

USERS AND PRIVACY

The Web Privacy Tussle

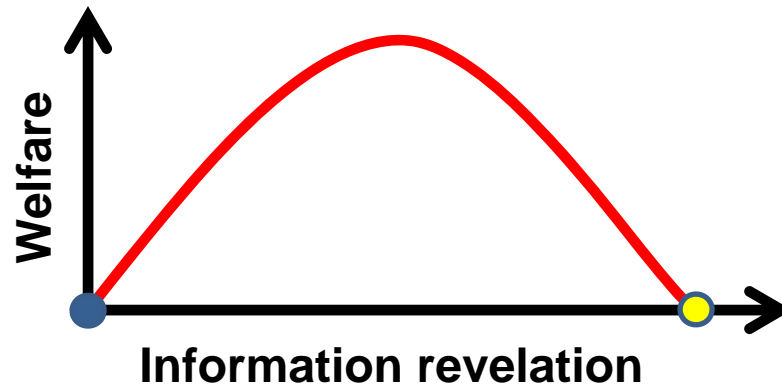
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Introduction

- Multifaceted concept
- Definition
 - Ownership of and control over personal information (90%)
 - Personal dignity (60%)
 - Freedom to develop (50%)
 - Ability to assign monetary values to each data flow (26%)



Individuals' Privacy Preferences and Behaviors

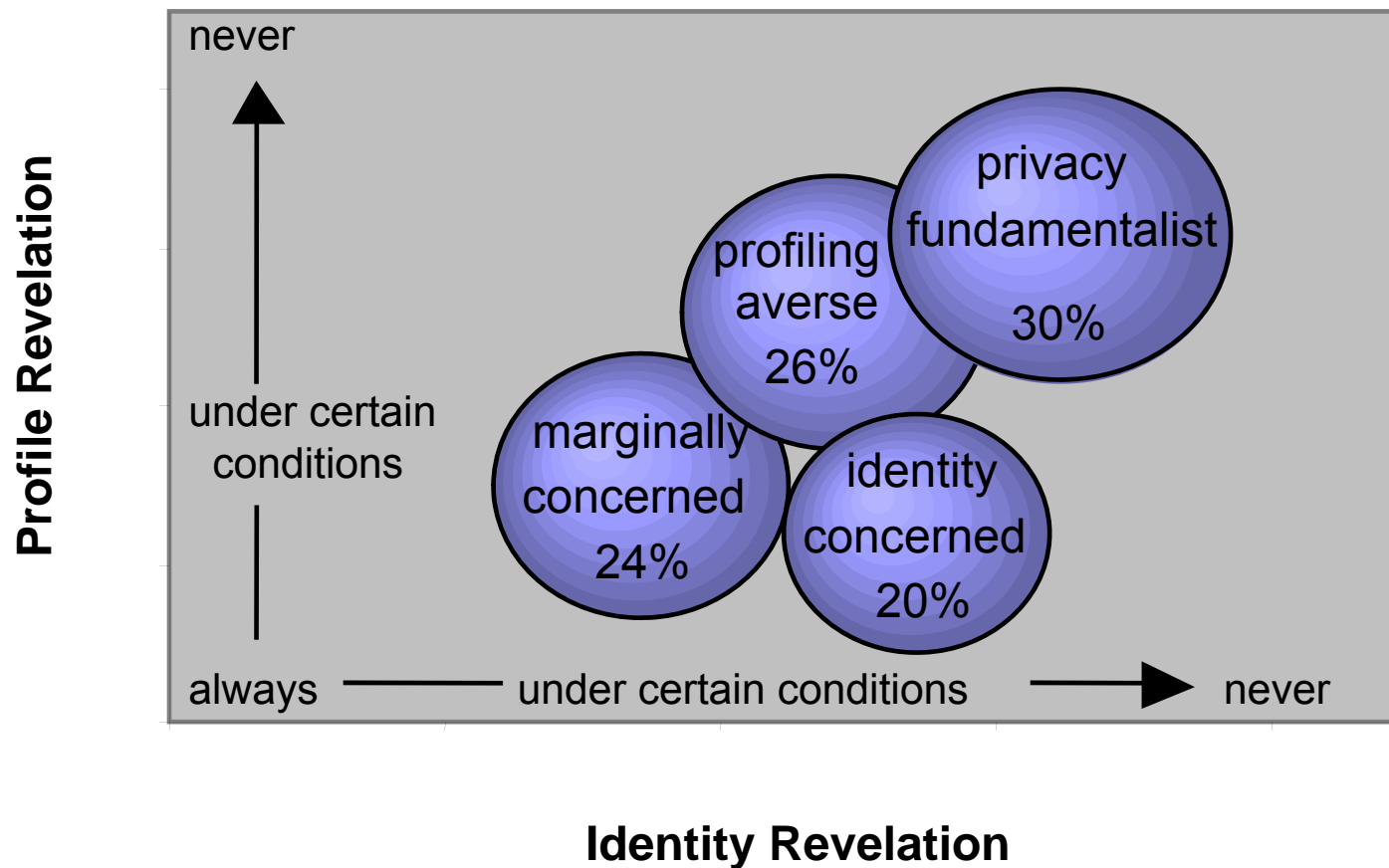


A classic privacy experiment

- Study of interaction behavior between an intelligent sales advisor agent and 171 consumers
- Participants signed privacy statement indicating that their data would be sold to an anonymous entity
- Subjects spent their own money on products



Privacy Attitudes



Identity-related results

- Identity information revealed
 - No reason was given for elicitation

– Fundamentalist:	26%
– <i>Identity</i> -concerned:	23%
– Profiling-concerned:	35%
– Unconcerned:	64%



Profiling-related results

- Privacy cost
 - Controlled for privacy sensitivity with pre-study

– Fundamentalist: 78%

– *Profiling*-concerned: 78%

– Identity concerned: 97%

– Unconcerned: 100%



Lessons learned

- Are privacy preferences reflected in behavior?
 - Participants pick up cues
 - Degree of information revelation is very high
- Attitudes and behaviors are not random, but exhibit a **privacy gap**



What drives behavior?

- Incomplete or asymmetric information
 - Understanding of situation
- Bounded rationality
 - Analysis of privacy consequences
- Psychological aspects
 - Total immersion in activity leads to lack of metacognitive monitoring (i.e., flow state)





Obstacles

- Decision-making over time
 - Actions “now” have consequences “later”
- Choices are not and should not be perceived as independent



Justin

I started setting up my Google+ account this weekend. I think it's cute how Google plays dumb and asks me fill in my personal information.

 4 hours ago via iPhone ·  · Like · Comment



Intervention and psychological response



Improvement of notice experience

- Non-trivial: See lessons learned from P3P project
- Short notices or highlighted notices
 - EU Short Notice Directive, FTC, Microsoft: Layered Notices
 - Conspicuous notice: Brief, concise language & prominent presentation of terms

