

# Engineering for Ethics, Privacy, and Fairness in Computer Systems

CMSC 25910 (“CS 259”)

Spring 2022

The University of Chicago



THE UNIVERSITY OF  
CHICAGO

# Course Overview

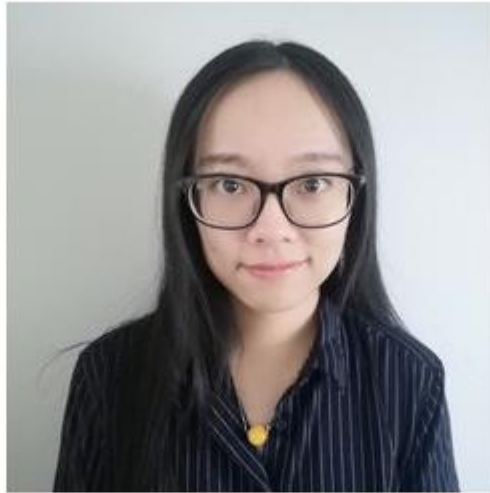
# Course Description

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**  
**Instructor**



**Weijia He**  
**TA**



**Kevin Bryson**  
**TA**

# CMSC 25910/25900 vs. DATA 25900

**CMSC 25910** (Blase): <https://classes.cs.uchicago.edu/archive/2022/spring/25910-1/>

Focus on computer systems / algorithms / engineering / implementation

8 programming assignments; 8 reading responses; 1 course project

Multiple languages, including Python, JavaScript, HTML, MySQL

(Highly similar to CMSC 25900 from Spring 2021)

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**DATA 25900** (Raul): <http://raulcastrofernandez.com/DATA-25900-Spring22/>

Focus on data science / data analysis

4 programming assignments; 6 reading responses; project; report; quizzes

Python using Jupyter Notebooks

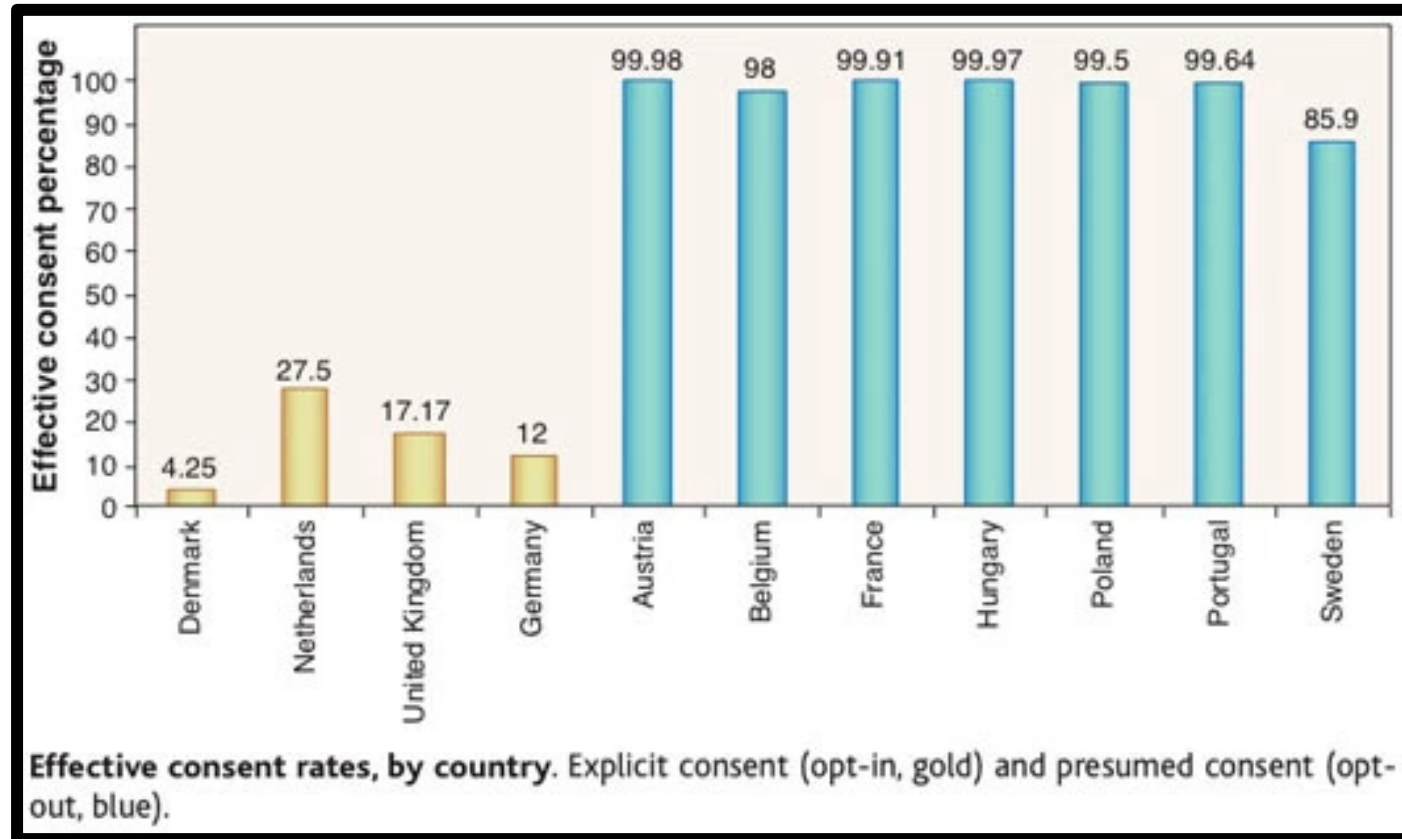
# Responsible and Respectful User Interfaces

