KNOCK KNOCK, WHO'S THERE?

On the Security of LG's Knock Codes

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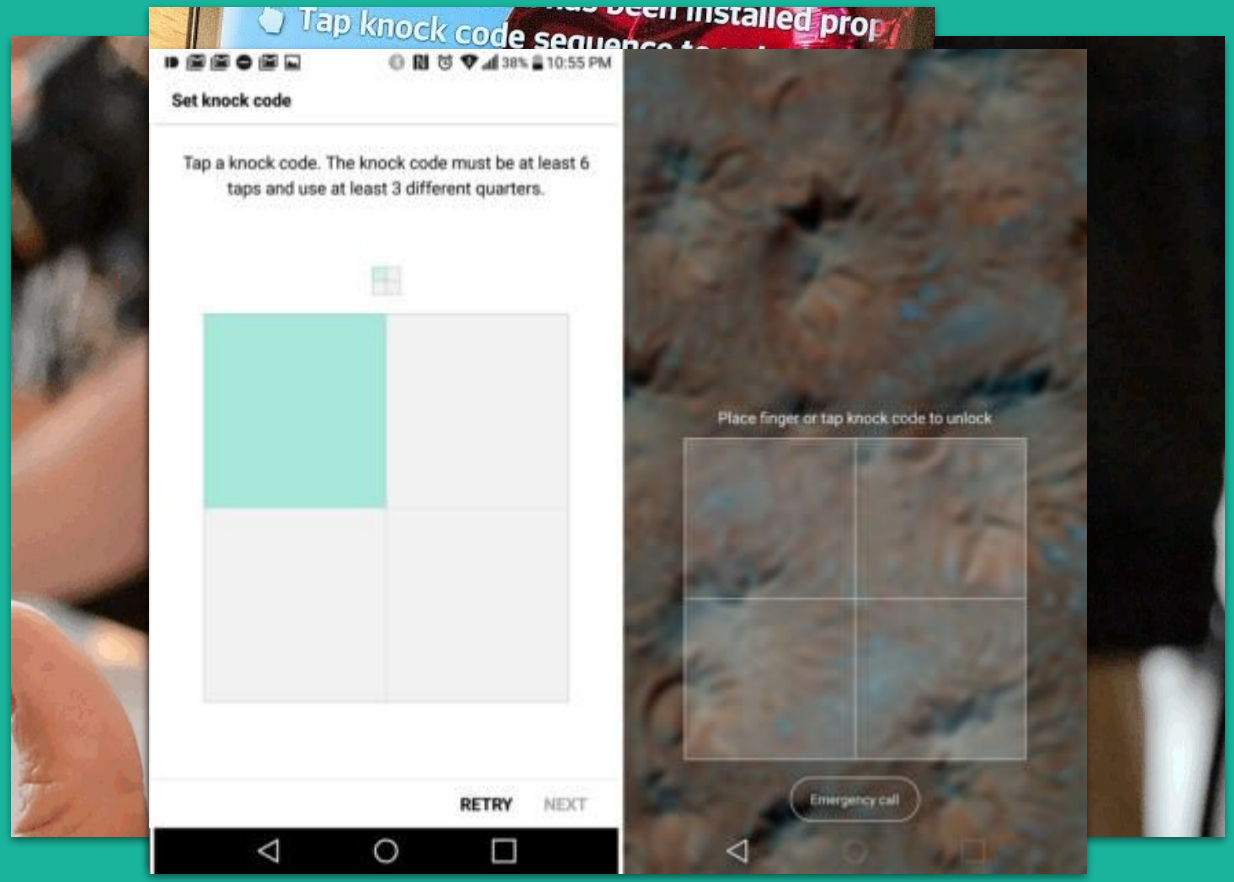
USENIX Symposium on Usable Privacy and Security (SOUPS)
August 10th 2020

LG KNOCK CODES: A DIFFERENT WAY TO UNLOCK

- Users select/recall a series of 6 to 10 “knocks” on a 2x2 grid
- Used with the screen off or on
- We estimate 700,000–2,500,000 users in the US alone



How *secure* and *usable* are Knock Codes?

APPROACH

Two online user studies using Amazon Mechanical Turk

Desktop browser study

Mobile only with three treatments:

- control
- blocklist
- larger grid size

1,138 Knock Codes were analyzed

Preliminary Study → Main Study → Security Analysis → Usability Analysis

n=218

n=351

Each participant created two Knock Codes

SECURITY ANALYSIS:
PERFECT KNOWLEDGE ATTACKER

Has complete knowledge of the frequency order Knock Codes, from most to least frequent

β-Success Rate (%)

