Age-Related Vulnerabilities to Social-Engineering Attacks

Daniela Oliveira, Harold A. Rocha, Huizi Yang, Donovan Ellis, Sandeep Dommaraju, Melis Muradoglu‡, Devon H. Weir, Adam Soliman, Tian Lin, Natalie C. Ebner
University of Florida New York University‡

Background

- Spear-phishing emails apply different
  - **Life Domains:** health, finance, legal, ideological, security, social *Baltes et al., 2006*
  - **Psychological Weapons of Influence:** perceptual contrast, authority, scarcity, reciprocity, consistency, social proof *Cialdini, 2006*
- **General Assumption:** older adults are particularly at risk for cyber attacks
  - General cognitive processing capacities and deception sensitivity decline with age, while self-reported trust increases

Ebner et al., 2016; Mather, 2006; Verhaeghen & Salthouse, 1997

Questions

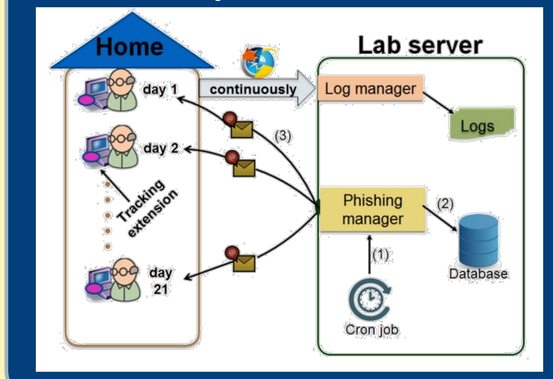
1. Do younger and older Internet users differ in susceptibility to spear-phishing attacks?
2. Which weapon(s) is/are particularly effective?
   a. Does effectiveness of weapons vary by age group?
3. Which domain(s) is/are particularly effective?
   a. Does effectiveness of domain vary by age group?

Methods

Sample:
- *n* = 100 young adults (range: 18-37 yrs, 56% female)
- *n* = 58 older adults (range: 62-89 yrs, 43% female)

Study Procedure:
- Installation ➡ 21 day study session ➡ Uninstallation
- Participant web browsing activity; **Merlin web browser plugin** recorded URLs visited
- Participants received daily spear-phishing emails (counterbalanced by domains and weapons)
- On final day, participants were asked to rate perception of their susceptibility to a complementary set of phishing emails

Study Framework



Subject: Emergency Contact Notice
Hello *Name*,
You have been named an emergency contact for someone who was taken into custody as of yesterday at 7 p.m. You have two days to contact the prisoner in question by following the link below. Due to confidentiality protocols, all information about the signer's situation is held in a secure portal for you to view and cannot be displayed in this email.
Access our secure portal here: http://www.harbenlock.com/contact-legal/
Thank you,
~Name~
~County~ Corrections Correspondent

Box 1. Example of spear-phishing email utilizing **Authority** (Weapon of Influence) and **Legal** (Domain)

- **Susceptibility to spear-phishing email attacks**: clicking on email link provided in email.

Data Analysis

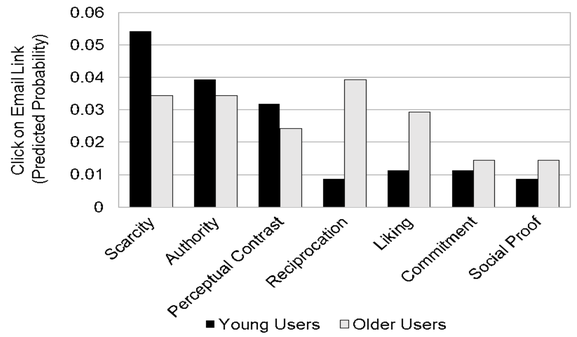
- **Hypothesis 1. Age-related susceptibility**
  Multi-level logistic regression
  Significant Age x Gender interaction (B = .98, z = 2.02, p = .04)
- **Hypothesis 2. Susceptibility to Weapons**
  Multi-level logistic regression
  Significant Age effect (B = −.34, z = −4.79, p < .001)
- **Hypothesis 3. Susceptibility to Life Domains**
  Multi-level logistic regression
  Significant Age effect (B = −.41, z = −4.91, p = .001)

Results

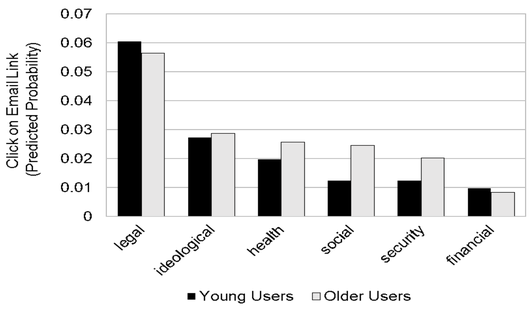
1. High susceptibility to spear-phishing attacks across total sample
More than **40%** of participants clicked on at least one email link; 12% clicked on more than one email link.

2. Significant Age by Gender interaction in susceptibility to spear-phishing. In particular older women (B = .98, z = 2.02, p = .04).

3. Susceptibility to Weapons of Influence
Younger: Scarcity;
Older: Reciprocation
All: Authority



4. Susceptibility to Life Domains
Younger: Legal most effective, minimal efficacy of other domains; **Older:** Legal most effective, moderate to low efficacy of other domains



5. Exploratory: Susceptibility *Awareness*
Participants rated a complementary set of 21 spear-phishing emails on how **likely** (1=not at all; 5 = very much) they were to click on the email link.
There was a significant age effect (B = −.78, z = −2.11, p = .035) in that younger users (*M* = 2.30, *SD* = .92) reported higher susceptibility awareness than older users (*M* = 1.96, *SD* = .93). This is unique contrast to users' observed behavioral susceptibility.

Discussion

- Overall high attack susceptibility, low susceptibility awareness - particularly pronounced in older women.
- Younger adults most susceptible to scarcity, older adults most susceptible to reciprocation, all susceptible to authority.
- Defense approaches **should not come as a "one-size-fits-all"**, but consider age-by-gender variations.
- **Future Directions:** development and validation of detection and warning tool for age-tailored use.

Interested in meeting the PIs? Attach post-it note below!

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WHERE DISCOVERIES BEGIN

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UF UNIVERSITY of FLORIDA