Engineering for Ethics, Privacy, and Fairness in Computer Systems

CMSC 25910 (“CS 259”)

Spring 2024

The University of Chicago

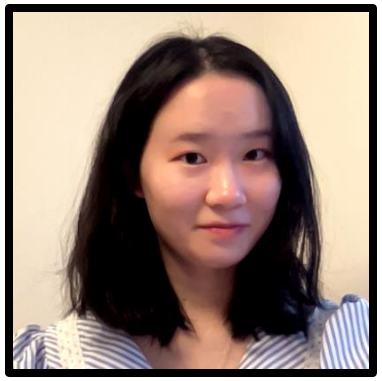
Course Overview

Course Description

This course takes a **technical approach to understanding ethical issues** in the design and implementation of **computer systems**. Tensions often arise between a computer system's utility and its privacy-invasiveness, between its robustness and its flexibility, and between its ability to leverage existing data and existing data's tendency to encode biases. The course will demonstrate how computer systems can violate individuals' privacy and agency, impact sub-populations in disparate ways, and harm both society and the environment. It will also introduce algorithmic approaches to fairness, privacy, transparency, and explainability in machine learning systems. Through hands-on programming assignments and projects, students will design and implement computer systems that reflect both ethics and privacy by design. They will also wrestle with fundamental questions about who bears responsibility for a system's shortcomings, how to balance different stakeholders' goals, and what societal values computer systems should embed.

Course Staff

Blase Ur



Alison Gan

Arthur Borém

Madison Pickering

Office Hours

- Mondays 4:30pm – 5:30pm (Blase)
- Tuesdays 1:00pm – 2:00pm (TA)
- Tuesdays 3:00pm – 4:00pm (TA)
- Wednesdays 4:30pm – 5:30pm (TA)
- …or by appointment

- All office hours will be held in **JCL 356**

Coursework / Grades

- **Lectures**: not recorded; **attendance required**

- **Programming assignments**: 8 × 8% = 64%
- **Reading responses**: 8 × 1.5% = 12%
- **Project**: 19%
- **Participation in lecture**: 5%

Communication

- **Course website**: Syllabus, schedule, readings
- **Canvas**: Distribution of assignments and reading responses

- **Canvas**: Submission of code/data for assignments
- **Gradescope**: Submission of prose (single PDF) for assignments and reading responses (paste into Gradescope)

- **Ed**: Questions, announcements, requests; **don’t email us**

- **Gradescope**: Grades, regrade requests

Course Policies

- **P/F grading**: Post on Ed with “P/F request” by end of ninth week
- **Late submission**: Up to 24 hours late with -15 point penalty
  - Applies to both assignments and reading responses
  - Not permitted for project due to grading deadlines
- **Extensions**: Granted only for medical/personal emergencies
  - Not granted for other classes, interviews, travel, RSOs/sports
- **Wellness**: Reach out in a private Ed post to the course staff
  - Emails to Blase are also ok

Academic Integrity

- Detailed on syllabus
- All work submitted must be your own
- You may speak in general terms about approach, but not share code; **do not look at each other's code**
- Encouraged to talk to classmates and form study groups
- On each Gradescope submission, you **must document everyone in the class you spoke to, as well as every major resource you consulted** other than what we provide
- For **LLMs** (e.g., ChatGPT), you must include the **prompt** you used

Academic Integrity

- Example for the top of your Gradescope submission:
  - “I discussed the whole assignment with Jane Smith. We also discussed Part 3 with John Doe. I consulted: *https://www.helpfuldomain.com/helpfulpage.html* to understand the fetch() API and I used two lines from *https://www.other.com/page.html* in Part 3.”
- Code reuse from websites, Stack Overflow, LLMs, and published resources only allowed if **all** of the following apply:
  - Around 4 lines of code or fewer
  - Doesn’t solve the **intellectual point** of that part of the assignment
  - Documented at top (see above) or as comments
  - Exception: If the assignment itself points you directly to a tutorial, it’s ok to reuse larger code fragments (with attribution)

Course Topics and Schedule

- https://www.classes.cs.uchicago.edu/archive/2024/spring/25910-1/schedule.html

CMSC 25910 vs. DATA 25900

CMSC 25910 (Blase): https://classes.cs.uchicago.edu/archive/2024/spring/25910-1/

Focus on computer systems / algorithms / engineering / implementation

8 programming assignments; 8 reading responses; project (19% of grade)

Multiple languages, primarily Python

(Highly similar to CMSC 25900 from Spring 2021)

DATA 25900 (Raul): https://raulcastrofernandez.com/DATA-25900-Spring24/

Focus on data science / data analysis

5 programming assignments; 7 reading responses; project (50% of grade)

Python using Jupyter Notebooks

Class Introduction

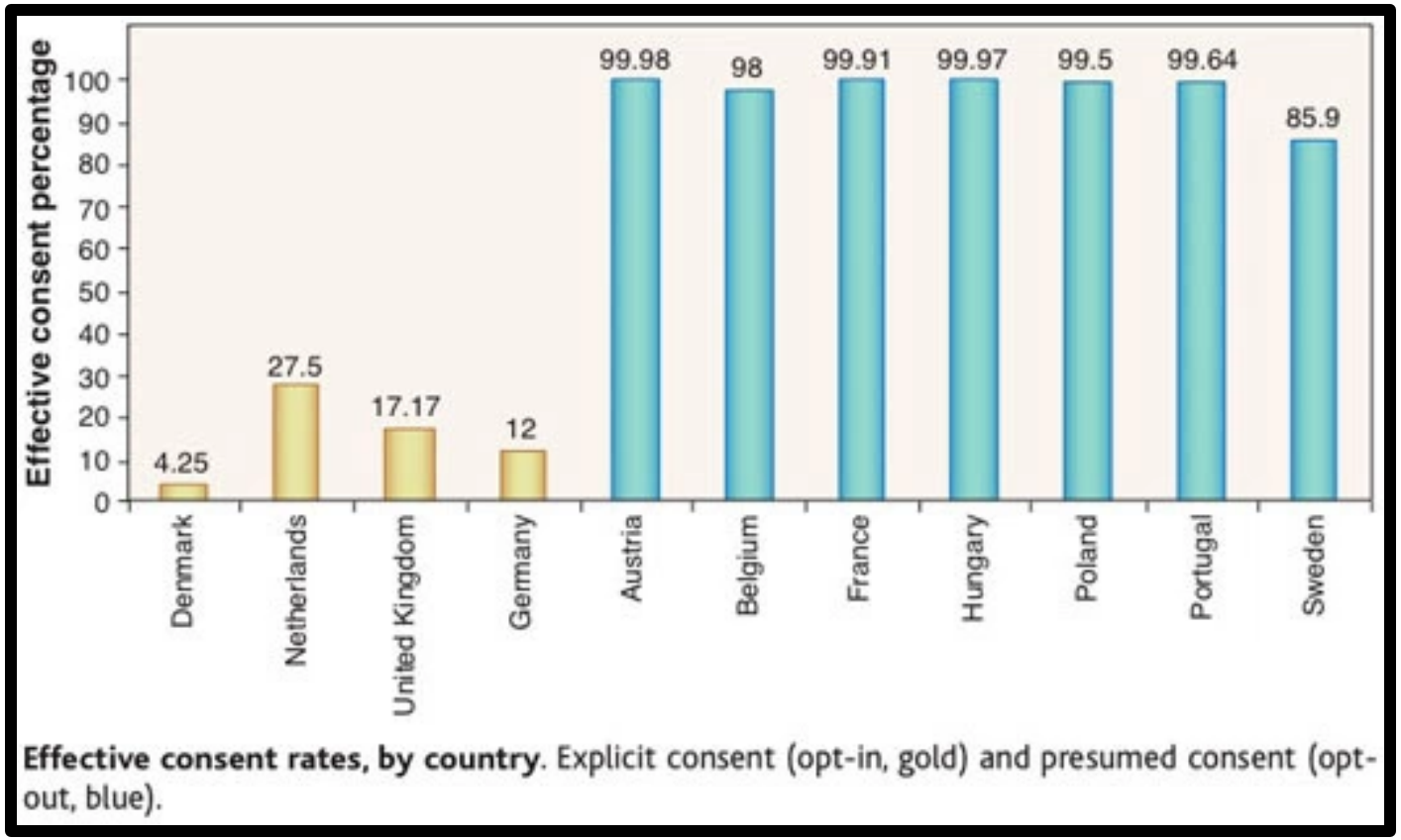
1) First name
2) Class year and major (e.g., third-year CS major)
3) Topic you are most interested in learning about

