Valuating Friends' Privacy: Does Anonymity of Sharing Personal Data Matter?

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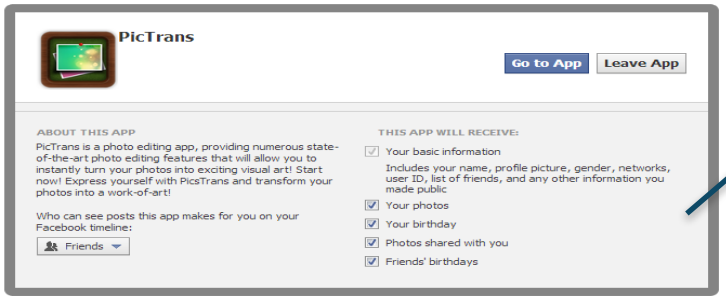
Interdependent Privacy

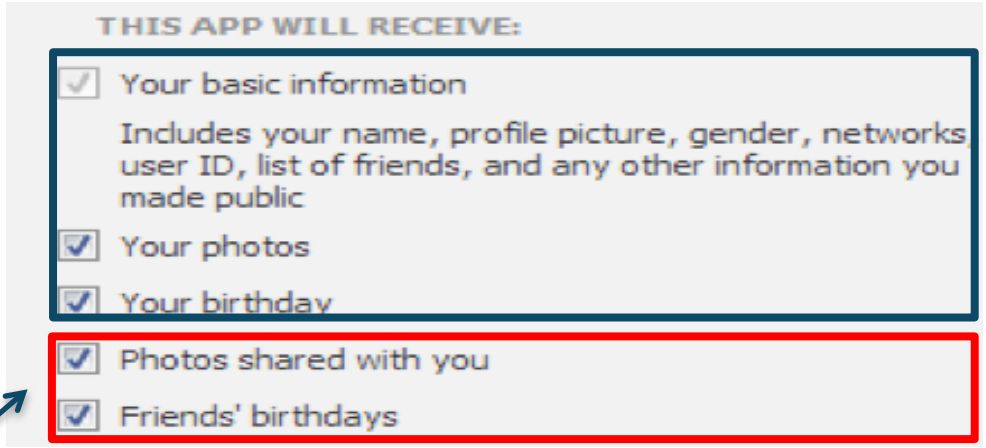
- To which degree do SNS users care about friends' privacy? Are we good stewards of others' data?
  - Many decisions on SNS involve data of "friends"
- Our scenario: Third-party Apps



1 User

Decision to adopt app





Data of 250 - 300 friends made accessible as well

Data of user made accessible

Third-Party Company

Direct decision-making path

Only very limited influence over decision

Approach

- Quantify the monetary value app users place on friends' personal profiles on SNS
  - Measured with *conjoint analysis* method
- Survey constructs to develop behavioral model to explain valuations
  - Model built with *Structural Equation Modeling*

Measure Privacy Value

- Conjoint analysis (Krasnova 2009, Han 2007)
  - Measure preferences in a trade-off scenario
  - Breaking a product down into its constituent parts (*attributes and levels*)
  - Test the preference combinations of attributes *(profiles)*
  - Use statistical analysis to quantify the value of each part of the product



Attributes and Levels

Attributes	Attribute Descriptions	Attribute Levels
Price	Price of the app	$0.00
		$1.99
Network Popularity	Percentage of a user's friends who installed the app	5%
		25%
Own Privacy	Information the app collects about the user	None
		Basic Profile
		Full Profile
Friends' Privacy	Information the app collects about user's friends	None
		Basic Profile
		Full Profile

FRIENDS' PRIVACY:

Basic Profile:
Friends' names, profile pictures, gender, user IDs, number of friends' friends, any public profile info

Full Profile:
Friends' basic profile, email-addresses, birthdays, all photos, location information

