

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



Primed for conservation:
Experimental evidence from nudges to join
water-use information website

Professor Laura Grant

*Department of Economics & School of
Freshwater Sciences, University of
Wisconsin, Milwaukee*

Your water use

- How much do you use per month?
- How much do you pay?

Your water use

- How much do you use per month?
- How much do you pay?

- In Milwaukee
 - Water is actually a great value.
 - Five gallons cost one cent.
 - As measured by your water meter, 100 cubic feet (748 gallons) cost \$1.68.
 - That is 6 standard bathtub fills.
 - About the same price as a large bottled water.
 - The average residential bill is \$56.70 per QUARTER.
 - <http://city.milwaukee.gov/water/customer/CurrentWaterRates.htm>

Water rates comparison

Similarly size cities, varying water sources

City	Usage Level	Monthly Usage CCF	First Block \$/CCF	Second Block \$/CCF	Total /Annum	Ave \$ /CCF
Milwaukee*	High	15	\$1.73	\$1.63	\$297.40	\$1.652
Milwaukee	Medium	10	\$1.73	\$1.63	\$199.60	\$1.663
Milwaukee	Low	5	\$1.73	\$1.63	\$101.80	\$1.697
Portland	High	15	\$3.44	n/a	\$619.38	\$3.441
Portland	Medium	10	\$3.44	n/a	\$412.92	\$3.441
Portland	Low	5	\$3.44	n/a	\$206.46	\$3.441
Las Vegas**	High	15	\$0.87	\$1.560	\$206.28	\$1.146
Las Vegas	Medium	10	\$0.87	\$1.560	\$104.40	\$0.870
Las Vegas	Low	5	\$0.87	\$1.560	\$52.20	\$0.870
Fresno	High	15	\$0.61	n/a	\$109.80	\$0.610
Fresno	Medium	10	\$0.61	n/a	\$73.20	\$0.610
Fresno	Low	5	\$0.61	n/a	\$36.60	\$0.610
Virginia Beach	High	15	\$3.30	n/a	\$594.00	\$3.300
Virginia Beach	Medium	10	\$3.30	n/a	\$396.00	\$3.300
Virginia Beach	Low	5	\$3.30	n/a	\$198.00	\$3.300

*Milwaukee uses decreasing block pricing; **Las Vegas uses increasing block pricing; Portland, Fresno and Virginia Beach use flat rate volumetric pricing

What economists don't do



What economists do

- Study of the allocation of scarce resources.
- The theories of economics can be applied to any scarce resource, not just traditional commodities.
- Economics is not about profits or money.
- We face constraints and we must make tradeoffs.
- Economists study how incentives affect people's behavior.

Water economics

- Water is usually publicly owned, making it particularly vulnerable to no one taking responsibility.
- Water prices are rarely market outcomes, bureaucratic and political forces keep water rates artificially low, not reflecting the true resource scarcity.
- Even in threat of droughts and other shortages, management institutions are reluctant to raise prices.
- Incentives are truly lacking.

How do we get people to care? And how to measure that?

- Low cost of water delivery to each household.
- Lack of visible water quality issues.
 - Rivers are not on fire.
- Not surprising:
 - 2010 poll of the great lakes region found
Over 80% of respondents agreed with
“The actions of individuals do not have an impact on water quality and quantity problems.”
 - Over 70% said agreed with
“I do not see a role for myself in protecting the region’s water resources.”

(Public Policy Forum, Research Brief for 1000 Friends of Wisconsin)

Water conservation can be win-win

- Some people want to conserve water, especially if the measures save them money.
- Green consumers may even want to go beyond personal gain.
- However, we see two behaviors in contradiction:
 - Consumers do not take advantage of numerous and fairly easy opportunities to reduce use for personal gain.
 - When information is available and designed to assist in recognizing the opportunities, there is relatively little voluntary uptake of information programs.

