

An Online Shopping Search Engine User Study

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CMU Usable Privacy and Security
Laboratory

<http://cups.cs.cmu.edu/>

Research Motivation

■ Privacy Concerns

- Studies consistently show that people have privacy concerns.

■ Privacy Policies \neq Privacy-Protecting Behavior

- Difficult to read and understand.
- Dichotomy between stated privacy preferences and observed behavior.



Research Question

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



■ Understandable Privacy Policies

- Platform for Privacy Preferences (P3P)
 - Communicate privacy policies in a standard machine-readable format.
- Enables development of tools
 - Summarize privacy policies.
 - Compare policies with user preference.
 - Alert and advise users.



■ *Privacy Finder*

- Privacy-enhanced P3P search engine



poster

Search

Search Engine:



Google



Yahoo!

Preference Level:

Medium



[Privacy Report](#)

[Decorate with Framed Posters, Art Prints & Photography from Barewalls.com](#)

Offers posters and lithographs. Custom framing, canvas transfers, and board mounting services also available.

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Online store for posters and prints of movies, actors, sports, music, and other subjects.

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Barewalls Interactive Art, Inc. Privacy Practices

[Privacy Policy Summary](#) | [Full Privacy Policy](#) | [Contact Site](#) | [P3P Policy](#)

Privacy Policy Check

Barewalls Interactive Art, Inc.'s privacy policy *matches your preferences.*

Barewalls Interactive Art, Inc. may share your information with:

- Delivery companies that help this site fulfill your requests and who may also use your information in other ways -- only if you request this
- Companies that help this site fulfill your requests (for example, shipping a product to you), but these companies must not use your information for any other purpose



AllPosters.Com Privacy Practices

[Privacy Policy Summary](#) | [Full Privacy Policy](#) | [Opt-Out](#) | [Contact Site](#) | [P3P Policy](#)

Privacy Policy Check

AllPosters.Com's privacy policy *does not match your preferences:*

- Site may contact you to interest you in other services or products and does not allow you to remove yourself from marketing/mailing list

AllPosters.Com may share your information with:

- Companies that help this site fulfill your requests (for example, shipping a product to you), but these companies must not use your information for any other purpose
- Delivery companies that help this site fulfill your requests and who may also use your information in other ways



Research Objectives

■ Privacy Concerns

- Determine the level of concern in various online scenarios.
- Determine if *Privacy Finder* addresses relevant concerns.

■ Privacy-Related Behavior

- Determine if users will select websites with P3P policies and pay a premium for privacy.
- Investigate the effectiveness of *Privacy Finder* as a risk communication tool.



Surveys

■ Survey Design

- Decide what you want out of the survey.
- Decide what questions to ask.
 - Conduct a literature review for examples.
- Write out some analysis procedures.
- Select a format for your survey.
 - Paper
 - Email
 - Webpage
- Submit an IRB application.
- Pilot the study with friends.
- Edit/Update the survey.

