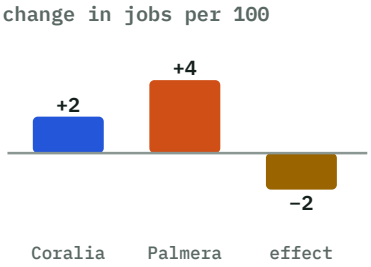
How do you prove a policy works? Compared with whom?

"Things changed **after** the policy" never proves the policy did it: everything else changed too. Find a **control group** that got everything but the policy, and subtract its change. Question 6 of the ten to ask a number.

1 The before-and-after trap

after ≠ because

- **Coralia Gazette** (the toy island's newspaper): "Jobs UP after the wage rise!" · Coralia raised its **minimum wage** (lowest legal pay) · fast-food jobs 100 → 102 = **+2**
- After a policy **everything else changes too** → season · economy · weather
- **Palmera** (neighbor island, no rise): 100 → 104 = **+4** ⇒ the story flips
- Bars show **changes**, not levels → 102 next to 104 on a bar from zero would look the same



2 Difference in differences

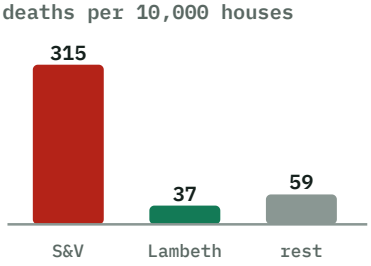
compare, then subtract

- **Treatment group** = got the policy · **control group** = did not → shows what would have happened without it
- `effect = change of treated − change of control` · `(+2) − (+4) = −2` jobs per 100 · if Palmera **+0** → effect **+2** ⇒ the answer depends on the control group → it must be **alike**
- Practice: free breakfast → scores Coralia 60 → 66, Palmera 60 → 63 → `(+6) − (+3) = +3`, not 6 · speed camera → crashes Road A 50 → 44, Road B 30 → 28 → `(−6) − (−2) = −6 + 2 = −4` · compare **changes**, not levels (B starts lower: no matter)

3 Natural experiment

chance borrowed

- Something **outside the study**, not a researcher, splits people into groups → unrelated to the result
- **John Snow** (English doctor, 1813-1858), London **1854**, cholera (deadly gut disease) · bad air? dirty water? · **map**: > 500 deaths in 10 days around one Soho pump → handle off 8 Sept · deaths already falling → before-and-after · two water firms, same streets: **S&V** (Southwark & Vauxhall) → river Thames in town (sewage) · **Lambeth** → water from upriver since 1852 · 7 weeks from 8 July, per 10,000 houses → **315** · **37** · rest of London 59 · "on the grandest scale" (1855)
- **David Card** (Canadian, Nobel 2021) & **Alan Krueger** (American), 1994 · New Jersey 1 April **1992** $4.25 → $5.05 · Pennsylvania no rise · 410 fast-food restaurants → jobs did **not fall** vs Pennsylvania · others (firms' pay records) → small losses · debate open · the **method**, not a verdict



4 Randomized trial

chance made

- A **coin or lottery** decides who gets the treatment ⇒ groups alike in everything else, **on average** ⇒ gap afterwards = effect
- **Kenya**, Edward Miguel & Michael Kremer, **2004**: deworming pills (kill gut worms) given to schools in a random order → pupils missed ≈ **a quarter** less school · Banerjee, Duflo & Kremer → Nobel **2019**
- **Oregon**, **2008**: Medicaid (public health insurance, low-income adults) · ≈ 90,000 signed up → ≈ 30,000 drawn by lottery → **+25 percentage points** insured in year 1 · two years: less depression and medical debt · no clear effect on blood pressure
- Fair trial, in order: sign up → **lottery** splits → one group treated → compare at the end

5 Self-selection

who chose?

Comparison	Gap	Measures
chose the evening class (74) vs did not (59)	**15**	class + who chose
lottery winners (68) vs losers (64), all wanted it	**4**	the class
left over: 15 − 4	**11**	who chose to go

- **Self-selection** = people pick their own group → groups differ **before** the policy · keen pupils pick the class
- Sort it → **randomized**: coin for a math app, lottery for seats, insurance · **natural**: born a day either side of the cutoff birthday for a school year, a storm shuts 1 of 2 bridges, 2 water firms · **none**: café after new paint, grades after laptops

6 So what?

question 6 of 10

- **Ten questions to ask a number** · 1 · Where does the axis start, and what is its scale? · 2 · Average of what: the mean or the median? · 3 · Percent of what? Percent or percentage points? · 4 · Real or nominal: did prices change too? · 5 · What else changed? Could something else explain both? · **6 · Compared with whom? Where is the control group?**
- Gazette rewritten → "Fast-food jobs in Coralia rose 2 per 100 after the wage rise. In Palmera, with no rise, they rose 4. Compared with Palmera, the rise is linked to 2 fewer jobs per 100."
- Met before: Policy Lesson 2 (New Jersey) · Development Lesson 4 (treatment and control villages) · Micro Lesson 2 (a model shifts one curve and holds the rest still → a control group for free) · next → Lesson 7, who was asked?

Watch out: "after we did X, Y improved" proves nothing alone · subtract the control group's change · the control group must be alike · people who choose the treatment are not a fair comparison → chance must pick