Finding the context & counterfactual

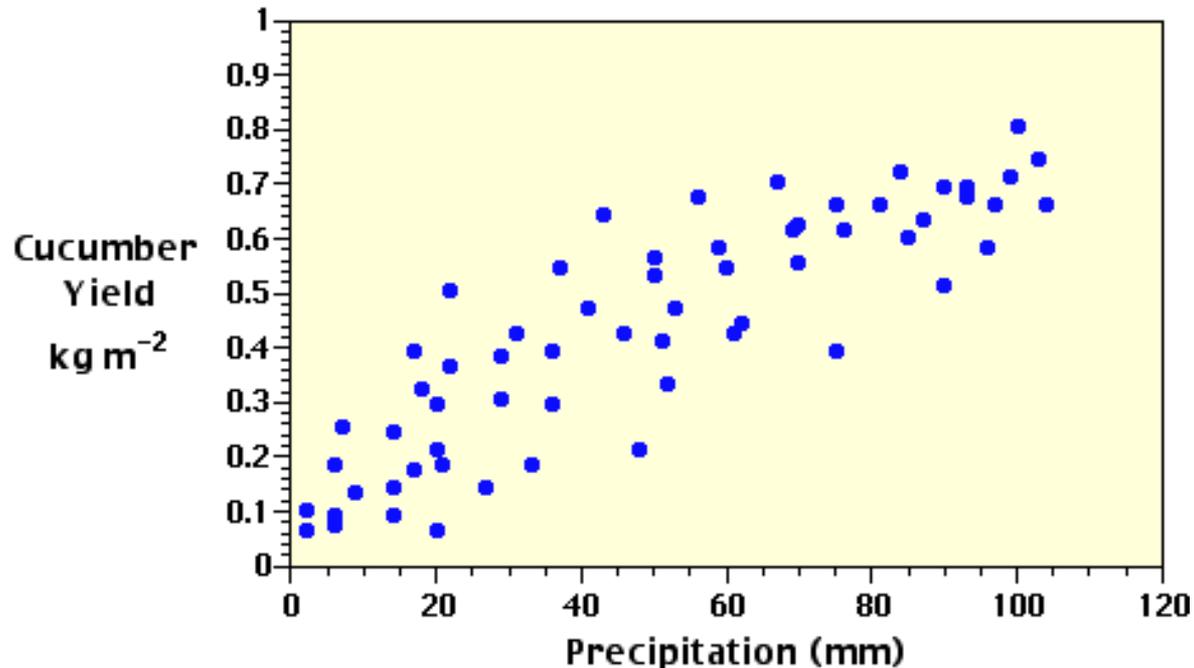
- What scenario or data would be ideal for learning about **our interesting questions**?
- What would happen if....
 - a new policy is passed requiring a household water-saving device?
 - a media campaign is launched about pharmaceutical levels in drinking water?
- What would have happened if it is not...
- What is the right tool to answer these?





