



DECART Summer School 2018:

Causal Inference Module

Paper Discussion

What can we do when SUTVA is violated:

Evaluating Kindergarten Retention Policy

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Study Info

- Early Childhood Longitudinal Study Kindergarten cohort (ECLS–K).
- repeated observations of a nationally representative sample of students, their families, teachers, and schools over two school years
- Outcome: reading and math scale scores calibrated by item response theory (IRT)
- Treatment: retained or promoted
- Further consideration: children were clustered by school (organizational effect)
- Rubin (1990): SUTVA becomes problematic when, for example, educational treatments are given to children who interact with one another.

Notation:

- Consider N subjects from one single school, $i=1, \dots, N$
- Z_i treatment for subject i : $Z_i = 1$ if child i is retained and $Z_i = 0$ if promoted.
- Other children's treatment also affect the outcome of child i 's outcome, so the counterfactual outcomes are $Y_i(z_1, z_2, \dots, z_N)$
- How to simplify the problem?
- $Y_i(z_i, \mathbf{z}_{-i}) = Y(z_i, v(\mathbf{z}))$
- SUVTA assumes that $Y_i(z_i, \mathbf{z}_{-i}) \equiv Y_i(z_i)$

Notation:

- Consider multiple schools, $\mathbf{S} = (S_1, S_2, \dots, S_N)$
- Counterfactual outcomes: $Y_i[z_i, v(\mathbf{z}), \mathbf{s}]$
- The contrast of interest then is
$$E\{Y[z, v(\mathbf{z}), \mathbf{s}] - Y[z', v(\mathbf{z}'), \mathbf{s}']\}$$
- Simplification:
 - a. Intact schools: set the estimands of interest will be conditional on current school assignments
 - b. No interference between schools
$$Y_i[z_i, v(\mathbf{z}), \mathbf{s}] \Rightarrow Y_{ij}[z_{ij}, v(\mathbf{z}_j)]$$
 - c. Strongly ignorable treatment assignment: connect observational data to counterfactuals defined here.