Human behavior and energy consumption

Understanding decisions about energy

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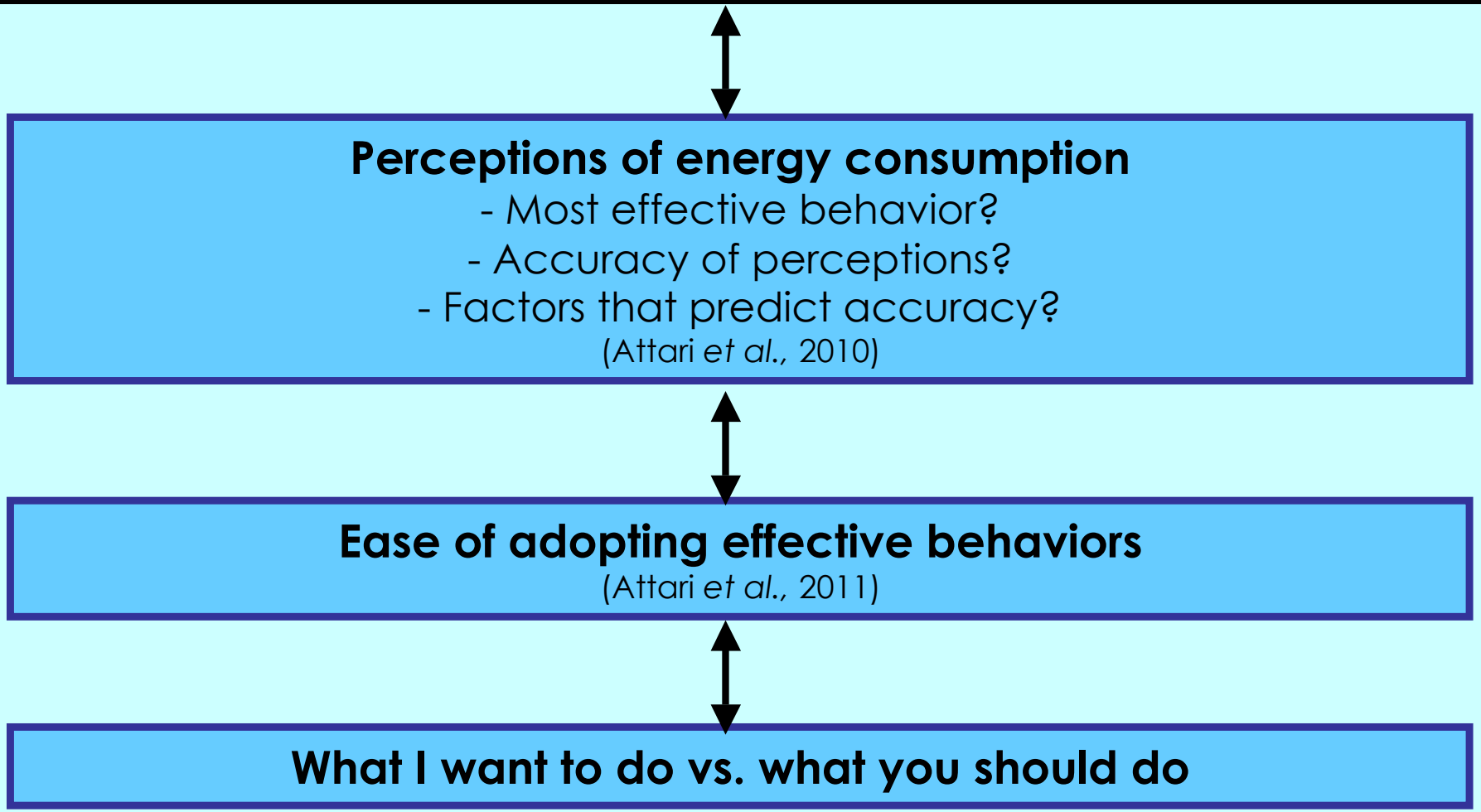
Overview

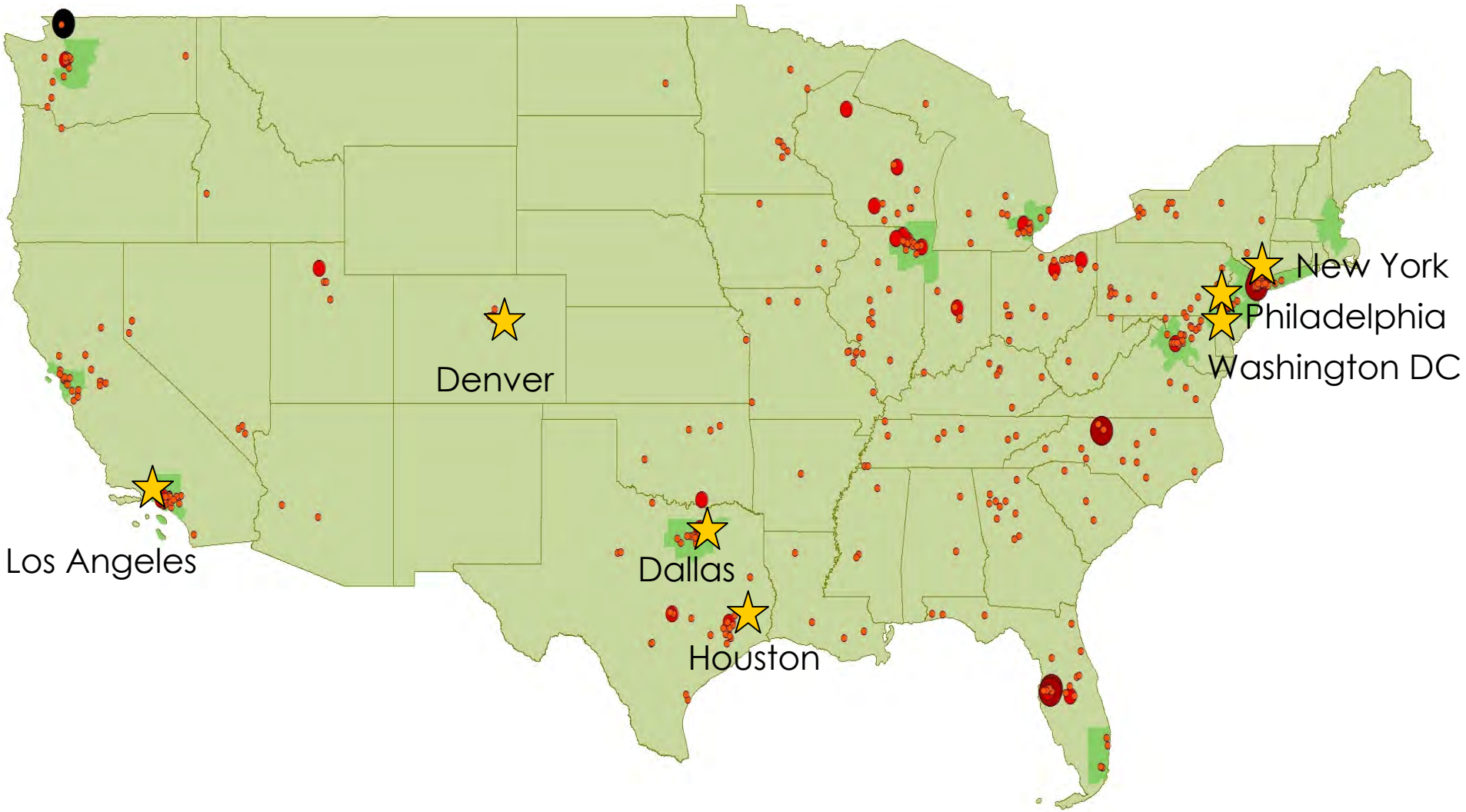
work completed

Understand how people interact with technology and nature



Perception Study: Participants

Online survey advertized via Craigslist in seven metropolitan cities (*n* = 505)



Behaviors deemed "most effective" by participants

Behaviors	Percentage of participants
Turning off the lights	19.6
Conserving energy	15.0
Drive less / Bike / Use public transportation	12.9
Change setting on thermostat	6.3
Change my lifestyle / Not have children	5.9
Unplug appliances	5.7
Shut off appliances / Use appliances less	4.9
Recycle	4.2
Other (for behaviors only mentioned once)	4.0
Education / Thinking about my actions	3.8
Use energy efficient bulbs	3.6
Use energy efficient appliances	3.2
Use efficient cars/ Hybrids	2.8
Sleep more / Relax more	2.8
Buy green energy / Alternative energy	2.6
Insulate my home	2.1
There is no way / I don't know	0.8

