Designing for Mindful Human-Computer Interaction

Introduction

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About Me

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  o Research Topic: Digital Wellbeing
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About You (hello!)

What are your research interests?

What are your expectations for this course?

What (Not) to Call Mindful Human-Computer Interaction

Mindless sessions of **infinite scrolling** negatively influence our **Digital Wellbeing:**

- The temptation with the highest **self-control failure** rate is media use, which people fail to resist 76% of the time
- Excessive digital media use has been linked to various **attentional harms**, ranging from impaired focus during driving and social interactions to decreased productivity and sleep disturbances.
- While the impact of these individual instances might appear minor, their cumulative effect can hinder individuals from effectively managing their time in alignment with **their personal goals and values.**

What (Not) to Call Mindful Human-Computer Interaction

THIS IS NOT BY ACCIDENT

- A stimulus leads to behavior when reinforced by a reward:
  - *"The knowledge that rewards on an intermittent schedule prompt more behavior than ones on a regular schedule, helps explain why one should expect users to visit Facebook more often when rewarding content appears at random times as opposed to batched together every four hours"*
    Kai Lukoff - Designing to Support Sense of Agencyfor Time Spent on Digital Interfaces

- The Fogg Behavioral Model and Nir Eyal's Hooked (1) trigger → (2) action → (3) variable reward → (4) investment
  - *"The added "investment" phase is getting the user to spend resources (e.g., time, money, social proof, or create content) in the product."*
    Kai Lukoff - Designing to Support Sense of Agencyfor Time Spent on Digital Interfaces

What Do <u>You</u> Mean For Digital Wellbeing?

https://polito.padlet.org/albertomonge/wvk9r31t0bzuu8dk

Digital Wellbeing Definitions

- "The impact of digital technologies on what it means to live a life that is good for a human being in an information society."

  Christopher Burr, Mariarosaria Taddeo, and Luciano Floridi. 2020. The Ethics of Digital Well-Being: A Thematic Review. Science and Engineering Ethics.

- " We define digital wellbeing as a state where subjective wellbeing is maintained in an environment characterized by digital communication overabundance. Within a condition of digital wellbeing, individuals are able to channel digital media usage towards a sense of comfort, safety, satisfaction and fulfilment. These conditions are favoured both by specific individuals' skills and by the socio-cultural context they live in. "

  From https://www.digitalwellbeing.eu

- "It is about crafting and maintaining a healthy relationship with technology. It's about how technology serves us and moves us towards our goals, rather than distracting us, interrupting us or getting in the way. Being in control of technology enables us to use its full potential and gain all the benefits of it."

  Google

Attention Economy

- Why is our digital well-being undermined by contemporary technology?

- Most of the contemporary tech-companies adopt a business model that is called the "Attention Economy"
  - Our **attention** is transformed into a **currency**
  - We **«pay»** for a service with the time we spend on it
  - Tech companies **may sell** our attention (and our data, sometimes) to advertising companies

- This business model is convenient
  - **Alphabet** (the company that owns Google) is worth $1 trillion
  - **Meta** (which owns Facebook, Instagram and WhatsApp) is worth about $700 billion

Attention Economy

- Traditional advertising on TV, newspapers, magazines, or billboards is very straightforward:
  - everyone sees the same ads, and the ads don't feed precise data back to advertisers about the people looking at them.

- Digital services like social media have several unique advantages that make advertising vastly more powerful:
  - **artificial intelligence:** digital services can predict what ads can be most effective;
  - **personalization:** ads are personalized according to our previous digital interactions.

Attention Economy

Digital Wellbeing: a Ph.D. Course

- Growing interest in **research**!
  - Digital self-control tools, dark patterns, technology "addiction" …
  - you are "training" as researchers, after all

- The topic is being recognized by **tech companies**, too:
  - The Digital Wellbeing by Google (https://wellbeing.google/)
  - Apple Screen Time (https://support.apple.com/en-us/HT208982)

- The course will give some starting points and directions
  - research-based (exploiting the HCI perspective!)
  - if you want, you can go deep on different topics
  - the tools, frameworks, and guidelines presented in this course can be applied to your research

Some Other Relevant Courses @ PoliTo

- DIGITAL WELLBEING
  - Benessere Digitale, 6 credits, B.S. in Computer Engineering

- HCI
  - Human-Computer Interaction, 6 credits, M.S. in Computer Engineering
  - Human-Machine Interaction, Ph.D. course
  - Human-AI Interaction, Ph.D. course

Course Logistics

"Teaching Philosophy"

- Put persons first!
  - different backgrounds and expectations in this room
  - how to do something "good" for all of you?

- Interactivity

- Learn by doing, do by learning
  - mix of lectures and "practical" exercises
    - programming included, if you want!

Course Information

- Material
  - https://elite.polito.it ->Teaching -> Current Courses -> 01GOFIU – Designing for Mindful Human-Computer Interaction
  - short link: https://bit.ly/polito-mindfuldesign
  - Slides, exercises, etc.

