Privacy economics, attitudes, and behavior

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& Rebecca Balebako
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8-533 / 8-733 / 19-608 / 95-818:
Privacy Policy, Law, and Technology
Today’s Agenda

• Quiz
• IRB and Human Subjects Research
• Economics of Privacy
• Measuring Privacy Attitudes and Behaviors
By the end of class, you should be able to:

• Understand the review process of doing privacy research on human subjects

• Understand the difficulties in measuring privacy preferences and behavior

• Critically evaluate studies on privacy preferences or behavior
Human subjects research
Institutional Review Board

• Reviews human subjects research to make sure it is ethical and human subjects are protected

• Takes time and lots of paperwork

• Before submitting paperwork to IRB, you must complete human subjects training

• [http://www.cmu.edu/research-compliance/human-subject-research/](http://www.cmu.edu/research-compliance/human-subject-research/)
IRB approval

- Research involving human subjects requires IRB approval
- Surveys are exempt, but you must ask IRB for exemption
- Exempt and low-risk IRB approval usually happens within 2 weeks
- High risk usually takes about a month, but may be longer
- Whenever possible, design study with informed consent
  - You will have to convince IRB that there is a good reason not to
- Submit your IRB form as early as possible
  - You can submit a modification later
Ethical considerations

• Sometimes tests can be distressing
  – users have left in tears

• You have a responsibility to alleviate
  – make voluntary with informed consent
  – avoid pressure to participate
  – let them know they can stop at any time
  – stress that you are testing the system, not them
  – make collected data as anonymous as possible
IRB approval needed?

- A grad student is conducting an anonymous online survey to find out how people feel about employers firing people who posted about work on Facebook. She plans to write a paper about this.

- A professor is surveying her students to find out which of the course reading assignments were most and least useful so that she can improve the assignments next semester.

- A grad student is recording his Facebook feed every day for a month and then systematically analyzing the posts to determine whether the number of words in each posts is correlated with the time of day it was posted. If he finds something interesting he will write a paper about it.
Economics of privacy
Financial Transactions

• Buyer and seller example [Varian 1996]
• Why do buyers want sellers to know what they want?
• What do buyers not want sellers to know?
• How can sellers incentivize buyers to honestly reveal information?
Externality

• The actions of a mailing list buyer impose costs on individuals on that list

• The seller of the list ignores those costs

• Varian says: Costs could be mitigated through choice
Contracts and markets for info

• What if we had property rights in information about ourselves?
Public interest in personal information

- Public records
  - Court records
  - Tax assessments
  - Salaries of public officials

- What happens when information goes online and transaction costs approach zero?
Privacy attitudes and behaviors
Consumer surveys to measure privacy attitudes

- Westin/Harris surveys
  - Privacy fundamentalist, pragmatist, unconcerned (marginally concerned)

- TRUSTe surveys

- Academic research

- Does it matter what consumers think?
Privacy concerns seem inconsistent with behavior

• People say they want privacy, but don’t always take steps to protect it

• Many possible explanations
  – They don’t really care that much about privacy
  – They prefer immediate gratification to privacy protections that they won’t benefit from until later
  – They don’t understand the privacy implications of their behavior
  – The cost of privacy protection (including figuring out how to protect their privacy) is too high
How do we measure privacy behaviors?

• Self reported behaviors
• Web surveys
• Lab studies
• Field experiments
• Natural experiments
Measuring Behavior in lab studies
Effect of privacy info on purchasing

Will the salient display of privacy information cause consumers to take privacy into account when making online purchasing decisions?


• J. Tsai, S. Egelman, L. Cranor, and A. Acquisti. The Effect of Online Privacy Information on Purchasing Behavior: an Experimental Study. Information Systems Research. Published online 2010.
What if we make privacy protection easy?

Will people pay to protect their privacy?
Add privacy meters to search results
How can we test whether privacy meters change behavior?