Responsible and Respectful User Interfaces

Should a product have an opinion?

The power of defaults

The power of the default (organ donation)

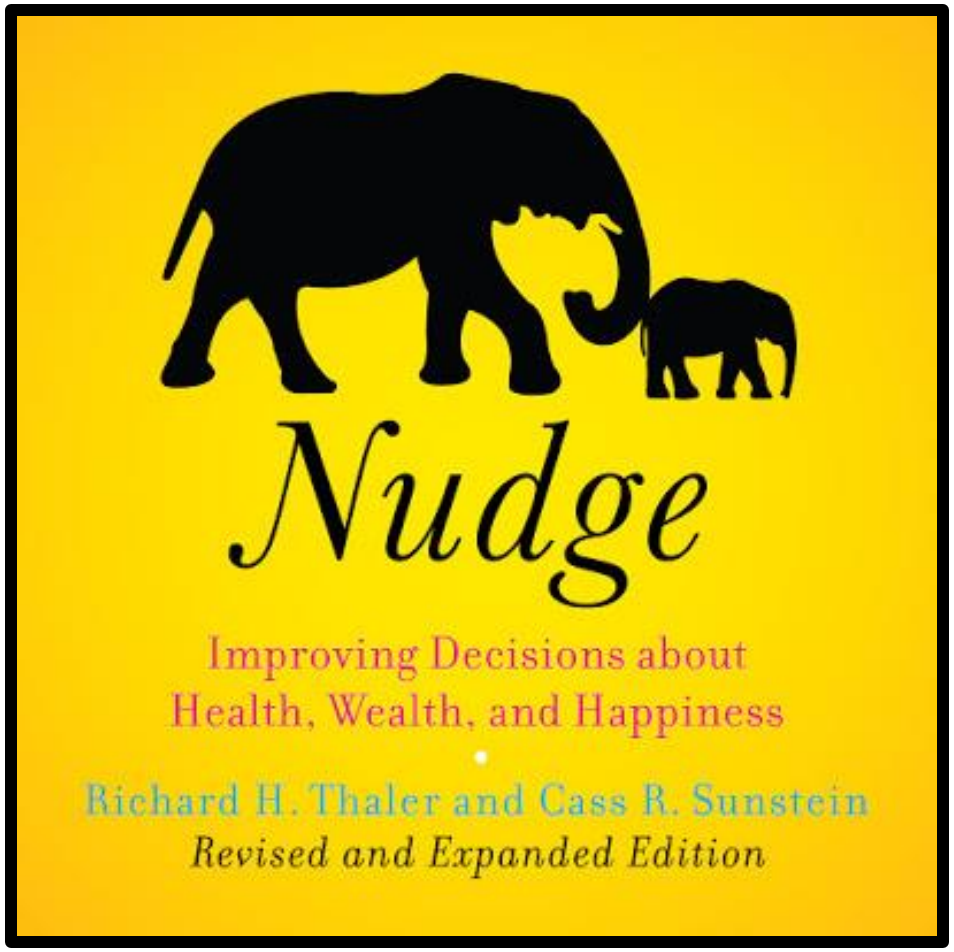


Effective consent rates, by country. Explicit consent (opt-in, gold) and presumed consent (opt-out, blue).

https://medium.com/@tanayj/the-power-of-defaults-976bc8b015b7

Interfaces that influence

Behavioral nudging



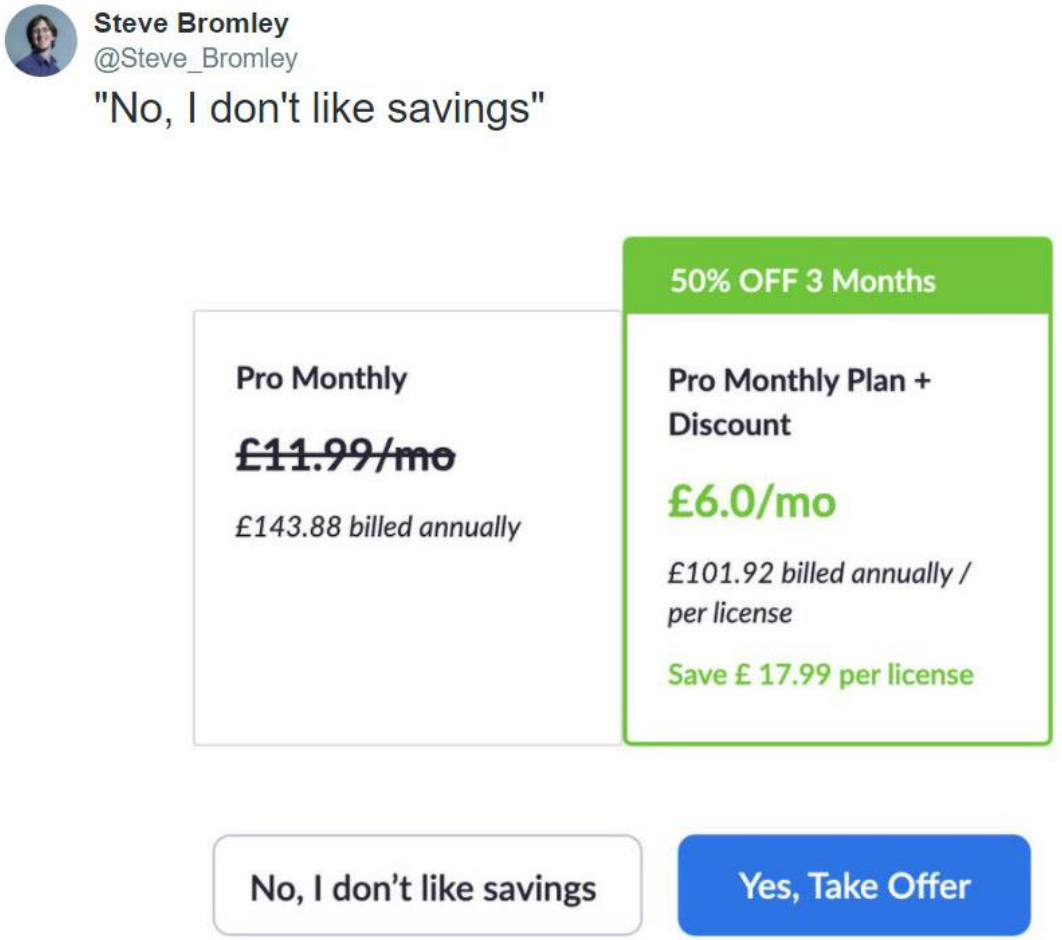
Dark patterns
(AKA Deceptive patterns)