***Should a product have  
an opinion?***



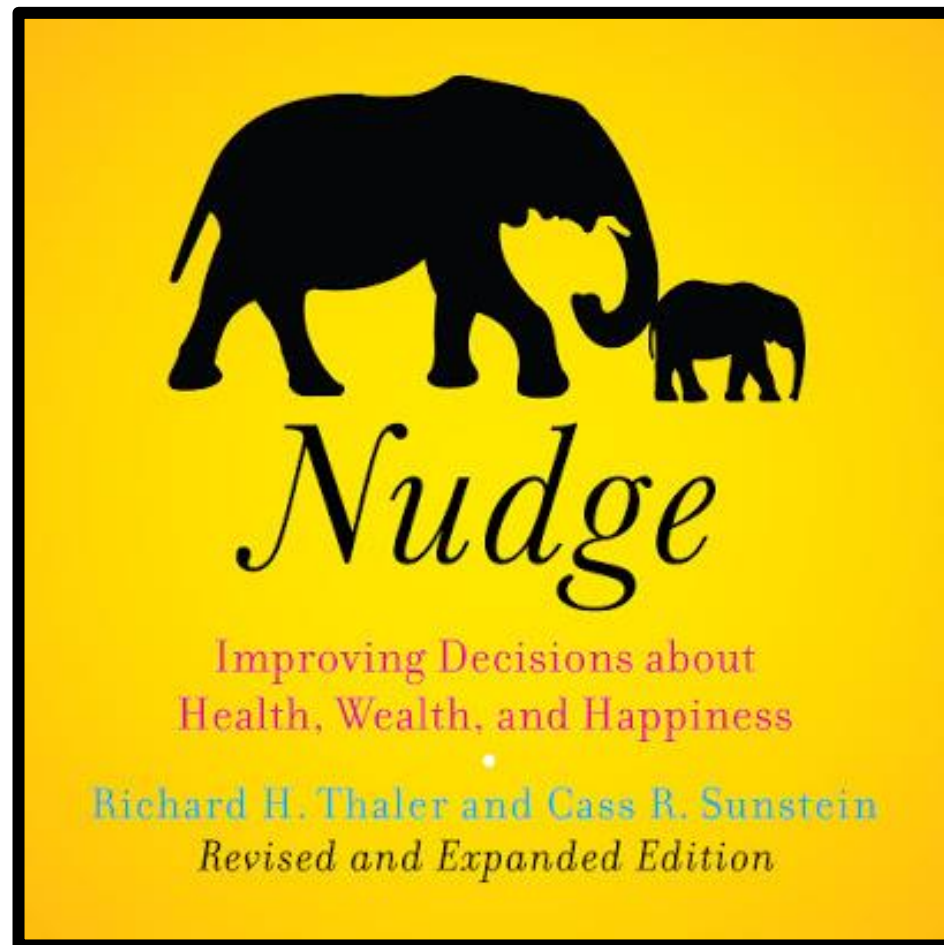
# **The power of defaults**

# The power of the default (organ donation)



# **Interfaces that influence**

# Behavioral nudging



# Dark patterns

# Taxonomy from [www.darkpatterns.org](http://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](http://www.darkpatterns.org)



Steve Bromley  
@Steve\_Bromley

"No, I don't like savings"

<p>Pro Monthly</p> <p><b>£11.99/mo</b></p> <p><i>£143.88 billed annually</i></p>	<p>50% OFF 3 Months</p> <p>Pro Monthly Plan + Discount</p> <p><b>£6.0/mo</b></p> <p><i>£101.92 billed annually / per license</i></p> <p>Save £ 17.99 per license</p>
<p>No, I don't like savings</p>	<p>Yes, Take Offer</p>



Mar 14, 2021

# Examples from [www.darkpatterns.org](http://www.darkpatterns.org)



Benedict Evans ✓

@benedictevans


You could write a book about all the dark patterns Amazon uses to promote Prime.

amazon.co.uk

WELCOME ADDRESS ITEMS WRAP DISPATCH PAY CONFIRM

**Benedict Evans, we're giving you immediate access to all Prime benefits with a 30-day FREE trial**

Try 30 days of Prime for free. You can cancel anytime.

		Without Prime
Prime Video	Included	Unavailable
Amazon Music	Included	Unavailable
Fast delivery on Prime eligible items	FREE	From £4.99

[Order without Prime. Decline free trial](#)