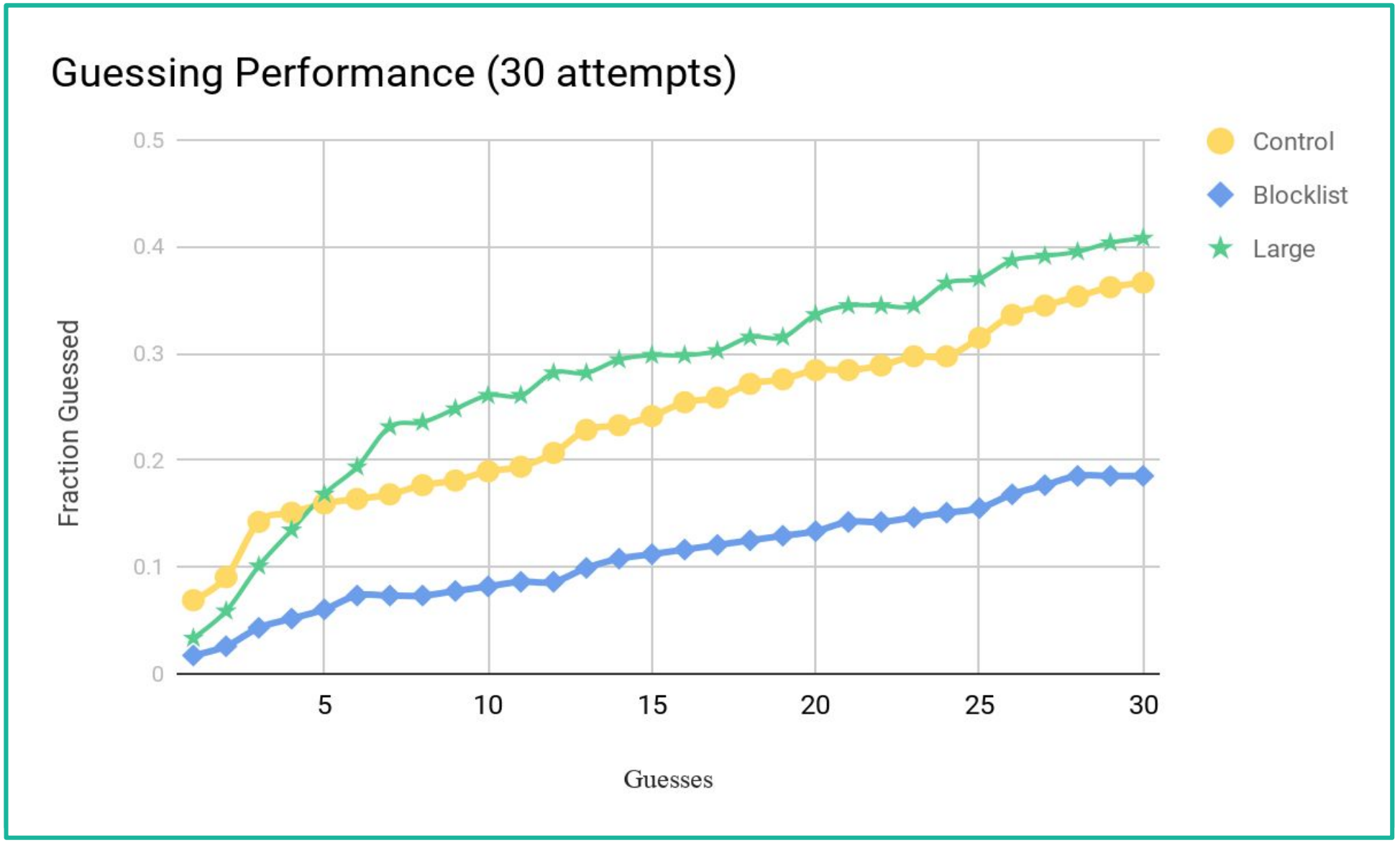
	3 guesses	10 guesses	30 guesses
Control	14.2%	28.0%	**51.3%**
Blocklist	6.9%	16.0%	35.4%
Large	12.9%	31.5%	**53.4%**

Partial Guessing Entropy (bits)

	α=0.1	α=0.2	α=0.5
Control	4.20	4.79	5.69
Blocklist	5.79	6.03	6.72
Large	4.53	4.70	5.54

SECURITY ANALYSIS:
SIMULATED ATTACKER

Knows a subset of the Knock Codes and constructs a model based on that observed distribution



USABILITY ANALYSIS:

Entry Time

	Entry Time (seconds)
Knock Code (Control)	7.1
PIN*	4.2
Android Pattern*	3.0

Using a blocklist does not affect general entry time

*Harbach et al. "It's a hard lock life: a field study of smartphone (un)locking behavior and risk perception" SOUPS 2014

Recall Rates

	Recall Rate (%)
Control	88.8%
Blocklist	80.6%
Large	92.9%

However, other methods such as PINs and patterns have a recall rate of 95%*or higher

*Markert et al. "This PIN can be easily guessed" IEEE Symposium on Security and Privacy 2020

USABILITY ANALYSIS:
User Responses

"EASY" "DISCREET"

"HARD TO GUESS"

"DIFFERENT"

"QUICK"

"HARD TO REMEMBER"

"INSECURE"

"NOT AN IMPROVEMENT"

"HARD TO TYPE"

CONCLUSION

First user study and security analysis of Knock Codes

- Knock Codes offer less security relative to other mobile authentication
- Participants find Knock Codes mostly unusable and insecure
- Using a blocklist with Knock Codes improves security
- Participants are open to new methods of mobile authentication

Thank you! Feel Free to Contact us!

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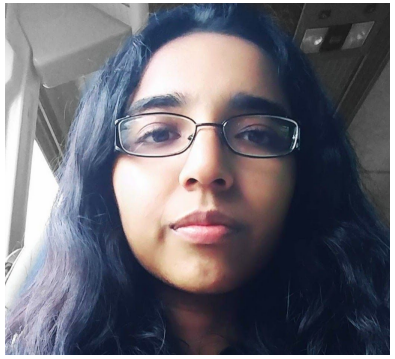

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