Taxonomy from www.darkpatterns.org

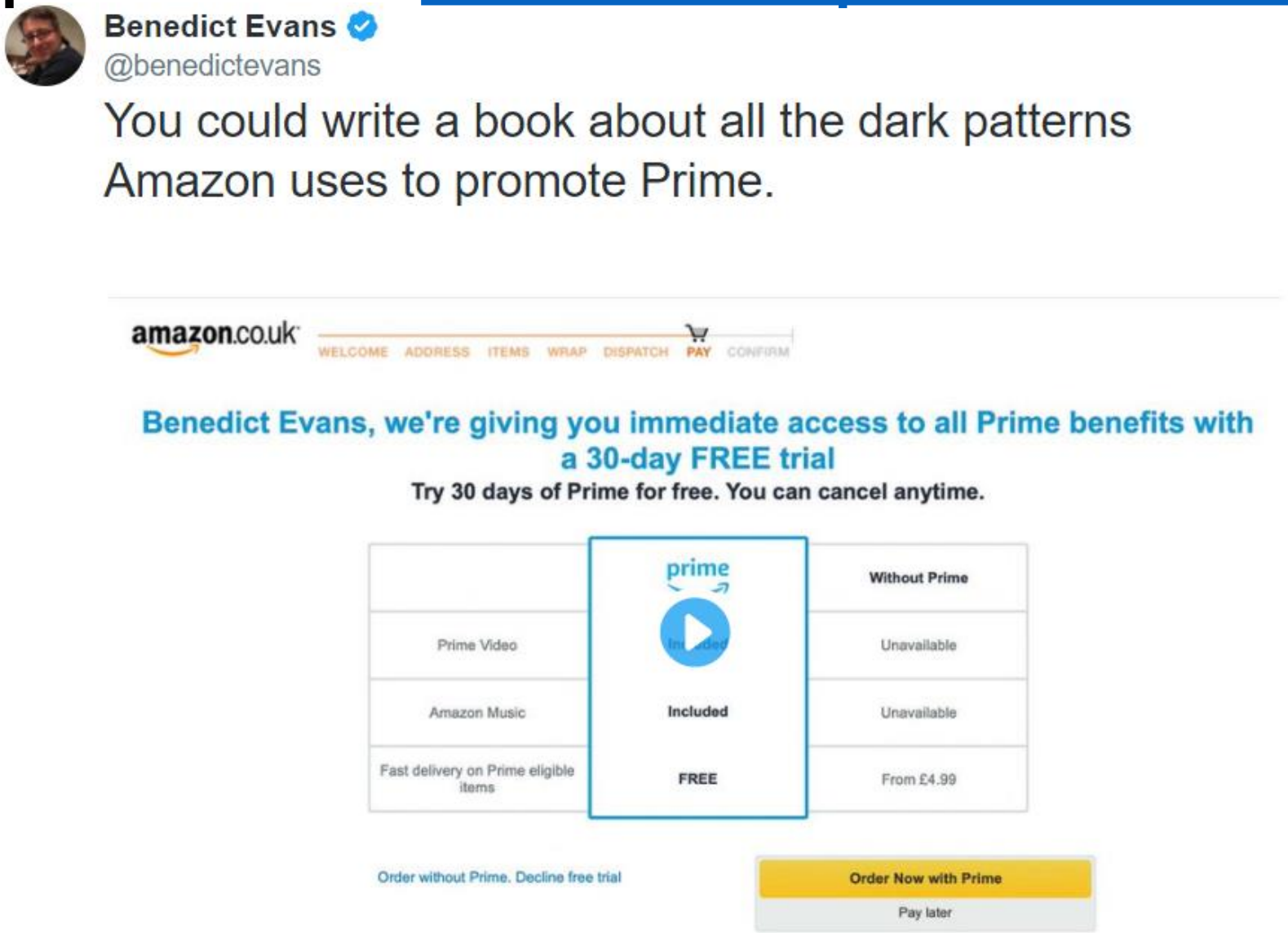
- Trick questions
- Sneak into basket
- Roach motel
- Privacy Zuckering
- Price comparison prevention
- Misdirection
- Hidden costs
- Bait and switch
- Confirmshaming
- Disguised ads
- Forced continuity
- Friend spam

