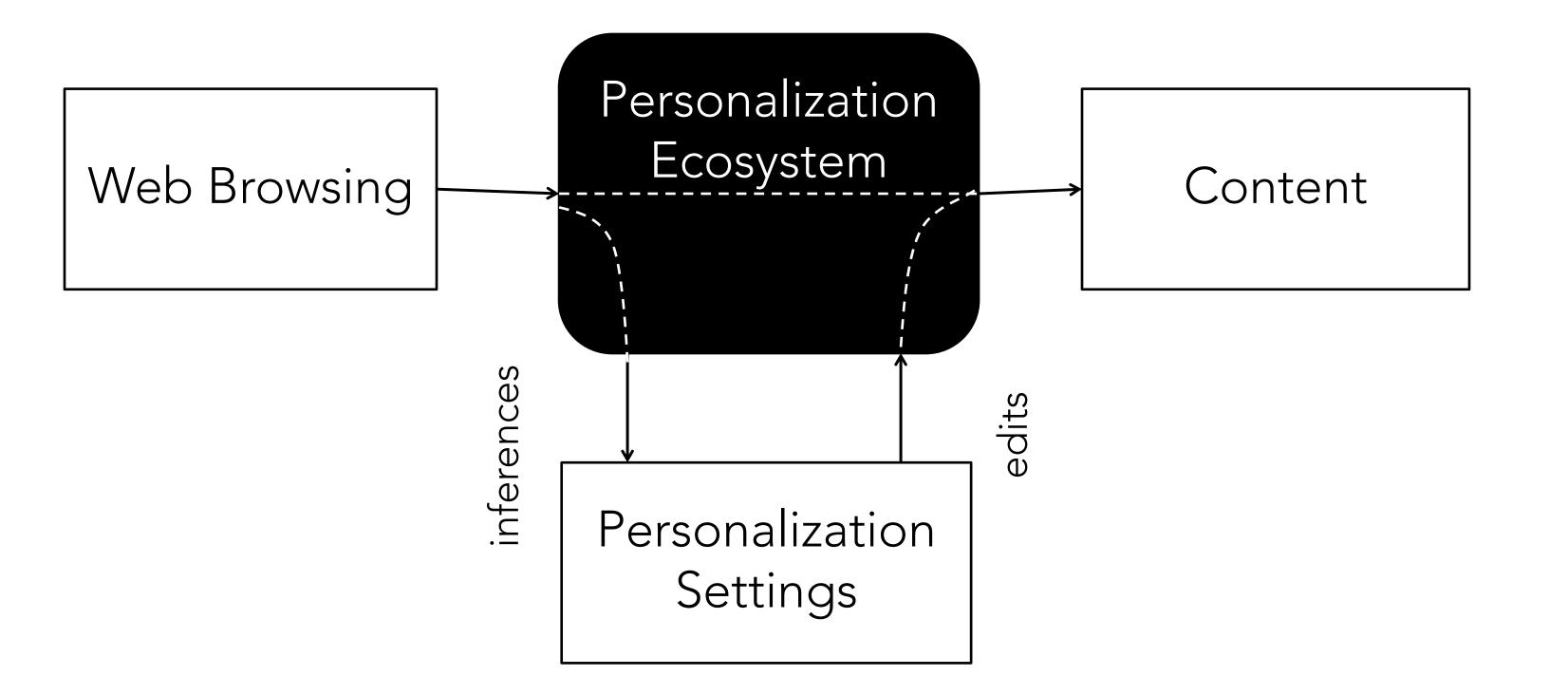
Information Flow Experiments to study Online Personalization Amit Datta, Michael Tschantz*, Anupam Datta Carnegie Mellon University, *International Computer Science Insititute

Motivation and Contributions

- Formally study online personalization in ads and news articles.
- Find statistically significant results without making unreasonable assumptions about output distributions.
- Demonstrate causal effects in personalization.
- In particular, we try to answer the following questions: lacksquare
 - Google Ad Ecosystem
 - Can personalized ads be discriminatory? • Are Ad Settings transparent?

Information Flow Experiments



Do Ad Settings provide users with choice?

Google News

- Do personalization settings provide users with choice?
- Are 'Suggested for you' stories personalized?
- Is there any unexpected personalization?
- We develop AdFisher, a tool for running Information ulletFlow Experiments. It is freely available at github.com/tadatitam/info-flow-experiments

