

Dancing Pigs or Externalities?: Measuring the Rationality of Security Decisions

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Abstract

Accurately modeling human decision-making in security is critical to thinking about when, why, and how to recommend that users adopt certain secure behaviors. In this work, we conduct behavioral economics experiments to model the rationality of end-user security decision-making in a realistic online experimental system simulating a bank account. We ask participants to make a financially impactful security choice, in the face of transparent risks of account compromise and benefits offered by an optional security behavior (two-factor authentication). We measure the cost and utility of adopting the security behavior via measurements of time spent executing the behavior and estimates of the participant's wage. We find that more than 50% of our participants made rational (e.g., utility optimal) decisions, and we find that participants are more likely to behave rationally in the face of higher risk. Additionally, we find that users' decisions can be modeled well as a function of past behavior (anchoring effects), knowledge of costs, and to a lesser extent, users' awareness of risks and context ($R^2=0.61$). We also find evidence of endowment effects, as seen in other areas of economic and psychological decision-science literature, in our digital-security setting. Finally, using our data, we show theoretically that a "one-size-fits-all" emphasis on security can lead to market losses, but that adoption by a subset of users with higher risks or lower costs can lead to market gains.

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