https://twitter.com/darkpatterns has many examples

Examples from www.darkpatterns.org



Examples from www.darkpatterns.org



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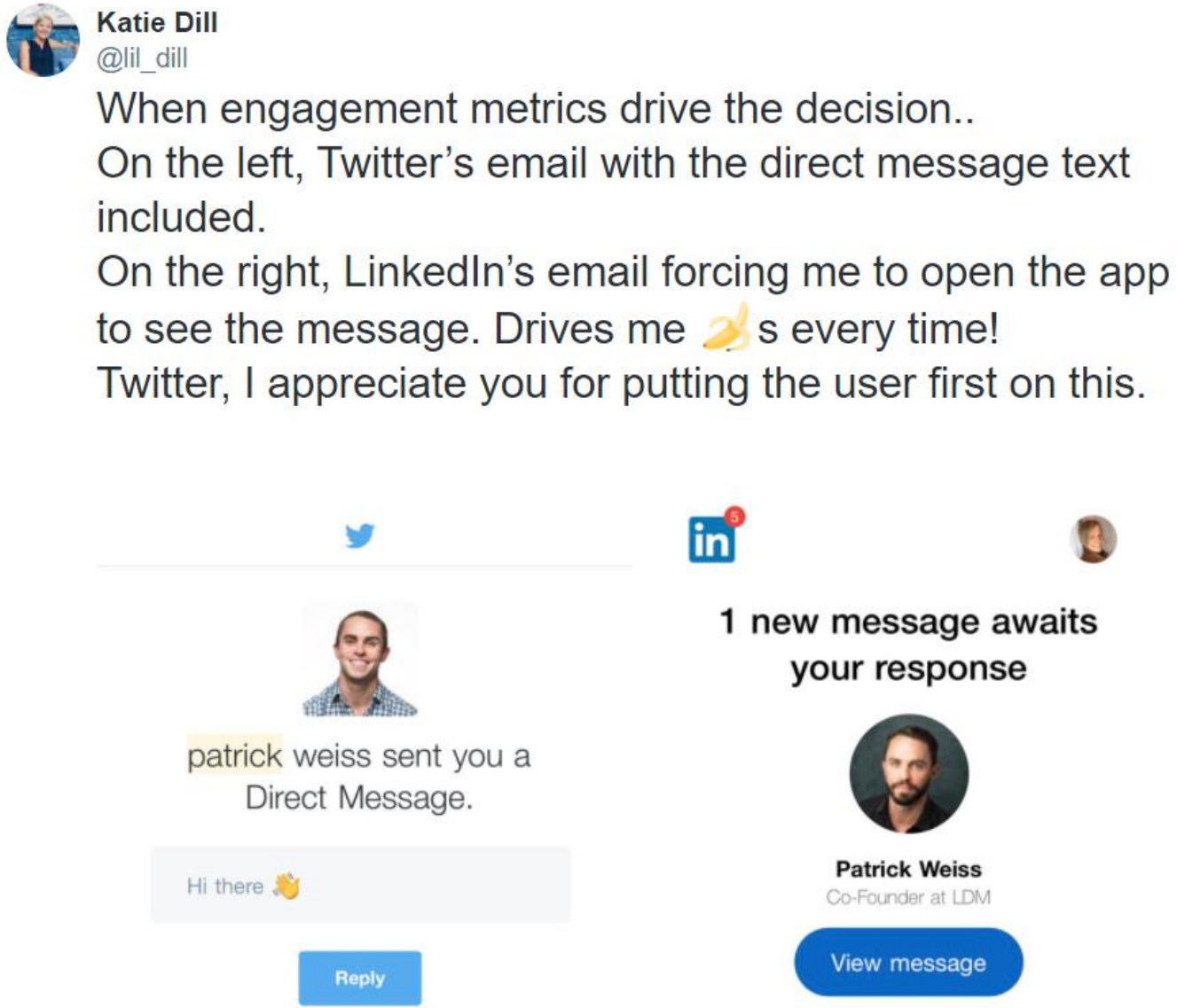

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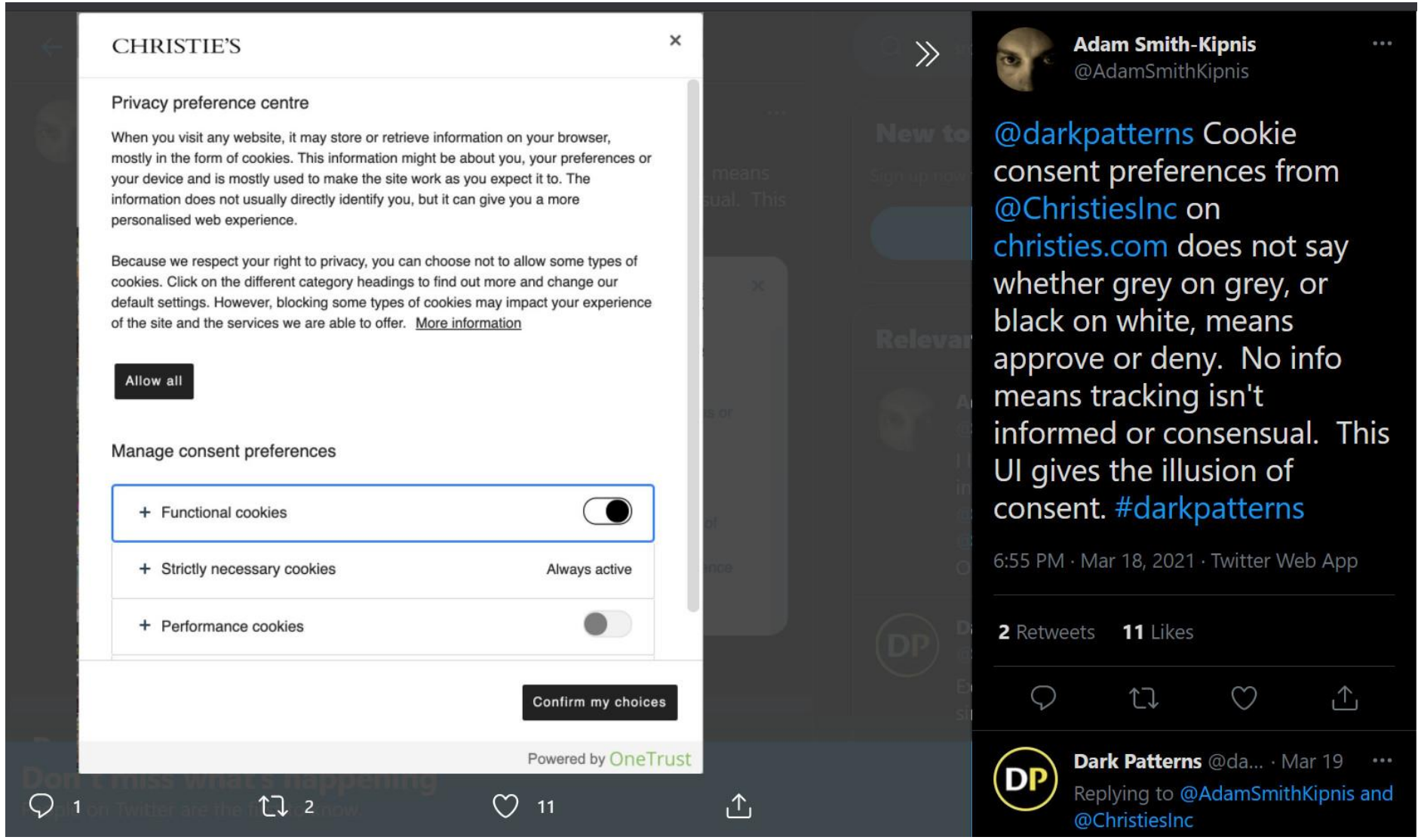

