

Food Scraps in the City:

Understanding and improving household organic waste separation behavior

Sally Geislar
Doctoral Candidate
Planning, Policy, & Design
University of California, Irvine

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The Problem



Food Waste
is the
single largest
material stream
entering landfills,
where it generates
20% of U.S.
methane
emissions

Municipal Waste Sent to Landfills 2012

Source: EPA MSW Characterization Study 2014

Some Solutions

- Landfilling → *most cities in US*
- Landfill Diversion credit → *coming to end in CA*
- Collection at the curb → *some successes*
 - *Composting*: Soil amendments and Water retention
 - *Anaerobic Digestion*: Clean energy generation



The Problem with Solutions

Residential Source Separation of Organics

These efforts have relied on:

Physical Infrastructure Development

Education Campaigns

Financial Incentives...



The Problem with Solutions

Residential Source Separation of Organics

These efforts have relied on:

Physical Infrastructure Development

Education Campaigns

Financial Incentives...

Still struggle with participation rates and accuracy

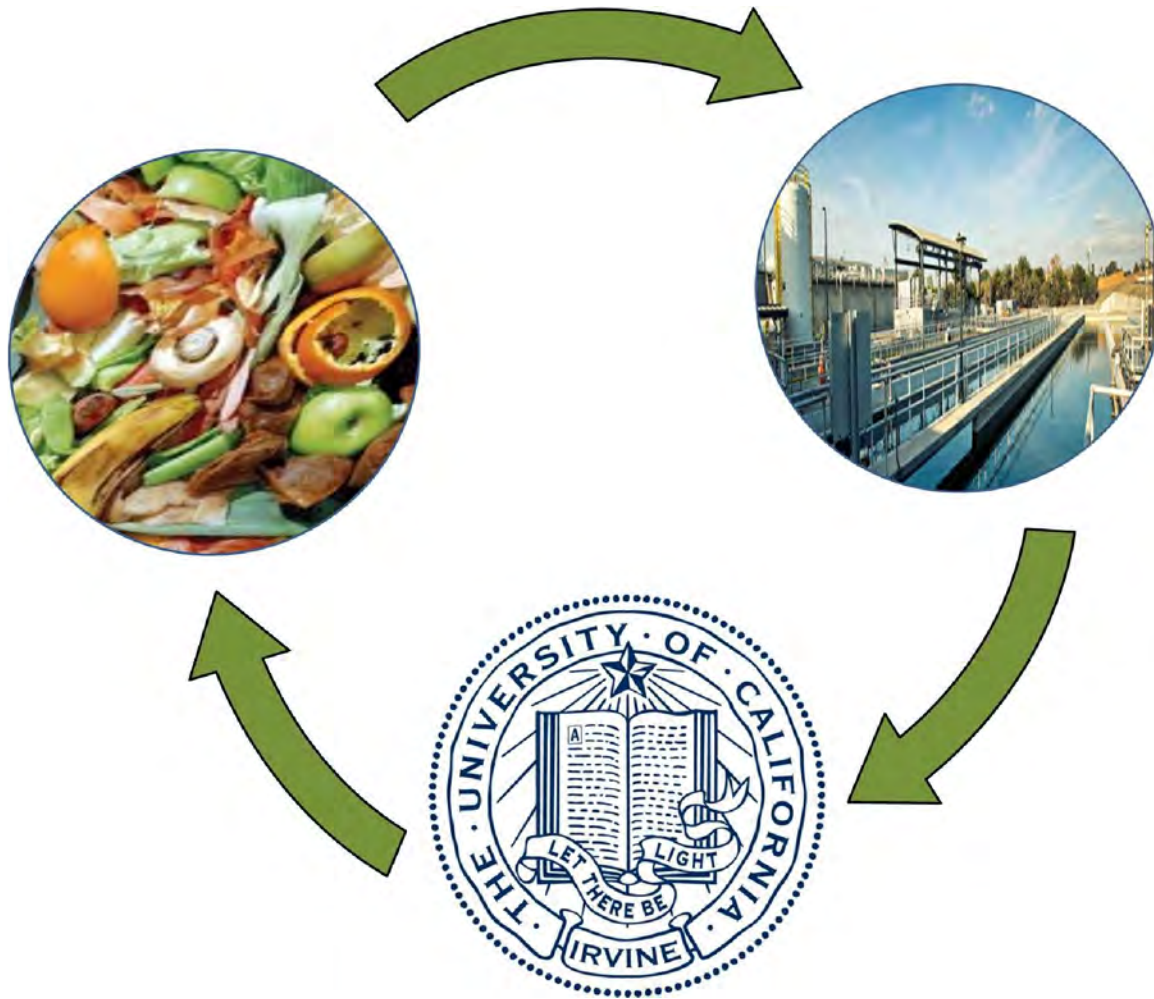
My research examines...