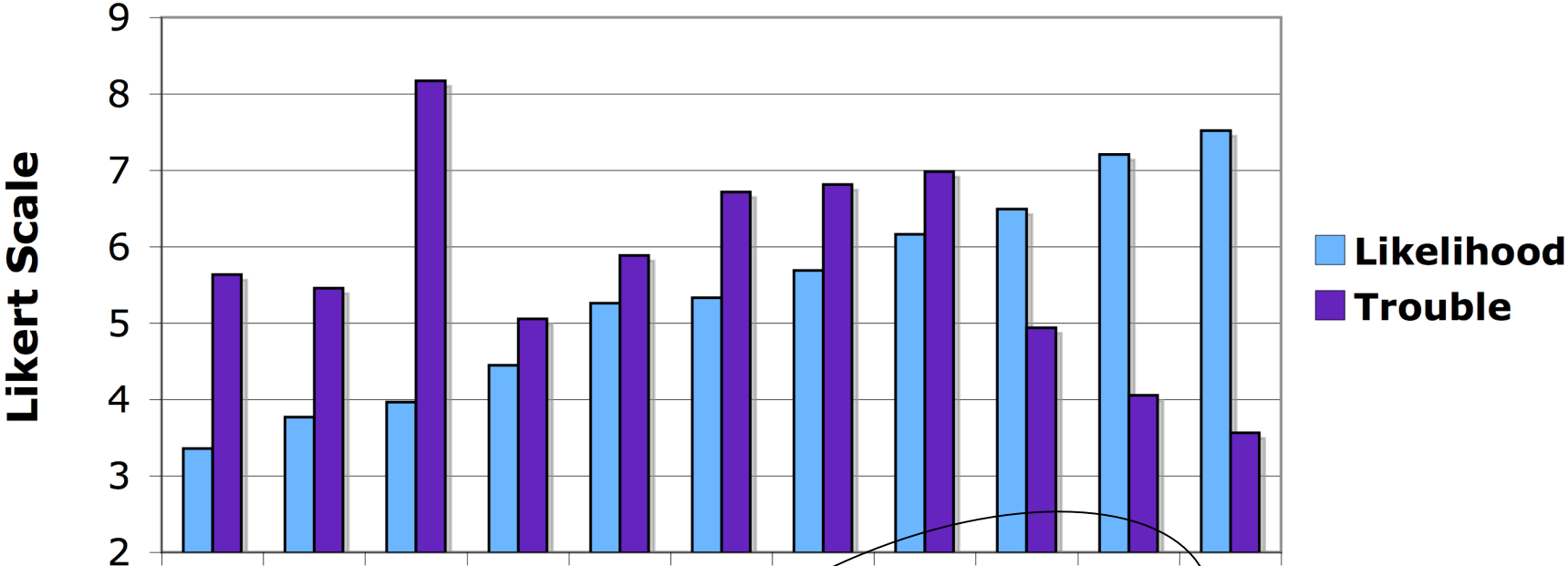


■ Online Concerns Survey

- Logistics
 - Designed survey on paper and ported to SurveyMonkey.com
 - Ruffled off an iPod Nano
- Methodology
 - Duration: 1 week
 - Participants solicited via Craigslist
 - $n = 276$
- Evaluated Perceived Likelihood of Privacy Violations
- Developed a Risk Score
- Selected Products for Purchasing