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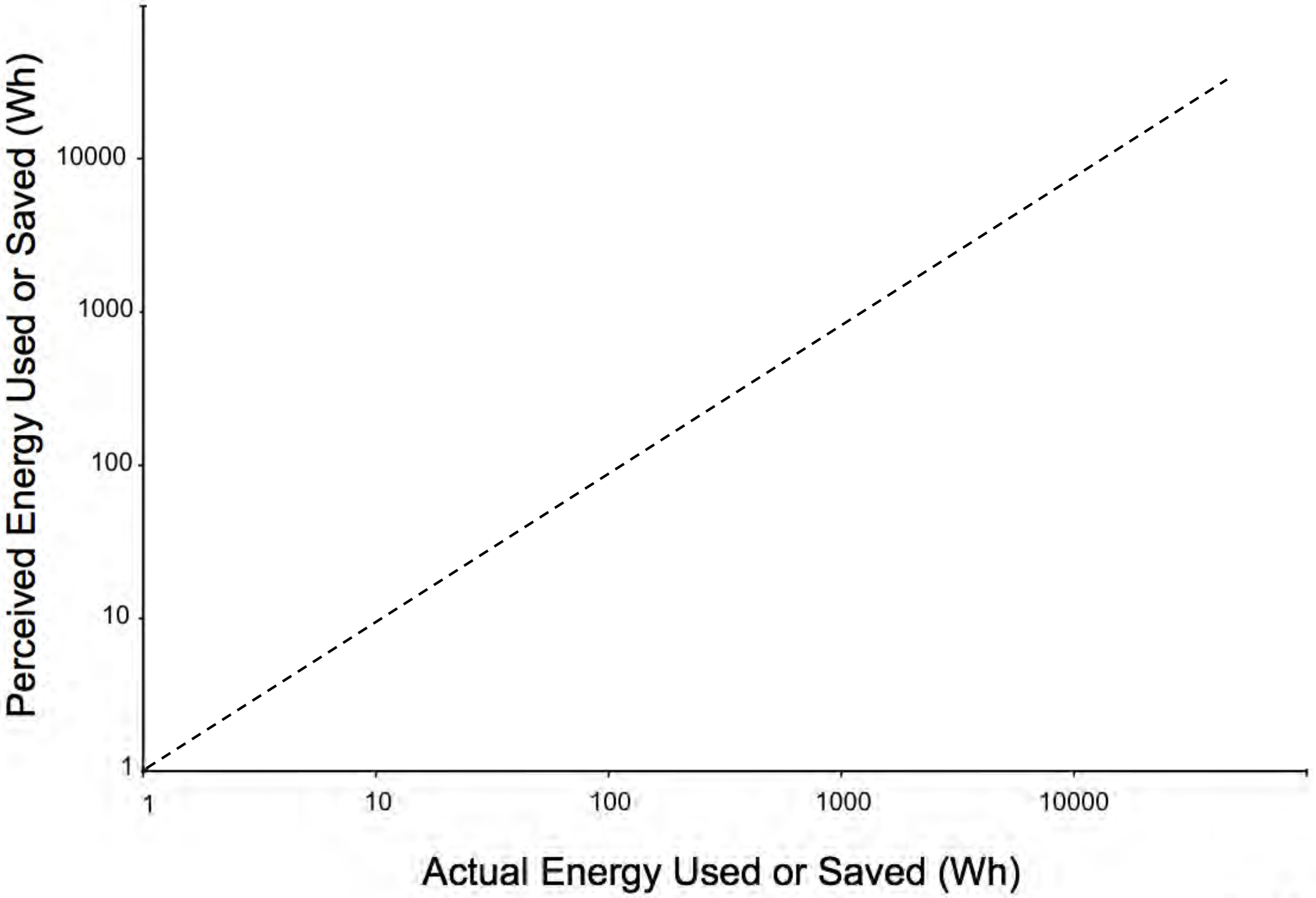
Actual vs. Perceived Energy Consumption



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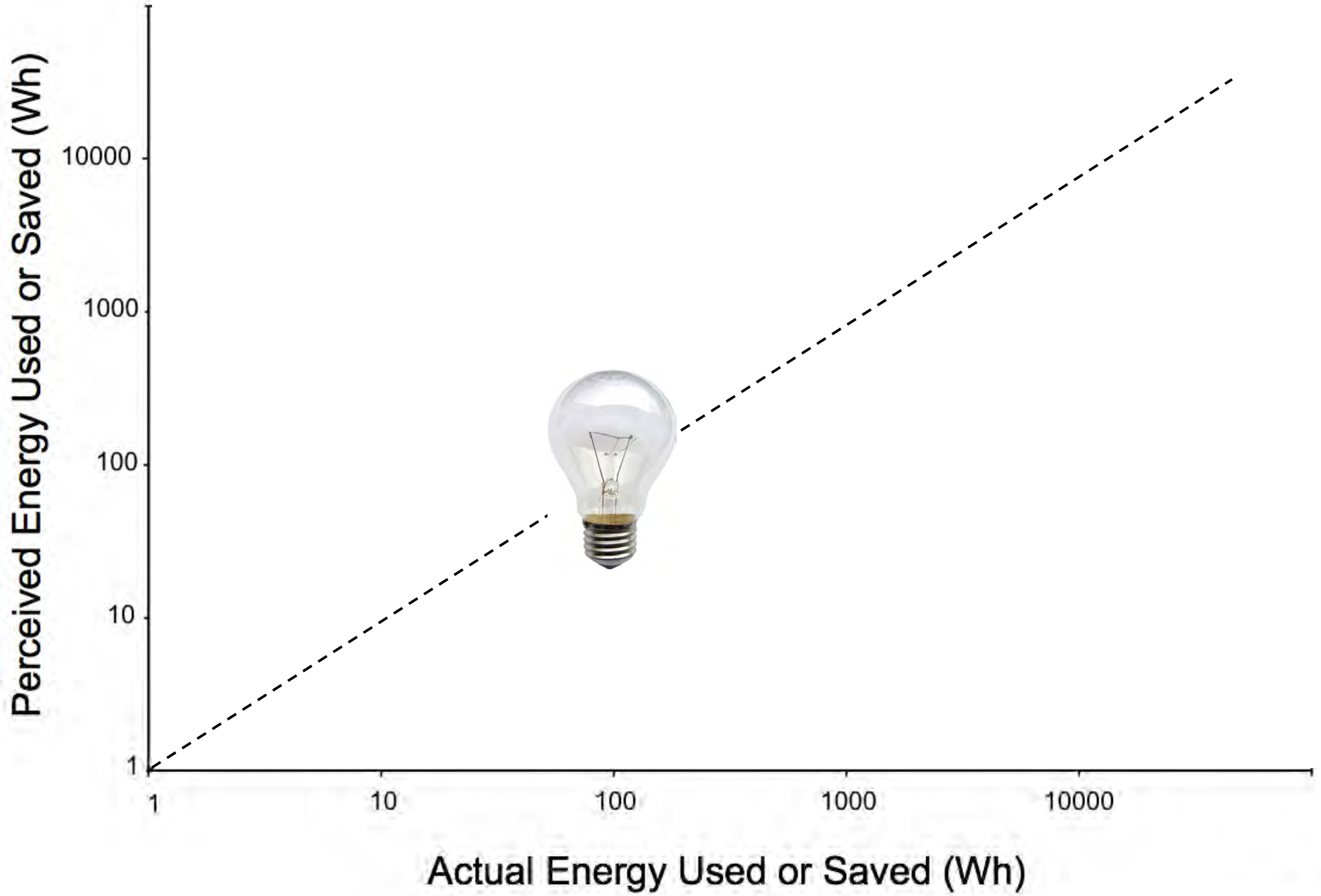

(Attari *et al.*, 2010)

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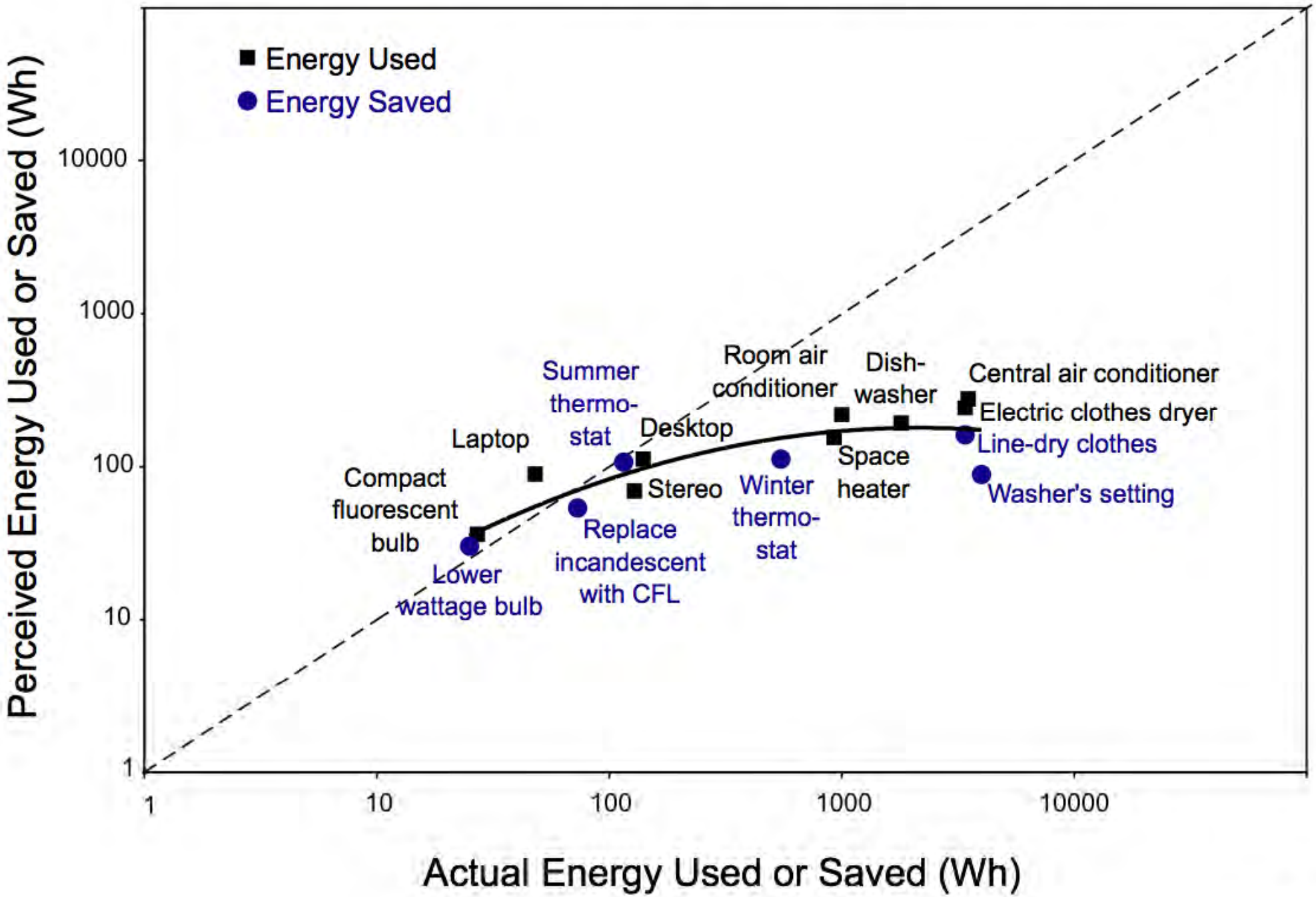