How to leverage behavior change tools
to improve food scrap separation

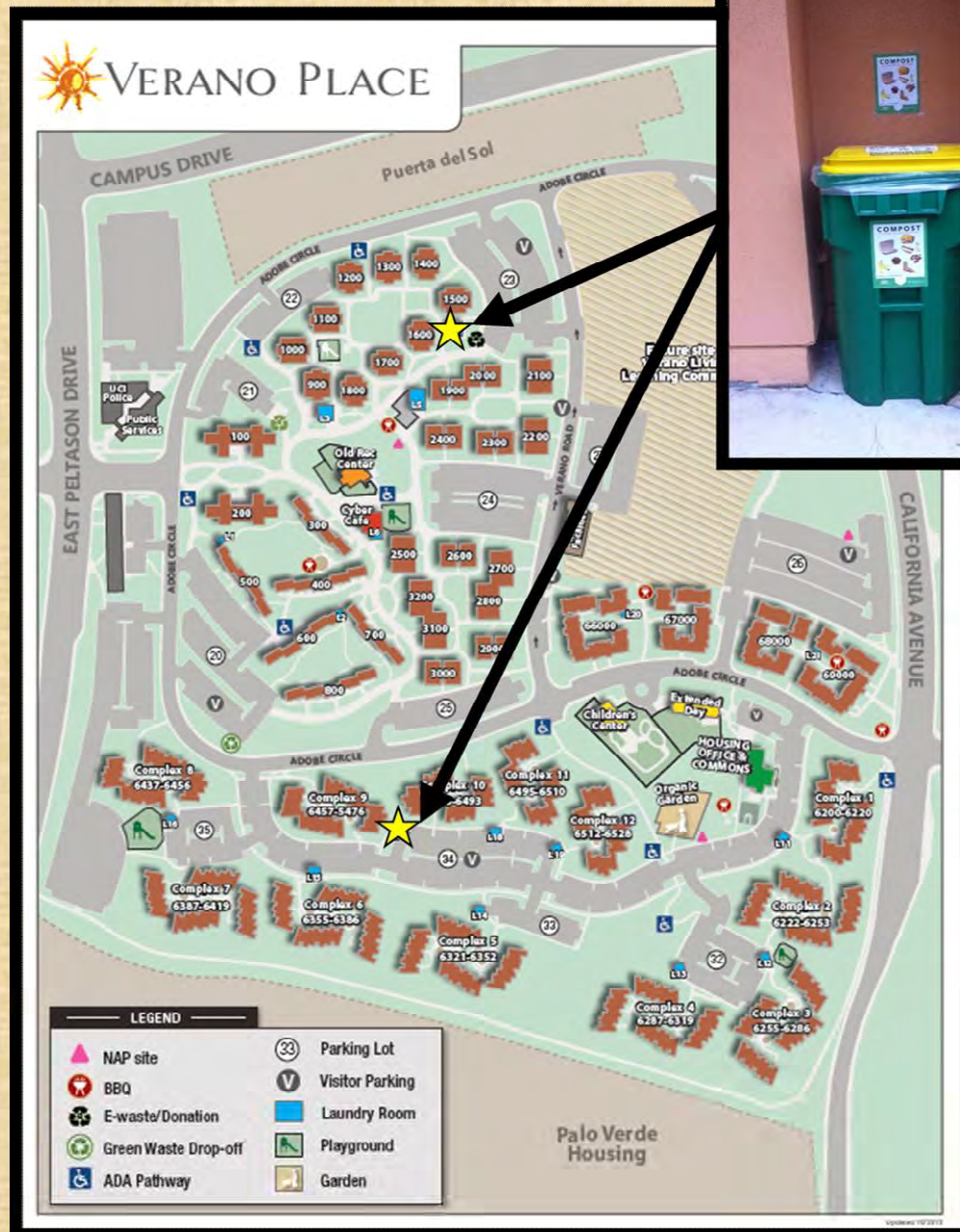
Roadmap

- A Collaborative Pilot
- Study design
- Quantitative results
- Qualitative results
- Next steps

Pilot Study



Pilot Study



- Approx. 1700 residents
- Targeted recruitment based on proximity to drop bins
- Weekly pick-up

Pilot Study



- Each participating household:
 - ✓ received a kitchen caddy and compostable bags
 - ✓ completed pretest-posttest survey
 - ✓ completed weekly digital survey documenting disposal

Pilot Study



- Door-to-door recruitment
- Digital survey tools

Pretest-Posttest surveys measured

- Environmental attitudes (NEP)
- Knowledge of waste and waste systems
- Other pro-environmental behaviors: recycling

Weekly short survey