**Order Now with Prime**

Pay later



# Examples from [www.darkpatterns.org](http://www.darkpatterns.org)



Katie Dill

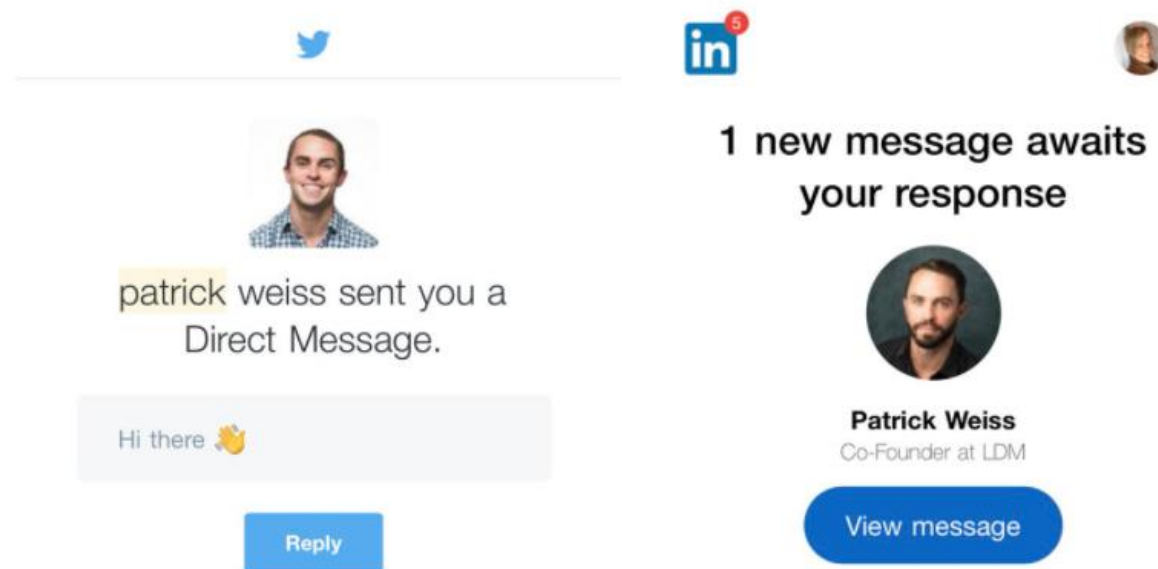