Conjoint Analysis Choice Task

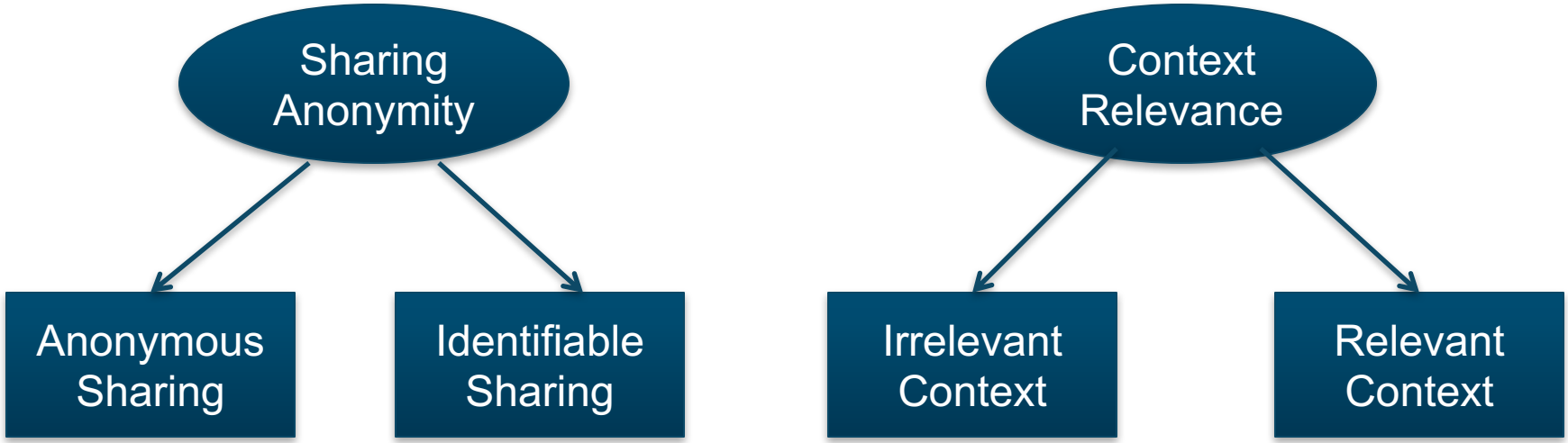


If these are the third-party apps that are available for you to install, which one will you choose?

Price:	$1.99
Popularity:	5%
Own Privacy:	None
Friends' Privacy:	None

Price:	$0.00
Popularity:	5%
Own Privacy:	None
Friends' Privacy:	Full Profile

Experimental Treatments



Participants

- Recruit from Amazon Mechanical Turk
- Total number of participants: 1007
  - ~250 in each treatment
- Female: 47.6%, male: 53.4%