- how full their bin was each time they emptied it
- how much of their food scraps went into the landfill bin

Results of the Pilot

Findings: Quantitative

Pilot Study

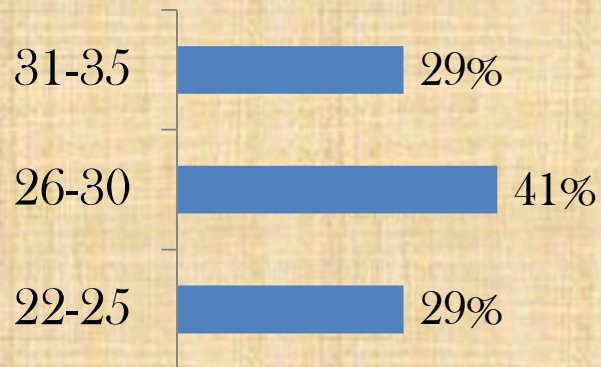
Pretest: n = 25 households

(67% response rate)

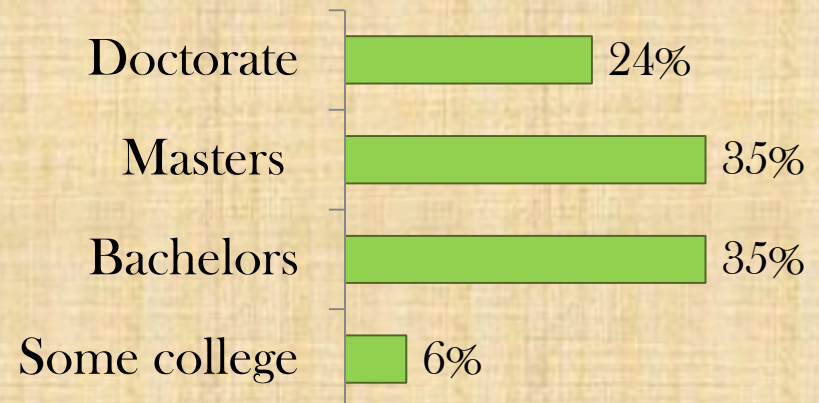
Posttest: n = 17 households

(47% retention rate)

Age Distribution (n =17)



Education Level (n =17)



Findings: Quantitative

Pilot Study

- **Knowledge** about available waste systems & environmental impact started high and stayed high
- **Recycling** behavior improved but was not significant
- **Pro-environmental attitudes increased**, was highly significant, and had a large effect size

Findings: Quantitative

Pilot Study

Pro-environmental Attitudes

(6-point NEP scale)