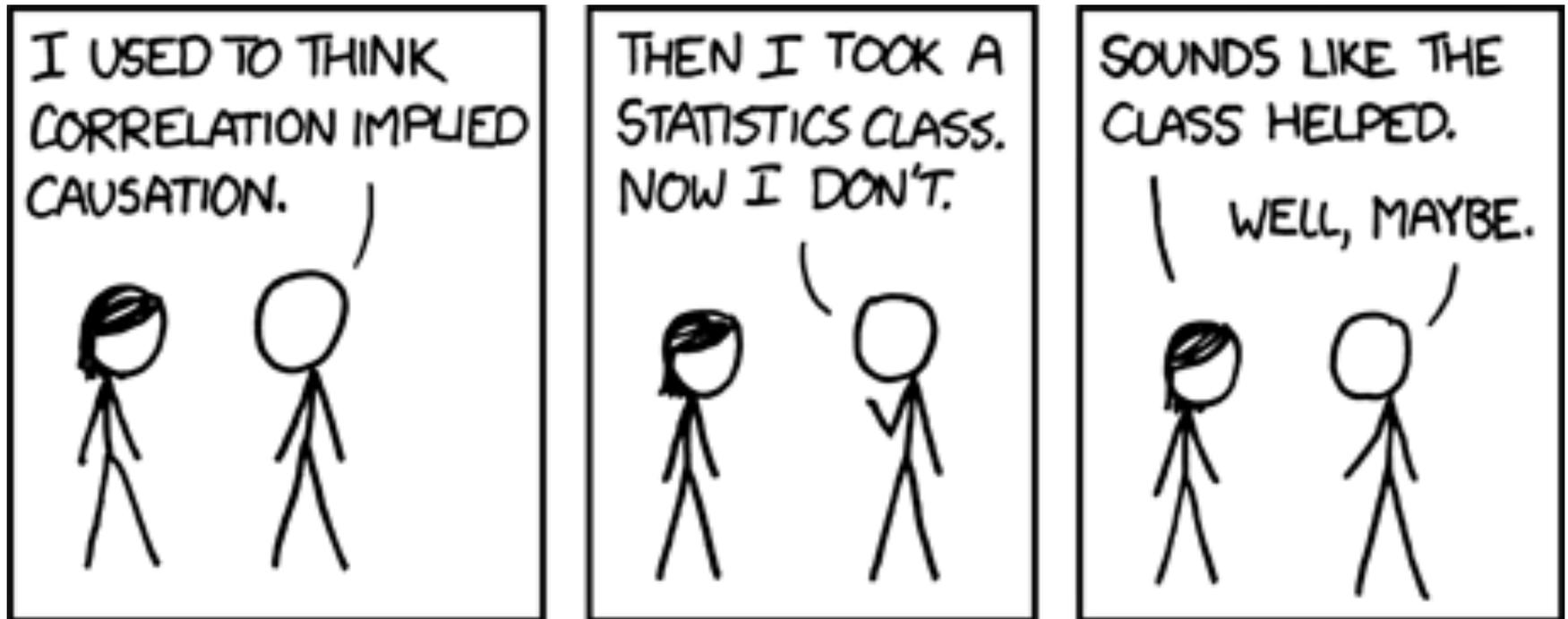
Statistical inference

- Collect data that has already occurred.
- Use statistical methods, which suggests how variables are related.



Correlation v causation

- Just because two variables move together, does not mean one affected the other.
- Example: Children's height and their vocabulary



Do environmental groups improve water quality?

with Christian Langpap, Oregon State University

- Environmental groups aim to make a difference:
 - protecting endangered species, mitigating climate change, improving the quality of water resources.
- Nearly 18,000 environmental nonprofits.
- Many factors influence the outcomes of the groups' work:
 - complex bio-physical systems, community interest, and fluctuating political pressures.

Evidence from watershed groups

- A watershed group is a common form of environmental non-profit.
- These groups have sprung up across the US as stewards of local rivers.
- Over 5000 nonprofit groups classified in “Water Resource, Wetlands Conservation & Management.”
- Annual watershed group financial data from 1994 through 2010. Average spending: \$600,000/yr

Water quality data

- Water Quality

Section 303(d) of the Clean Water Act:

- States required to assess water bodies every two years.
- Identify waters too polluted or otherwise degraded to meet water quality standards.