Methodology

Randomized Controlled Trials

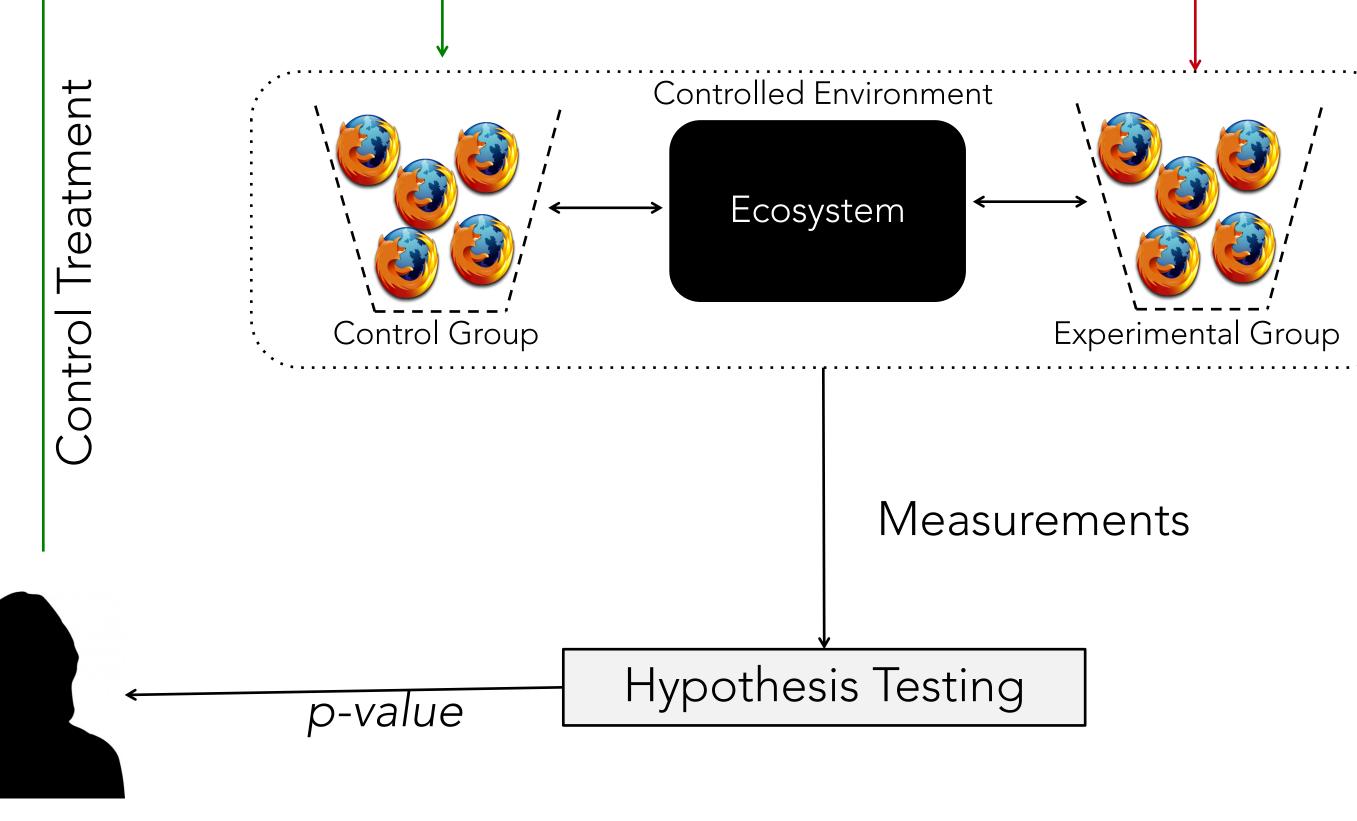
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Experimental Findings