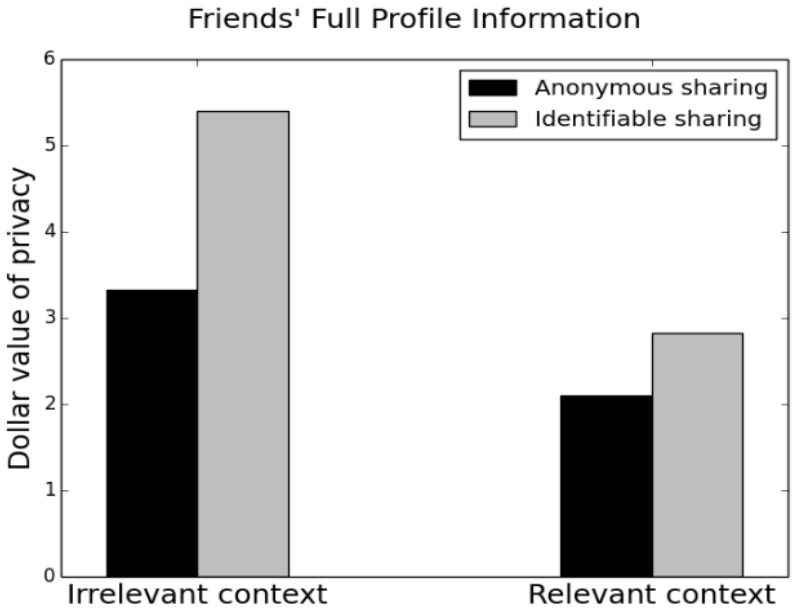


Effects of Sharing Anonymity and Context Relevance

Sharing Anonymity:
$p = 0.025$

Context Relevance:
$p = 0.002$

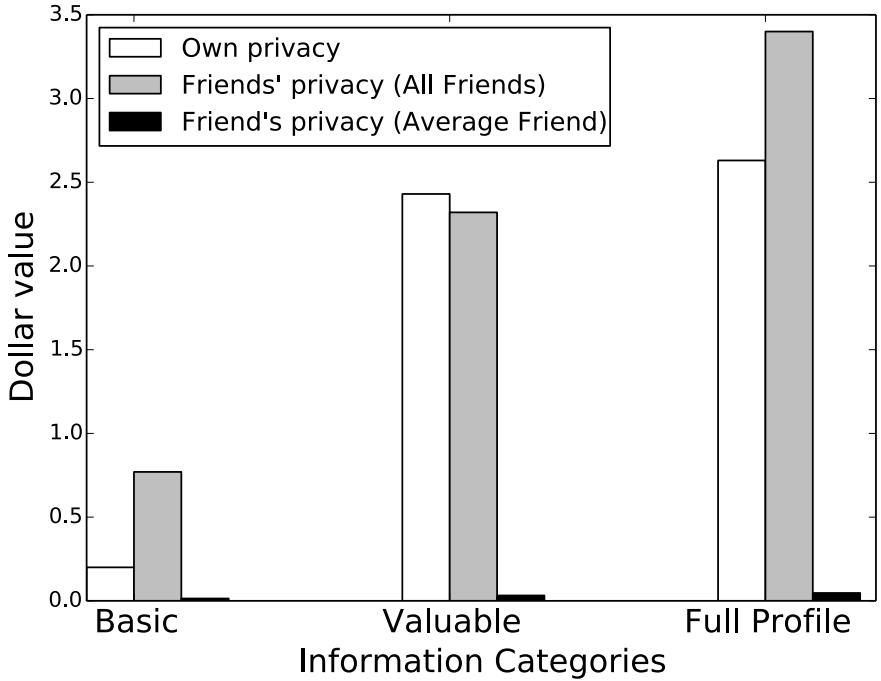
Detect the same effects for:
- Friends' basic profile information
- Friends' valuable information



Value of Single Friend's Data

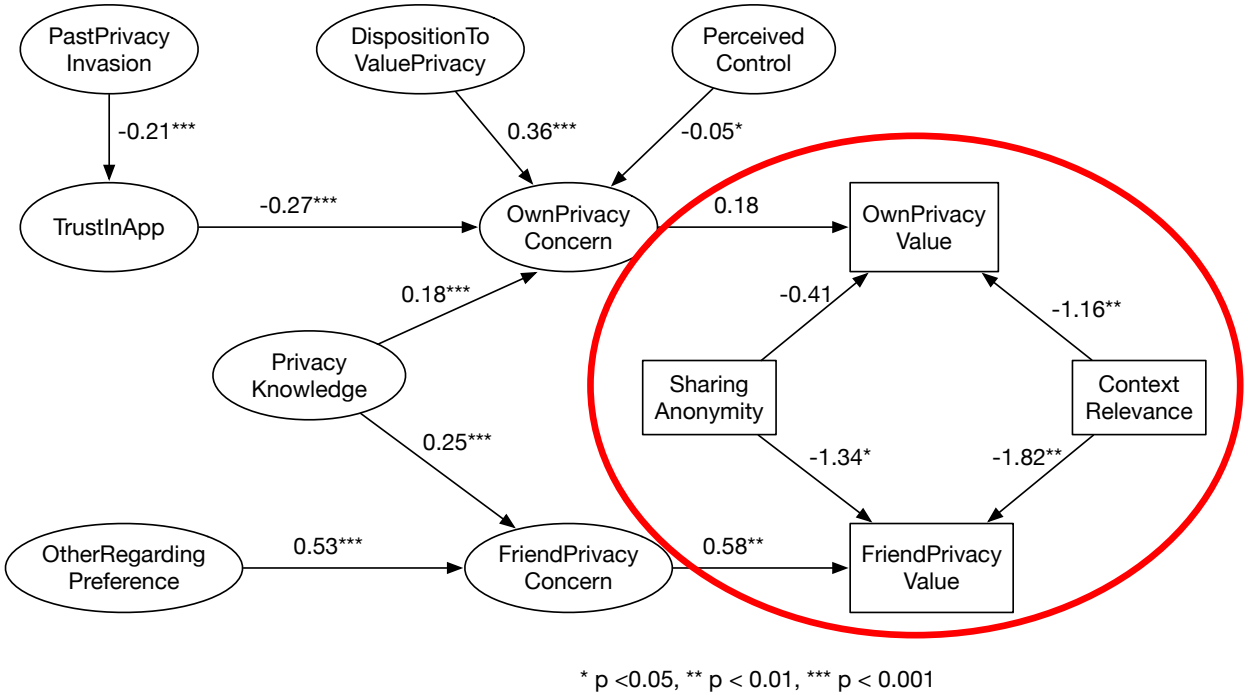
Privacy Egoist





Data aggregated across treatments (same effects for different treatment groups)