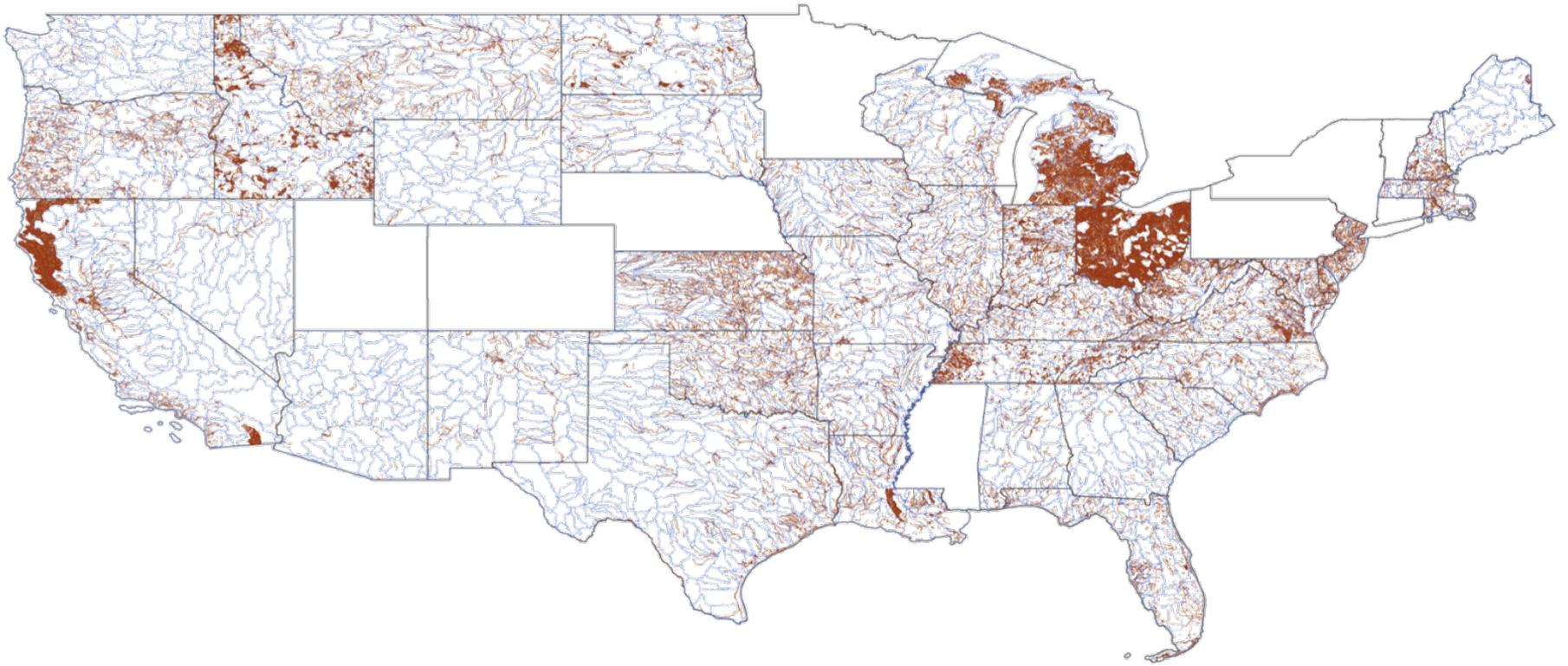
- Data for 39 states

- 1,860 watersheds

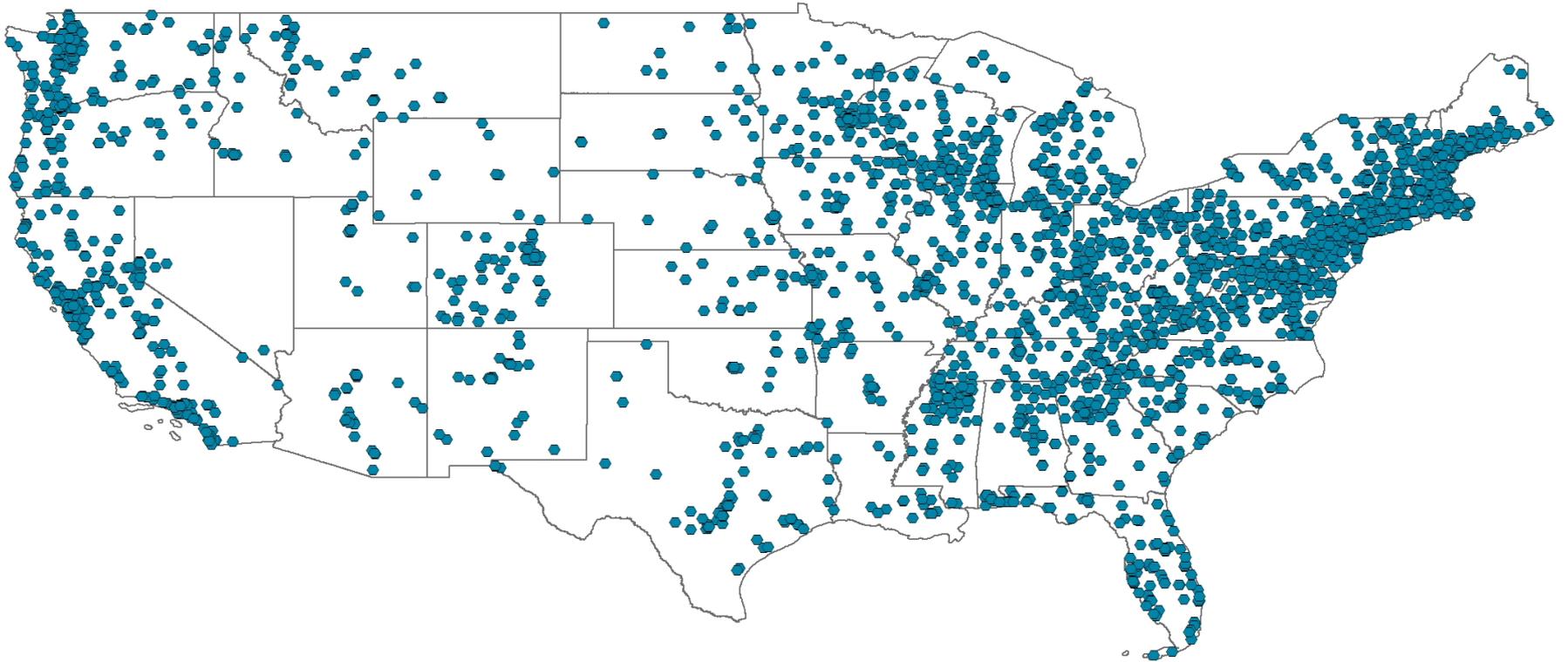
- Years 1996–2008

- 50,000 stream segments impaired; $\frac{1}{3}$ have been delisted through the years.

