**Shared Knowledge Questions for Access Control**

Prioritizing understandability, flexibility, and social tact over cryptographic rigor

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A question about shared knowledge implicitly defines a region in the social network without accounts, passwords, or access control lists.

Access control lists do not scale to social lives:
- 300 friends x 10 lists x 5 websites
- Friendships grow; sharer must repeatedly update all lists for all friends to reflect changed relationships and refactored groups
- With shared knowledge, viewers give themselves access

For additional security, access attempts can be limited and/or displayed to the sharer per account, ip addresses, or globally.

### Our approach

Secret Stuff

268 files

Try and unlock my secret files!

Q: What is dad's catchphrase?
A: [ ]

Q: What kind of bike do I own?
A: [ ]

Q: On whose rooftop did we celebrate regional?
A: [ ]

Q: Mercer Island is a wild ___?
A: [ ]

- family
- close friends
- sports team
- friends
- random

**Study**

39 subjects collected 174 photos they wanted to share with some people, but not everyone

Who subjects desired to see and not to see photos:

<table>
<thead>
<tr>
<th>Category of person or group of people</th>
<th>Desired</th>
<th>Undesired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friends</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>Family</td>
<td>78%</td>
<td>22%</td>
</tr>
<tr>
<td>Strangers</td>
<td>3%</td>
<td>97%</td>
</tr>
<tr>
<td>Specific people by name</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Common interest group</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Friends or photograph</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>Authorityfigures</td>
<td>22%</td>
<td>78%</td>
</tr>
<tr>
<td>Personal relationships</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Unusual and unusual</td>
<td>30%</td>
<td>70%</td>
</tr>
</tbody>
</table>

58% of subjects had privacy preferences that today’s photo-sharing sites cannot support.

### Resilience to adversarial attack

Anonymous Amazon Mechanical Turk workers were rewarded to guess answers with 75¢ for a correct guess in first 3 tries, and 25¢ for one in 10

Percent of correct guesses in each of 10 attempts:

- If system allows 3 guesses, there is a 6% chance of a random stranger guessing correctly.

### Users accurately estimate hardness of most questions

Number of 10 strangers able to correctly guess answers to each question (10 attempts each) compared to estimates

- Subjects successfully created questions for 98% of photos suggesting shared knowledge exists to separate most inclusion/exclusion groups.

- Subjects designed a shared knowledge question to guard each photo

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- Took 8 seconds (median) to design a guard question. Compare with 34 seconds to create a 6 person whitelist.

- 12% of questions were easy (90% or more correct guessing)

- User predicted number of correct guesses

- Actual correct guesses

- The dangerous unpredicted easy questions, in upper left, are only 4-6% of all questions.

- Of these seven, five were choices from a small set of options ("What day of the week...") and two were googlable ("What weird rock in Seattle and east of a Winery")

- Sharer may just want it hard, not impossible, for internet passers-by to view photos.

- We put many aspects of our lives on the Internet...

- But managing all these logins, passwords, whitelists, blacklists, groups, and privacy controls is confusing, overwhelming, and inflexible. And formal access controls in social environments can feel rude!

- NEW SCRUTINY FOR FACEBOOK OVER PREDATOS
  - FACEBOOK POSES PRIVACY ISSUES FOR STUDENTS
  - OMG MY MOM JOINED FACEBOOK!

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