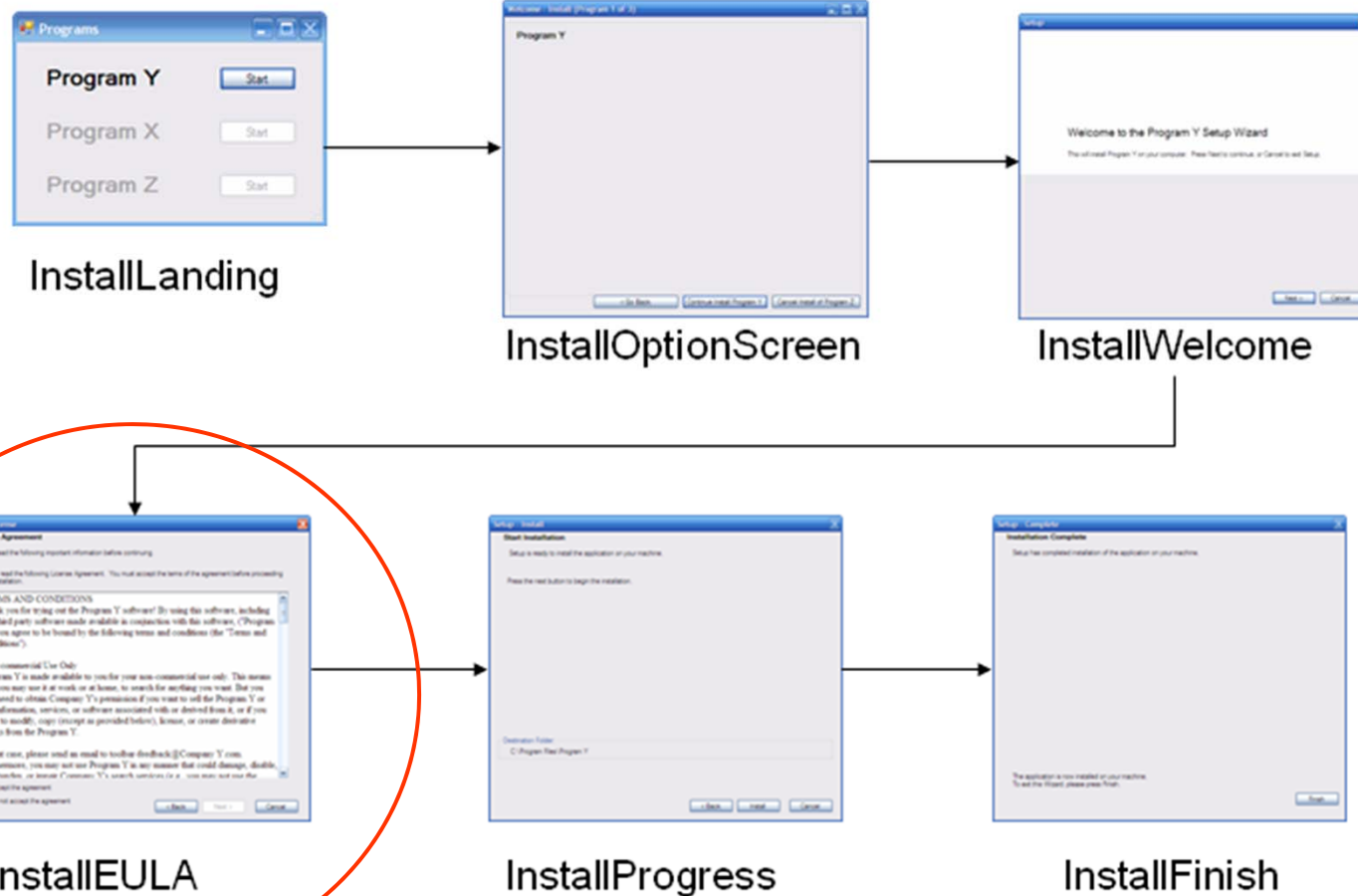


A second experiment

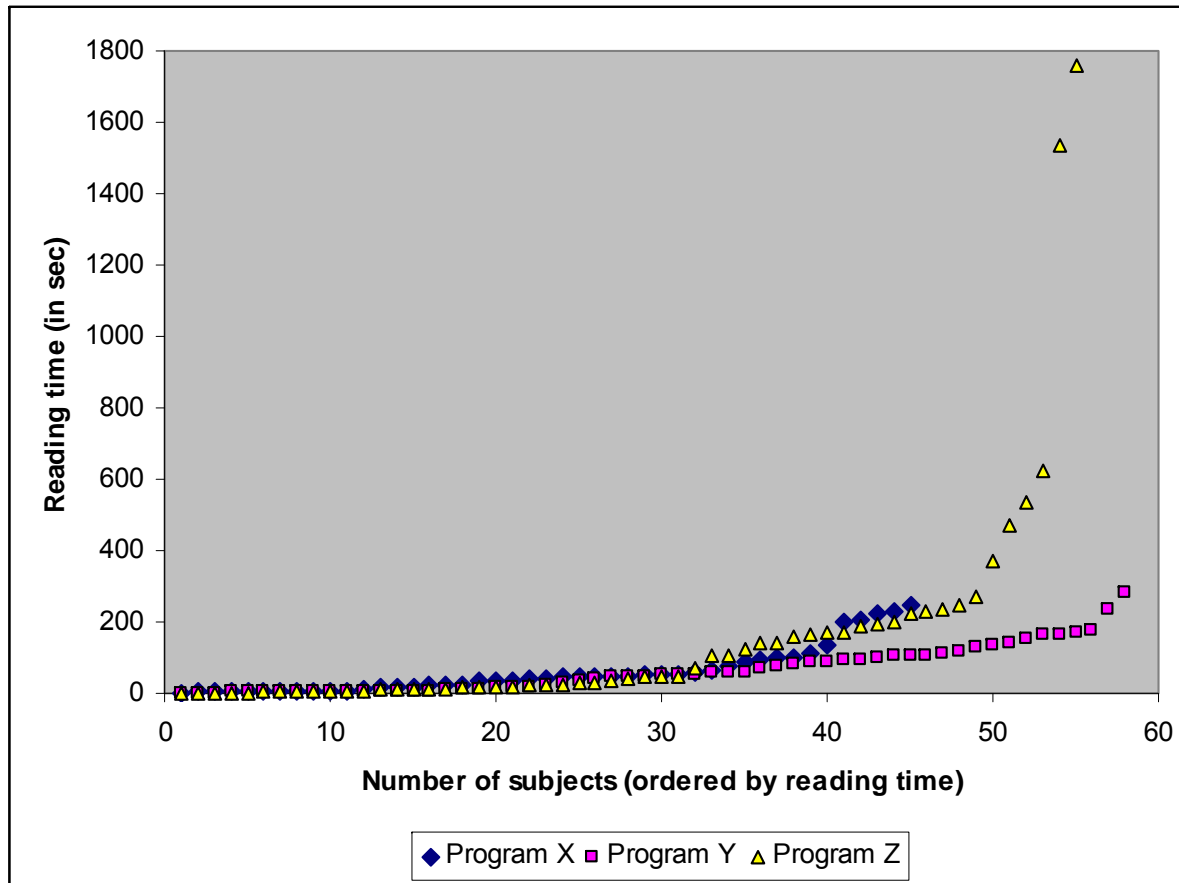
- Improving notice and consent
 - Installation dialogue for 3 popular consumer programs in randomized order
 - Removed brand information & interface differences to improve experimental control
 - Post-experimental survey
 - 222 individuals in 3 treatments; between subjects design
 - Standard EULA
 - Standard EULA + short notice at begin of dialog
 - Standard EULA + short notice after installation