Listed 303d water-segments



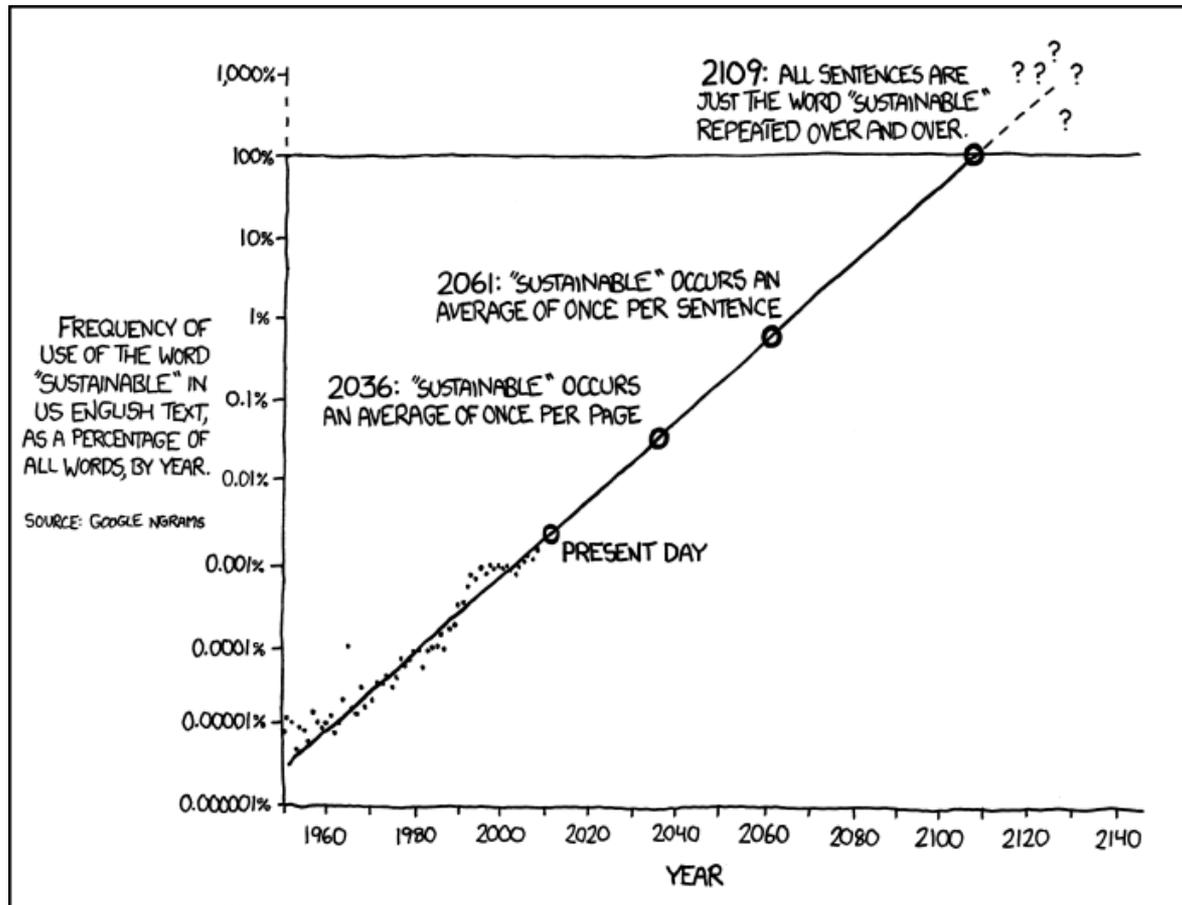
Watershed nonprofit groups in the US



Effects of presence of water groups on water quality

- Significant evidence that private groups have improved water quality.
 - Compared to what would have happened, a 5% reduction in listings for the average watershed every 2 years.
- Private groups have a role in mitigating environmental problems.
- The private sector promotes compliance with environmental regulations go beyond citizen suits.
 - Expenditures by water groups are for activities, such as monitoring to identify water quality issues, lobbying, advocacy, or legal action, that result in additional water bodies being listed as impaired.

Use caution when extrapolating



THE WORD "SUSTAINABLE" IS UNSUSTAINABLE.



Experimental designs

- Spending on environmental programs is growing.
- Controversial in current times due to the fiscal cuts.
- Want cost-effective ways of reaching enviro goals.

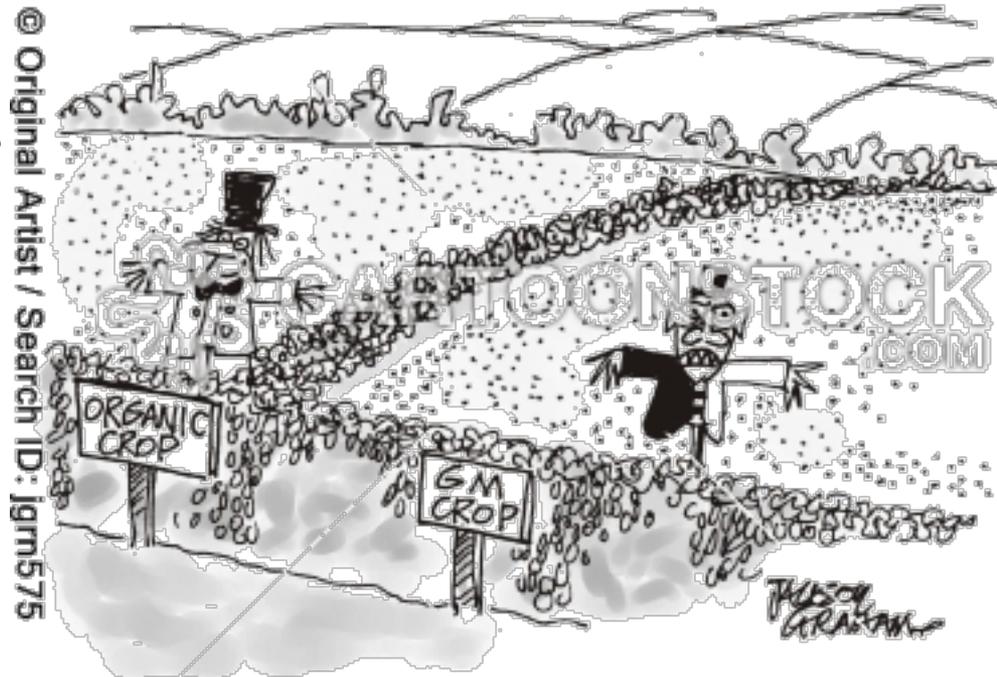
- Test the implications of different programs & designs on outcomes and learn lessons.
- Experiments can help isolate how individuals and regulators would respond to incentives.
- Very similar to medical randomized control trials.
- Implement test in the “field” – real places, people.