Hypothetical task

- Search for product
- Which site would you buy from?

Real task

- Search for product
- Make purchase with your credit card

Hypothetical

No real privacy tradeoff

Expensive

Difficult to control
Power strips, prophylactics, and privacy, oh my!

- “Online shopping study” in our lab
- 24 students paid $10 plus reimbursement for purchases made with their own credit cards
- Used “Shopping Finder” search engine
  - Control condition: no privacy icons
  - Experimental condition: privacy icons

J. Gideon, S. Egelman, L. Cranor, and A. Acquisti.

Power Strips, Prophylactics, and Privacy, Oh My! SOUPS 2006.
1. **Trojan Shared Sensation Spermicidal Condoms - 12 Pack**
   Trojan Shared Sensation Spermicidal Condoms - 12 Pack - Unique Shared Sensation Design for the Pleasure and Excitement of Both Partners: -Alternating rows of raised bumps and ridges for her -Flared ...
   store.yahoo.com/eprice/trojsharsens.html - Cached - Privacy Policy - Similar Pages

2. **Trojan Shared Sensation Condoms**
   Purchase Trojan Shared Sensation condoms at QuikCondoms.com for discount prices and free shipping! ... Product Description. The Trojan Shared Sensation is part of the latest trend in condom design; with condoms companies ... QC Price. Qty. Trojan Shared Sensation Lubricated 12 Pack. 11.99 ... https://www.quikcondoms.com/product.jsp?id=151 - Cached - Similar Pages

3. **Trojan Shared Sensation Lubricated Latex Condoms - 12 Condoms | Vitacost**
   Trojan Shared Sensation Lubricated Latex Condoms - 12 Condoms - Pleasure for Both Partners. Unique Shared Sensation Design for the Pleasure and Excitement of Both Partners: alternating ...
   www.vitacost.com/TrojanSharedSensationLubricatedLatexCondoms - No Cache - Privacy Policy - Similar Pages

4. **Trojan Shared Sensation Spermicide Condoms - 12 Pack**
   Trojan Shared Sensation Condoms feature a stimulating lubricant that enhances sensual pleasure for both partners. The Shared Sensation lubricant is activated by natural body mois
   www.gameline.com/sitemap/inkt_ref/title/230424.html - No Cache - Similar Pages

5. **Trojan Shared Sensation Spermicidal Condoms**
   ... Spermicidal Condoms > Trojan Shared Sensation Spermicidal Condoms. Trojan Shared Sensation Spermicidal Condoms ... Size: 12 Retail Pack. Trojan Shared Sensation Spermicidal Condoms ...
   www.condomave.com/trojan-shared-sensation-spermicidal-lubricated-condoms-condom.html - Cached - Privacy Policy - Similar Pages

6. **Trojan Shared Sensation Condoms 12 PK**
   ... Trojan Shared Sensation Condoms 12 PK. Lubricated Unique Shared Sensation is design for the pleasure and excitement of ... Trojan Ultra Pleasure 12 pack ...
   www.abcondoms.com/trshsec12pk.html - Cached - Privacy Policy - Similar Pages

7. **Trojan Shared Sensation Lubricated - 12 pack**
   Shared Sensation Lubricated Trojan Condoms supplies pleasure and excitement of both partners. It has alternating rows of raised bumps and ridges for her, and a flared design that's roomy at the tip for him.
   store.yahoo.com/loveessentials/trojsharsenl.html - Cached - Privacy Policy - Similar Pages
Privacy icons influenced purchases

- **With privacy info:** more people purchased from sites with better privacy
- Larger effect for privacy-sensitive purchase
But study had significant limitations

• Participants were all students
• Reimbursement did not incentivize saving
• Price/privacy tradeoff not obvious
• Maybe people just like pretty indicators
• Privacy-sensitive item not sensitive enough
So we tried again

- 72 Pittsburgh residents
- Price/privacy tradeoff
- Fixed payment, keep the change
- New icons, new products, new conditions
User Study Items