@lil\_dill

When engagement metrics drive the decision..

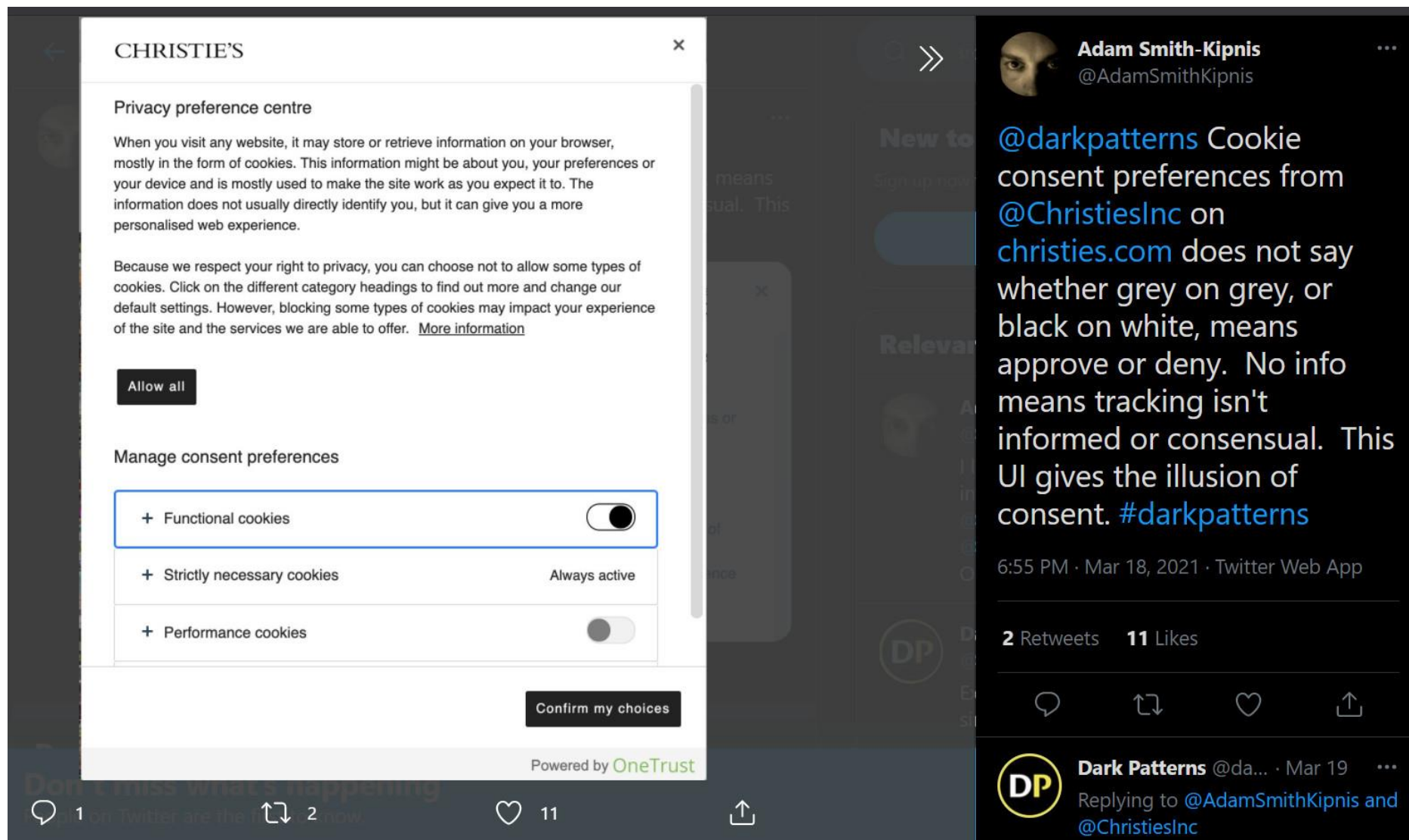
On the left, Twitter's email with the direct message text included.

