

CSCI 331:
Introduction to Computer Security

Lecture 17: Social Engineering

Instructor: Dan Barowy
Williams

Announcements

David Jensen, UMass Amherst

- Class of 60's talk:
What's So Important About Explanation? Science,
Machine Learning, and Large Language Models
**Thu at 7:30pm in Bronfman
Auditorium**
- Friday's colloquium:
Explanation, Causation, and Mechanism in AI
systems
Fri at 2:35pm in Wege Auditorium



Topics

Paper discussion (Provos)
Social engineering

Your to-dos

1. Read *Cryptology and Physical Security: Rights Amplification in Master-Keyed Mechanical Locks* for **Thu, 11/16 and take notes.**
2. Lab 7, **due Sunday 11/19.**

Paper discussion (Provos)

Social engineering attacks

“You can’t trust the system, man!”

<https://www.youtube.com/watch?v=gAYL5H46QnQ>

(I do not remember why I put this link in the slides... so just... enjoy the video.)

Social Engineering

Social engineering, in the context of information security, is the **psychological manipulation of people** into **performing actions** or **divulging confidential information**.

- Cognitive biases
- Social/cultural pressures

Category: Cognitive Bias

A **cognitive bias** is a **systematic pattern of deviation** from **rationality** in judgment.

Heuristics

Heuristics are simple strategies or mental processes that we use to **quickly form judgments**. Heuristic processes are **used to find solutions** that are approximately correct; however, **they are not foolproof**.

Attack: People do not think logically about risk. E.g., hackers reading your emails are far less likely (and possibly less consequential) than your spouse reading your emails.

Consistency

Consistency refers to a person's **strong psychological need to be consistent with prior acts** and statements. To remain consistent, people will sometimes change their **attitudes, beliefs, actions** and **perceptions** (!!!).

Attack: People can be coerced into doing things if it can be demonstrated that those actions are consistent with their self-image.

Consistency

The Psychological Roots of Anti-Vaccination Attitudes:
A 24-Nation Investigation

Matthew J. Hornsey, Emily A. Harris, and Kelly S. Fielding
University of Queensland

Consistency

Objective: Strengthening of antivaccination movements in recent decades has coincided with unprecedented **increases in the incidence of some communicable diseases**. Many intervention programs work from a deficit model of science communication, presuming that vaccination skeptics lack the ability to access or understand evidence. However, interventions focusing on evidence and the debunking of vaccine-related myths have proven to be either nonproductive or counterproductive. Working from a motivated reasoning perspective, we examine the psychological factors that might motivate people to reject scientific consensus around vaccination. To assist with international generalizability, we examine this question in 24 countries. **Methods:** We sampled 5,323 participants in 24 countries, and measured their antivaccination attitudes. We also measured their belief in conspiracy theories, reactance (the tendency for people to have a low tolerance for impingements on their freedoms), disgust sensitivity toward blood and needles, and individualistic/hierarchical worldviews (i.e., people's beliefs about how much control society should have over individuals, and whether hierarchies are desirable). **Results:** In order of magnitude, antivaccination attitudes were highest among those who (a) were high in conspiratorial thinking, (b) were high in reactance, (c) reported high levels of disgust toward blood and needles, and (d) had strong individualistic/hierarchical worldviews. In contrast, demographic variables (including education) accounted for nonsignificant or trivial levels of variance. **Conclusions:** These data help identify the "attitude roots" that may motivate and sustain vaccine skepticism. In so doing, they help shed light on why repetition of evidence can be nonproductive, and suggest communication solutions to that problem.

Health Psychology
2018, Vol. 37, No. 4, 307–315

© 2018 American Psychological Association
0278-6133/18/\$12.00 <http://dx.doi.org/10.1037/hea0000586>

Consistency

According to the attitude roots model, one way to create change is to identify underlying motives for rejecting the science on immunization, and then to tailor interventions that are congenial to those underlying motivations (the so-called *jiu jitsu* approach; Hornsey & Fielding, 2017). From this perspective, the goal of science communication is to align with people's underlying fears, ideologies and identities, thus reducing people's motivation to reject the science. If the motivation to reject the science is reduced, then people should become more willing to embrace the evidence on its merits.

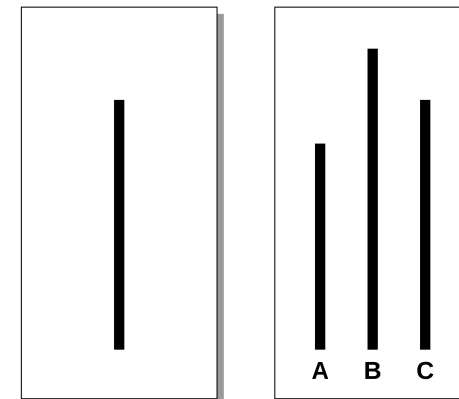
From a *jiu jitsu* approach it is counterproductive to try to reduce people's conspiratorial thinking (and there is no evidence that this is feasible). Rather, one should work with people's underlying worldviews: to acknowledge the possibility of conspiracies, but to show how vested interests can conspire to obscure the benefits of vaccination and to exaggerate the dangers.

Category: Social/cultural pressure

Social pressure is the direct influence on an individual who is encouraged to follow their peers by **changing** their **attitudes, values** or **behaviors** to **conform** to those of the influencing group or individual.

Attack: People are often thoughtlessly bound by convention. E.g., holding the door open for a stranger.

Conformity



Asch conformity experiment (1951).

Conformity

- 74% of the participants conformed on at least one trial.
- On average people conformed one third of the time.

Attack: People feel pressure to go with the group. If multiple attackers subtly coerce a person, there is a higher probability of success.

Obedience to Authority



Milgram obedience experiments (1964).

Obedience to Authority

BEHAVIORAL STUDY OF OBEDIENCE¹

STANLEY MILGRAM²
Yale University

This article describes a procedure for the study of destructive obedience in the laboratory. It consists of ordering a naive S to administer increasingly more severe punishment to a victim in the context of a learning experiment. Punishment is administered by means of a shock generator with 30 graded switches ranging from Slight Shock to Danger: Severe Shock. The victim is a confederate of the E. The primary dependent variable is the maximum shock the S is willing to administer before he refuses to continue further. 26 Ss obeyed the experimental commands fully, and administered the highest shock on the generator. 14 Ss broke off the experiment at some point after the victim protested and refused to provide further answers. The procedure created extreme levels of nervous tension in some Ss. Profuse sweating, trembling, and stuttering were typical expressions of this emotional disturbance. One unexpected sign of tension—yet to be explained—was the regular occurrence of nervous laughter, which in some Ss developed into uncontrollable seizures. The variety of interesting behavioral dynamics observed in the experiment, the reality of the situation for the S, and the possibility of parametric variation within the framework of the procedure, point to the fruitfulness of further study.

- 65% of experiment participants administered the experiment's final massive 450-volt shock.
- All administered shocks of at least 300 volts

Attack: People often obey authorities in institutions they trust.

Reciprocity

In cultural anthropology, **reciprocity** refers to the non-market exchange of goods or labor where **a return is eventually expected** as in the exchange of birthday gifts.

Attack: People can be tricked into giving away valuable things. E.g., romance scams, phishing.

Human Vulnerabilities

This list is not exhaustive!

- Cognitive bias
 - Heuristics
 - Consistency
- Social/cultural pressures
 - Conformity
 - Authority
 - Reciprocity

Recap & Next Class

Today we learned:

Undefined behavior

Next class:

Physical security