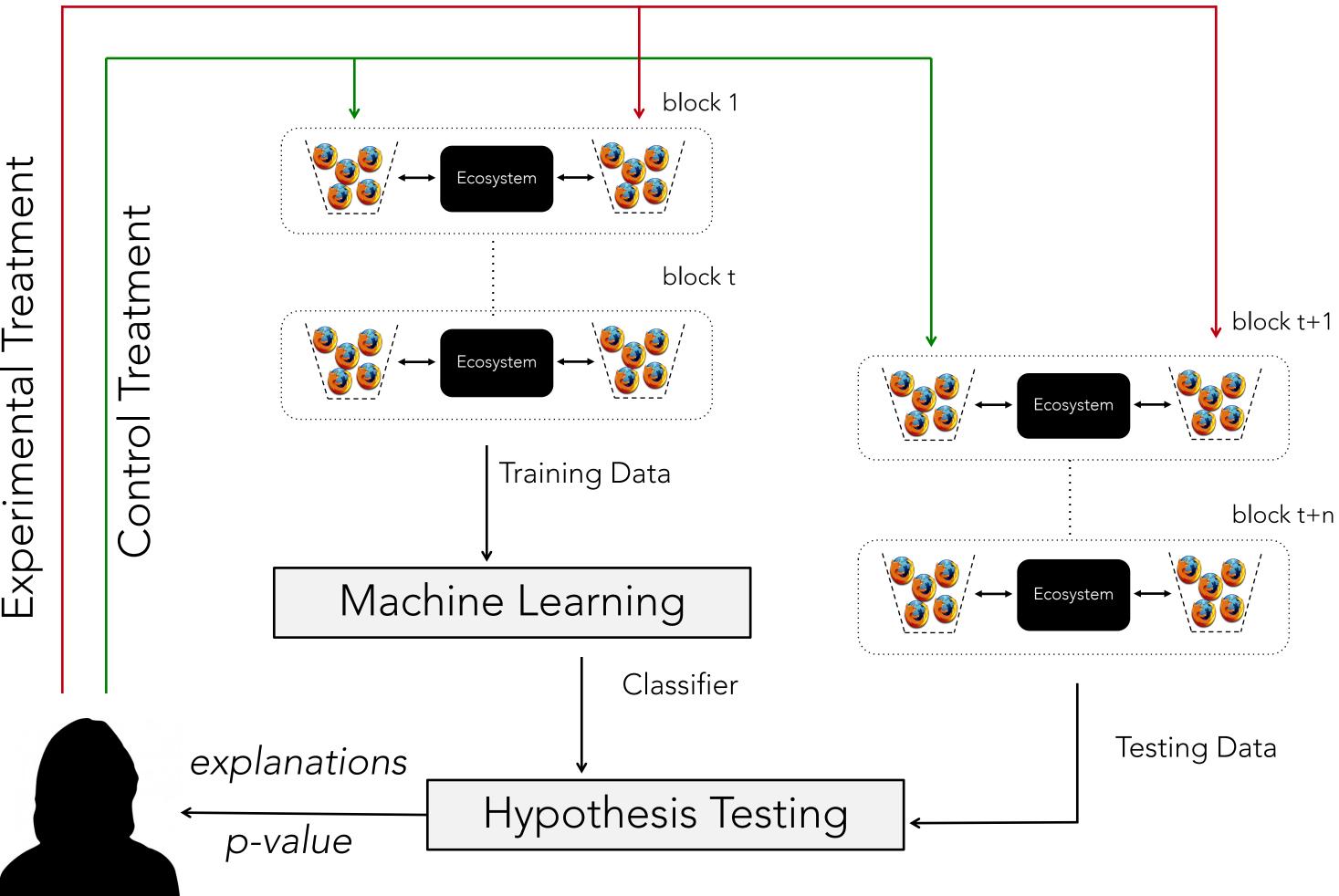
Discrimination in Google Ads

Top ads for male group				
\$200k+ Jobs - Execs Only	careerchange.com			
Find Next \$200k+ Job	careerchange.com			
Become a Youth Counselor	www.youthcounseling.degreeleap.com			
CDL-A OTR Trucking Jobs	www.tadrivers.com/OTRJobs			
Free Resume Templates	resume-templates.resume-now.com			
Top ads for female group				
Jobs (Hiring Now)	www.jobsinyourarea.co			

4Runner Parts Service www.westernpatoyotaservice.com www3.mc3.edu/Criminal+Justice Criminal Justice Program Goodwill - Hiring goodwill.careerboutique.com



Blocked Randomized Controlled Trials



UMUC Cyber Training

www.umuc.edu/cybersecuritytraining

Opacity in Ad Settings

Top ads for group visiting s	substance abuse webpages
The Watershed Rehab	www.thewatershed.com/Help
Watershed Rehab	www.thewatershed.com/Rehab
The Watershed Rehab	Ads by Google
Veteran Home Loans	www.vamortgagecenter.com
CAD Paper Rolls	paper-roll.net/Cad-Paper

Ad Settings respect user choice. Opting out of behavioral ads, and removing inferred interests had the desired effect.

News personalization settings also respect user choice. Adjusting news sources led to expected outcomes.

Google search activity affects 'Suggested for you' stories, but no evidence of personalization otherwise.

Carnegie Mellon University

Security and Privacy Institut

Adjust Sources		
	+	
Wall Street Journal	- +	
New York Times	- +	
Fox News	- +	
CNN	- +	
ESPN	- +	
Save	Settings Reset Help	

suggested for you »

CMU grad's mission to supply fire trucks to Nepal top priority

ribune-Review - 17 hours ago

The Carnegie Mellon University graduate trained the two guides to be vatchmakers and put them in charge of a factory in Nepal. It was lestroyed in the first quake. He established the Soarway Foundation vith Sir Ranulph Fiennes, a polar explorer and .

erested in Carnegie Mellon University? Yes No



Conversations in Google Hangouts can

Today - 10 hours ago

spite a growing awareness of surveillance and the occasional role of governmental organisations in it, an internet user may still be more vulnerable to being spied on. Even though there are many apps which guarantee 'NSA-proof' security, the ones ...

Interested in Google Hangouts? Yes No

Amit Datta, Micheal Tschantz, Anupam Datta. Automated Experiments on Ad Privacy Settings: A Tale of Opacity, Choice, and Discrimination. (PETS 2015)

Micheal Tschantz, Amit Datta, Anupam Datta, Jeannette Wing. A Methodology for Information Flow Experiments. (CSF 2015)