- Students are encouraged to attend the classes with their laptops, to work on the proposed exercises.

The Plan: Overview

- 5 classes
  o around 50% interactive lectures and 50% exercises

- 4 hours per class

- Schedule
  1. 16/01/2025 h. 13:00-17:00, LAB8 (DAUIN)
  2. 23/01/2025 h. 13:00-17:00, LAB8 (DAUIN)
  3. 30/01/2025 h. 13:00-17:00, LAB8 (DAUIN)
  4. 06/02/2025 h. 13:00-17:00, LAB8 (DAUIN)
  5. 13/02/2025 h. 13:00-17:00, LAB8 (DAUIN)

TODO: Group Composition

- Form a group for the upcoming activities

- **2-3 people** per group

- Fill up this spreadsheet:
  - https://docs.google.com/spreadsheets/d/1KNMhNyGgSJh_q7nas4qoCxOMSSJ9wPr7OksWgHcoqX0/edit?usp=sharing
  - **Deadline**: Next week!

The (Tentative) Detailed Plan

Class	Type	Topic
1	Lecture	Course introduction, fundamentals on persuasive technology and the Attention Economy
2	Exercise	**Reading Panels.** Finalize group formation.
	Lecture	The end-user perspective: tools for digital self-control
3	Lecture	The designer perspective: Designing for the good the Digital Attention Heuristics
	Exercise	**Heuristic Evaluation**
4	Lecture	The policy perspective: regulating the Attention Economy
	Exercise	**Case Study: Prototyping for the Digital Wellbeing**
5	Exercise	**Case Study (cont'd)**
	Exercise	**Case Study (cont'd). Final Presentation.**

Exam

Three assignments to be carried out **in class** (and partially at home, if you need more time):

1. Assignment 1 - Reading Panel (individual, <u>next week</u>) -> to be prepared before the class!

2. Assignment 2 - Heuristic Evaluation (in group, class #3)

3. Assignment 3 - Case Study Prototype and Presentation (in group, class #4 and #5)

To **pass** the exam:
- o   2 assignments completed with success – one being the case study
- o   **MERIT** with all the three assignments (successfully) done

Logistic

- The preferred way to follow the course is *in person.*

- However, "life happens":
  o Lectures will be video-recorded and shared after each class.
  o Group exercises and presentations can have *hybrid* groups, with <u>at least</u> one person of the group in the room.

About Programming…

- Do you know "enough" programming?

- You need to know some JavaScript (preferably)
  - other languages may be ok (e.g., Python, Java, …)

- Needed for the **case study,** only
  - We will provide examples and projects to get started with
  - We will be here (obviously!)

Questions?

Fundamentals

Technology Overuse and Technology "Addiction"

- The "Digital Wellbeing" term was made famous by Google some years ago:
  - *"We're committed to giving everyone the tools they need to develop their own sense of* **digital wellbeing**. *So that life, not the technology in it, stays front and center"*

- However, researchers in different areas, including HCI, are discussing the negative aspects of **overusing technology** since decades.

Technology Overuse and Technology "Addiction"

- Technology has **tons of positive effects** on people and society, including positive effects on people's subjective wellbeing.

- An excessive use of devices like smartphones or digital services like social networks, however:
  o induces severe breakdowns of **self-regulation**;
  o is associated with negative effects on **mental health** and **social interaction**;
  o **distracts** users from their current goal, e.g., studying or working;
  o affects like physical activities like **sleeping**.

Technology Overuse and Technology "Addiction"

- In the past decades, several studies used a **"technology addiction"** framing to describe compulsive behaviors when using devices, digital services, and the Internet in general.
  - Several tools and validates scales to assess addiction exists as well, e.g., the *Smartphone Addiction Scale* and the *Facebook Addiction Scale.*

- The idea of considering technology use under the umbrella of clinical addictions is however currently debated:
  - Lanette et al., *How Much is 'Too Much'?: The Role of a Smartphone Addiction Narrative in Individuals' Experience of Use.* CHI 2018. https://doi.org/10.1145/3274370

Digital Self-Control Tools

- Right now, the main strategy to support users' digital wellbeing is the develomplemt of **Digital Self-Control Tools (DSCTs):**
  - dedicate, additional tools (apps, browser extensions, …) to help people **self-regulate** their use of technology;
  - propose interventions to **reduce/block** problems (blocking apps, usage timers, etc.).
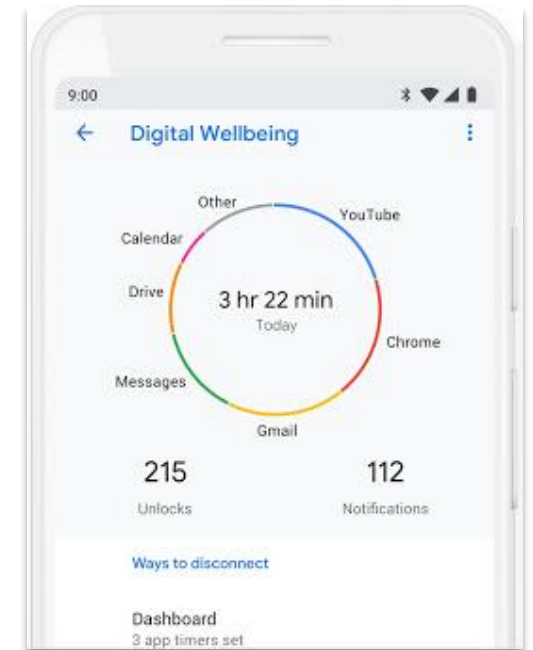
# Towards Designing for Digital Wellbeing