Meta-example from xkcd

MANAGE YOUR PREFERENCES

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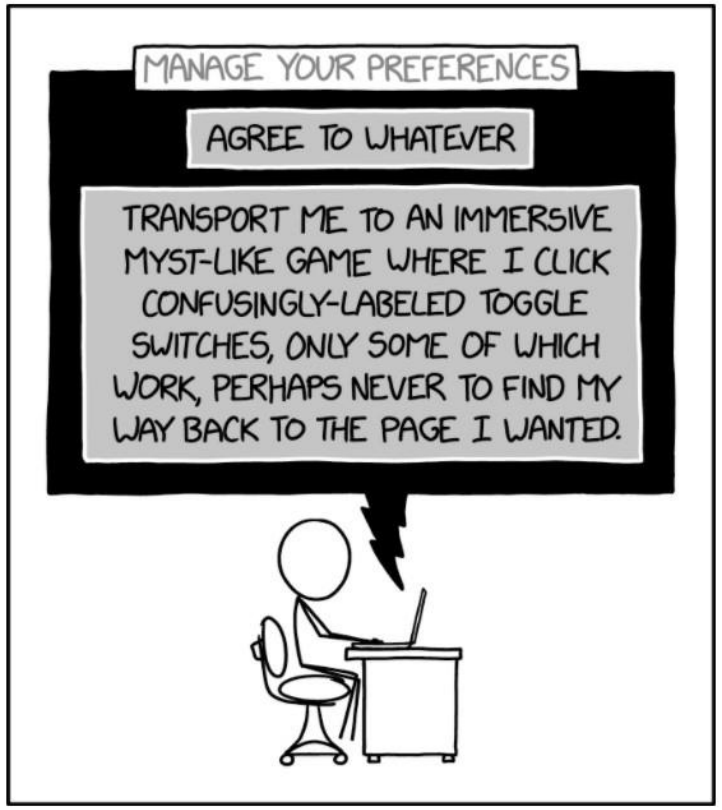

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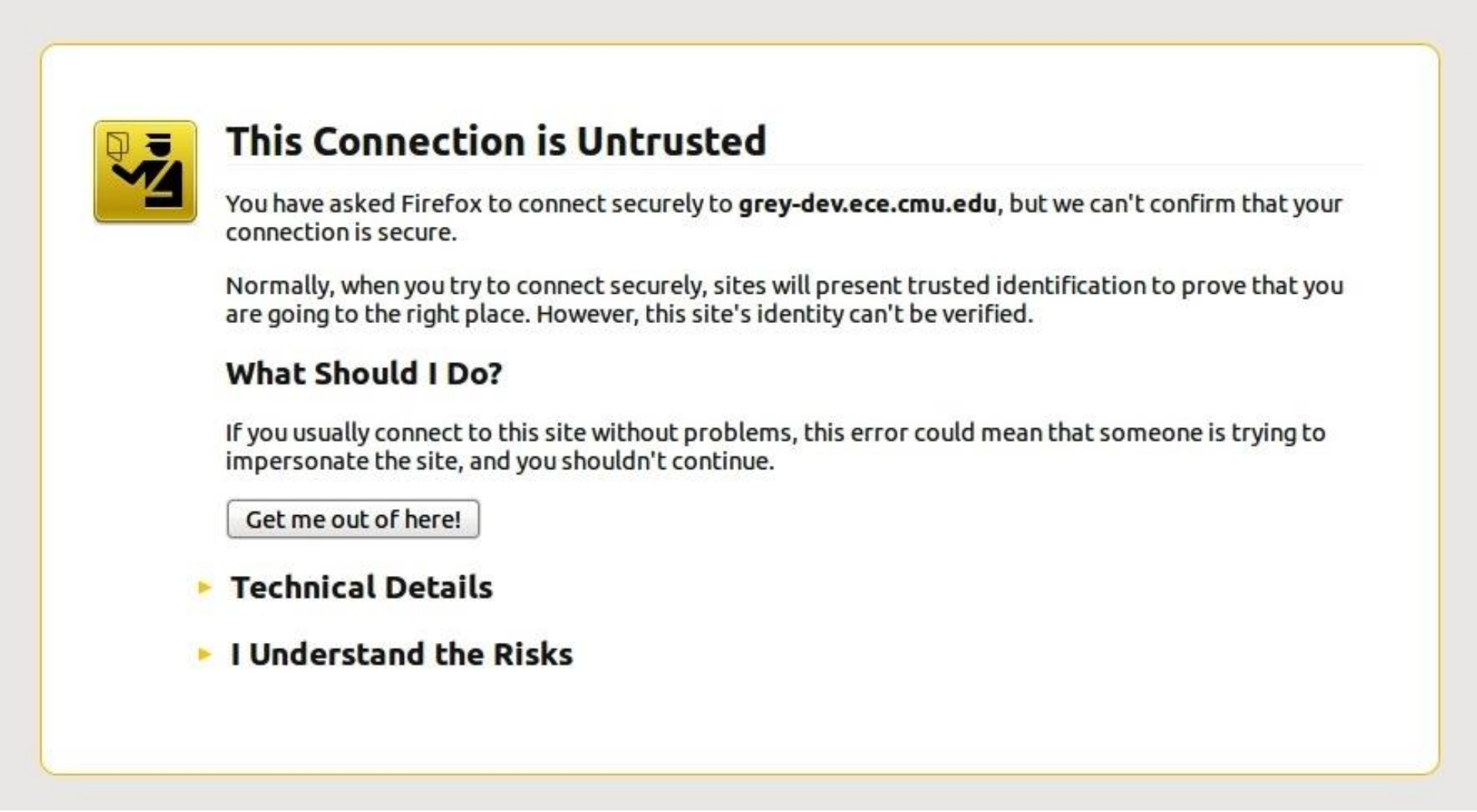
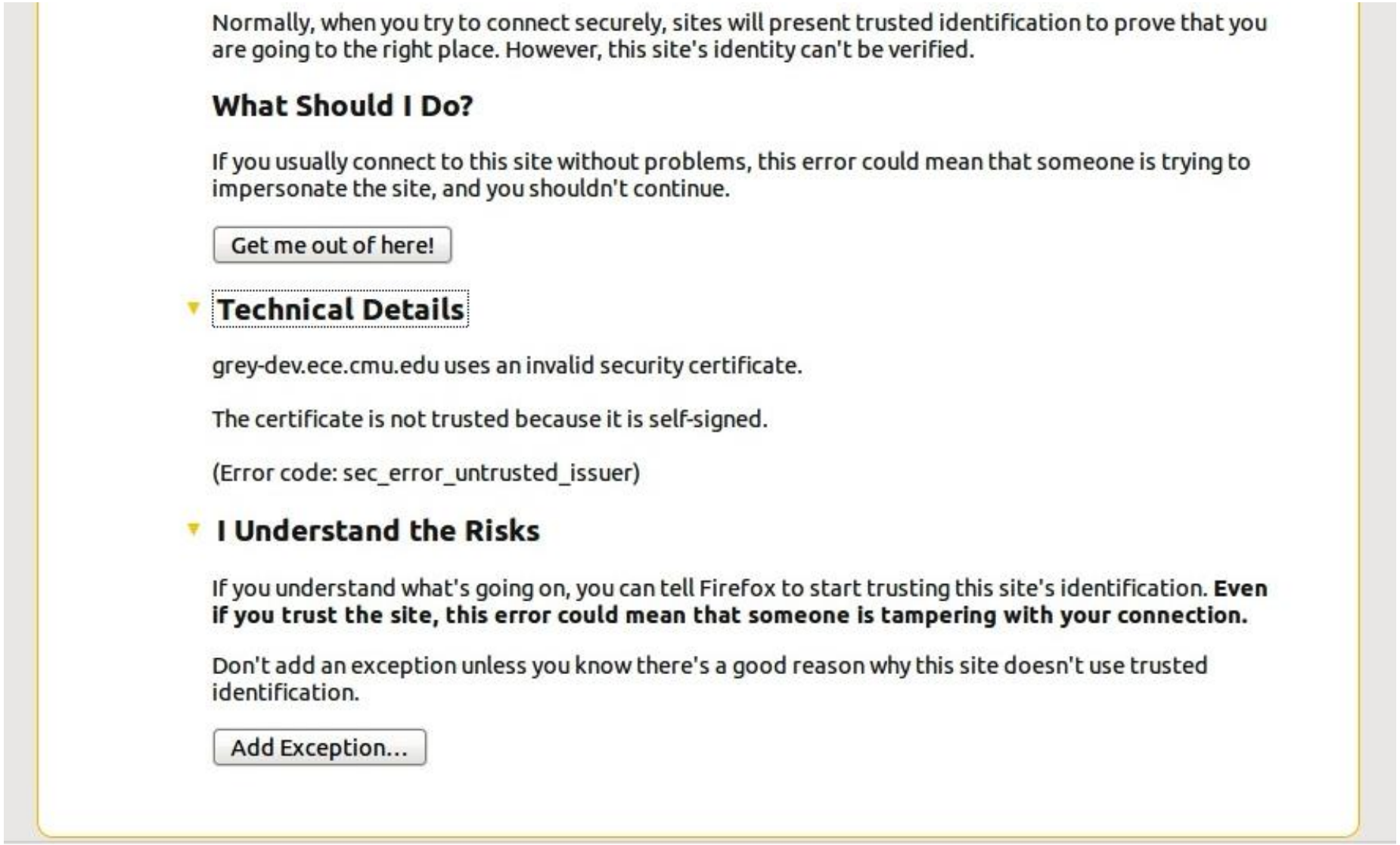
PERMANENT LINK TO THIS COMIC: HTTPS://XKCD.COM/2432/