Experimental Treatment A



Reading time analysis for EULA



- Majority does not read EULA information
→ Median \approx 45 sec
- Time required to pass through EULA is 14, 10, 14 min* for Programs X, Y, and Z, respectively

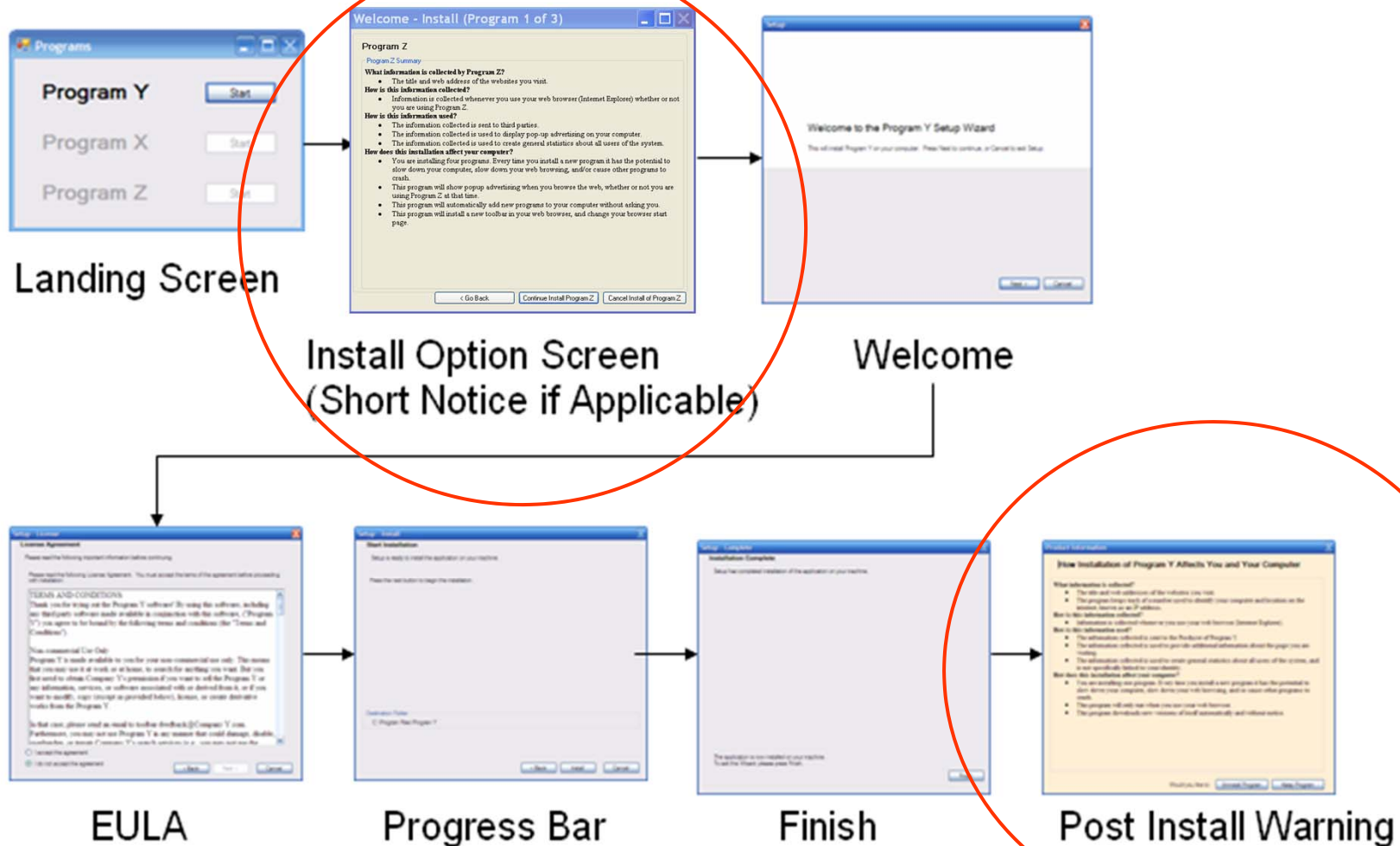


Installation results

- Installation frequency
 - X: 70%; Y: 91; Z: 86%
- **Regret** test with EULA summary
 - Of installers only X: 2%; Y: 62%; Z: 18% would keep program installed
- Consumers do care
 - Some differentiation based on standard EULA
 - Strong response to debriefing with EULA summary

