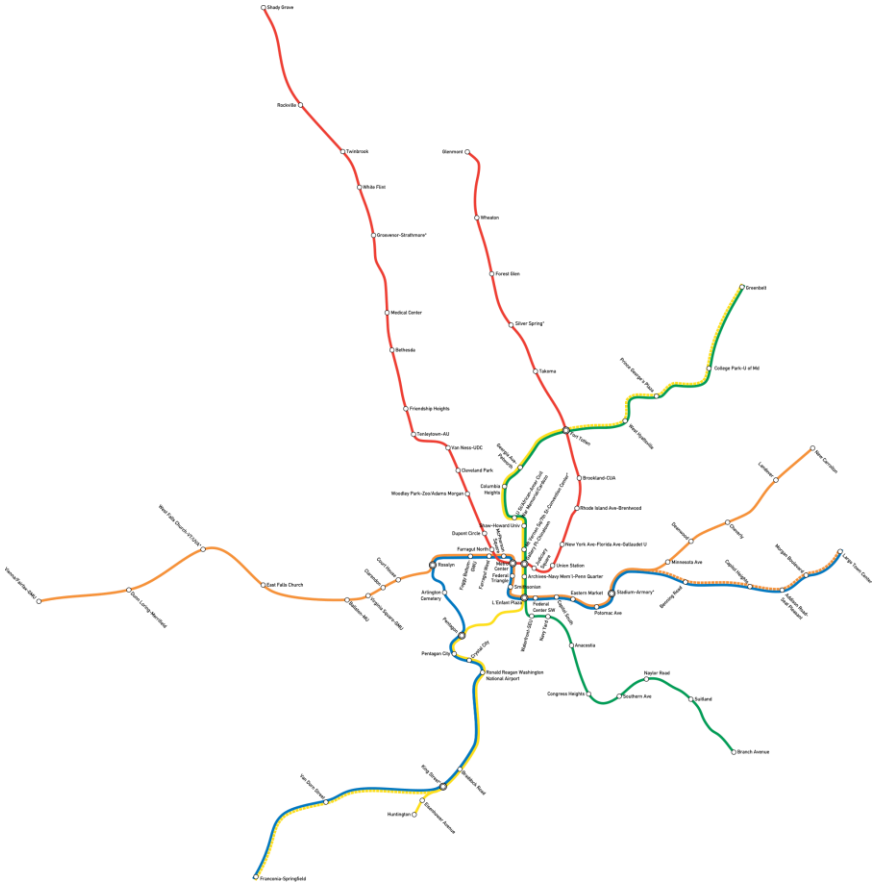


Date collected	Plot	Species	Sex	Weight
1/9/78	1	DM	M	40
1/9/78	1	DM	F	36
1/9/78	1	DS	F	135
1/20/78	1	DM	F	39
1/20/78	2	DM	M	43
1/20/78	2	DS	F	144
3/13/78	2	DM	F	51
3/13/78	2	DM	F	44
3/13/78	2	DS	F	146

Limitations

A simple model:

Two models of the same system:



Models are useful, but limited

- Endogeneity
- Measurement error
- Spurious correlation
- Misspecification
- Omitted variables
- Simultaneity

Marketing

Why were some of the bad models we discussed successful?

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- Simple and intuitive

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- Simple and intuitive
- Appeal to what we want

Attractive ideas are effective ideas

- Writing (and thinking)
- Visualization

Vocabulary

- Data Generating Process
- Model