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## Backup Questions for Account Recovery

Mike Reiter

*Lawrence M. Slifkin Distinguished Professor  
Department of Computer Science*

Based on J. Bonneau et al., "Secrets, Lies, and Account Recovery: Lessons from the Use of Personal Knowledge Questions at Google," WWW 2015.

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## Threats to Backup Questions

1. Questions with common answers
  2. Questions with few plausible answers
  3. Publicly available answers
  4. Social engineering
  5. Social guessing (knowledge based on your relationship with the person)
- This study focused on #1 and #3

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## Measures of Security

- For this lecture: What percentage of users share the  $\beta$  most common answers?
  - Paper denotes this by  $\lambda_\beta$
- Other measures are discussed in the paper

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## Online Attacks: Names

question	lang.	<i>online guessing (success %)</i>				
		$\lambda_1$	$\lambda_3$	$\lambda_{10}$	$\lambda_{100}$	$\lambda_{1000}$
best friend's name	Spanish	1.3%	3.5%	7.8%	27.8%	61.1%
	French	0.7%	1.7%	4.5%	23.6%	62.4%
childhood best friend's name	English	0.4%	1.0%	2.7%	13.3%	40.5%
	Portuguese	1.0%	2.7%	6.4%	27.6%	58.8%
	Russian	1.9%	4.2%	9.4%	35.8%	65.4%
	Spanish	1.0%	2.8%	7.2%	28.9%	63.0%
father's middle name	Chinese	2.2%	6.0%	15.0%	49.9%	85.7%
	English	2.7%	6.6%	14.6%	40.3%	64.9%
	Portuguese	2.7%	6.7%	15.4%	44.6%	73.8%
	Spanish	3.8%	8.9%	21.3%	58.1%	83.8%
first teacher's name	Arabic	7.7%	14.4%	23.7%	37.4%	61.4%
	English	0.4%	1.1%	2.8%	9.7%	26.7%
	Russian	1.5%	4.3%	11.3%	39.4%	61.4%
	Portuguese	6.0%	8.5%	13.0%	34.7%	65.2%
	Spanish	2.9%	5.3%	11.3%	37.6%	69.5%
first manager's name	English	0.9%	2.7%	5.9%	21.6%	46.8%

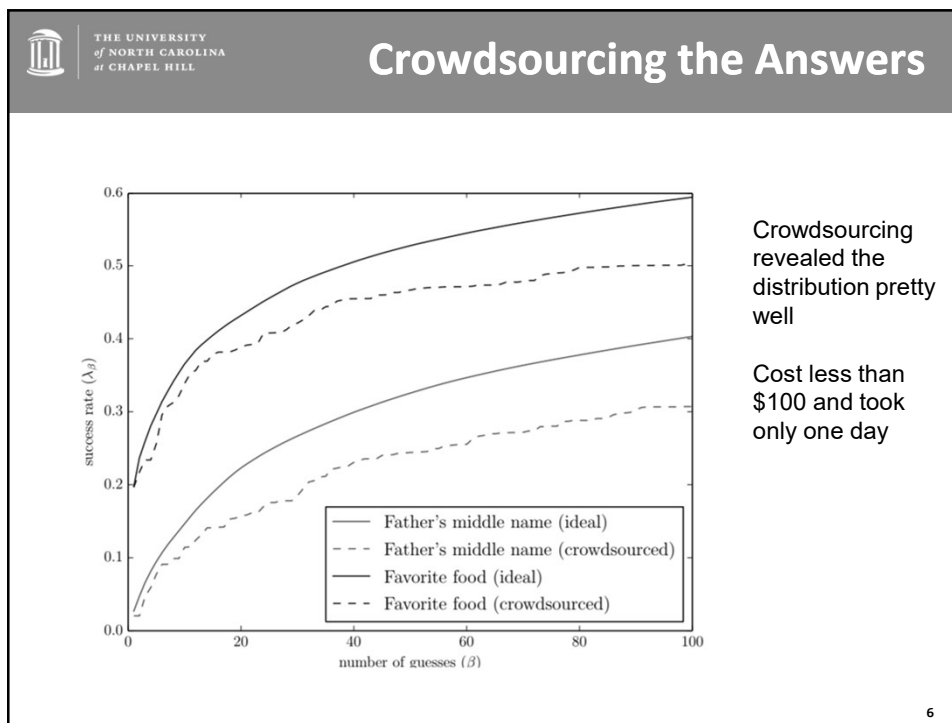
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		Online Attacks: Favorites, Places, Numbers				
question	lang.	online guessing (success %)				
		$\lambda_1$	$\lambda_3$	$\lambda_{10}$	$\lambda_{100}$	$\lambda_{1000}$
favorite food	English	19.7%	26.0%	36.5%	59.4%	76.8%
	Korean	11.8%	30.5%	43.2%	70.0%	85.7%
	Spanish	7.3%	15.4%	28.1%	59.2%	80.1%
place of birth	English	1.3%	3.0%	6.9%	24.6%	58.8%
	Korean	12.0%	25.0%	39.0%	70.1%	87.8%
high school	English	0.5%	0.9%	1.9%	7.6%	22.6%
first telephone number	Arabic	2.9%	6.3%	13.0%	28.6%	38.5%
	Chinese	1.2%	2.4%	4.5%	7.9%	10.2%
	Korean	1.2%	2.8%	6.4%	13.0%	18.3%
	English	0.4%	1.0%	2.5%	5.5%	8.4%
	Portuguese	0.9%	2.2%	4.3%	10.8%	16.7%
	Russian	2.4%	4.2%	7.3%	14.6%	21.7%
frequent flyer number	Spanish	0.6%	1.5%	4.4%	9.7%	14.1%
	English	4.2%	7.8%	13.6%	26.8%	38.6%
vehicle registration number	Portuguese	5.8%	11.8%	21.6%	43.2%	63.2%
	English	0.8%	1.5%	2.6%	5.6%	11.2%
library card number	English	2.3%	6.4%	12.2%	22.5%	33.0%