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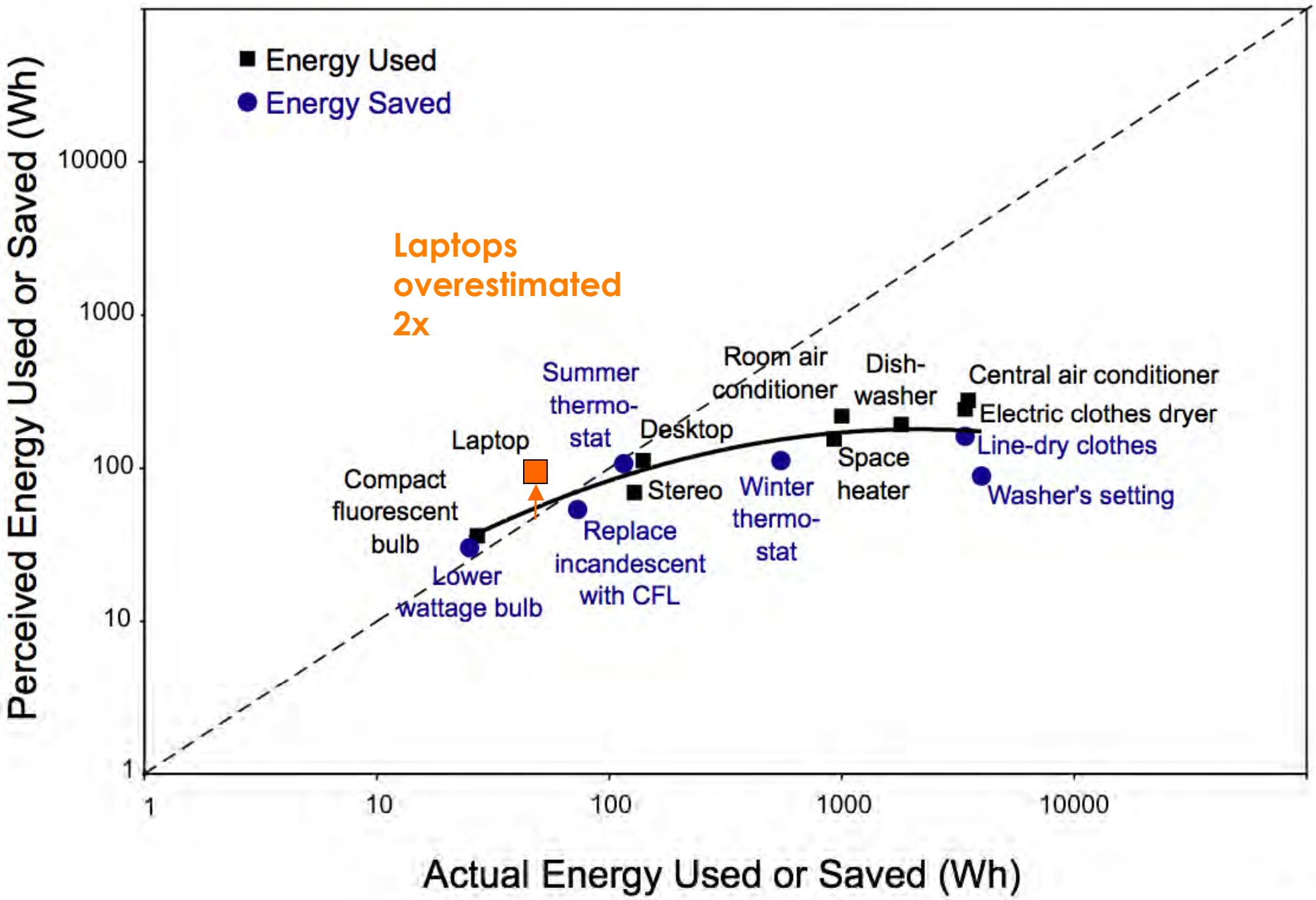

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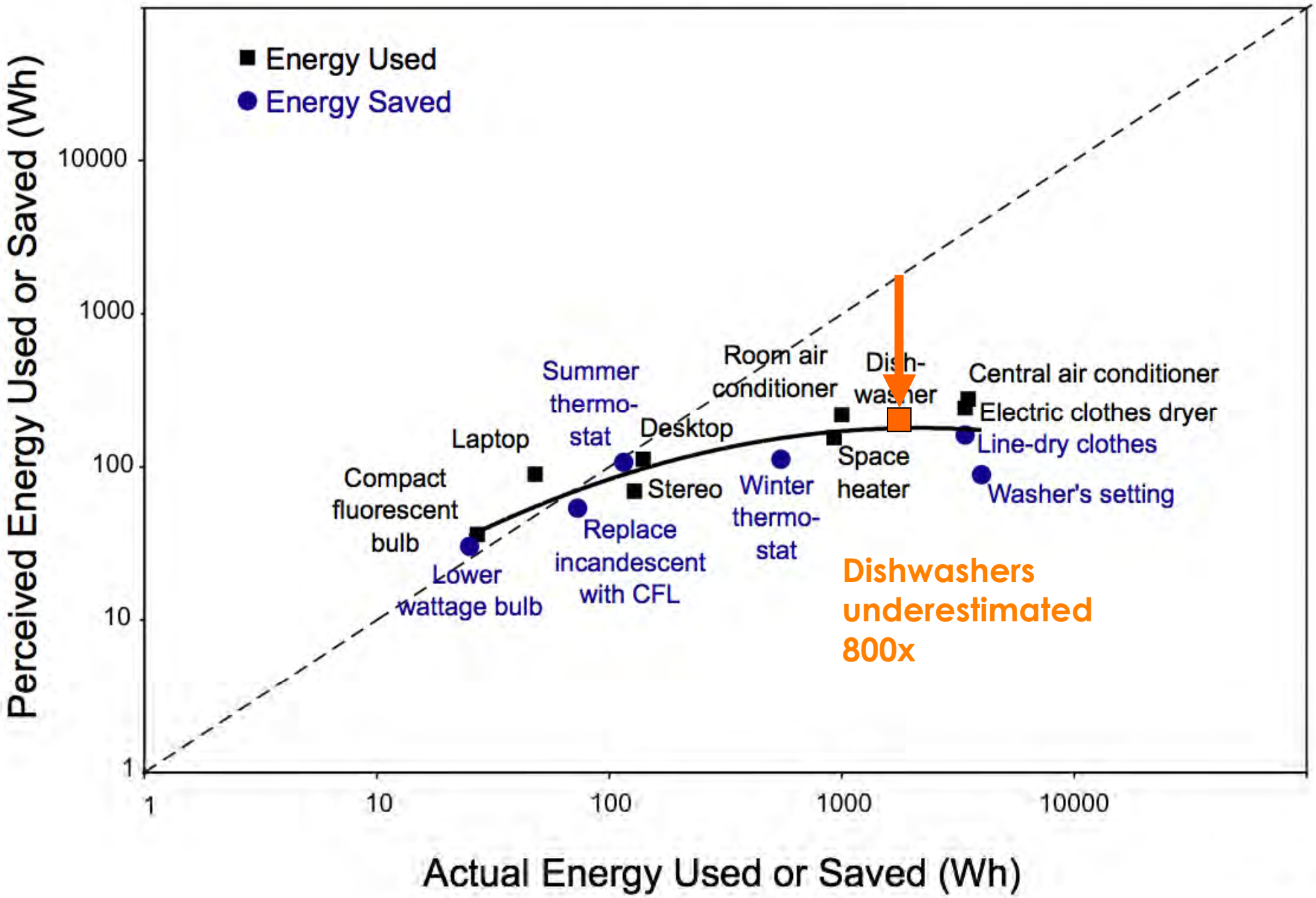