1. Textbooks
2. Office Supplies
3. Flowers
4. Shoes
5. Laptop
6. Lingerie
7. Condoms
8. Lubricant
9. Book - Depression
10. Pregnancy Test
11. Book - Bankruptcy
12. Fertilizer
13. Adult Diapers
14. Hunting Knife
15. Cigarettes
16. Bottle of Peroxide
17. Sex toys
18. HIV test
19. Porn DVD
20. STD Medication
22. Bulletproof jacket
23. Bullets
24. Bomb-Making

Would Not Purchase
Purchase, Very Concerned
Purchase, Somewhat Concerned
Purchase, No Concerns
Merchant selection

• Selected 10 merchants for each product
• No well-known merchants
• Controlled first four search results: more expensive ➔ better privacy

<table>
<thead>
<tr>
<th>Merchant</th>
<th>Privacy score</th>
<th>Price w/ shipping</th>
</tr>
</thead>
<tbody>
<tr>
<td>ccvsoftware.com</td>
<td>?</td>
<td>$14.45</td>
</tr>
<tr>
<td>discountofficeitems.zoovy.com</td>
<td>0/4</td>
<td>$14.60</td>
</tr>
<tr>
<td>instawares.com</td>
<td>2/4</td>
<td>$14.80</td>
</tr>
<tr>
<td>officequarters.com</td>
<td>4/4</td>
<td>$15.14</td>
</tr>
</tbody>
</table>
### Privacy information condition

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duracell Alkaline Battery, AA, 8/PK</td>
<td>Long-life alkaline batteries provide the best, longest power source. Recommended for use in smoke alarms, flashlights, lanterns, calculators, pagers, cameras, recorders, radios, CD players, medical equipment, toys and electronic games. Dependable after seven years of storage.</td>
<td>$14.45 (w/shipping)</td>
</tr>
<tr>
<td>Duracell AA8 DURACELL Alkaline Battery Value Packs</td>
<td>DURACELL AA ALKALINE BATTERY - 8 PACK Countercard for peg hook 8 pack Specifications Weight 0.45 lbs. Length 4.5 inches Width 3.75 inches Height 1 inches Manufactures Web site <a href="http://www.duracell">www.duracell</a>...</td>
<td>$14.60 (w/shipping)</td>
</tr>
<tr>
<td>Duracell Coppertop Alkaline AA Batteries</td>
<td>Long-life alkaline batteries provide the best, longest power source. Recommended for use in smoke alarms, flashlights, lanterns, calculators, pagers, cameras, recorders, radios, CD players, medical equipment, toys and electronic games. Dependable after seven years of storage.</td>
<td>$14.80 (w/shipping)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$15.14 (w/shipping)</td>
</tr>
</tbody>
</table>
Irrelevant information condition
No information condition

**Duracell Alkaline Battery, AA, 8/PK**
Duracell Coppertop Alkaline AA Batteries Long-life alkaline batteries provide the best, longest power source. Recommended for use in smoke alarms, flashlights, lanterns, calculators, pagers, cameras, recorders, radios, CD players
www.ccsoftware.com/c/product.html?record@56119

$14.45 (w/shipping)

**Duracell AA8 DURACELL - Alkaline Batteries Value Packs**
Duracell AA8 DURACELL Alkaline Battery Value Packs...
discountofficeitems.zoovy.com/product/DURMN15RT12Z

$14.60 (w/shipping)

**Duracell Alkaline Battery Value Packs**
Duracell AA8 DURACELL Alkaline Battery Value Packs DURACELL AA ALKALINE BATTERY - 8 PACK
Cardboard card for peg hook 8 pack Specifications Weight 0.45 lbs Length 4.5 inches Width 3.75 inches Height 1 inches Manufactures Web site www.duracell...
www.instawares.com/Coppertop-Alkaline-Lithium-Bat...