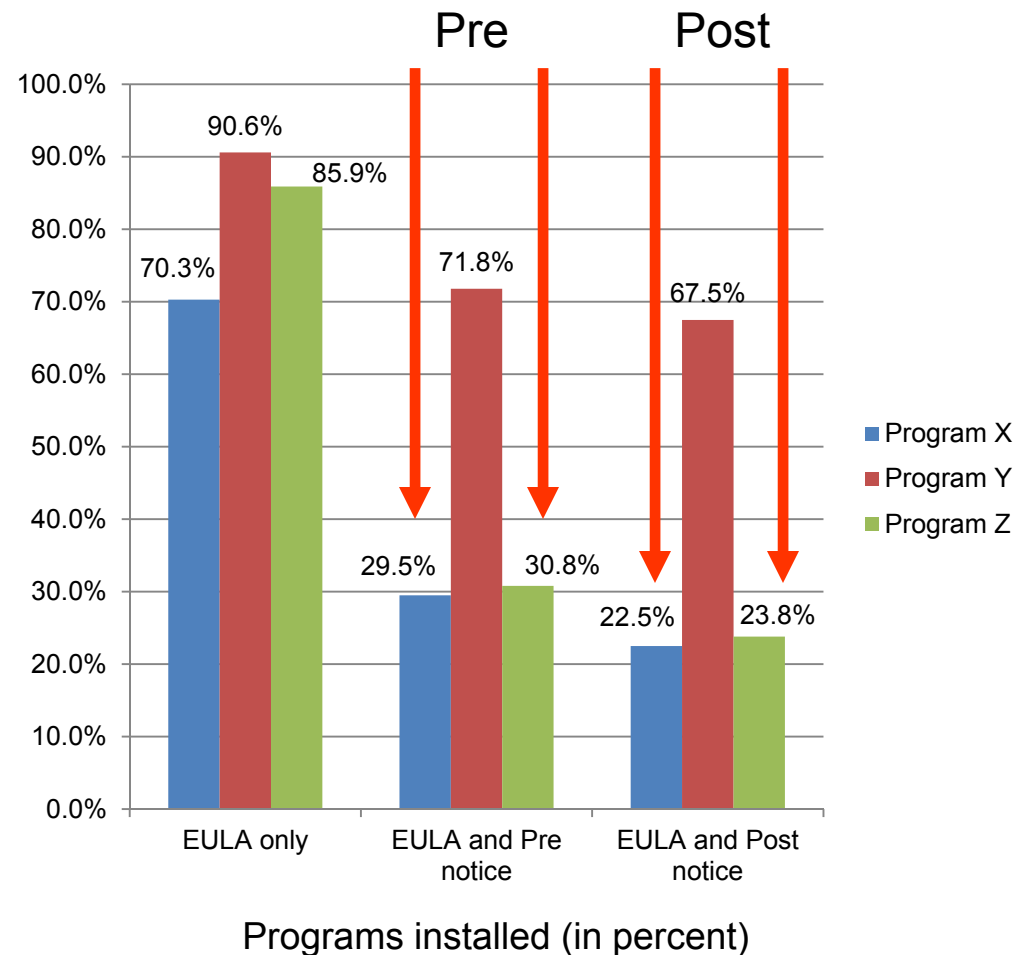


Experimental Treatments B & C



Installations per Notice

- Post- and Pre-Notice significantly reduced the amount of installation of “bad” programs
- Post- and Pre-Notice had comparatively little effect on the installation of “good” programs