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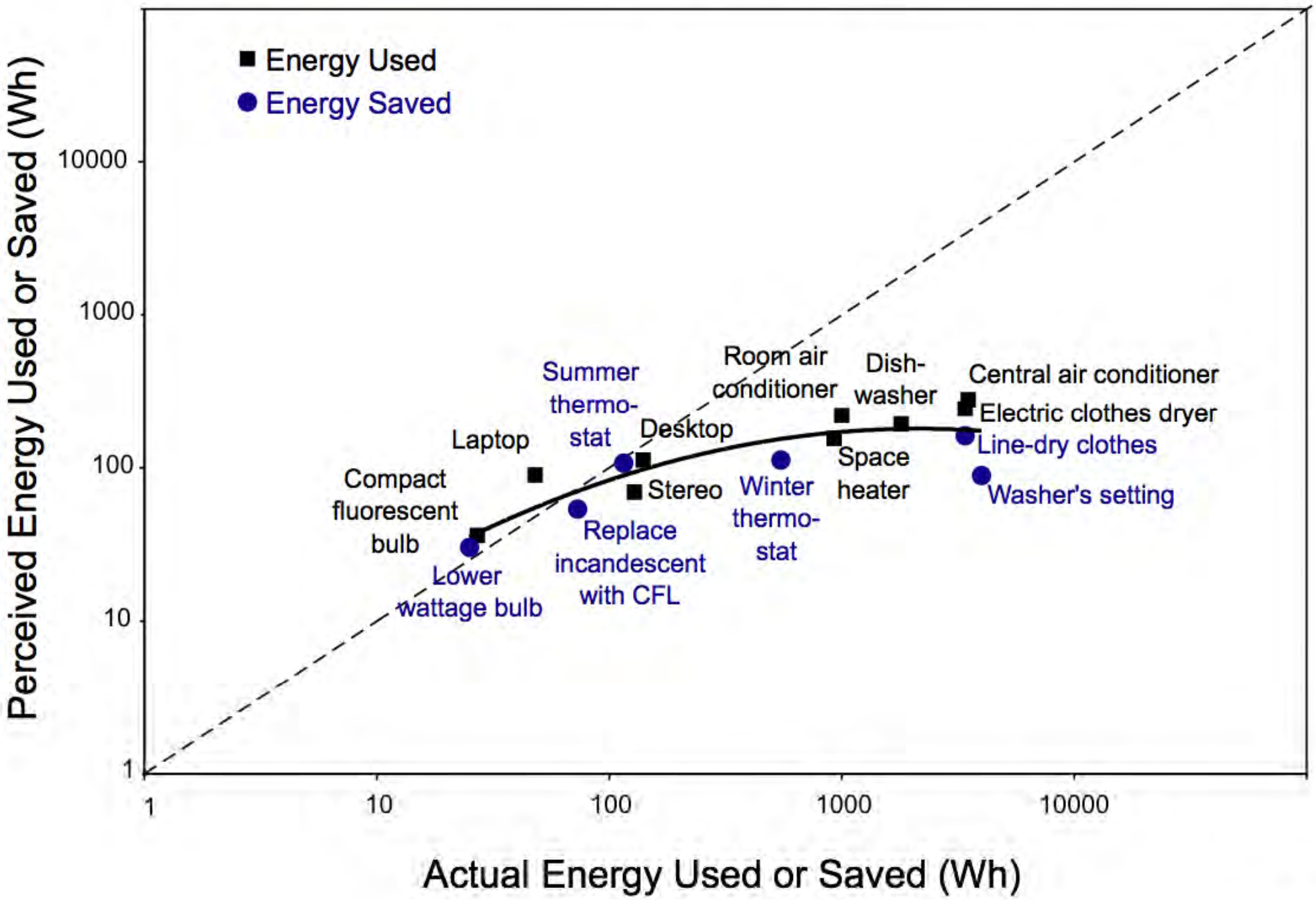

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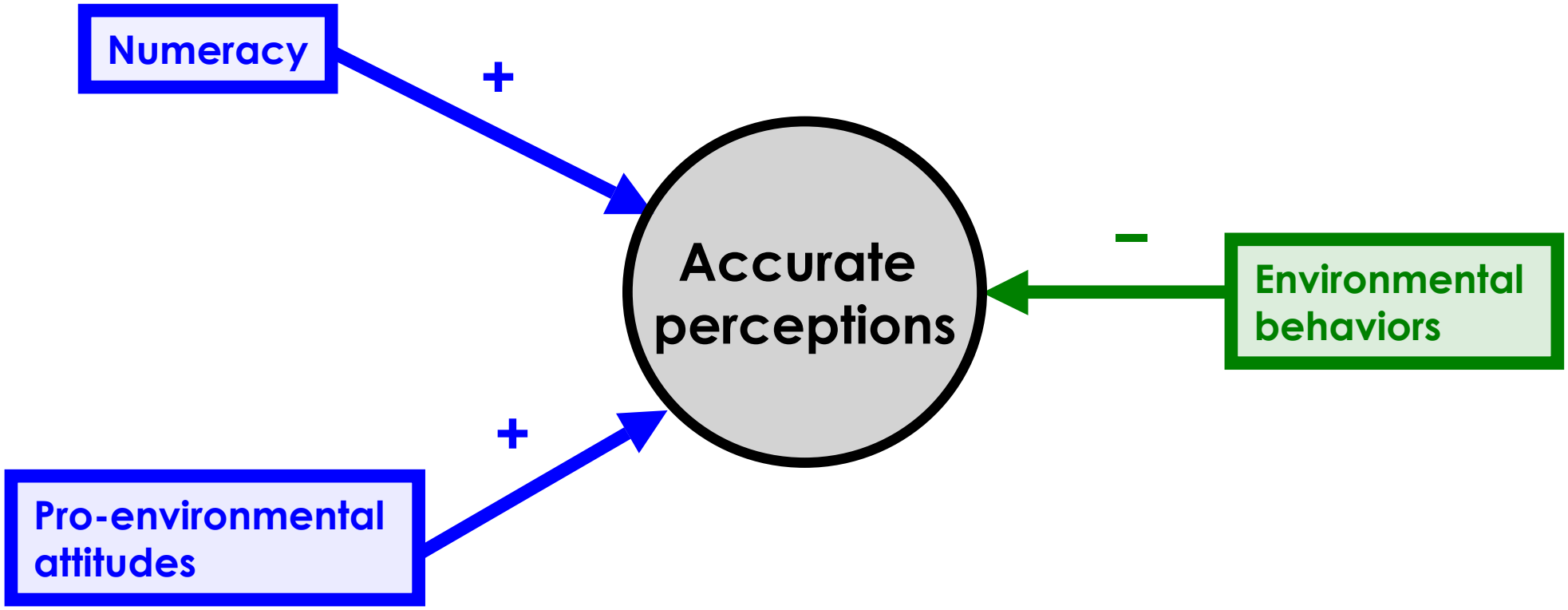
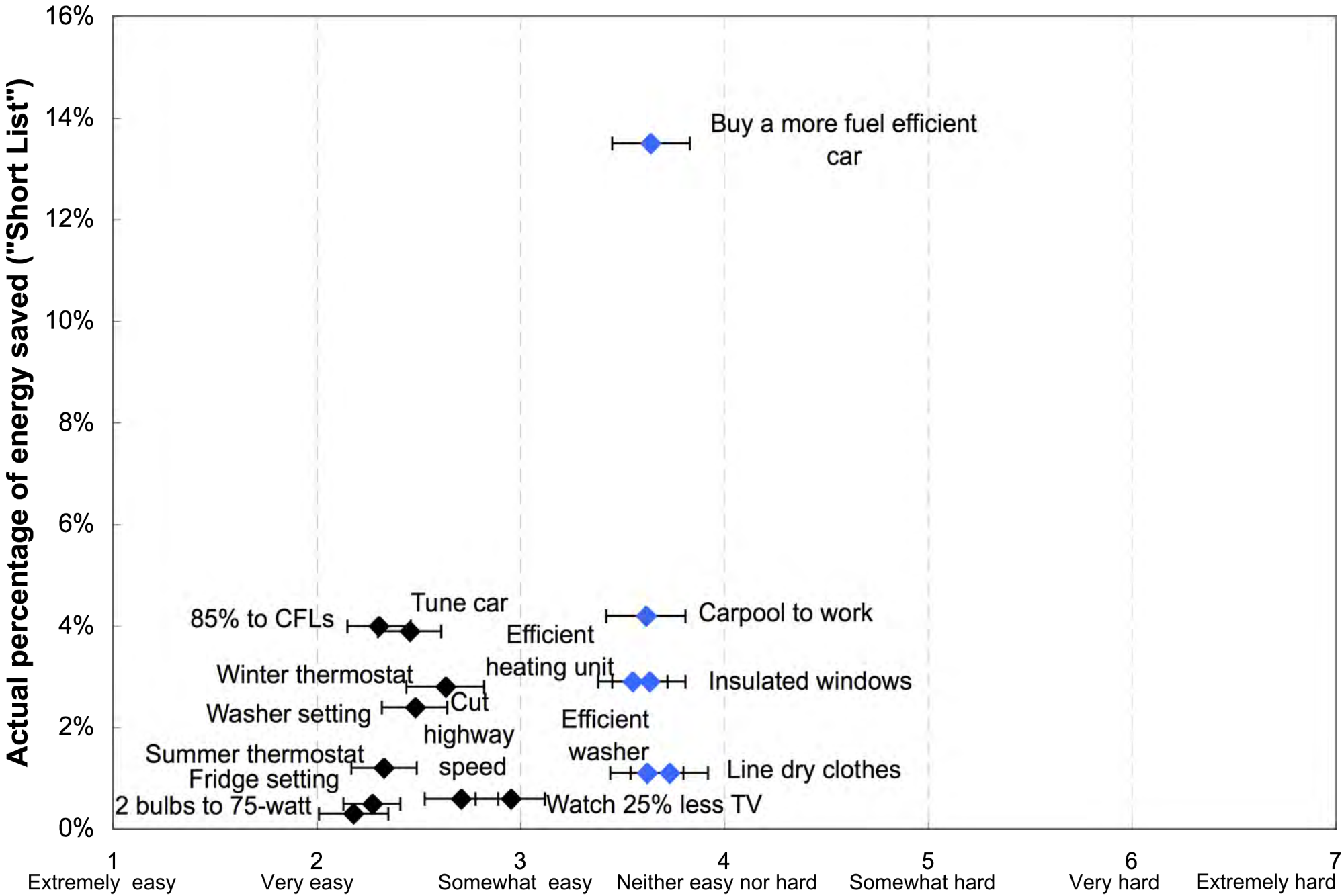
Predictors of accurate perceptions of energy consumption



Generally non-significant parameters:

Climate change attitudes, uses more energy than average, owns car, owns home, political views, gender, age, income, and education