Pretest
(avg = 23)



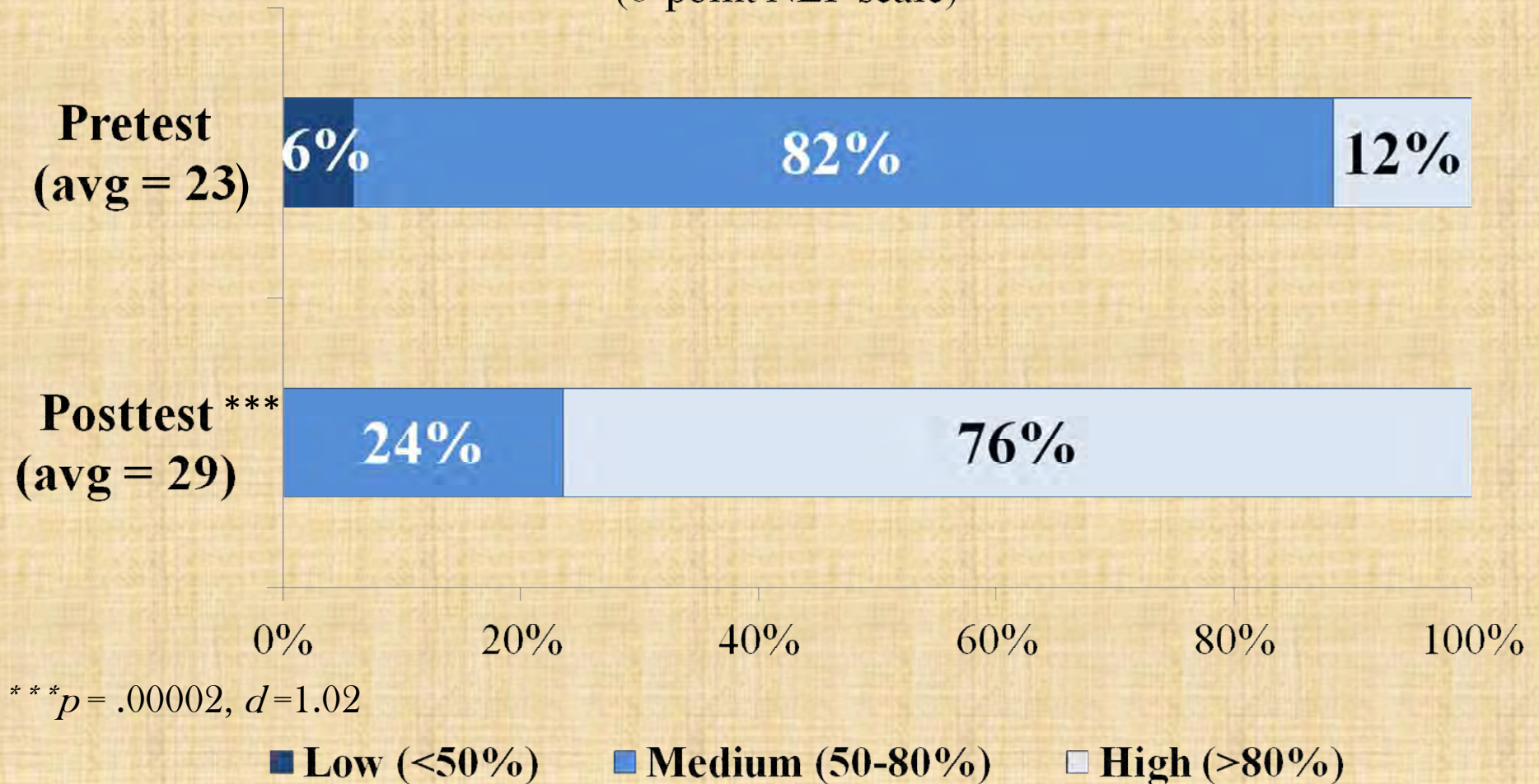
■ **Low (<50%)** ■ **Medium (50-80%)** ■ **High (>80%)**