We can't afford not to know what works!

Field experiments

- Implement two or more “treatments” in real world situation.
- Participants are unaware they are part of an experiment.
- Elicits real responses.
- Ethics board approval.

© Original Artist / Search ID: jgrn575



That's the results of my social science experiment. I discovered that one out of one husbands in this household do not care about pressed shirts.



What makes people conserve the most water?

with Michael Price, Georgia State University

- Increases in price?
- Information on how to save \$?
- Prizes for saving water?
- Doing better than their neighbor?
- Summer droughts?
- Flooding overflows?
- Giving savings to environmental groups?
- Other?

Experiments can help us find the answer:

- Determine the setting we want to study.
 - Households in Milwaukee
- Split to subjects randomly into groups.
 - Neighborhood areas
- Give each group a slightly different incentive.
 - Information, bonuses, peer pressure
- Keep one group as a control.
 - No treatment
- Compare outcomes
 - Who saves the most water?

Information provided by H₂Oscore

- H₂Oscore is Marquette University-based startup.
- H₂Oscore partners with water utilities, getting data from water meters.
- Provides consumers with a personal water-use dashboard, an online snapshot of water use.
- Heightens awareness of consumption and provides metrics to encourage conservation.
- Signing up and making conservation decisions are both **voluntary**.

Lack of salience, lack of information, lack of attention?

- We are testing why there is a disparity between desire and behaviors.
 - Salience: noticeable enough to recognize and act upon. Often attitudes like “it’s only a drop in the bucket” and “we’ll get to it later” trump action.
 - Learning: information about how to implement conservation is lacking, we can correct decision making by giving individuals more suggestions.

Theory of limited attention

- Perhaps the problem is a large cognitive burden of considering frequent conservation decisions, implying mechanisms of “revealed attention.”
- If so, we would predict effectiveness in nudges to think about the issue and to act.

Our research design – priming with a conservation nudge

- Randomly selects households to receive two stages of treatments to encourage signing up and water conservation.
- First stage is a priming nudge with messages unrelated to H2Oscore.
- Second stage is an invitation to sign up for H2Oscore, with some households receiving a \$10 incentive to participation.

Distribute flyers to households

*Is our home's
water use
normal for our
neighborhood?*



Use a smartphone or computer to automatically track and compare your home's water use!

1) My home uses _____
Gallons of water
Per Day.

2) My home's **water** use
rank is _____ out of _____
homes in my neighborhood.



Find the answers: Log in
to your home's display at

H2Oscore.com*

*H2Oscore.com is a **FREE** service available to
all who receive a Milwaukee water bill.

Some households get a nudge

- One day before the flyers:
- We put a door hanger about water for a smaller selection.
- We want to see if these households are more likely to sign up & to save water.