Ease of energy-saving behaviors



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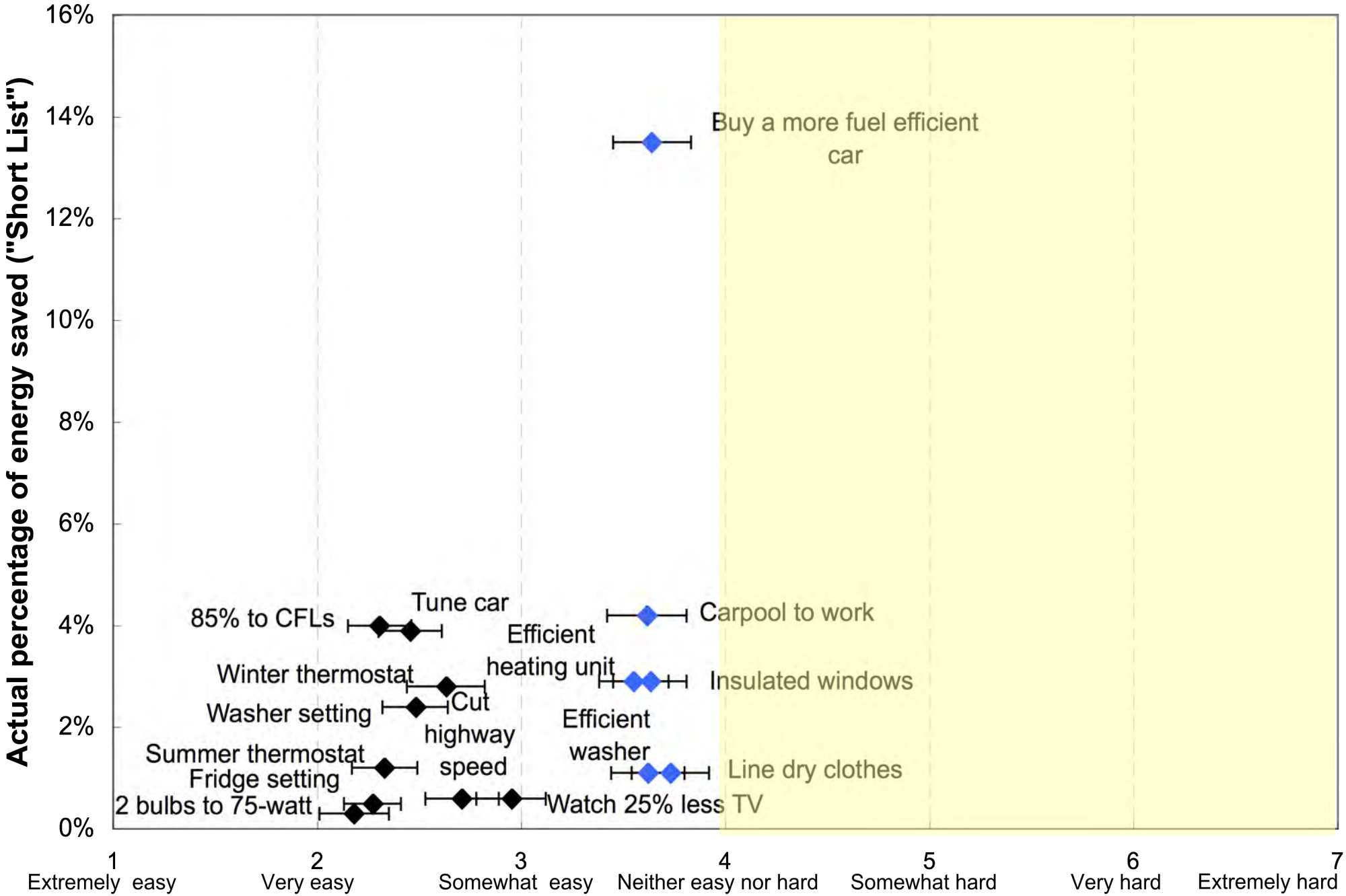

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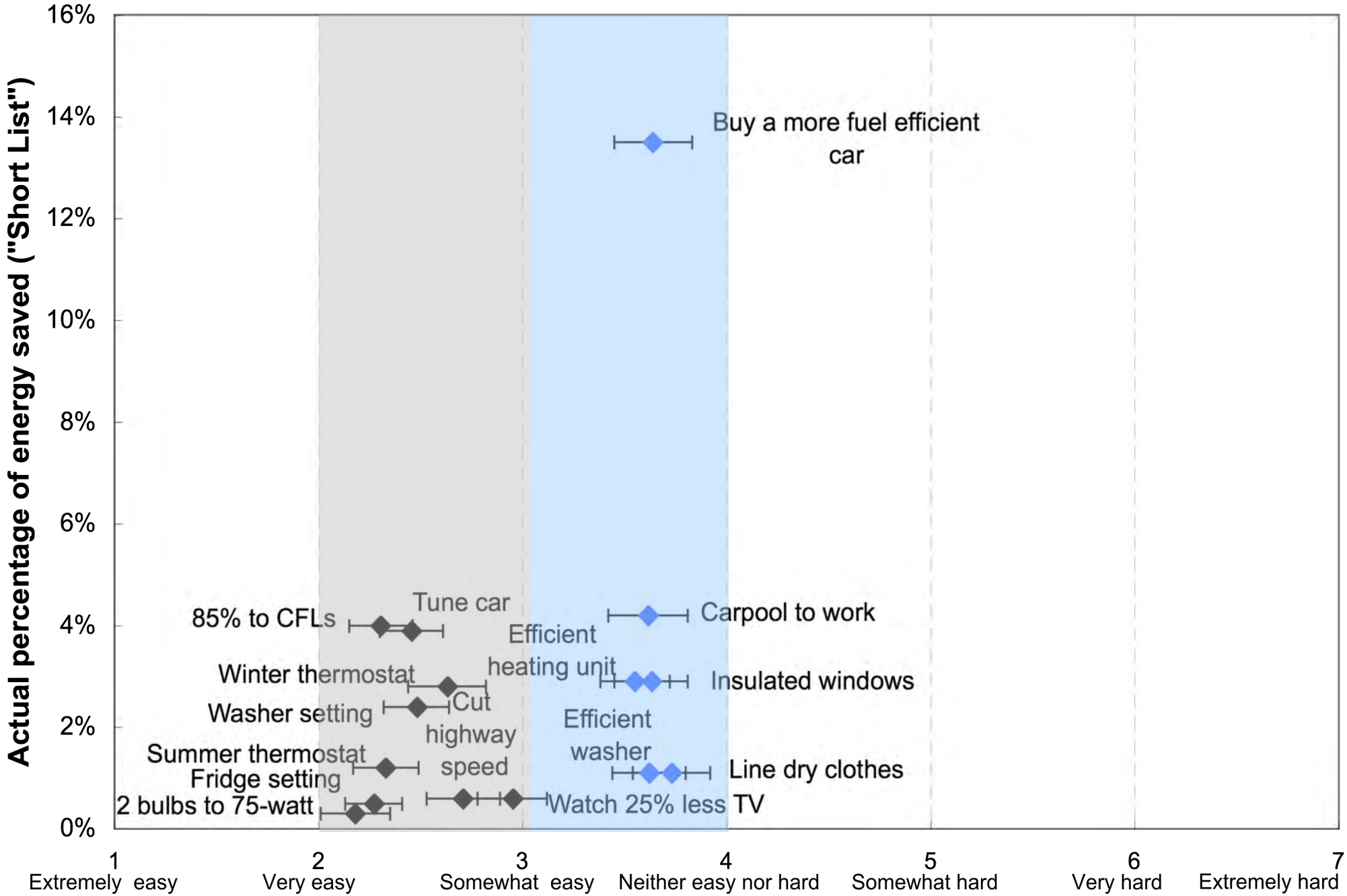

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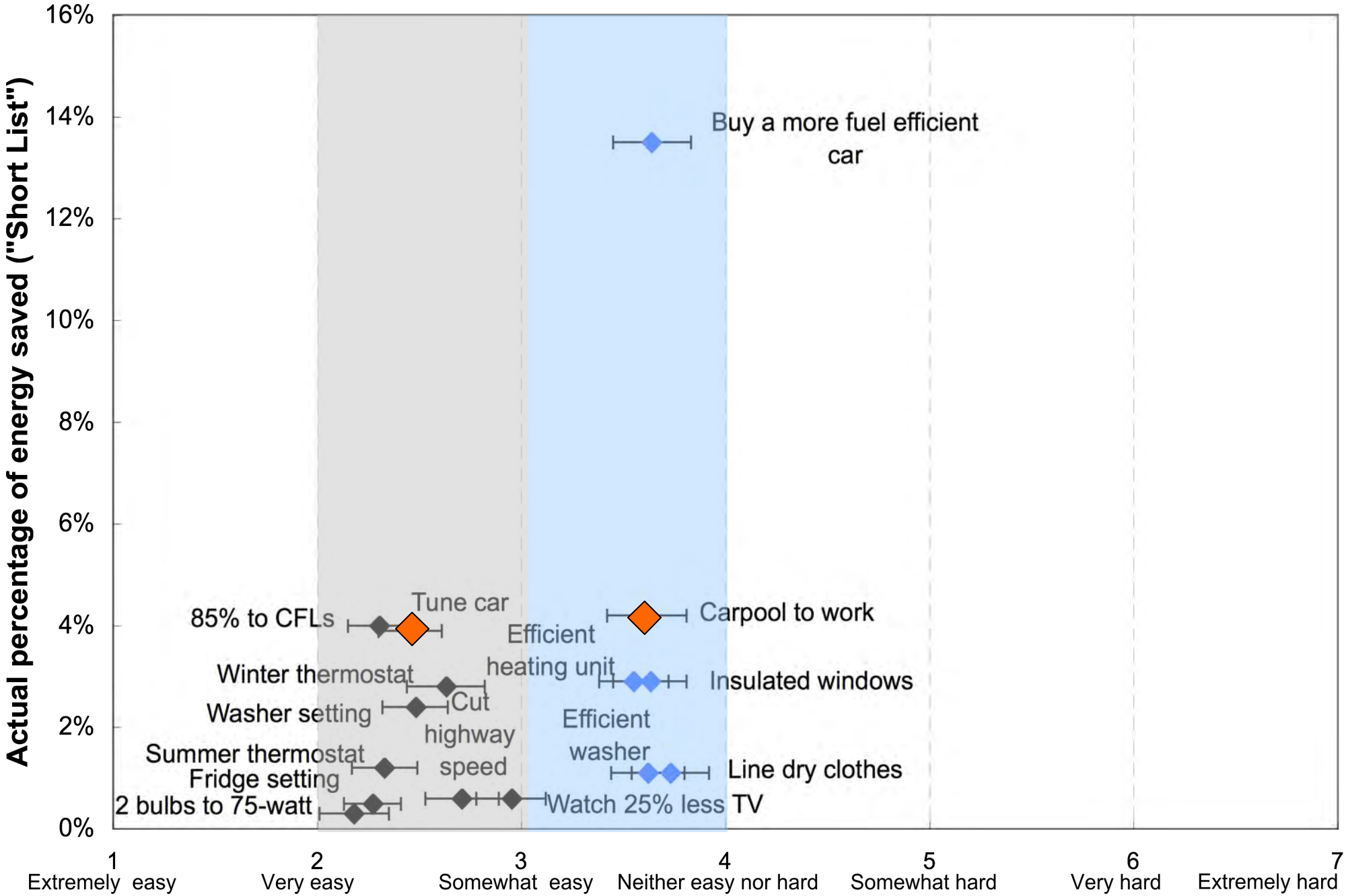