Findings: Quantitative

Pilot Study

Pro-environmental Attitudes

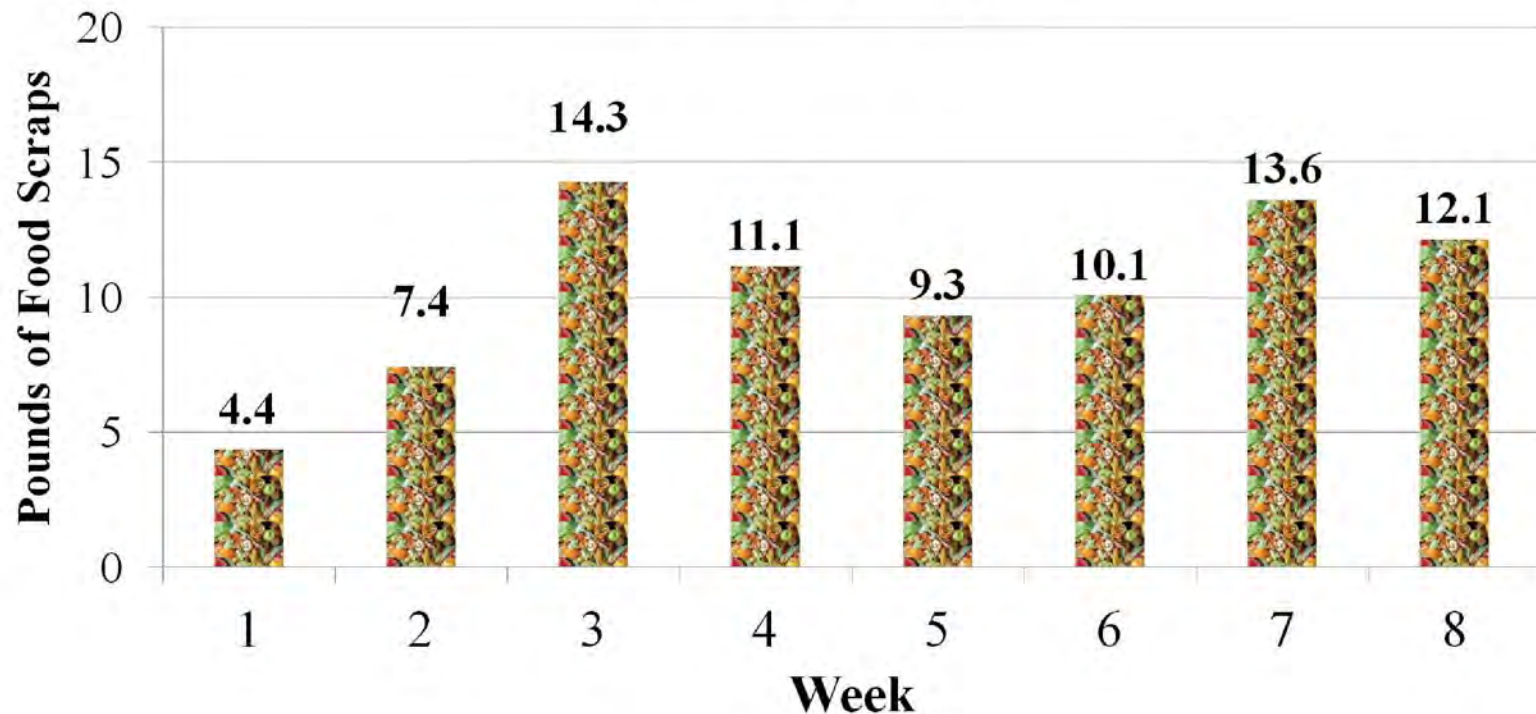
(6-point NEP scale)



Findings: Quantitative

Pilot Study

Pounds of Food Scraps Diverted
(Per Person Per Week)



Observed data:

1,000 lbs per month

Pilot impact:

2,000 lbs

Enduring impact:

9,000lbs

Qualitative Results

Nine in-depth interviews
Understanding user experiences

Findings: Interview Themes

Pilot Study

- Infrastructure Made it Easy (...enough?)
- Balance: Caddies, Bags, and Pests
- Increased Environmental Awareness
- Spillover Behaviors

Themes

Infrastructure Made it Easy

“I knew there was a composting bin in the garden plot, but I was too lazy, and the garden was too far. But this thing was so easy, you provide bins ...and all I have to do is throw food in the bin” --Sung

“You should provide kitchen caddies to other households if possible. And have biodegradable bags available in multiple locations and easy to obtain.”
--Regina

Balance: Caddies, Bags, and Pests

Themes

Goldilocks syndrome:

Need to balance the user and the infrastructure
in home and community level

Different values shape the balance:

“The bags from the store are too big, I felt obligated to not waste bags and to try and fill most of the caddy [before emptying it]” -Eliana

“A larger caddy would have been a plus for me....I preferred to make fewer trips with a full bin instead of emptying contents frequently.” --Brian

Balance: Caddies, Bags, and Pests

Themes

Outcomes for nuisances varied

“I think the smell and the problems of forgetting to remove it should be warned against more directly; people might not know that could be a problem, and then it turns them off of it.” -Angela

“We didn’t have any issue with pests or smells inside because we took it [the caddy] out so often.” --Sondra

Increased Environmental Awareness

Themes

“You know, I'm looking at garbage differently now. I'm more aware. Because all of the [waste streams] are related to energy, so I'm looking to all of them in terms of energy and also money right now, of course.” -Anton

“You know, this made me more aware generally, that ‘oh, I should probably recycle more’, it made me think about the disposal choices I was making.” --Sondra

“I am more aware of the environmental impact. This is a practical way to keep environmental concerns in mind.”-Jim

Spillover Behaviors

Themes

“One thing new to me since I started was looking at the growing pile of food waste--I'm making too much food waste so I try to shop more wisely. Sometimes I buy a big bunch and then they go bad and I realize how much I'm wasting.” – Sung

“I noticed my garbage was almost entirely food packaging, stuff you can't do anything with, like cellophane...there should be some other way of treating this material or recycling it” --Brian

“I'm looking at products with much less plastic when I shop at the store. I'm getting cage free eggs.” –Anton

Key Takeaways

- **Balance** between users and infrastructure
 - In the home (caddy size) & at the community level (promotion)
- Infrastructure makes it easy, but is it **easy enough**?
 - ...probably not
 - Maintenance of storage (caddy) and frequent removal
 - Understanding when food becomes perceived as garbage
 - Target behavior change tools here
- **Give residents tools** to prevent ick-inducing practices

Next Steps

- Empirical tests in two part community-based true experiment with larger sample size
 - Effects of food scrap separation itself
 - Social-psychological intervention effects
 - Spillover pro-environmental behaviors
- Exploring opportunities for scaling-up



Reduced landfill
methane emissions



Biogas eliminates
diesel emissions



Increased food
waste awareness



Pro-environmental
behavior spillover

Thank you!

Questions?

