Digression: Randomization and Its Limits

- **Appeal**
  - Randomization is used to estimate average treatment effects (ATEs) in causal inference (was born in medicine) and it is perceived to be **one of the mest methods to yield credible causal inference, while requiring minimal substantive assumptions**.
  - Randomization ensures covariate balance between treated and control groups (in principle, with proper randomization, T is uncorrelated with w, so controlling for w is not strictly required).
- **Randomization is a powerful tool but not a panacea. Needs awareness of:**
  1. Asymptotic Balance of w
     - Key assumption but is Balance between T and w only holds asymptotically (large sample or infinite replications). **But, in practice, 1) samples are small (cross sect) and/or 2) replications (on africa, asia...) are rare, especially in economics (not so publishable)**. This issue is extremely relevant in cross-country regression: a limited number of countries and a potentially enormous number of variables that influences y (potentially k > n). Large samples are not immune bc covariates are a lot and if you add interactions (more infra)...
  2. Beware of Heterogeneous Treatment Effects
     - Small (OFTEN selected) samples may be non representative! Raises **external validity** concerns!
     - Recall: you check heterogeneity by interacting variables iwth the treatment
     - ATE is valid only where interaction variables v are similar to those in the study.
     - Especially in macro context it could be that treatment effect varies greatly with the interaction of social and environmental contexts
     - Hence, the ATE may obscure important heterogeneity. *"like the lawyer who explained that when he was a young man he lost many cases he should have won but as he grew older he won many that he should have lost, so that on the average justice was done"*
  3. Other Concerns: Trials not blinded (placebo effects) nor sufficiently controlled for other sources of bias (Hawthorn effects, John Henry effect, spillover effects, attrition, non-comliance)
- **What to take home**
  - Leamer, 2010: Part of the problem is that we data analysts want it all automated. We want an answer at the push of a "randomization" button on a keyboard without intellectual reflection.
  - Deaton and Cartwright (2018): Sound empirical work should integrate research purpose, theory, context, and prior knowledge alongside rigorous experimentation. Depending on what we want to discover, why we want to discover it,and what we already know, there will often be superior routes of investigation. RCT not necessarily best way.
  - RCT is wasteful and even unethical when it unnecessarily exposes people.