Explain Interdependent Privacy Values

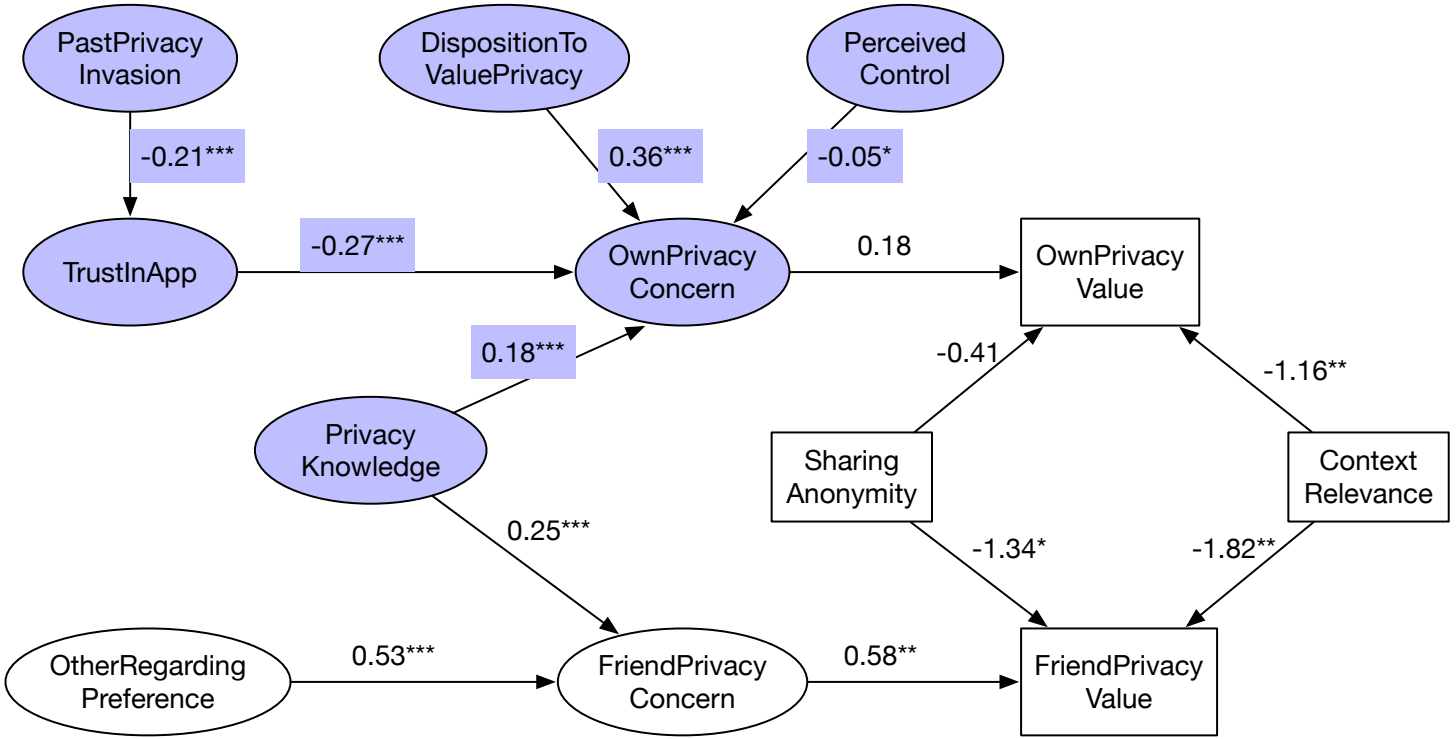


* p <0.05, ** p < 0.01, *** p < 0.001

- Measure factors using survey questions with same subject pool
- Establish hypotheses for a SEM model based on interviews and previous literature

