The Economics of Cybersecurity — Lecture 4 Notes

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1 Homework Review

2 Class Projects

3 In-Class Experiment—Loss Aversion

4 Paper Discussion

I think by this point in the class we have well an truly established that information asymmetry exists in computer security, and that this is a hindrance towards improving security. Whenever this topic comes up, I ask the class for suggestions on what to do about it.

This paper is all about "soft paternalism". Paternalism is when one party has a degree of control or responsibility over another party and makes decisions on their, typically under the guise of it being "for their own good". The word "paternalism" itself comes from the latin word *pater* for "father", so paternalism can be when a child wants to eat cookies for breakfast and their parent says no, because they know what's best for their child.

Can someone define what a "nudge" is for me?

4.1 Incomplete and Asymmetric Information

- A topic we have already covered many times

- One new example: Defenders don't know which vector attackers will use (i.e. not just consumers not being able to acertain quality)

4.2 What is Prospect Theory?

4.3 Heuristics and Bounded Rationality

- In CS we use heuristics to guide algorithms to compute more efficiently (e.g. A* vs Dijsktra's, or hillclimbing to find optima)

- In human cognition, we do the same thing, whether we recognize it or not.

- Just like in CS, cognitive heuristics can lead to traps in local optima

- This produces behavior that seems to conflict with the typical economists' assumption that humans are perfectly rational

    - Was your initial reaction to call B.S. on some of the assumptions economists makes? E.g. Akerlof's assumption that people want infinite cars according to the model.
    - How is it any different that when physicists say "assume a frictionless spherical cow a vacuum"?
    - The point is to abstract away things that have a negligible affect on outcomes when you can.
    - But the point of "bounded rationality" is that sometimes these mental shorcuts that we take *do* have an affect on our behavior and decisions, meaning that as humans we do often deviate from purely rational behavior.
    - You can measure and quantify how far off people are from purely rational behavior, and that you can use this to create more accurate models.
    - Similar to a physicist adding an additional term to an equation to represent friction in a physical model.

4.4 Not in paper? Experiments themselves interfering with results

TODO talk about this.

5 Paper Presentations

6 Danger Zone!

Behavioral Economics is having a bit of a reckoning at the moment:

- Many of the big names in the field have been called out for using questionable research practices or in some cases using outright faked data (Ariely, Gino, Wansink).

- There have been a lot of notable retractions (I don't know if any of the papers cited in our reading paper have been retracted, but there is a citation to a professor at Duke who has recently had several high-profile retractions).

- What can we do? What is the value of this line of research if everything is so questionable?

  - Much of issues of statistically low-powered studies can be fixed by enrolling more participants. In some cases though this is really hard to do and can be quite expensive. It's not obvious what the solution is.

  - Should we say that you can only publish study results if you have 100 participants? Does this mean that only research labs that have lots of money and are good at getting funding can do research?

- Regarding outright fraudulent data—sad but what can you do about it? Science is built on trust and cooperation, and for some there is an incentive to defect from the cooperation strategy (prisoner's dilemma).