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## Memorability

question	overall success	success within $n$ months			
		1	3	6	12
City of birth?	80.1%	83.9%	79.9%	79.2%	79.5%
Father's middle name?	75.6%	85.9%	75.7%	74.4%	74.3%
Childhood best friend?	68.5%	82.9%	65.0%	64.6%	63.7%
High school name?	67.3%	78.8%	62.8%	62.6%	61.4%
First phone number?	55.2%	70.0%	55.4%	53.3%	50.1%
Favorite food?	48.0%	73.6%	52.8%	50.1%	46.6%
First teacher's name?	47.1%	71.7%	45.9%	43.2%	39.8%
Library card number?	22.5%	49.6%	24.3%	19.9%	17.7%
Frequent flyer number?	9.0%	32.1%	8.5%	6.4%	6.4%

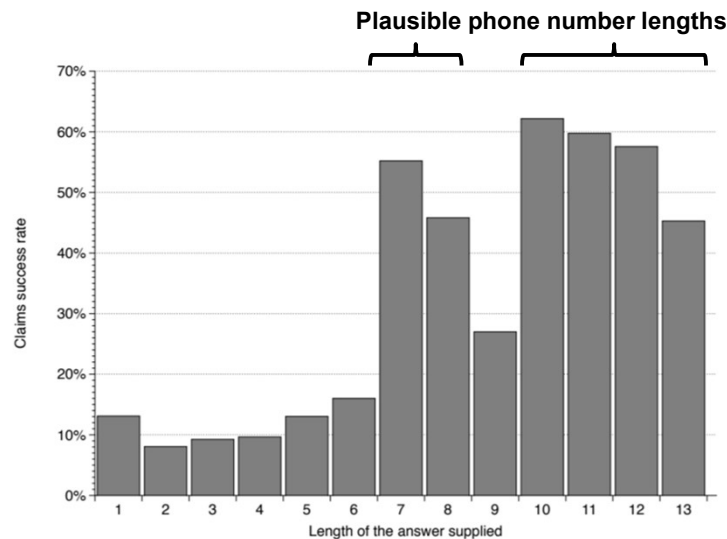
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## Memorability of "First Phone #?" (US)



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## Cultural Factors Play a Role

Recall for the question "Father's middle name?"

language	country	months since registration			
		1	3	6	12
English	US	85.9%	75.7%	75.1%	74.4%
English	UK	81.2%	68.0%	64.6%	64.1%
German	Germany	81.9%	68.0%	64.4%	64.4%
Spanish	US	88.3%	81.3%	82.2%	80.8%
Spanish	Spain	85.3%	71.7%	70.2%	62.8%
French	France	56.8%	39.6%	37.6%	36.9%

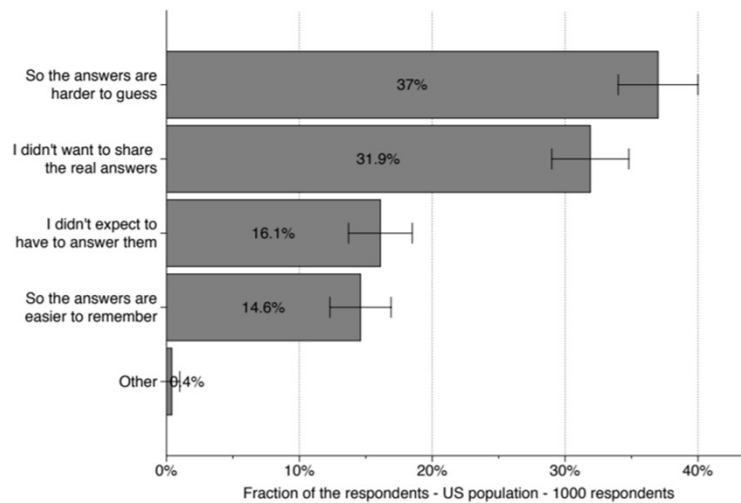
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## Why Give Fake Answers?



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## What Works Better?

- SMS or email recovery
- Other possibilities?
  - Recalling your recent online activity?
  - Getting others to vouch for you?
  - Recognizing images you've seen before?

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