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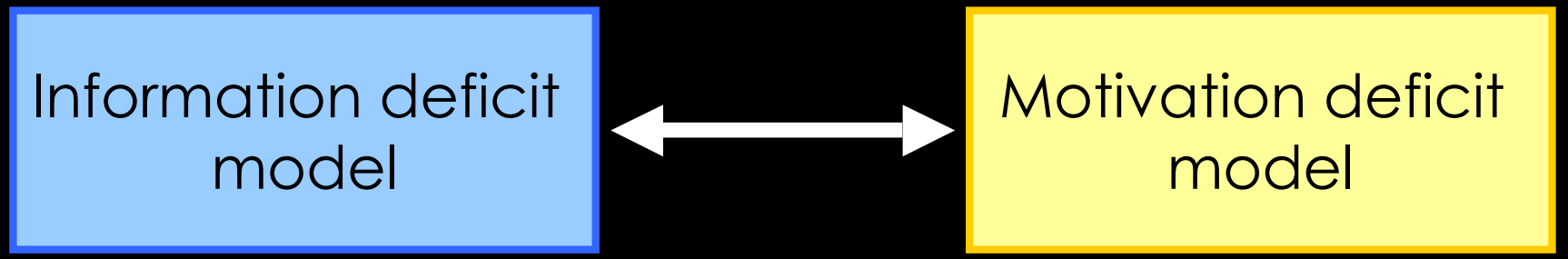
On why people do not act

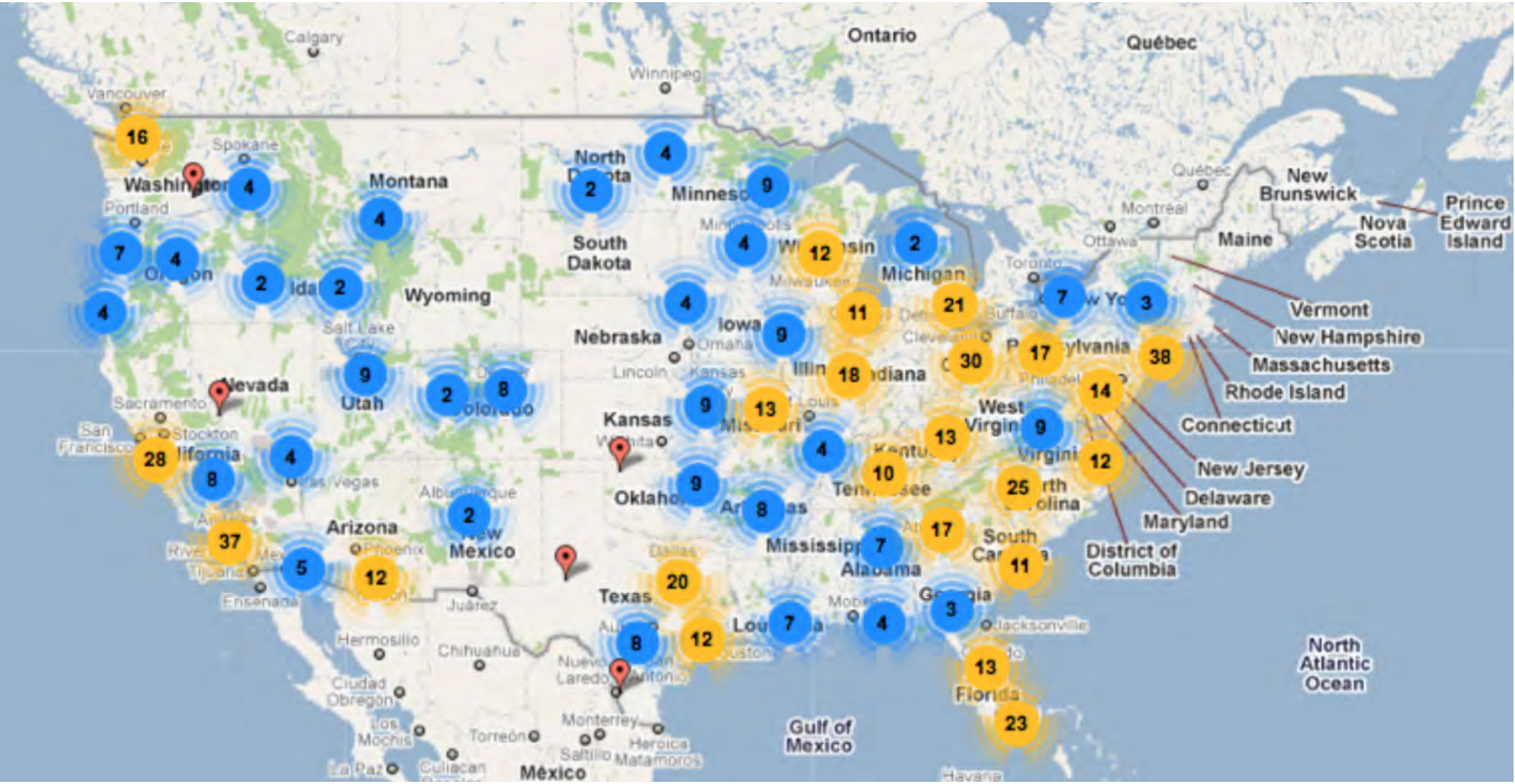


Don't know how much I will save
Don't know what to do
Don't know how
…

Cost
Time
Effort
Social norms
…

Participants for self vs. others study

Online survey via Amazon Mechanical Turk -- an online marketplace for work (*n* =760)



Most effective behavior: Self vs. others

	Percentage of Answers	
Behavior Category	**Self**	**Other Americans**
Turn off lights	19.5	13.0
Drive less/public transit/carpool/bike/walk	19.3	31.8
Turn off appliances	10.8	7.7
Change setting on the thermostat	9.0	4.6
Sleep/relax more	7.5	4.6
Use appliances less	5.4	4.6
Unplug appliances	5.0	2.8
Conserve water/energy	4.7	4.5
Use energy efficient bulbs	2.8	3.6
Consume less	2.6	4.1
Other (each mentioned only once)	2.4	1.8
Use efficient cars/hybrids	2.2	2.2
Use efficient appliances	1.8	2.9
Change my lifestyle	1.8	2.5
Buy green energy	1.3	3.2
Buy green products	1.1	1.0
Eat green	1.0	1.0
Recycle	0.7	1.4
Insulate my home/weatherize	0.4	0.4
There is no way/I don't know	0.4	0.4
Awareness/education; more attention	0.1	1.4
Phase out inefficient technologies	0.1	0.4

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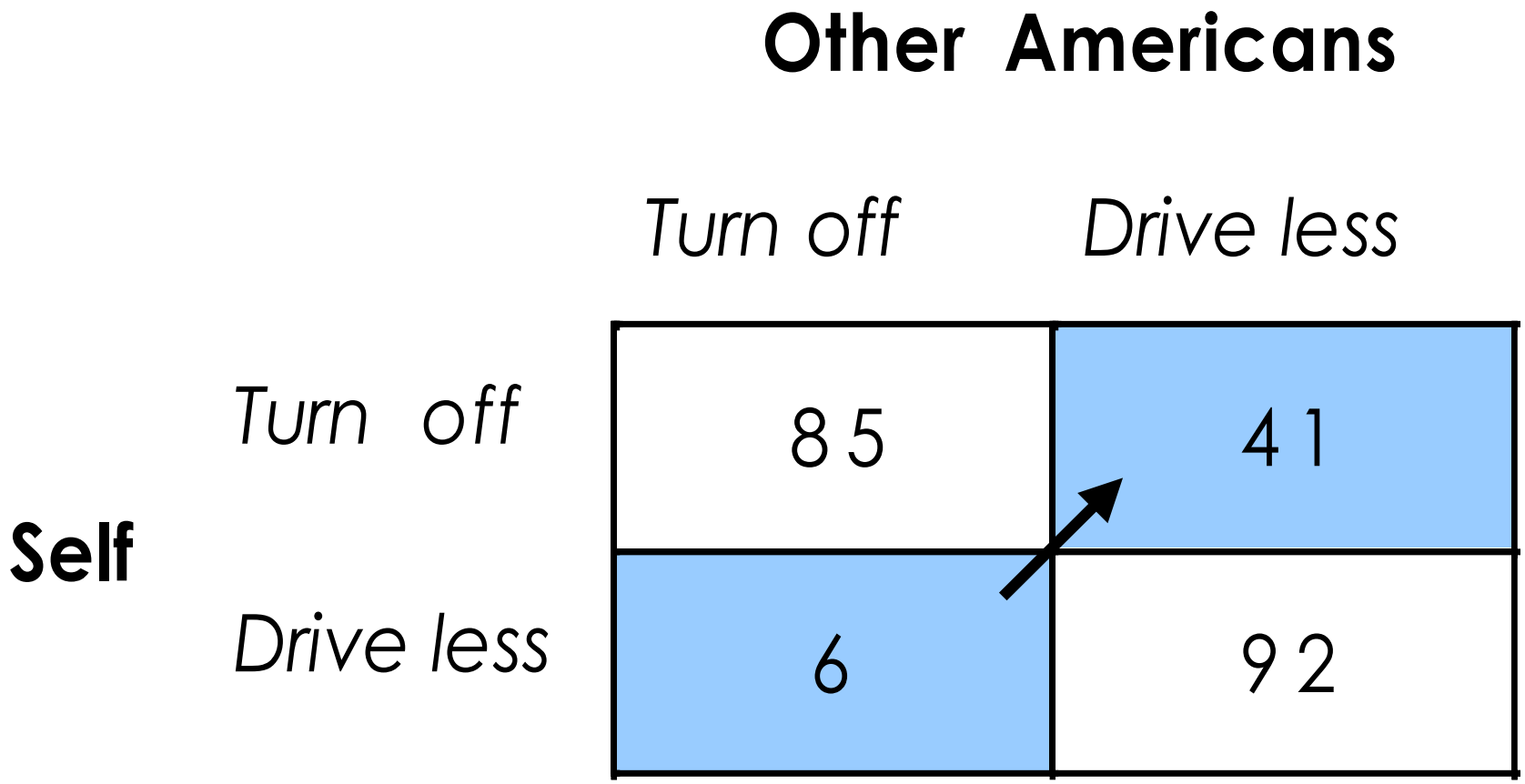
Phase out inefficient technologies	0.1	0.4

