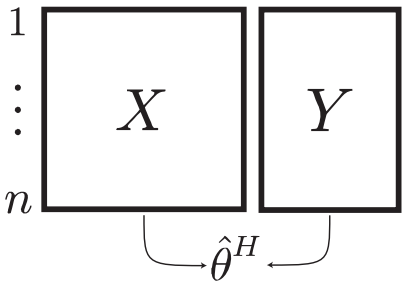
The mixed subjects design decreases costs of precise estimates and maintains validity

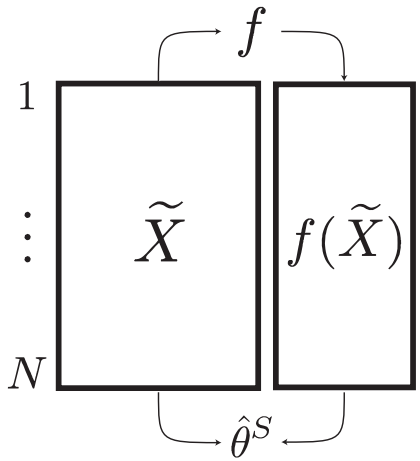
Human Subjects



Estimate $\hat{\theta}^H$ with classic inference, e.g. by using OLS to regress observed outcome Y on X.

- ✓ valid estimate
- ✗ precise estimate
- ✗ inexpensive data

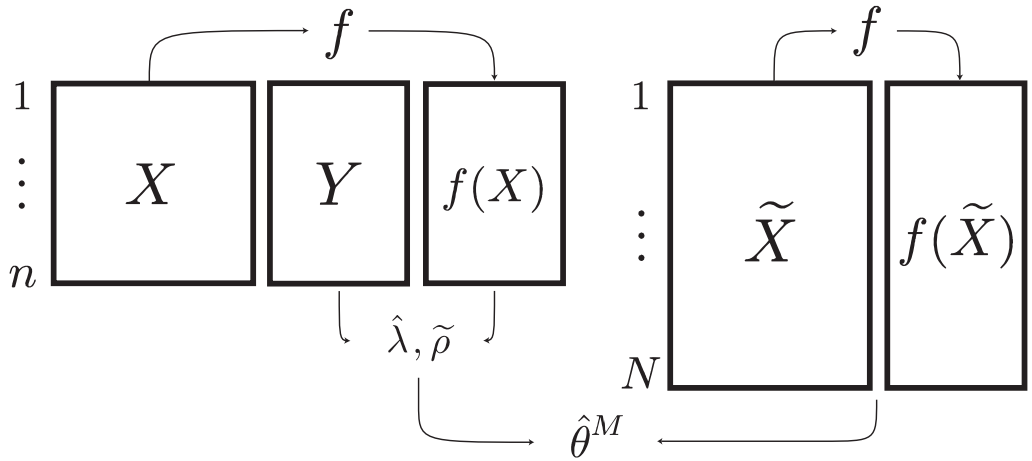
Silicon Subjects



Estimate $\hat{\theta}^S$ with classic inference, e.g. by using OLS to regress LLM predictions $f(\widetilde{X})$ on $\widetilde{X}$.

- ✗ valid estimate
- ✓ precise estimate
- ✓ inexpensive data

Mixed Subjects



Estimate $\hat{\theta}^M$ by combining data from human subjects and LLM predictions. Prediction-powered inference (PPI) assesses their interchangeability $\tilde{\rho}$, avoids bias in parameter estimates, and enhances precision through power-tuning $\hat{\lambda}$.

- ✓ valid estimate
- ✓ precise estimate
- ✓ inexpensive data