On the right, LinkedIn's email forcing me to open the app to see the message. Drives me 🍌s every time!

Twitter, I appreciate you for putting the user first on this.



# Examples from [www.darkpatterns.org](http://www.darkpatterns.org)

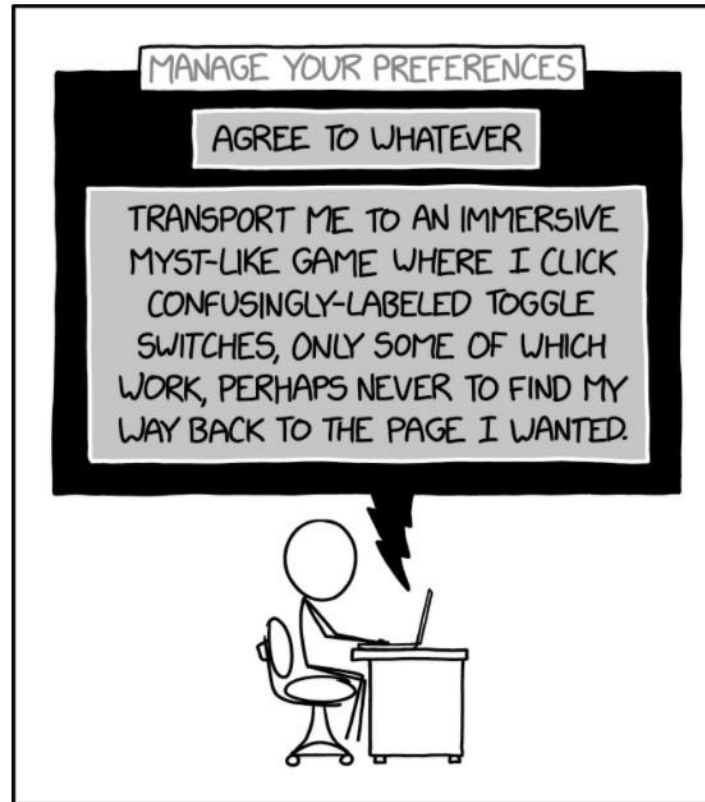


The image shows a screenshot of a Twitter thread. On the left, a modal window titled "CHRISTIE'S" is displayed, showing a "Privacy preference centre". The text explains that cookies are used for personalization and offers an "Allow all" button. Below this, there are three categories of cookies: "Functional cookies" (with a toggle switch), "Strictly necessary cookies" (labeled "Always active"), and "Performance cookies" (with a toggle switch). A "Confirm my choices" button is at the bottom. The modal is powered by OneTrust.

On the right, a tweet by Adam Smith-Kipnis (@AdamSmithKipnis) is shown. The tweet text reads: "@darkpatterns Cookie consent preferences from @ChristiesInc on christies.com does not say whether grey on grey, or black on white, means approve or deny. No info means tracking isn't informed or consensual. This UI gives the illusion of consent. #darkpatterns". The tweet is dated 6:55 PM · Mar 18, 2021 · Twitter Web App and has 2 Retweets and 11 Likes. A reply from Dark Patterns (@da...) is also visible, replying to @AdamSmithKipnis and @ChristiesInc.

