SOCIAL CYBERSECURITY
Reshaping Security Through An Empirical Understanding of Human Social Behavior

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How can we design systems that encourage better cybersecurity behaviors?
What makes people...

...use a PIN on their phone?

...enable two-factor authentication?

...keep their software updated?

...behave “securely”? 
“I started using [a PIN] because everyone around me had a [PIN] so I kind of felt a group pressure to also use a [PIN].
“One of my boys wanted to use my phone...so I gave them my passcode. And not that I have anything that I don’t care for them to see or anything, but after they did that then I changed it”
“my friends...have a lot of different accounts, the same as me. But they didn’t get into any trouble. So I think maybe it will not be dangerous [to reuse passwords].”
A lot of it is social.

Security behavior, like any human behavior, is largely driven by social influence.
HACKERS, TOM

~50% of behaviors were socially driven.

HACKERS EVERYWHERE
Absent knowledge of how security and social behaviors interact, we have little hope of doing better.
Social influence strongly affects security behaviors, and this effect is contingent upon the design of a security tool affects its potential for social spread.

Making cybersecurity systems more social can encourage better security behaviors.
Social influences strongly affect cybersecurity behaviors, and we can encourage better behaviors by designing more social cybersecurity systems.
Measuring Social Influence In Security Behaviors

Improving Security Behaviors with Social Influence
Analyzed how the (non)-use of three optional security tools was affected by friends' use of those tools for 1.5 million Facebook user's social networks.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Social</th>
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<tbody>
<tr>
<td><img src="facebook.png" alt="Login Notifications" /></td>
<td><img src="facebook.png" alt="Login Approvals" /></td>
</tr>
<tr>
<td><img src="facebook.png" alt="Facebook Notifications" /></td>
<td><img src="facebook.png" alt="Login Code" /></td>
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<tr>
<td><img src="facebook.png" alt="Facebook Security Team" /></td>
<td><img src="facebook.png" alt="Trusted Contacts" /></td>
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</table>

Call Your Friends to Get Your Security Codes

We have sent codes and instructions to your trusted friends below. Check your email for next steps and a link back to this page.

- Jonathan Frank
- Dustin Ho
- Jake Brill
750k users who newly adopted one of the aforementioned security tools.

750k “use-nots” who had not adopted one of the aforementioned security tools.
For a given security tool, empirically select exposure levels to friends who use that tool. e.g., 1%, 5%, 10%...

For each exposure level, compare adoption rate of those who are exposed versus those who are not. This is the effect of social influence.

Difference in Adoption Rate

Exposure to friends who use given security tool
Difference in Adoption Rate

- - No effect

Exposure to friends who use given security tool
Difference in Adoption Rate

Exposure to friends who use given security tool

- No effect
- Expected effect
Difference in Adoption Rate

Exposure to friends who use given security tool

- No effect
- Expected effect

Trusted Contacts
Difference in Adoption Rate

Exposure to friends who use given security tool

- No effect
- Expected effect

Trusted Contacts
Login Approvals
What's going on here?
DISAFFILIATION

e.g., teenagers who dislike Facebook because parents now use it
Early adopters of some security tools can be perceived as “paranoid” or "nutty", and, in turn, stigmatize the use of those security tools.
All effects go up and to the right. More exposure is good! 

GOOD NEWS
The design of a security tool affects its potential for social spread.
Observability

Cooperation

Stewardship
Social influence **strongly affects** security behaviors, and this effect is contingent upon the design of a security tool affects its potential for social spread.
IMPROVING SECURITY BEHAVIORS WITH SOCIAL INFLUENCE

Randomized experiment with 50,000 Facebook users.
Stay Secure on Facebook
Michelle, we're always working to protect your account.
Let's look at 3 ways you can increase your security.

Not Now  Get Started
Keep Your Account Safe
You can use security settings to protect your account and make sure it can be recovered if you ever lose access.

Improve Account Security
Keep Your Account Safe
108 of your friends use extra security settings. You can also protect your account and make sure it can be recovered if you ever lose access.

Improve Account Security

Keep Your Account Safe
Over 20% of your friends use extra security settings. You can also protect your account and make sure it can be recovered if you ever lose access.

Improve Account Security

Keep Your Account Safe
Only 108 of your friends use extra security settings. Be among the first to protect your account and make sure it can be recovered if you ever lose access.

Improve Account Security

Keep Your Account Safe
Some of your friends are using extra security settings. You can also protect your account and make sure it can be recovered if you ever lose access.

Improve Account Security
8 conditions: 7 social + 1 non-social control

6250 randomly assigned participants per condition

Experiment ran for 3 days
MEASURES

CTR (click through rate)
7d adoptions
5mo adoptions
<table>
<thead>
<tr>
<th>Count</th>
<th>Percentage</th>
<th>Action Description</th>
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</thead>
<tbody>
<tr>
<td>46,235</td>
<td>93%</td>
<td>logged in and saw announcement</td>
</tr>
<tr>
<td>5,971</td>
<td>13%</td>
<td>clicked on an announcement</td>
</tr>
<tr>
<td>1,873</td>
<td>4%</td>
<td>adopted one of the promoted tools within 7 days</td>
</tr>
<tr>
<td>4,555</td>
<td>10%</td>
<td>adopted one of the promoted tools within 5 months</td>
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1.36x improvement in CTR
1.10x improvement in adoptions
Measuring Social Influence In Security Behaviors

Social influence strongly affects security behaviors, and this effect is contingent upon the design of a security tool affects its potential for social spread.

Improving Security Behaviors with Social Influence

Making cybersecurity systems more social can encourage better security behaviors.
How can we design systems that encourage better cybersecurity behaviors?
There is a **fruitful but largely untapped** opportunity to improve cybersecurity behaviors by making social systems that are more:

- **Observable**
- **Cooperative**
- **Stewarded**
How can we make it easier for people to observe and emulate good security behaviors?
How can we design additive security systems that make group security a sum instead of a min function?
How can we design systems that allow people to act on their concern for the security of their loved ones?
Social influences strongly affect cybersecurity behaviors, and we can encourage better behaviors by designing more social cybersecurity systems.

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