**Every
drop
counts.**

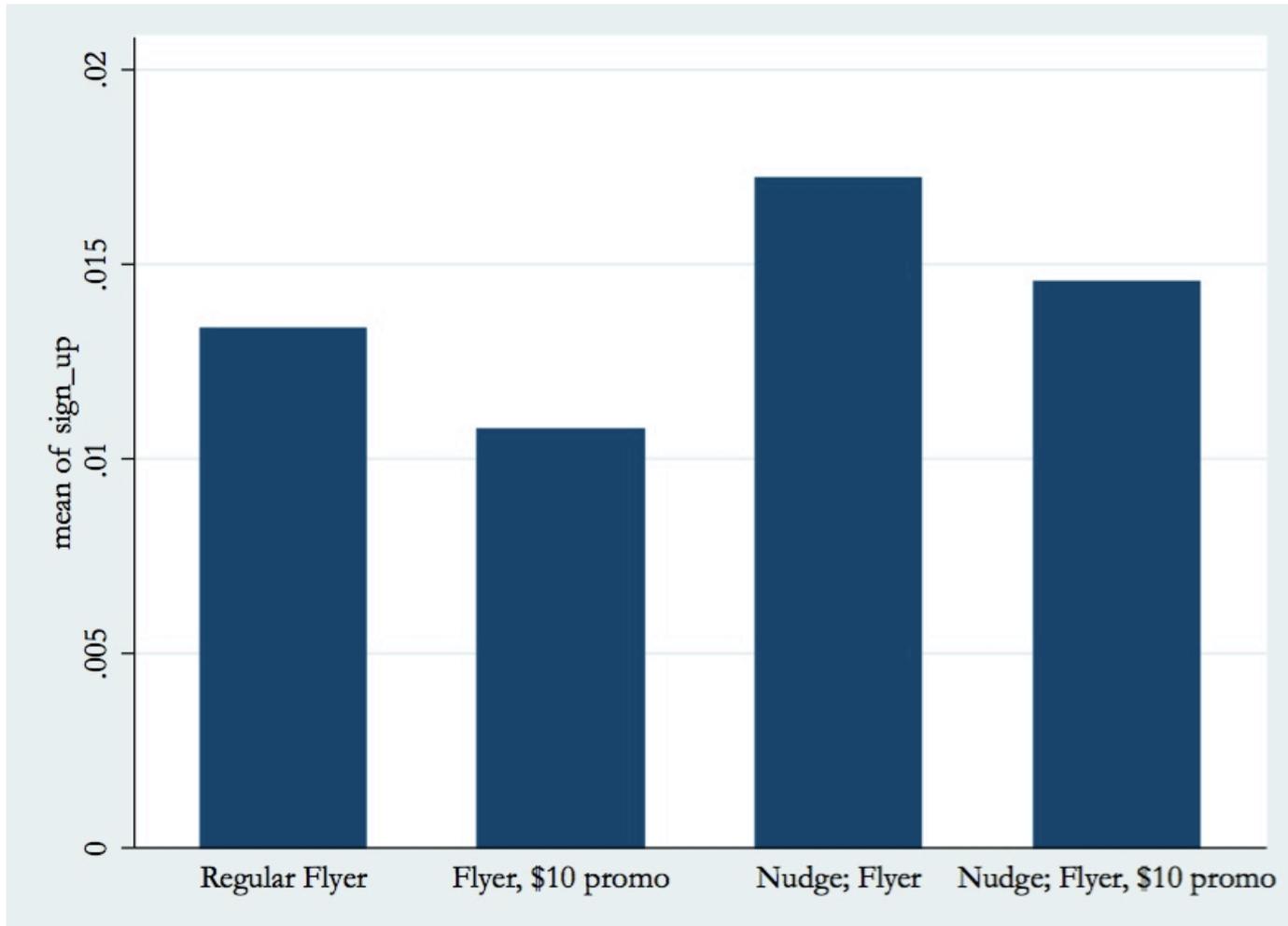
**Have you
thought
about
your
home's
water
use
lately?**



Number of houses receiving each type of flyer

	No Nudge	Nudge door hanger	<i>Totals</i>
Regular sign-up flyer	1,837	1,571	3,408
Flyer with \$10 bonus for sign-up	1,464	1,571	3,035
<i>Totals</i>	3,301	3,142	6,443

Preliminary results: H2Oscore sign-up



**Results do not include latest round of flyers & sign ups.
Do not circulate or cite.*

Further studies in water conservation

– prompting & incentivizing

- Milwaukee does not have real time water meters.
 - Instead, we will analyze website visits.
- Looking to partner with other municipalities to test effectiveness of promoting water conservation.
- More effects to Measure: Priming, Prompting, Incentivizing
 - Priming: subtle cues that such behavior conservation is important.
 - Prompting: explicit requests to monitor and reduce your water use.
 - Incentivizing: price penalties or rewards offered.
- Considering concerns with “conservation conundrum.”