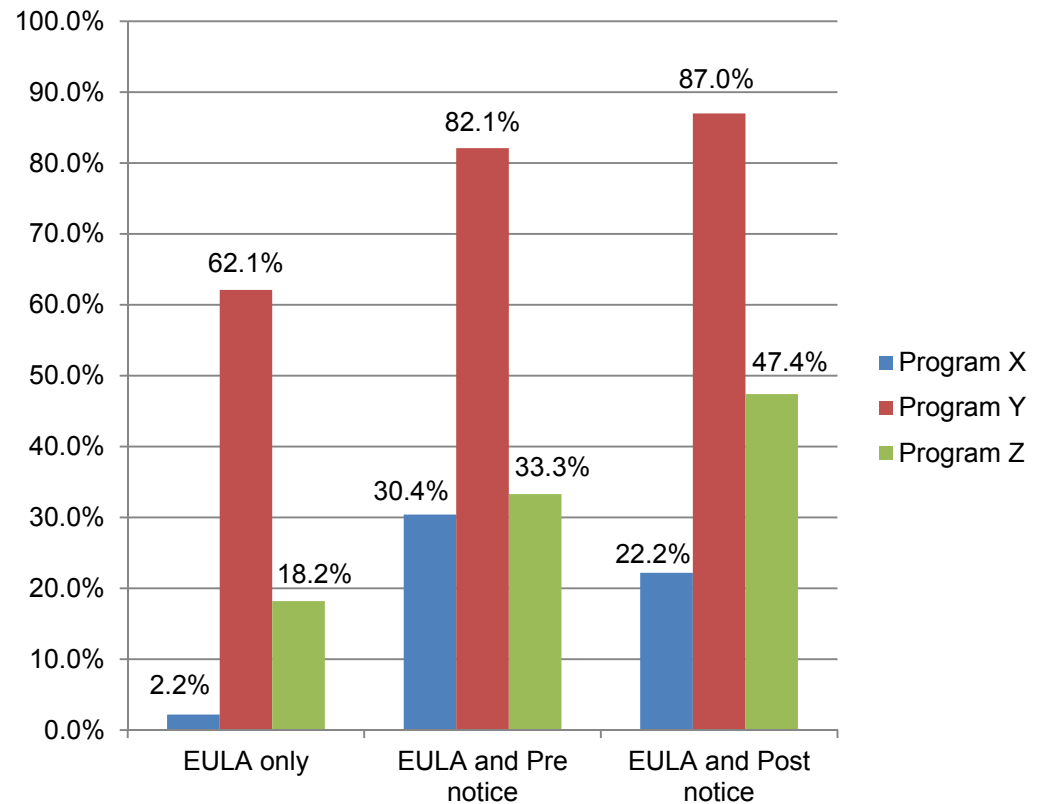


Regret

- Regret significantly lower in short notice treatments, but still high overall

→ However, up to 78% (70%) still regret decision to install in post (pre) notice treatment

Note: Approx. same number of programs is installed and not regretted in **all 3** treatments



Users who were happy with installation choices (in percent)



Lessons learned

- Emphasis on trying new product
 - Effects may be nonreversible
 - Optimism bias
- Agreement to terms remains dubious
 - Habituation



Economic aspects

- Informational market power
 - If consumers *cannot* easily obtain information about a product's safety but *can* easily observe its price, price competition may reward those who cut their price by offering a less safe product.
- Consequences:
 - Easy to observe → Product price is low
 - Hard to observe → Privacy costs are high



An experiment about money, security and privacy



Experiment 3: Paying People to Ignore Online Risks

- We **paid** people to download and run an **unknown executable**
- Mechanical Turk as experimental platform
 - Measured views vs. downloads vs. runs
 - 2854 users viewed task
- Payment was increased every week
 - \$0.01/\$0.05/\$0.10/\$0.50/\$1.00