# Meta-example from xkcd

## MANAGE YOUR PREFERENCES



***Are dark patterns bad?***

# Security “Dark Pattern”



## This Connection is Untrusted

You have asked Firefox to connect securely to **grey-dev.ece.cmu.edu**, but we can't confirm that your connection is secure.

Normally, when you try to connect securely, sites will present trusted identification to prove that you are going to the right place. However, this site's identity can't be verified.

### What Should I Do?

If you usually connect to this site without problems, this error could mean that someone is trying to impersonate the site, and you shouldn't continue.

Get me out of here!

- ▶ **Technical Details**
- ▶ **I Understand the Risks**

# Security “Dark Pattern”

Normally, when you try to connect securely, sites will present trusted identification to prove that you are going to the right place. However, this site's identity can't be verified.

## What Should I Do?

If you usually connect to this site without problems, this error could mean that someone is trying to impersonate the site, and you shouldn't continue.

Get me out of here!

## ▼ Technical Details

grey-dev.ece.cmu.edu uses an invalid security certificate.

The certificate is not trusted because it is self-signed.

(Error code: sec\_error\_untrusted\_issuer)

## ▼ I Understand the Risks

If you understand what's going on, you can tell Firefox to start trusting this site's identification. **Even if you trust the site, this error could mean that someone is tampering with your connection.**

Don't add an exception unless you know there's a good reason why this site doesn't use trusted identification.

Add Exception...

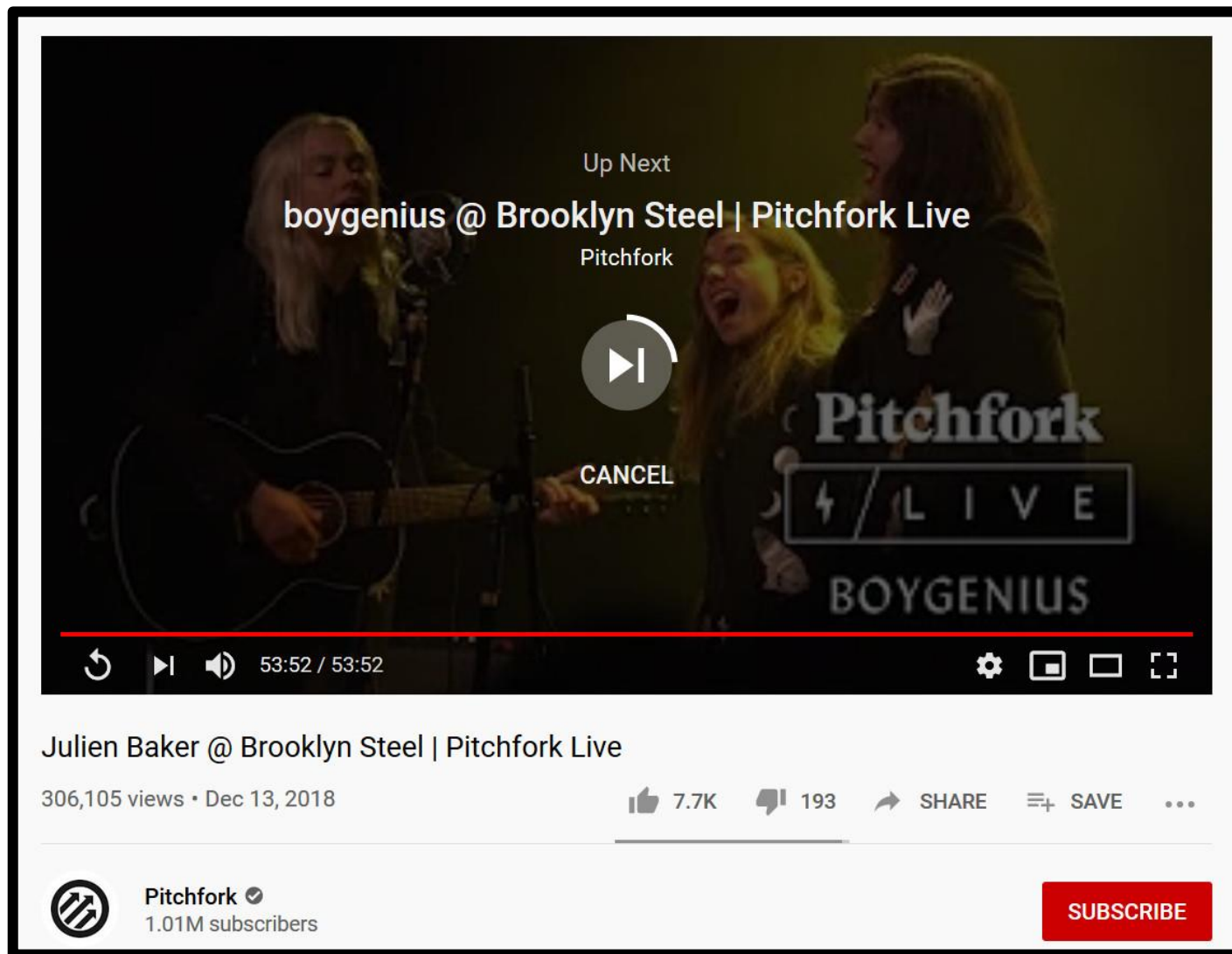
# **Interfaces that incentivize behaviors**