Are dark patterns bad?

Security Dark Pattern



Security Dark Pattern

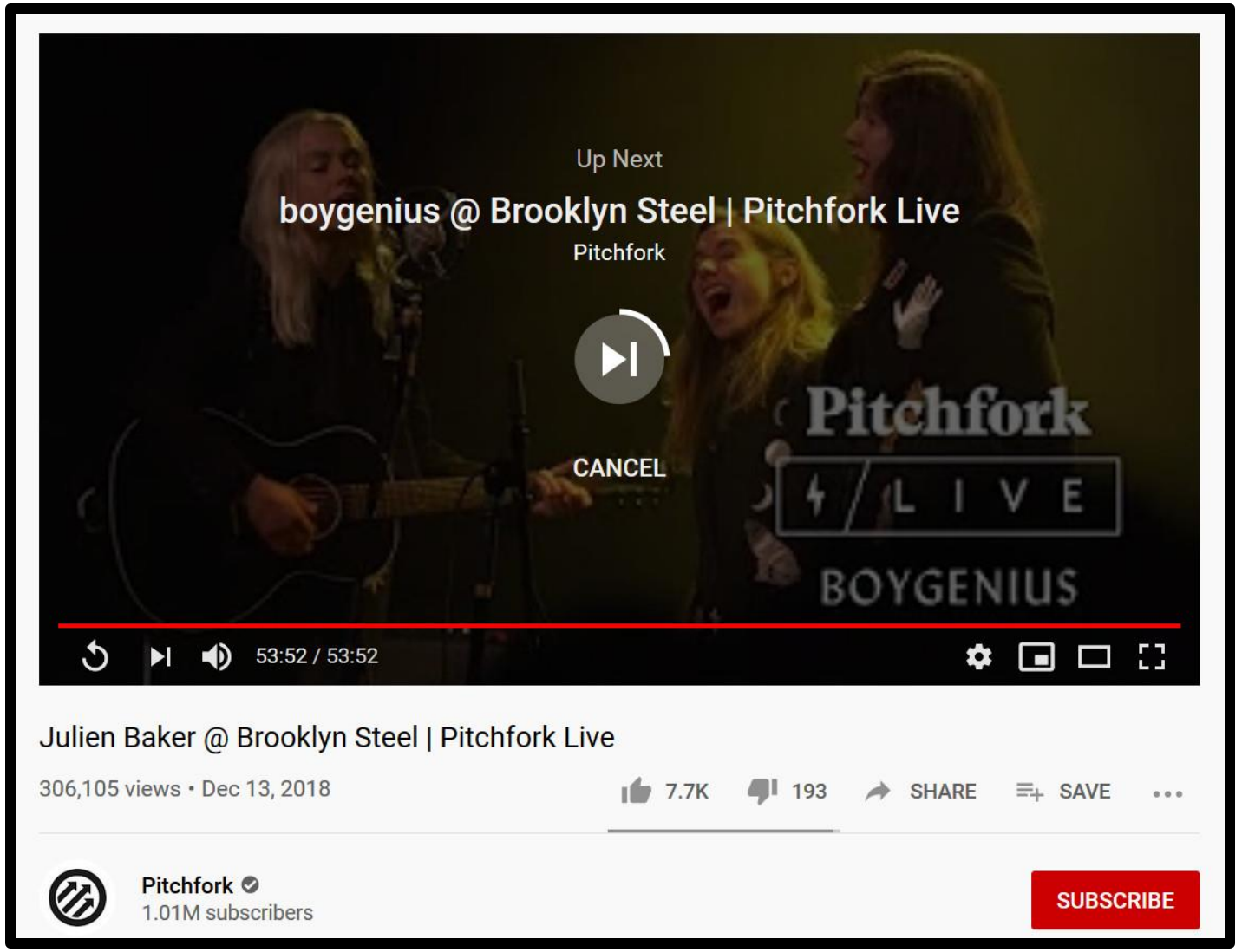


Interfaces that incentivize behaviors

Ways interfaces incentivize

- Social approval (like counts / view counts / follower counts)
- Karma / leaderboards / Reddit gilding
- Creating a Fear Of Missing Out (FOMO)
- “Only 1 left in stock”
- Forced obsolescence or devices that seem to slow down
- Intentionally showing inaccurate measurements

Does auto-play capture intent? Addiction?