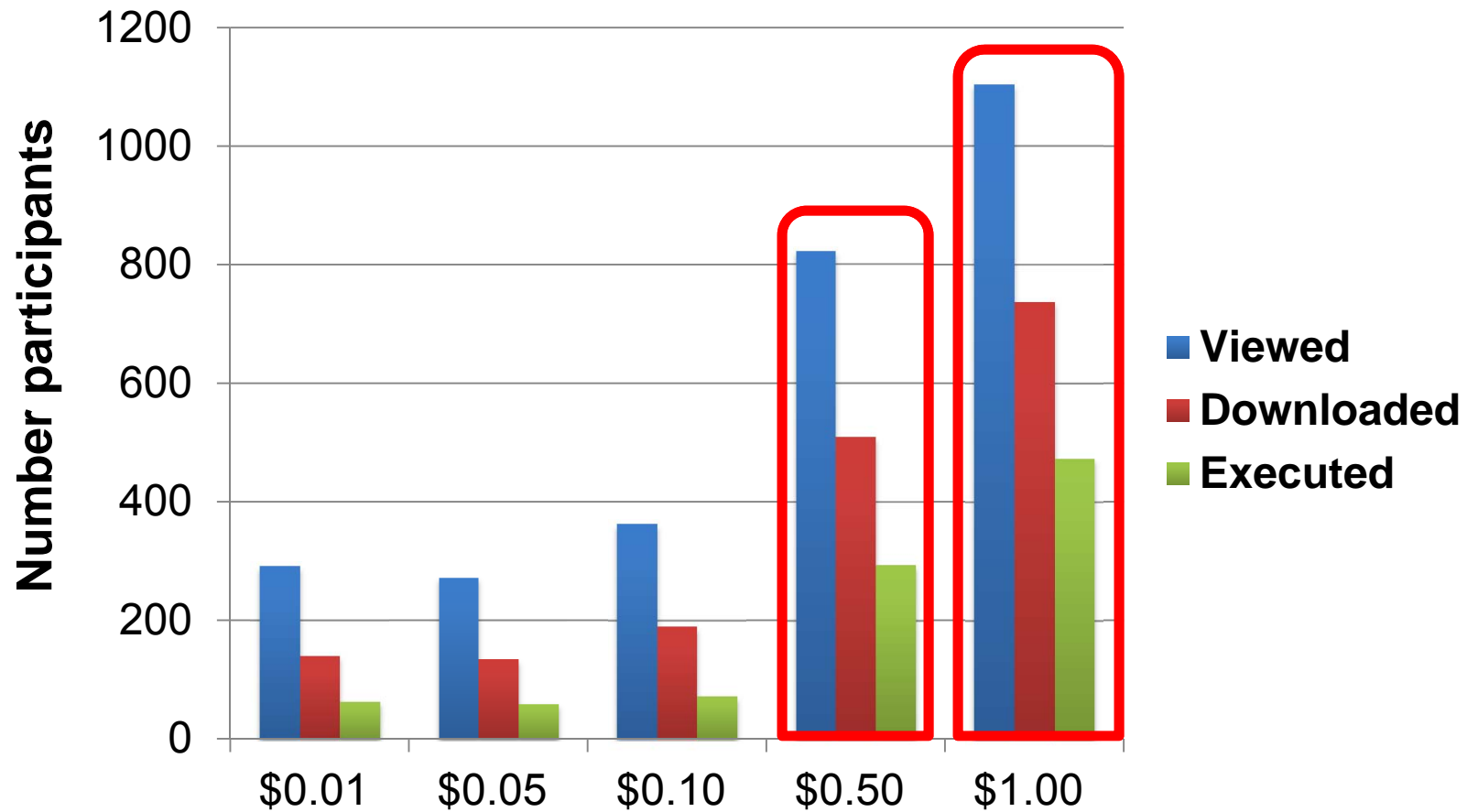


Experimental Environment

- Distributed Computing Project
 - No such project exists
 - All code was hosted on a third-party domain
 - No connection to us or our institutions

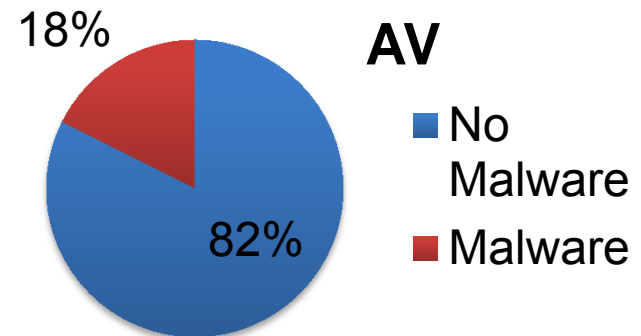
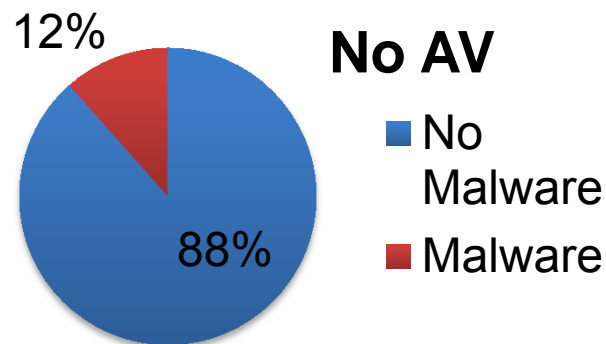


Results



Security Behaviors

- We categorized 3110 unique processes
 - 16% of users had malware
 - 79% of users had security software
 - Correlation between malware/security software: $\phi = 0.066$, $p < 0.039$



Price and Behavior

- Significant increase in patched software as payment increased
 - \$0.50-\$1.00: 69%
 - \$0.01-\$0.10: 54%
- Cheating (invalid codes) decreased significantly as payment increased
 - \$1.00: 15%
 - \$0.01: 47%



Security Perceptions

- With increasing payments participants' perceptions of danger also increased
 - People who *should* have known better participated once the price was right
- 70% of participants knew it was dangerous to download unknown programs
 - All of them did so anyway



Lessons learned

- Users behaving rationally?
 - Balance the incentives to run malware with the costs of the harm they directly experience
 - Thus, \$0.01 outweighed zero perceived harm
 - Externalities and immediate gratification
- Peltzman effect
 - Seatbelt laws and airbags
 - UAC had no impact