# 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?



Up Next

**boygenius @ Brooklyn Steel | Pitchfork Live**

Pitchfork

**▶**

CANCEL


Pitchfork  
LIVE  
BOYGENIUS

53:52 / 53:52

Julien Baker @ Brooklyn Steel | Pitchfork Live

306,105 views • Dec 13, 2018

7.7K 193 SHARE SAVE ...

 Pitchfork ✓  
1.01M subscribers

**SUBSCRIBE**

# Data coercion by user interfaces

The screenshot displays the 'Ethics20 Project Preferences' interface. At the top, it shows 'iQ Score: Great' and 'Published' status. The main area is titled 'Default Question Block' and contains three question configurations. The first question, 'Q1 Your name:', is selected with a checkbox and has a 'Text Entry' question type. The second question, 'Q2 Your UChicago email address (e.g., blase@uchicago.edu):', is also selected and has a 'Text Entry' question type. The third question, 'Q3 How excited or not excited are you to do your class project in each area below?', is not selected and has a 'Form' question type. On the right side, there is a 'Change Question Type' dropdown menu currently set to 'Text Entry'. Below this, there are radio button options for 'Text Type': 'Single Line' (selected), 'Multi Line', 'Essay Text Box', 'Form', and 'Password'. A red box highlights the 'Validation Options' section, which includes a checked 'Force Response' dropdown menu and other options like 'Request Response', 'Minimum Length', 'Maximum Length', 'Character Range', 'Content Validation', and 'Custom Validation'.

- Argument for not requiring: agency; privacy; legitimately missing
- Argument for requiring: preventing missing data, stopping laziness 26