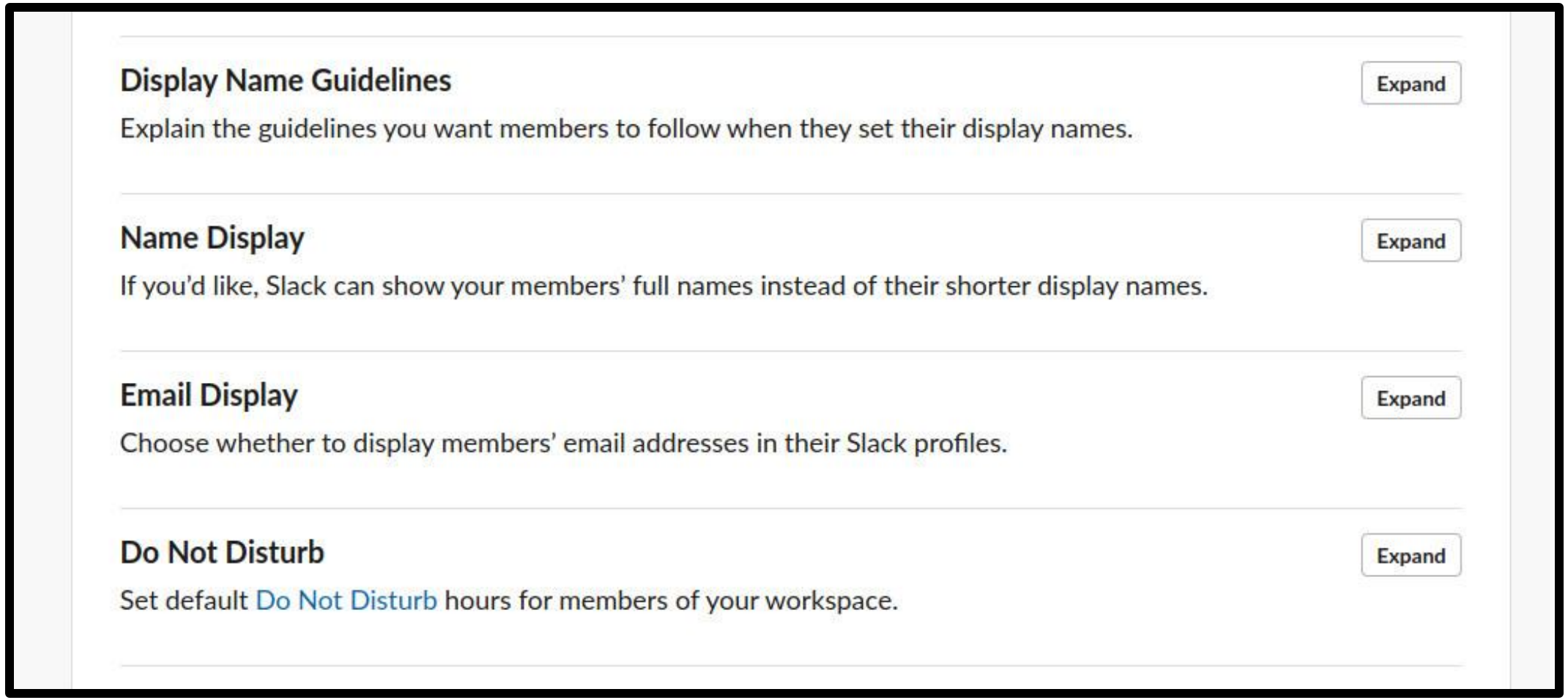
Can we think about data-relevant user interfaces in terms of power?

Power in interfaces

- Who chooses what questions are there?
- Who chooses default options / settings / option ordering?
- Who gets to add data?
  - Facebook shadow profiles (for advertising)
  - Tag others or upload photos of others in social media
  - Grubhub, Postmates, and DoorDash add restaurants without permission (see https://www.eater.com/2020/1/29/21113416/grubhub-seamless-kin-khao-online-delivery-mistake-doordash)
- Who chooses which data is right?
  - Wikipedia editing wars and controversial articles

Who sets policies?