Most effective action for self and other Americans

		Other Americans	
		Turn off	*Drive less*
Self	*Turn off*	8 5	4 1
	Drive less	6	9 2

Turn off (appliances and lights)
Drive less (drive less, carpool, use public transportation, bike, and walk)

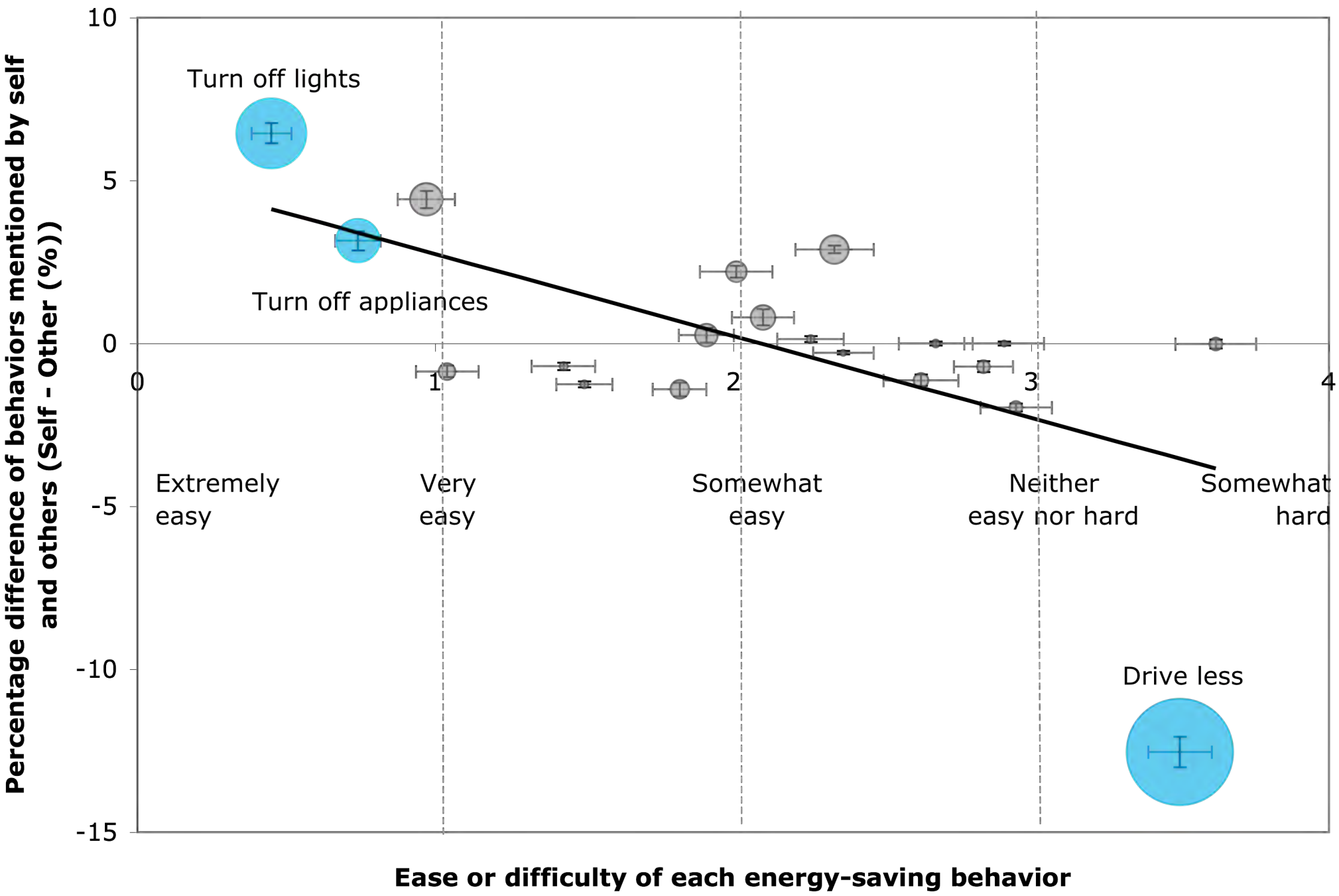
I'll do the easy thing, you do the hard thing



Individuals who choose the easier option for themselves are likely to ask others to do the harder thing.

McNemar chi-square statistic for asymmetry 26.1, $p < 0.0001$

I'll do the easy thing, you do the hard thing



Findings:

"In your opinion, what is the most effective thing that you could do to conserve energy in your life?"

- Participants state:

55% "curtailment"

12% "efficiency"

Gardener and Stern (2008):

"efficiency saves more energy than curtailment"

Findings:
Major misperceptions in energy consumption

- People have small overestimates for low-energy behaviors and large underestimates for high-energy behaviors

➔ many implications for technology, education, and policy

Findings:
Predictors of perceptions

- Participants who are numerate and pro-environmental ➔ accurate perceptions

- Participants who engage in environmental behaviors ➔ inaccurate perceptions

Possible reason: focusing effect

Findings:
Ease of behavior adoption

- Most participants found the 15 ‘short list’ behaviors relatively easy to do

- Should focus on behaviors that are easier than others and also save the most energy

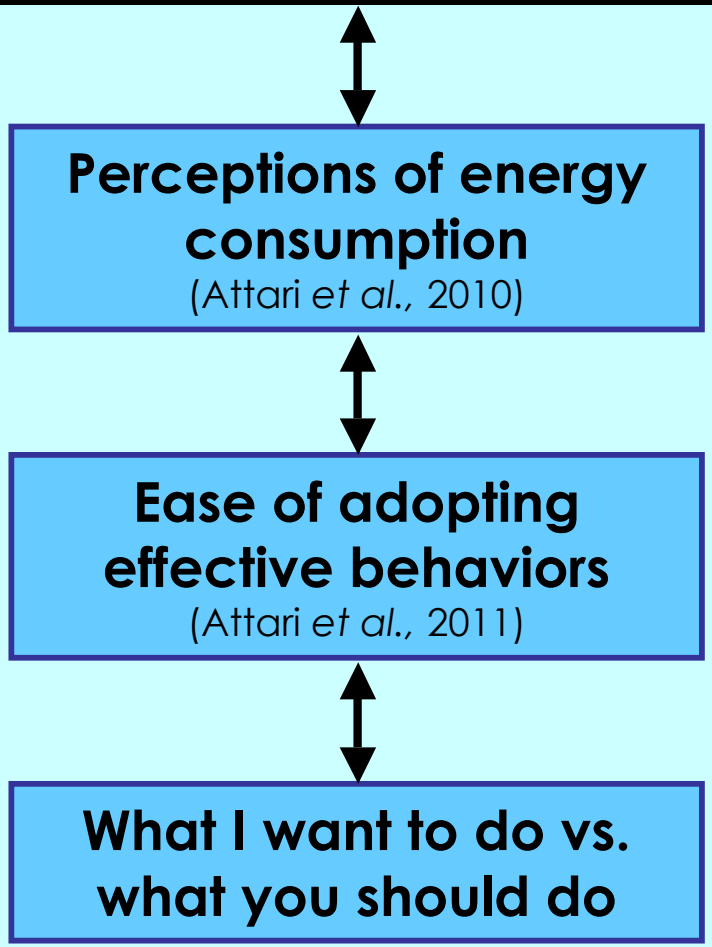
Findings:
I'll do the easy thing, you do the hard thing

- People are motivated to list easier behaviors for themselves and harder behaviors for others