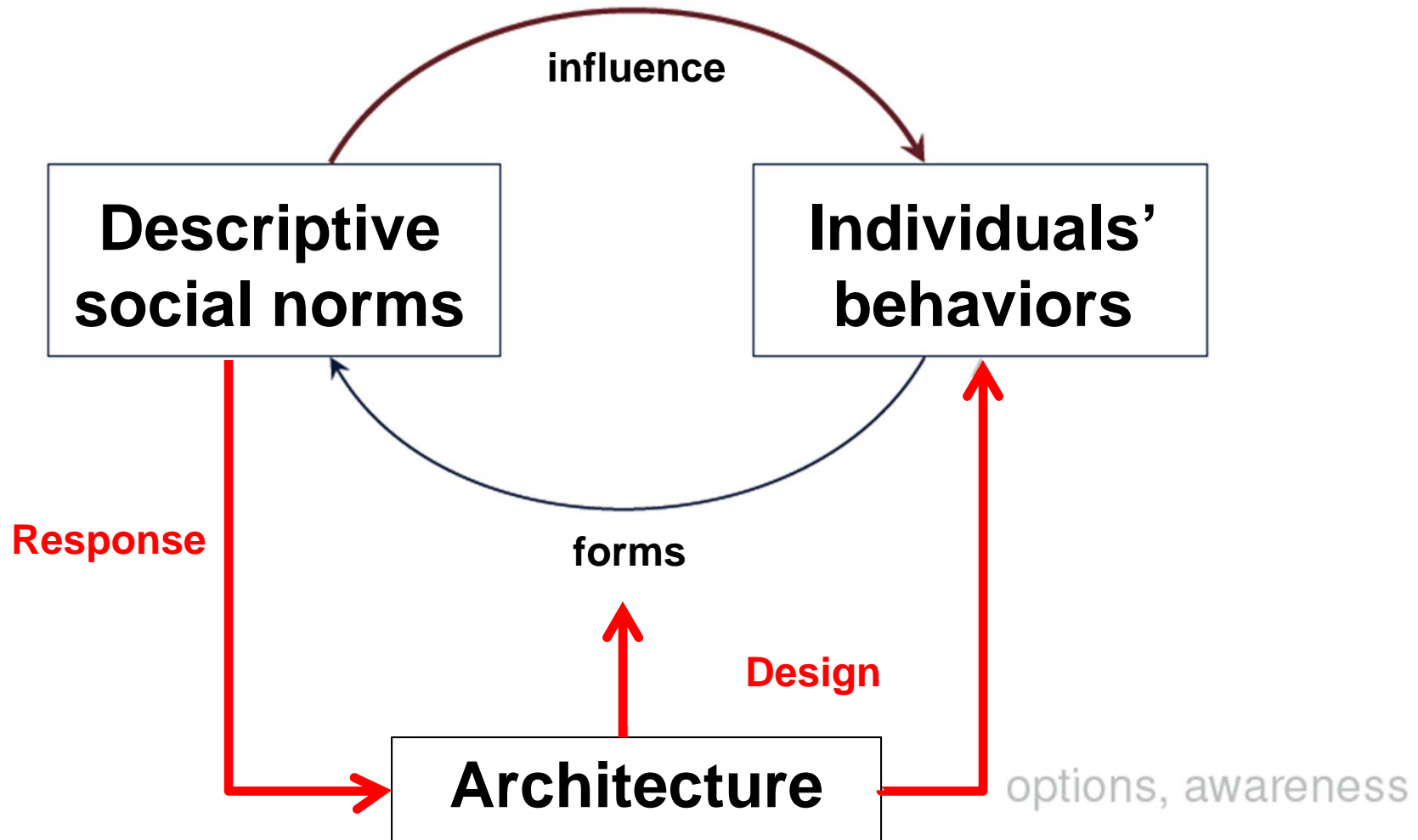


Discussion points

- Learn about your users
 - Run lab and field experiments
- Behavior is often rationalizable
 - Context-specific preferences and actions
 - Interventions result in better outcomes
- Undesirable actions and economic incentives
 - Protect “the ignorant, the unthinking, and the credulous”?
 - Rational ignorance
 - Negative externalities



Complex process



Papers:

E-privacy in 2nd generation E-Commerce:
Privacy preferences versus actual behavior, ACM
EC'01 (with S. Spiekermann, B. Berendt)

Noticing Notice: A large-scale experiment on
the timing of software license agreements,
CHI'07 (with N. Good, D. Mulligan, J. Konstan)

It's all about the Benjamins: An empirical study
on incentivizing users to ignore security advice,
FC'11 (with N. Christin, S. Egelman, T. Vidas)



Questions...?

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