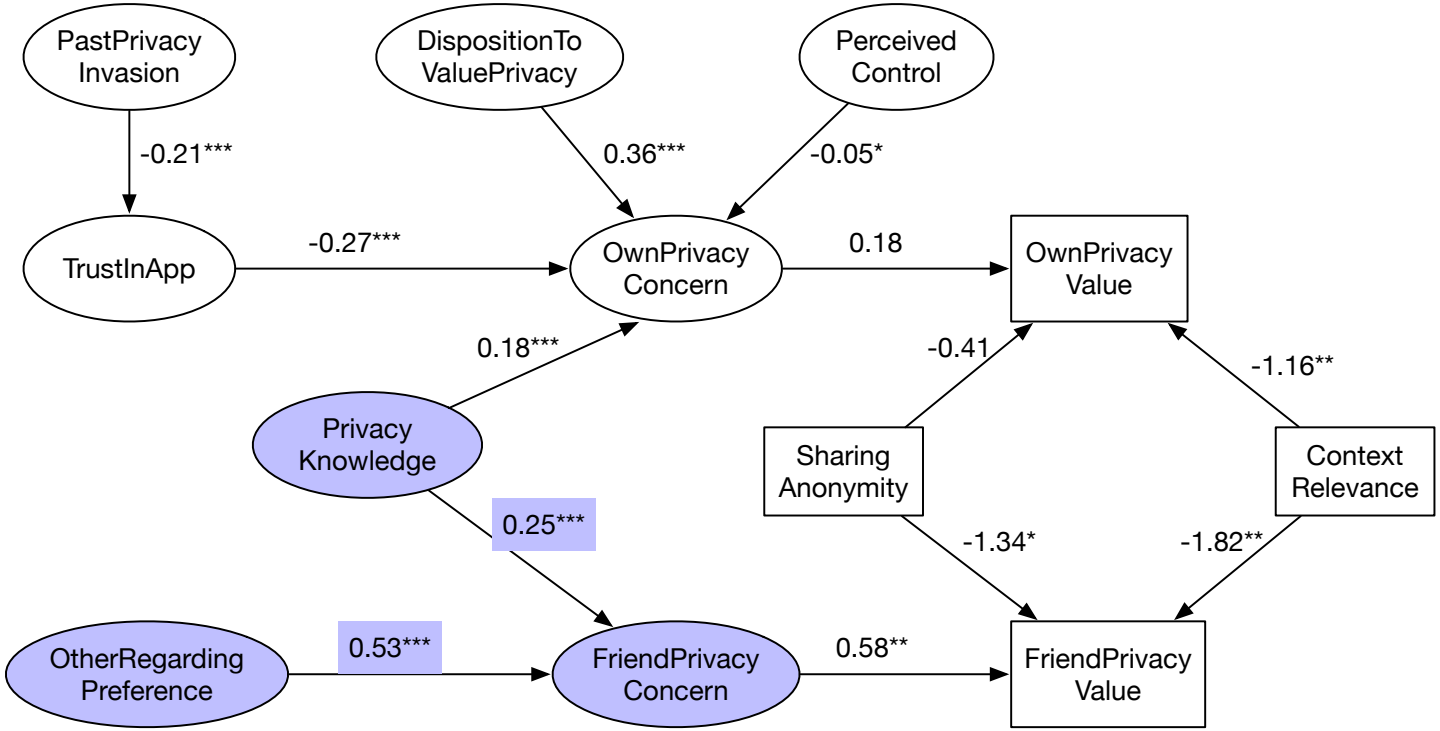


Factors Driving Concern Towards Own Privacy



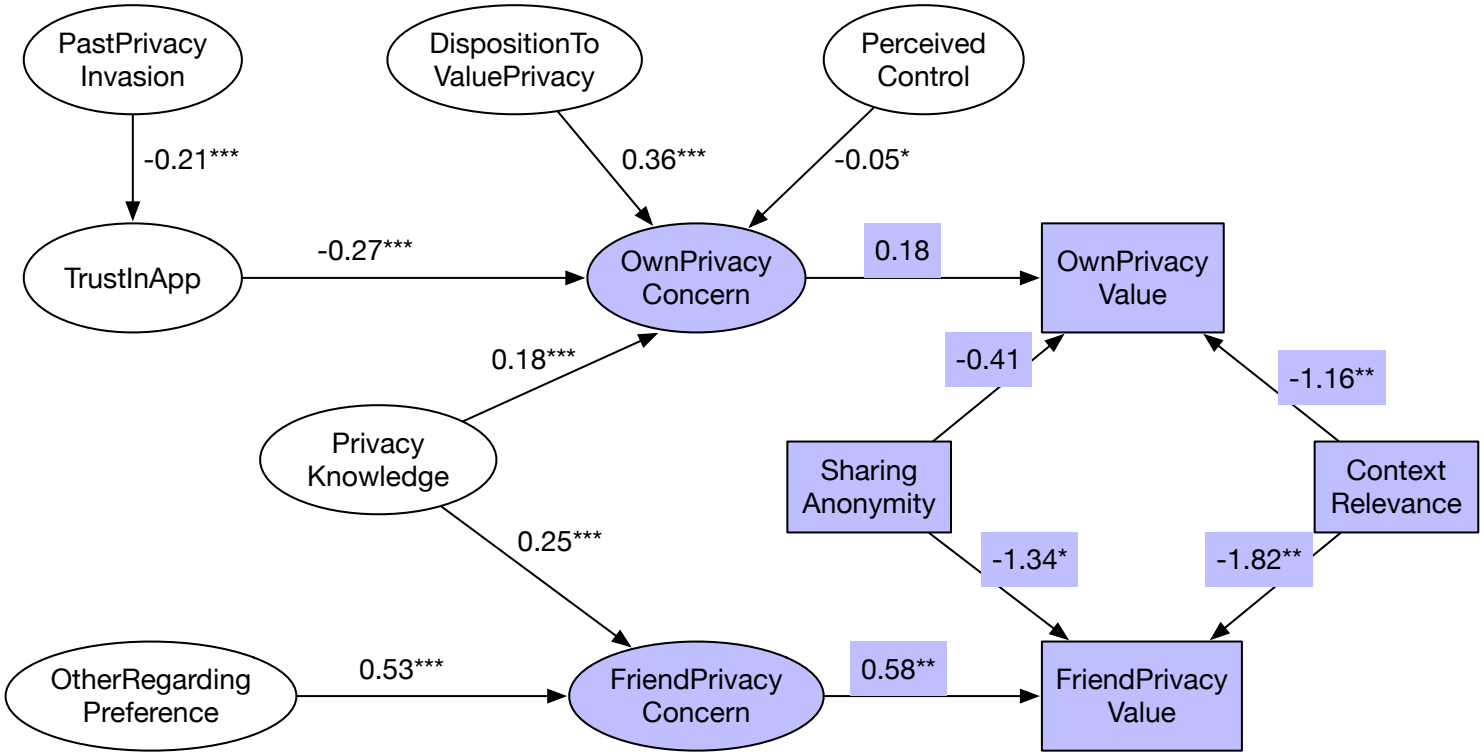
* p <0.05, ** p < 0.01, *** p < 0.001

Factors Driving Concern Towards Friends' Privacy



* p <0.05, ** p < 0.01, *** p < 0.001

Factors Driving Privacy Valuation



* p <0.05, ** p < 0.01, *** p < 0.001

Lessons Learned - Policy



- App users are “privacy egoists”
  - *--> Limit the collection of friends’ data*
    - *- What interventions are suitable?*
    - *- Can app platforms (SNS) self-regulate interdependence?*
- Privacy knowledge impacts interdependent privacy valuations
  - *--> Consider introducing policies which integrate interdependent privacy in educational programs*

Lessons Learned – Privacy by ReDesign

- Data collection contexts affect how users value their friends' information

  --> *Call for mechanisms that inform users of apps' data practices*

- Sharing anonymity plays an important role in interdependent privacy valuations

  --> *Suggests designs that inform users of whether sharing friends' information will be later discoverable*

Questions?





Related Publications

1. Yu Pu, and Jens Grossklags. Sharing is Caring, or Callous? In *15th International Conference on Cryptology and Network Security (CANS)*, 2016.

2. Yu Pu, and Jens Grossklags. Towards a Model on the Factors Influencing Social App Users' Valuation of Interdependent Privacy. In *16th Privacy Enhancing Technologies Symposium (PETS)*, 2016.

3. Yu Pu, and Jens Grossklags. Using Conjoint Analysis to Investigate the Value of Interdependent Privacy in Social App Adoption Scenarios. In *Proceedings of the 36th International Conference on Information Systems (ICIS)*, 2015.