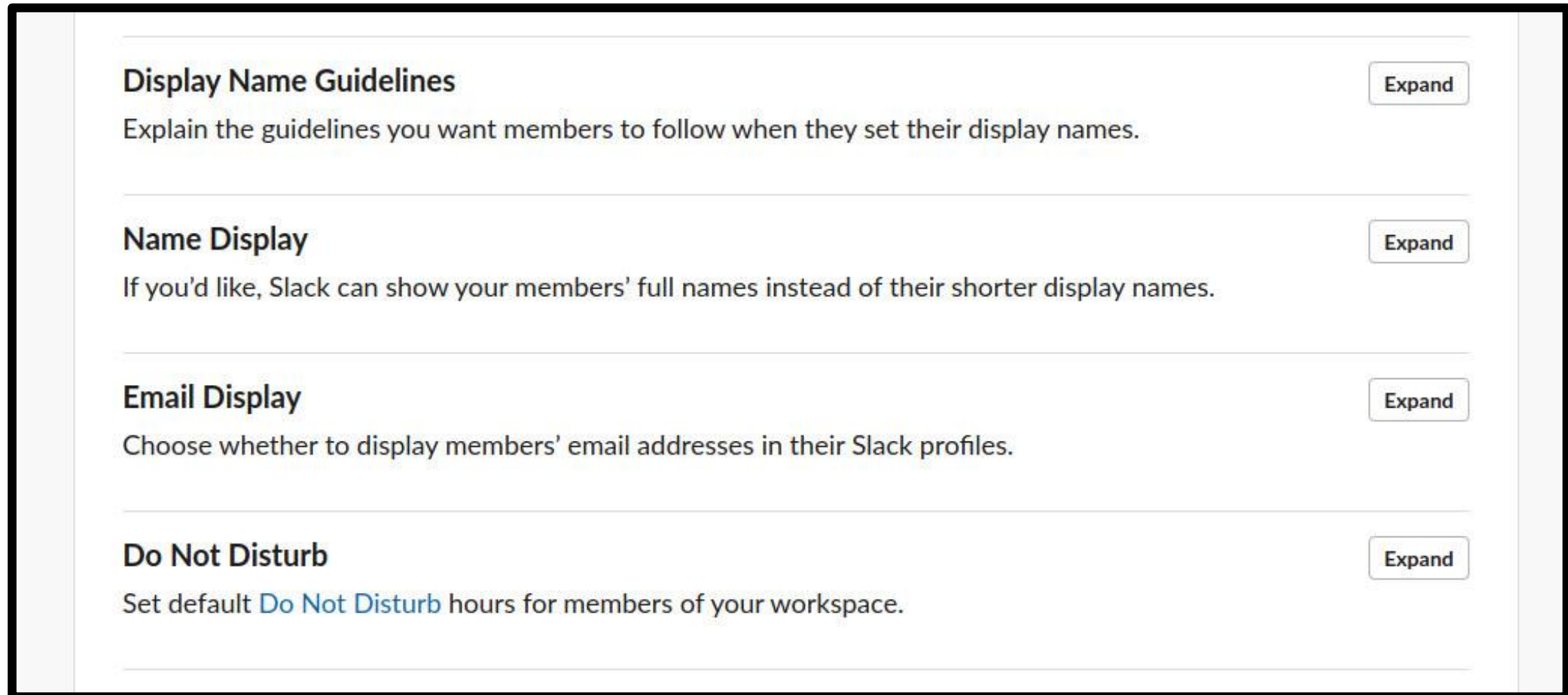
***Can we think about  
data-relevant user  
interfaces in terms of  
power?***

# 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



The screenshot displays a list of four organizational policy settings in Slack, each with a title, a brief description, and an 'Expand' button. The settings are: 'Display Name Guidelines', 'Name Display', 'Email Display', and 'Do Not Disturb'. Each setting is separated by a horizontal line.

Policy Name	Description	Action
Display Name Guidelines	Explain the guidelines you want members to follow when they set their display names.	Expand
Name Display	If you'd like, Slack can show your members' full names instead of their shorter display names.	Expand
Email Display	Choose whether to display members' email addresses in their Slack profiles.	Expand
Do Not Disturb	Set default <a href="#">Do Not Disturb</a> hours for members of your workspace.	Expand

# **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.

Acme Corp. ▾

● Sharon Robinson

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

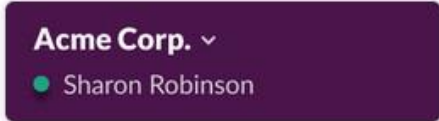



# Slack scheduling notification pauses

## 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