$14.80 (w/shipping)

**Duracell Coppertop Alkaline AA Batteries**
Long-life alkaline batteries provide the best, longest power source. Recommended for use in smoke alarms, flashlights, lanterns, calculators, pagers, cameras, recorders, radios, CD players, medical equipment, toys and electronic games. Dependable after seven years of storage.
www.officequarters.com/product.php/item/DUR-MN1500B8...

$15.14 (w/shipping)
Privacy icons influenced purchases

• **No privacy info:** most people purchased where price was lowest

• **With privacy info:** more people purchased from expensive sites with better privacy

• No clear difference between products
  – Because we didn’t control **privacy premium**?
Good privacy pays for web stores

People will pay more for goods if a website does a good job of protecting their privacy, a study shows.

The Carnegie Mellon study looked at what shoppers do when they are told what sites do with personal data.

It suggests that shoppers will pay a premium equal to about $0.60 (30p) on goods worth $15 (£7) if they are reassured about privacy.

The study was used to evaluate a tool that aims to give web users clearer information about privacy policies.
Follow-up study with cooperation of vendors to control privacy premium

• Contacted 46 battery and sex toy vendors
• Convinced 8 to adjust prices for our study
  – Asked one to lower prices and promised to pay the difference
  – Sent $140 check to The Dirty Bunny for “research project assistance”
Also investigated timing of privacy notice

• In search results
• Interstitial
• At top of website
Duracell Alkaline Battery, AA, 8/PK
Duracell Coppertop Alkaline AA Batteries Long-life alkaline batteries provide the best, longest power source. Recommended for use in smoke alarms, flashlights, lanterns, calculators, pages, cameras, recorders, radios, CD players.
www.littleofficesupply.com/dumm15008b2.html - Privacy Policy
$15.50 (w/shipping)

Duracell AA8 - Alkaline Batteries
Trusted Everywhere® delivers long-lasting, dependable quality in a wide range of everyday devices. For general use; Battery Size: AA; For Use With: General Use. Coppertop Alkaline Batteries, 1.5v, 8 Batteries Per Pack, AA
www.instawares.com/coppertop-alkaline-lithium-batt... - Privacy Policy
$15.75 (w/shipping)

Duracell Alkaline Battery 8-Packs
Duracell AA8 DURACELL Alkaline Battery Value Packs DURACELL AA ALKALINE BATTERY - 8 PACK Cardboard card for peg hook 8 pack Specifications Weight 0.45 lbs Length 4.5 inches Width 3.75 inches Height 1 inches Manufactures Web site www.duracell...
www.officequarters.com/product.php/item/DUR-MN15008B2/0... - Privacy Policy
$16.00 (w/shipping)

Duracell Coppertop Alkaline AA Batteries
Long-life alkaline batteries provide the best, longest power source. Recommended for use in smoke alarms, flashlights, lanterns, calculators, pages, cameras, recorders, radios, CD players, medical equipment, toys and electronic games. Dependable after seven years of storage.
www.onetimesupplies.com/Duracell_Coppertop_Alkaline_Batter... - Privacy Policy
$16.25 (w/shipping)

AA8 DURACELL DURACELL AA ALKALINE
Manufacturer: DURACELL Model: AASDURACELL Part Number: AA8 DURACELL UPC: 41333825014 Cardboard card for peg hook Dimensions: 4.5x3.75x3 Comments:...
www.shopfoodex.com/duracell-batteries-count-p-31250.html - Privacy Policy
$17.04 (w/shipping)
Privacy rating for: ontimesupplies.com

Go to: ontimesupplies.com
Go back to search results
Coppertop Alkaline Batteries, AA, 8/pack
Sure enough...

- Privacy-sensitive nature of product impacts willingness to pay a premium for privacy
- Privacy information had the greatest impact when presented alongside search results

Research questions

• What questions about privacy attitudes or behavior would you be interested in investigating?