Sally Geislar

sgeislar@uci.edu

Doctoral Candidate

Planning, Policy, & Design

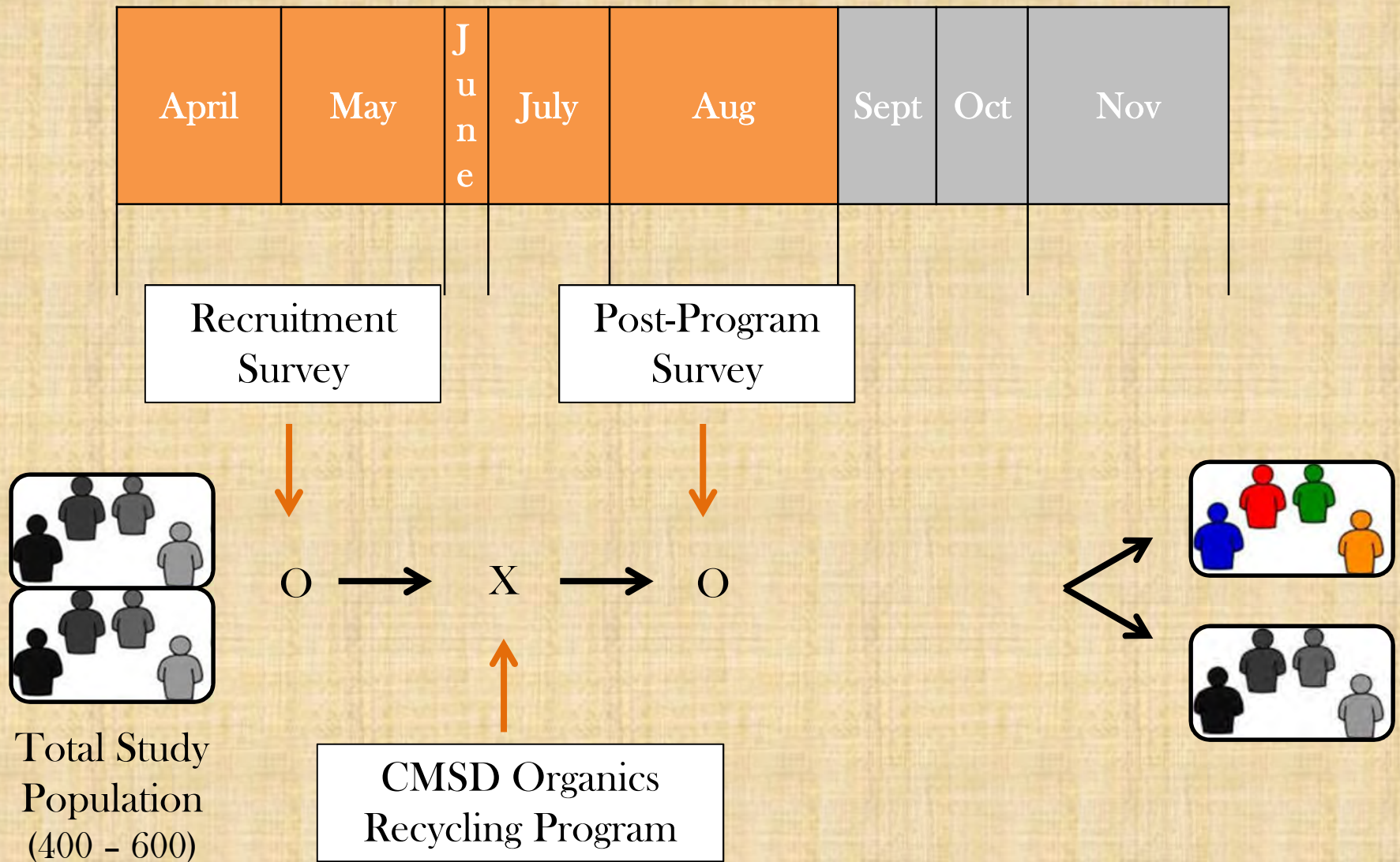
Founding Director, Food Works Lab

Center for Unconventional Security Affairs

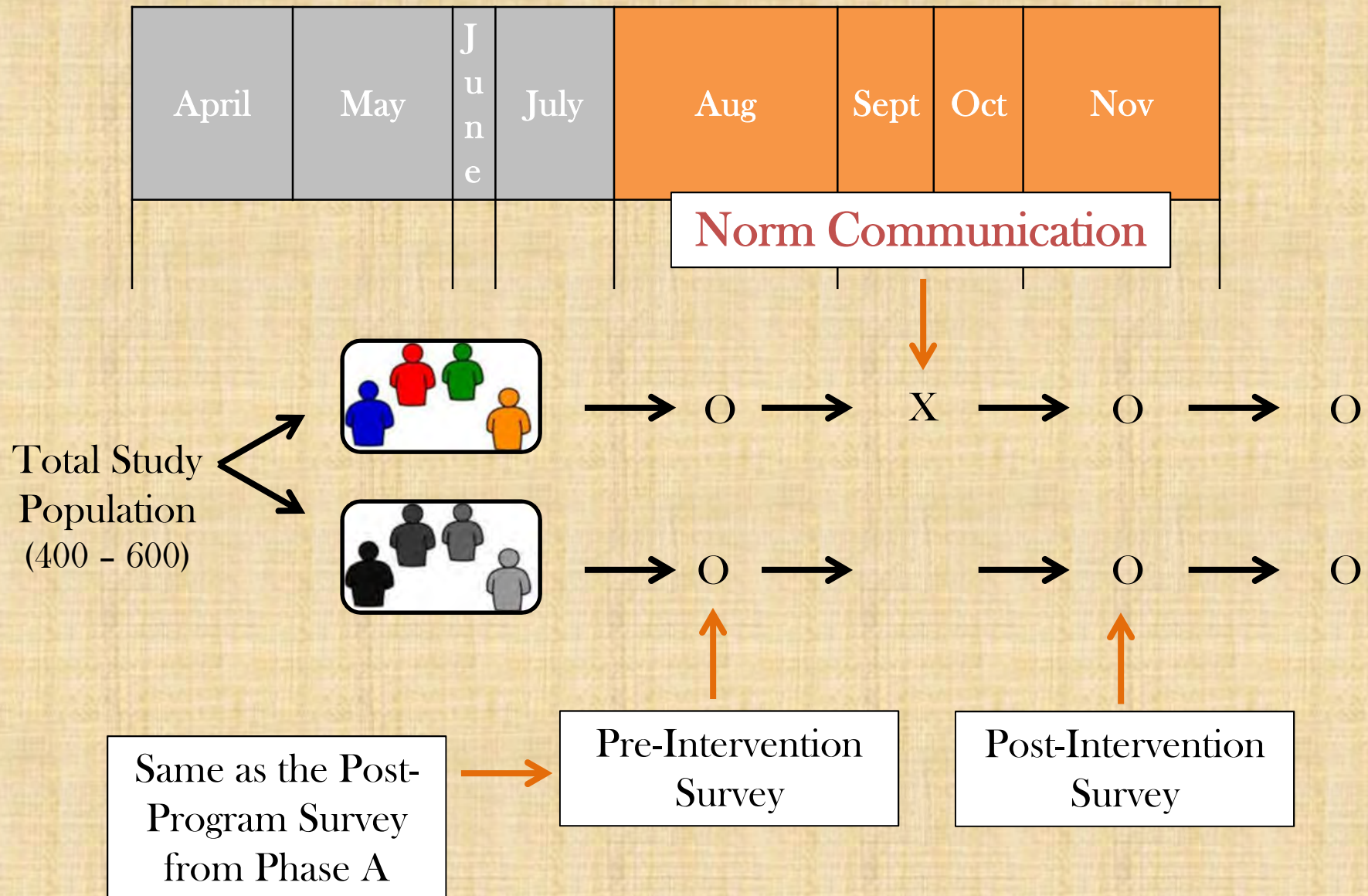
University of California, Irvine

Appendix

Study Update: Phase A



Study Update: Phase B



Slide 29

s4

move people and randomization to other side of intervention

sgeislar, 10/13/2014

6-point NEP using 7-point Likert scale

Appendix

- 1) The balance of nature is very delicate and easily upset.
- 2) Humans have the right to alter nature to satisfy wants and desires.
- 3) Despite our special abilities, humans are still subject to the laws of nature.
- 4) We are approaching the limit to the number of people the earth can support.
- 5) The so-called 'ecological crisis' has been greatly exaggerated.
- 6) Modifying the environment for human use seldom causes serious problems

Questions 2, 5, and 6 were reverse coded so that for all questions, the larger the value was, the greater the pro-environmental attitude.

The value for each of the six questions was summed and divided by the total possible summation (42, 7-point Likert Scale, 6 questions).

(Aldrich, Grimsrud, Thacher, & Kotchen, 2007; Dunlap 2008)