- Reasons may include: cost
  time
  effort…

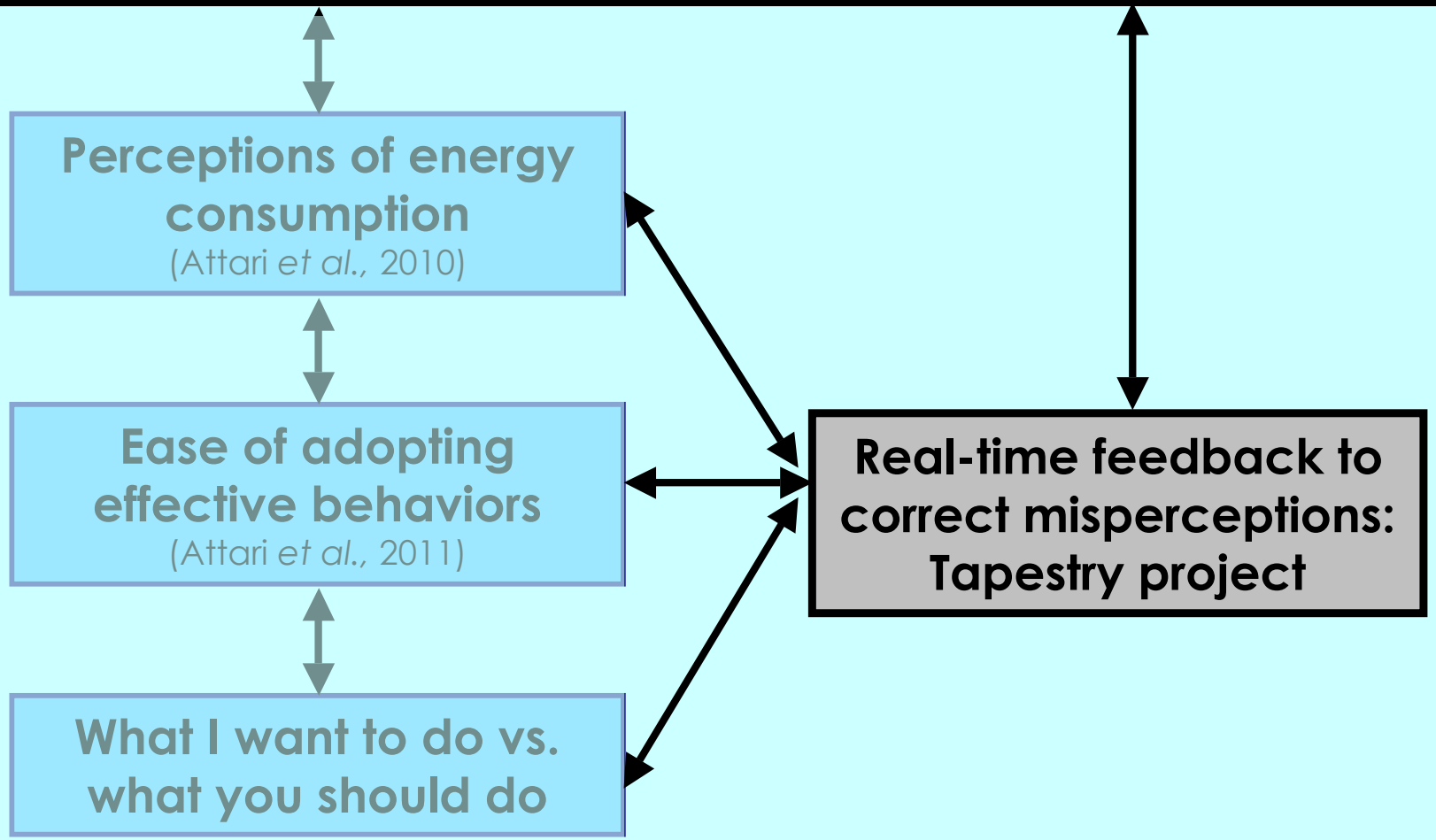
Overview
work completed

Understand how people interact with technology and nature



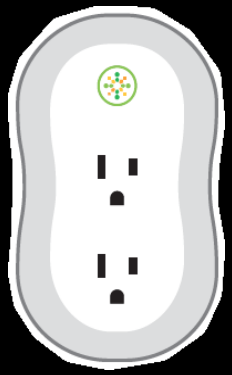
Overview
current and future work

Understand how people interact with technology and nature

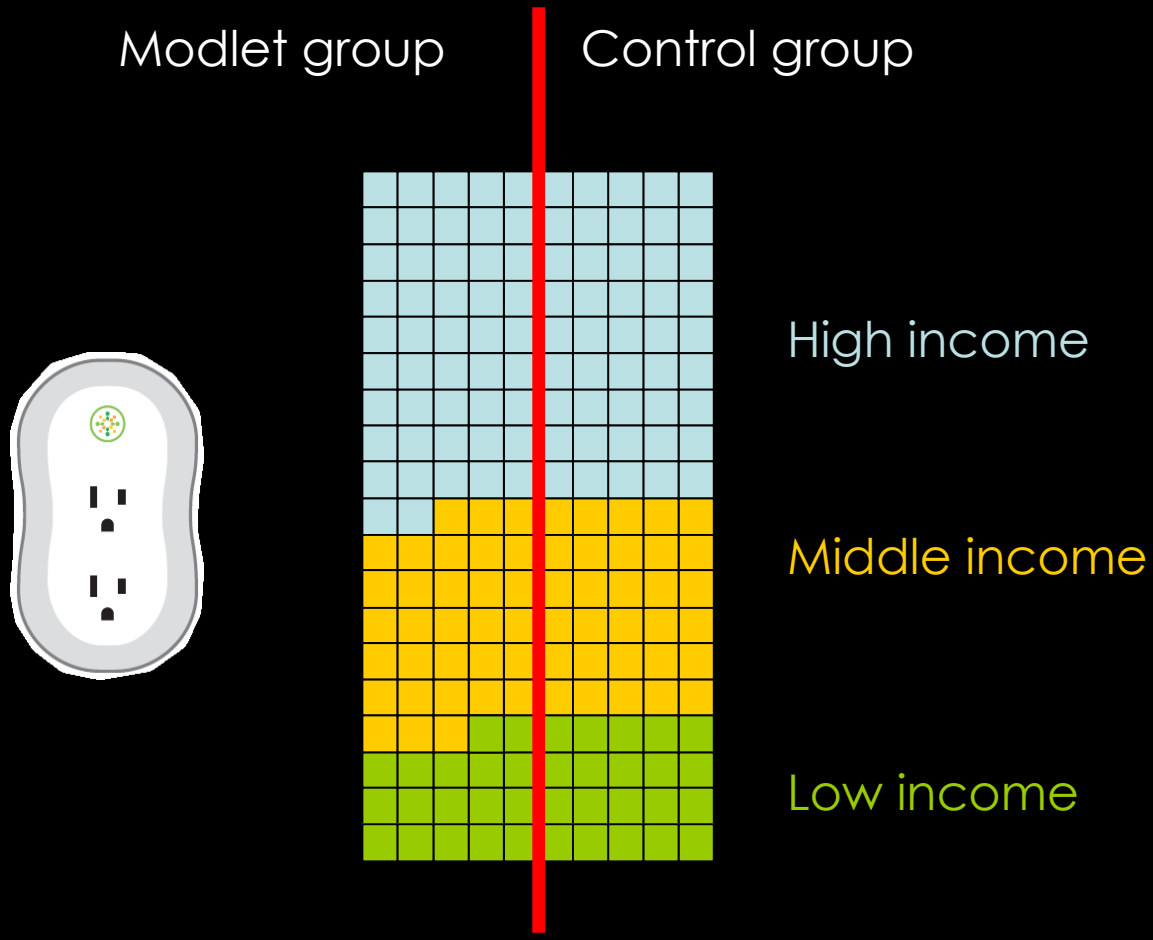


Current work: Real-time energy feedback

Tapestry building study



One year monitoring of plug load

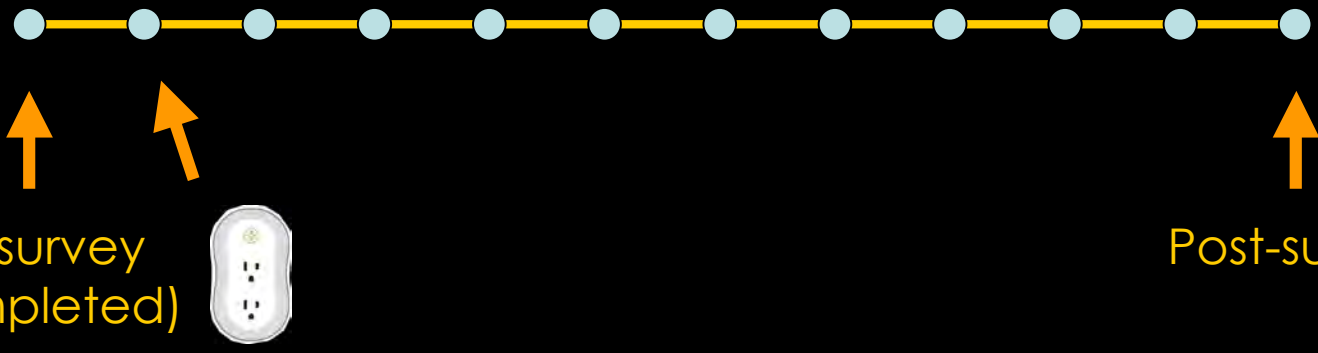


- Do perceptions of energy consumption improve?
- Elasticity of consumption based on income group?
- What types of feedback to people respond to?

$ saved, kWh, acres planted, bulbs turned on..

Investigating perceptions of standby energy consumption and behavior change

One year of monitoring and feedback



Standby energy is used by devices while they are switched off or not performing their primary function (LBNL, 2011)

e.g., microwave, computer, cable box, TV with projector, DVR, etc.

Investigating perceptions of standby energy consumption and behavior change

- Perceptions of standby energy consumption?

- Which groups buy efficient appliances?
  Many efficient devices are more expensive in the short-term (e.g., CFLs v. incandescent bulbs)

- Are there rebound effects of conservation?

- Is behavior change maintained?

Preliminary pre-survey results
(N = 129)

- 96% would use an energy monitoring system if free
- 73% would buy such a device (modal price: $100)
- Residents want to get feedback in financial savings ($ saved) rather than comparisons to their neighbors
- Only 2% of the participants know how to dispose of spent CFL bulbs

Acknowledgments

Columbia

David Krantz
Elke Weber

Carnegie Mellon

Cliff Davidson
Wandi Bruine de Bruin
Mike DeKay
Mitch Small
Robyn Dawes

Tapestry Team

Jonathan Rose Companies:
Jonathan Rose
Nicole Sherwood

CRED:
Elke Weber
Sabine Marx
Troy Simpson

ThinkEco:
Erika Diamond
Heidi Perry

Funding

CRED

Earth Institute

NSF

EREF