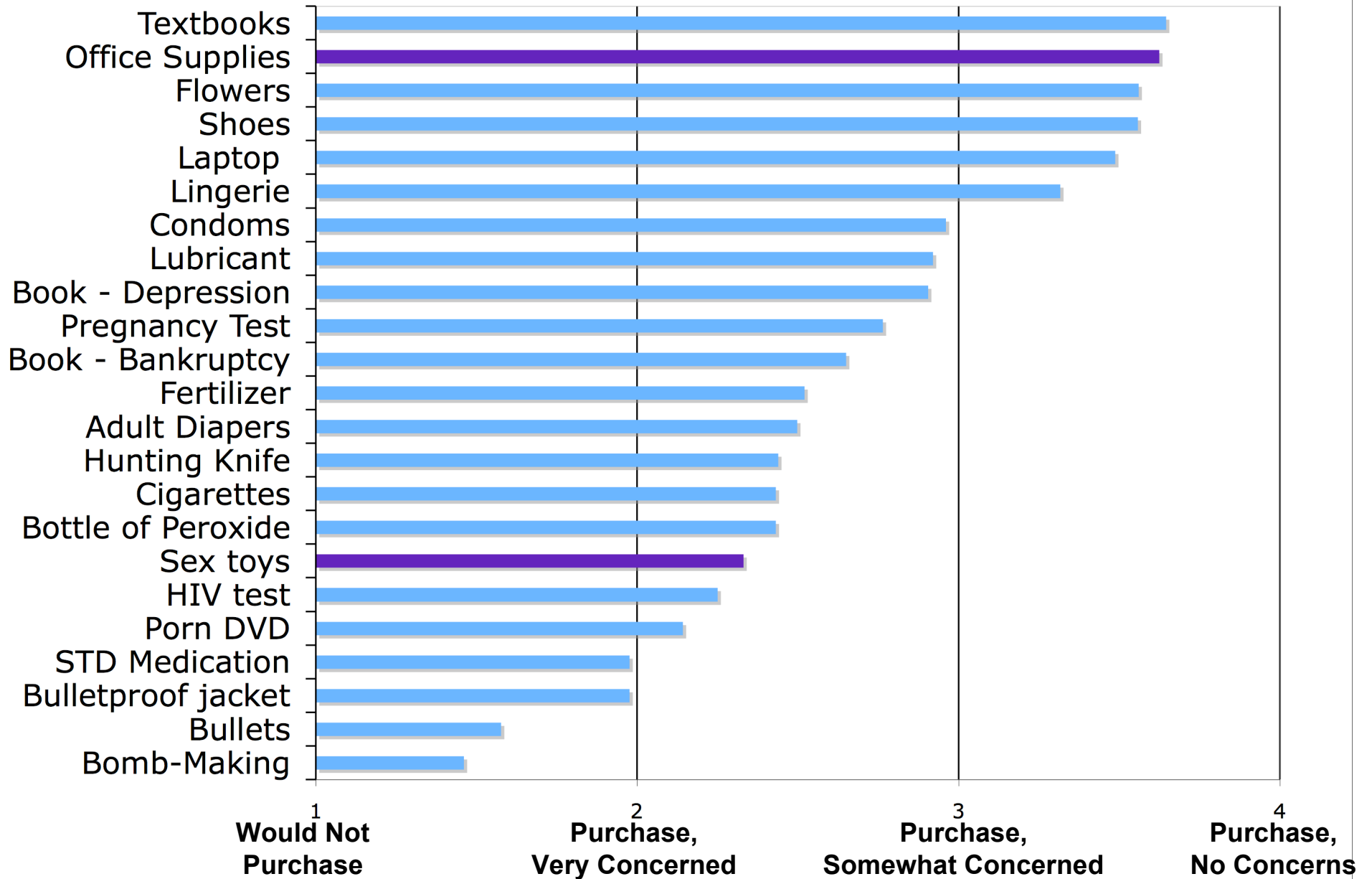
Online Concern Scenarios



Continued Contact
 Search History
 Dossier
 Information sold
 Unwanted Email
 Infer Information
 Track items

← Addressed by Privacy Finder

User Study Items



User Studies

■ Experimental Design

- What are you testing?
- How can you design your study to get the biggest effect?
 - Is there a target user population?
 - Will you be able to generalize your results?
- What kind of user study?
 - Online
 - One-on-one
 - Group Interview
- How many sessions?
 - One session?
 - Many sessions?
- IRB Application



■ Logistics

- Recruit Users
 - Misc. Market (CMU)
 - Pittsburgh Craigslist
 - CMU Center for Behavioral and Decision Research
 - Flyers around town
- Select Users
 - Screening survey
- Schedule Users
 - Create several sessions
 - Takes longer than you think
 - No shows



- Running the User Study
 - Reserve space
 - Prepare materials
 - Create a script
 - Prepare computer(s)
- Compensation
 - Cash
 - Entry into a raffle
 - Gift certificate



Online Shopping User Study

■ Experimental Design

- Framing: Usability Test of a New Search Engine
- Price Incentive for Purchases
 - Provide lump sum payment
 - Participants keep “remainder” after purchase
- Screening Survey



The User Study

- Three Conditions
 - Condition 1: No Information
 - Condition 2: Irrelevant Information
 - Condition 3: Privacy Information
- Two Products
 - Privacy Sensitive
 - Non-Privacy Sensitive
- 16 Participants in each Condition



■ eCommerce website selection factors

Factors	Mean	<i>p</i> Value
Price	5.61	<.0001
Return Policy	4.72	0.009
Shipping Speed	4.46	0.37
Customer Service	4.44	0.45
Privacy Policy	4.27	-
Website Design	4.11	0.53
Customer Reviews	3.9	0.18
Software Compatibility	3.69	0.02
Webpage Load Speed	3.63	0.009
Popularity	3.55	0.0058
Physical Location	2.48	<.0001
Cell Phone Compatibility	0.46	<.0001
Handicapped Accessibility	0.3	<.0001



Condition 1: No Information



Duracell AA batteries 8-pack

Search

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.ccvsoftware.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)

Condition 2: Handicap Information



Duracell AA batteries 8-pack

Search

[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

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Handicap
Accessibility

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Accessibility

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Handicap
Accessibility

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\$15.14 (w/shipping)

Condition 3: Privacy Information



Duracell AA batteries 8-pack

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Duracell AA8 DURACELL Alkaline Battery Value Packs...

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\$14.45 (w/shipping)



\$14.60 (w/shipping)