- Slack organizational policies about names

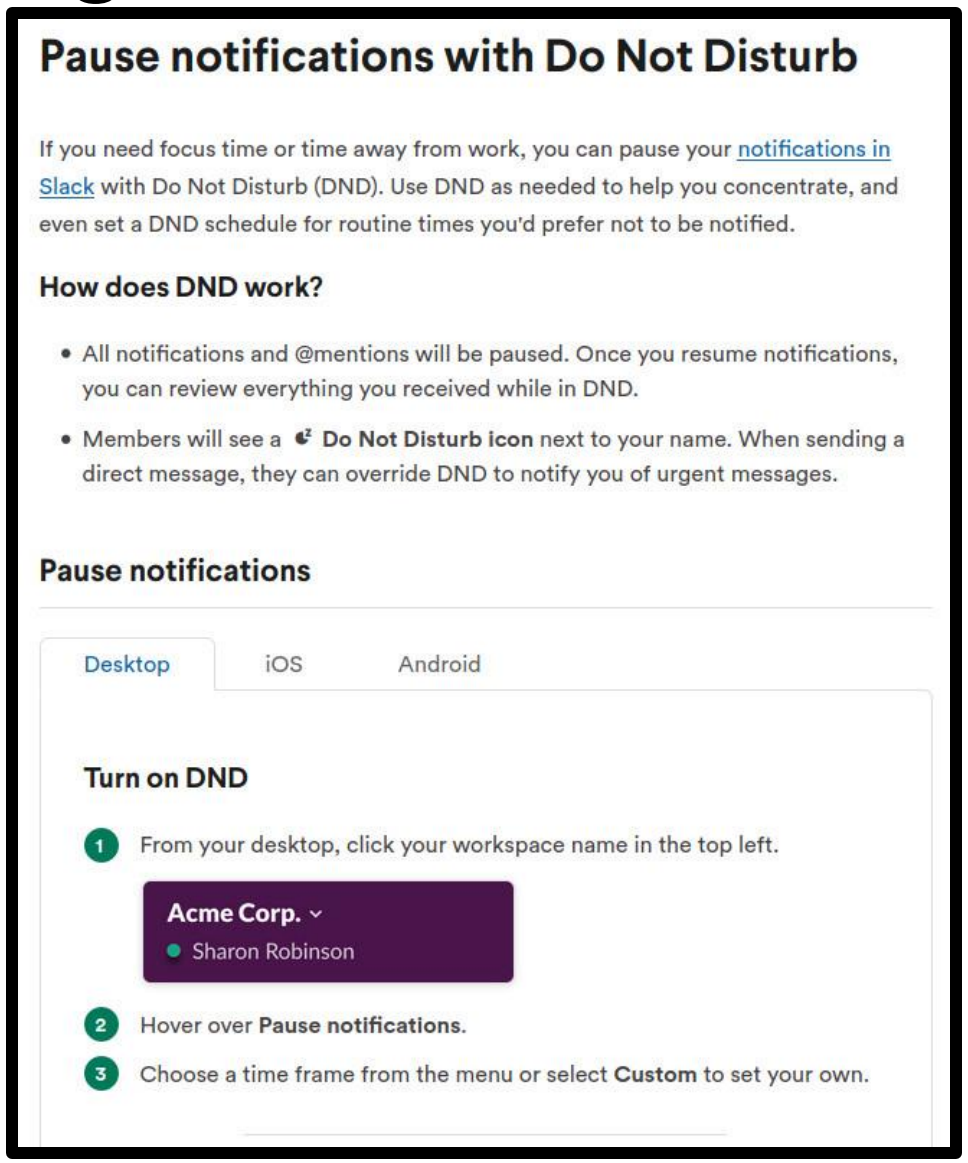


Respecting time and away-from-screen time

Expectations about types of notifications

- Email vs. text vs. in-app notification
- Are notifications *push* or *pull*?
- Does your device make a sound? Does it buzz?
- Is there an unread number on your screen?

Slack pausing notifications



Pause notifications with Do Not Disturb

If you need focus time or time away from work, you can pause your notifications in Slack with Do Not Disturb (DND). Use DND as needed to help you concentrate, and even set a DND schedule for routine times you'd prefer not to be notified.

How does DND work?

- All notifications and @mentions will be paused. Once you resume notifications, you can review everything you received while in DND.
- Members will see a **Do Not Disturb icon** next to your name. When sending a direct message, they can override DND to notify you of urgent messages.

Pause notifications

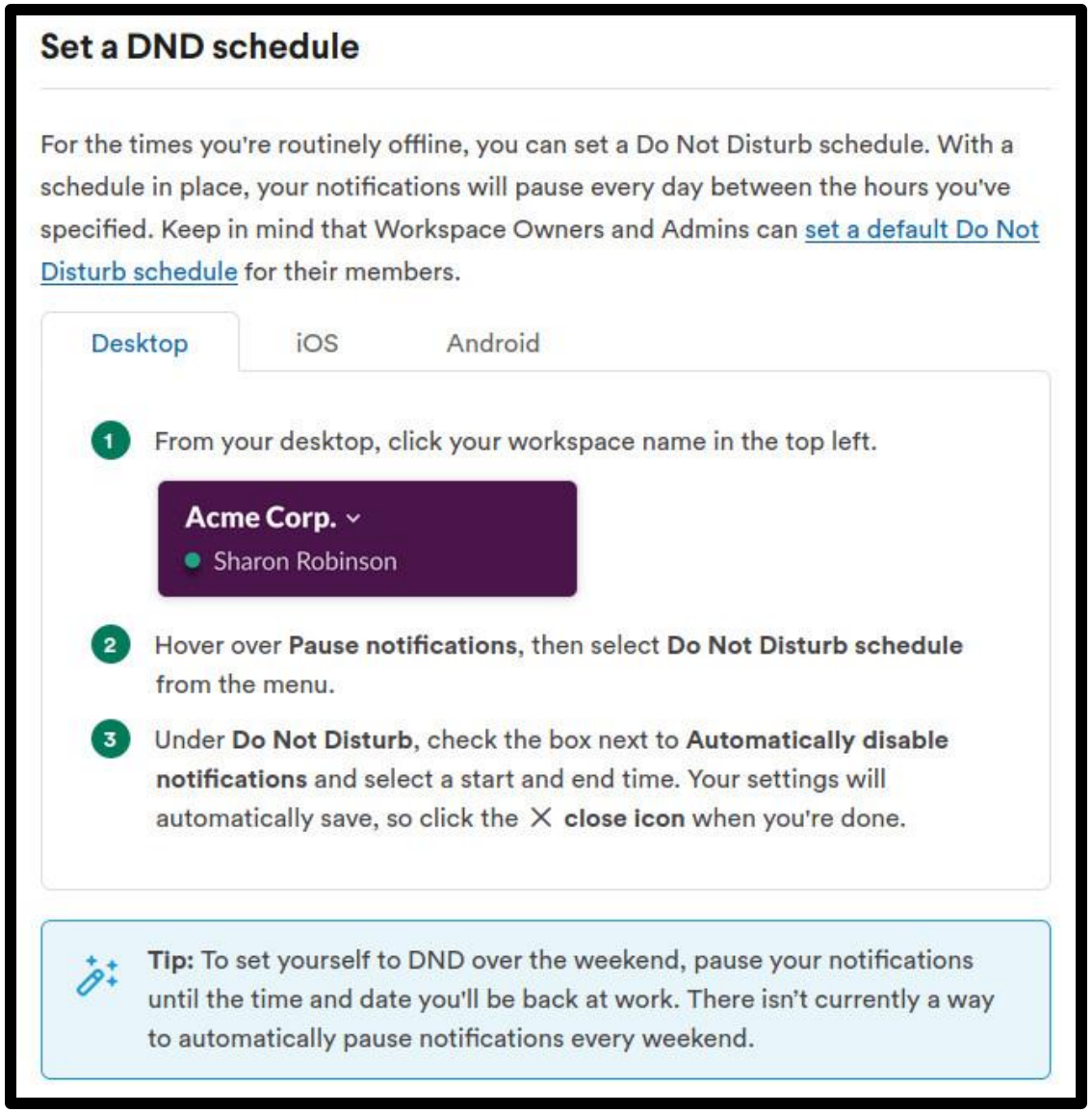
Desktop iOS Android

Turn on DND

1. From your desktop, click your workspace name in the top left.

2. Hover over **Pause notifications**.
3. Choose a time frame from the menu or select **Custom** to set your own.

Slack scheduling notification pauses



Set a DND schedule

For the times you're routinely offline, you can set a Do Not Disturb schedule. With a schedule in place, your notifications will pause every day between the hours you've specified. Keep in mind that Workspace Owners and Admins can set a default Do Not Disturb schedule for their members.

Desktop | iOS | Android

1. From your desktop, click your workspace name in the top left.

2. Hover over **Pause notifications**, then select **Do Not Disturb schedule** from the menu.
3. Under **Do Not Disturb**, check the box next to **Automatically disable notifications** and select a start and end time. Your settings will automatically save, so click the ✕ **close icon** when you're done.

Tip: To set yourself to DND over the weekend, pause your notifications until the time and date you'll be back at work. There isn't currently a way to automatically pause notifications every weekend.

Online status indicators (OSIs)

- Note that users and Slack organizations can disable OSIs

Visibility of online status / audit logs

- Organizations might want to know who is clocking in/out
- Zoom lets meeting hosts know when it is backgrounded