Toward Accurate Prediction of Security Behavior via Comprehensive Scales

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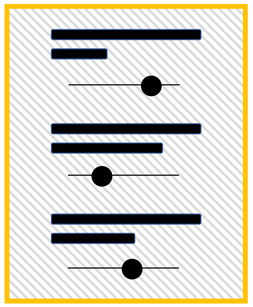
1. Background and motivation

- ✓ Psychometric scales are affordable, scalable means to learn about end-user security and privacy
- ✓ Conceptually, can enable various useful tasks (e.g., studying changes in user behavior over time)
- ✓ However, scales (e.g, SeBIS*) are often found to be poor predictors of actual behavior



Hyp.: More comprehensive S&P scales
⇒ predict users' behavior more accurately

2. Overall approach

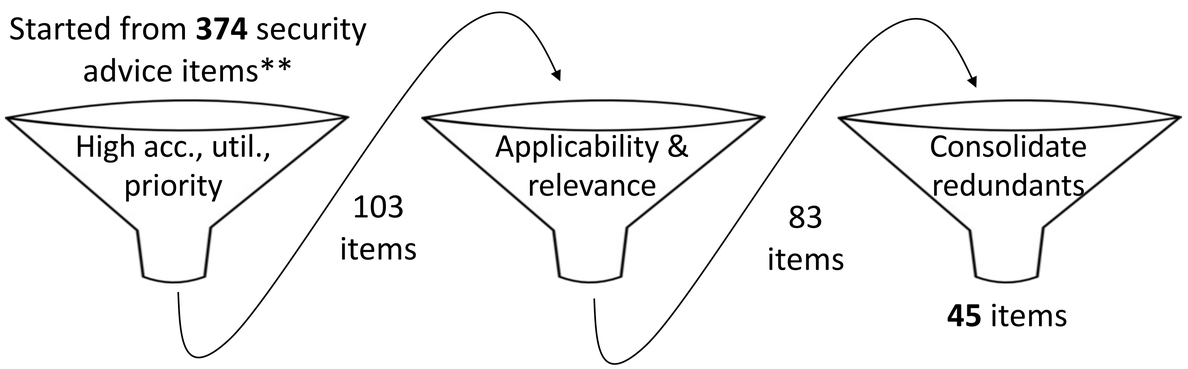
1. Construct comprehensive security scale
1.1. Collect initial items
1.1. Refine scale and identify construct

Done
(see Sec. 3—5)

1.1. Finalize scale
2. Validate hypothesis
2.1. Design experiments to observe security behavior
2.1. Test predictive accuracy of new scale

Future work
(see Sec. 6)

3. Initial scale's items



4. Refinement and factor analysis

- ✓ Designed and ran online study (n=299) to evaluate items
- ✓ Removed items with ceiling and floor effects or low variance
- ✓ Ran exploratory factor analysis with **23** items, identified factors:

Factor	*# items*	*Explained variance*	*λ*
1. Encryption	6	16.57%	3.81
2. Proactive awareness	6	13.14%	3.02
3. Account and data securement	6	9.92%	2.28
4. Anti-virus	3	8.95%	2.06
5. Updates	2	7.30%	1.68

Compared to SeBIS: **+44%** items & **+25%** factors

5. Discussions

- ✓ Two of our factors (anti-virus and encryption) are not present in SeBIS ⇨ Our new scale is more comprehensive
- ✓ In several SeBIS items were excluded from our scale due to ceiling effects ⇨ User behavior has changed from the time SeBIS was developed

6. Next steps

a. *Finalizing scale*

- ✓ Collect data to confirm construct and validate scale reliability

b. *Validate hypothesis*

- ✓ Design experiment asking users to fill scale and observe security behavior (e.g., OS updates, phishing susceptibility)
- ✓ Test if scale can predict behavior accurately

References

* Egelman and Peer. "Scaling the security wall: Developing a security behavior intentions scale (SeBIS)." In proceedings of CHI, 2015.
** Redmiles et al. "A comprehensive quality evaluation of security and privacy advice on the web." In proceedings of USENIX Security. 2020.