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Privacy Premium

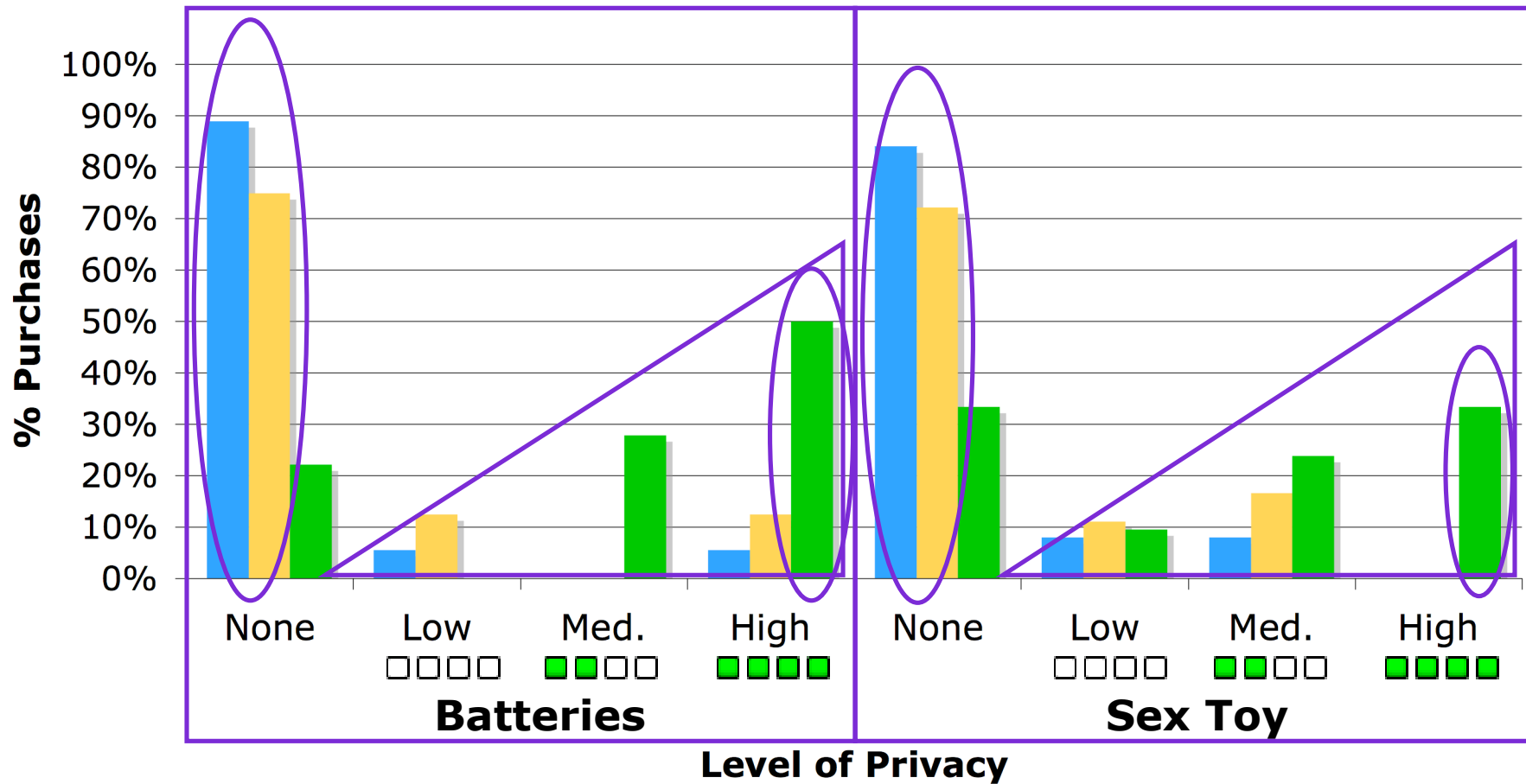
\$0.69

4.8%

H1: Privacy and Results of Purchases

% Purchases by Level of Privacy

■ No Information ■ Handicap ■ Privacy



Price Premium

■ Impact

- Price premium_{batteries} < Price premium_{sex toy}
- People may have been more willing to pay for high privacy for batteries for \$.50 than \$1.50 for the sex toy.



Privacy Premium

	Condition 1: No Information	Condition 2: Handicap Information	Premium	p Value
Average Price Batteries	\$14.64	\$14.69	\$0.05	0.64
Average Price Vibrator	\$15.26	\$15.30	\$0.04	0.65

No significant price differences



Privacy Premium cont.

	Condition 1: Privacy Information	Condition 3: Privacy Information	Premium	<i>p</i> Value
Average Price Batteries	\$14.64	\$15.23	\$0.59	0.0007
Average Price Sex Toy	\$15.26	\$15.88	\$0.62	0.00005

Significant price differences



■ Risk Communication

- Notice
 - 92% noticed the Privacy Icons
- Read
 - 32% of participants read the Privacy Report
- Shop
 - For 60%, privacy information influenced the sites *visited* and the sites from which *purchases were made*.



“Which factor had the most influence on your decision?”

- Open Ended Response of “Privacy Policy”
- Batteries
 - 32% (Privacy Condition)
 - 6% (“Handicap Information” Condition)
 - 0% (“No Information” Condition)
 - Privacy information heightened awareness!
- Sex Toy
 - 36% (Privacy Condition)
 - 11.8% (“Handicap Information” Condition)
 - 14.8% (“No Information” Condition)
 - Privacy concern already existed with privacy-sensitive item.



Lessons Learned

■ Have a Backup Plan

- Users do crazy things....
 - Try to use Google to search for items
 - Try to search for coupon codes
 - Go directly to their favorite online stores
- Out of Stock!
 - Various websites ran out of items during the study
 - New results selected and presented
 - Toss out data and find new participants



Conclusion

- Accessible privacy information affects consumer behavior
- Consumers willing to pay for better privacy
- *Privacy Finder* helps users make privacy informed decisions





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