Inspired by Donella Meadows' 12 Leverage Points to Intervene in a System
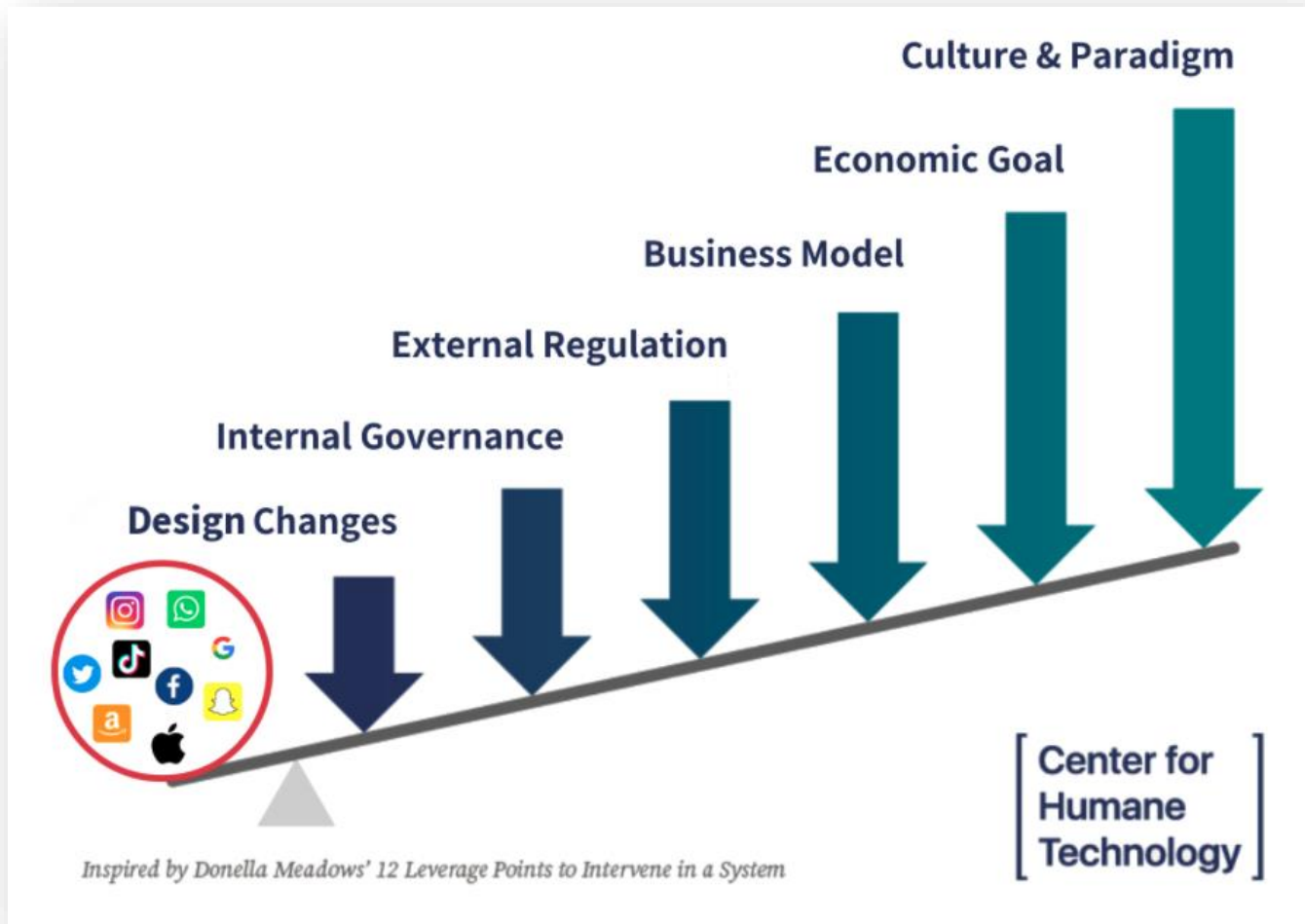
Leverage points (LP) for intervening in the extractive tech ecosystem.

https://www.humanetech.com/

The Leverage Point Framework: Design Changes

- Adjustments that technology companies themselves make in the visual design and user experience of their platforms:
  - they can have **material impact;**
  - they do not address **root-cause issues.**
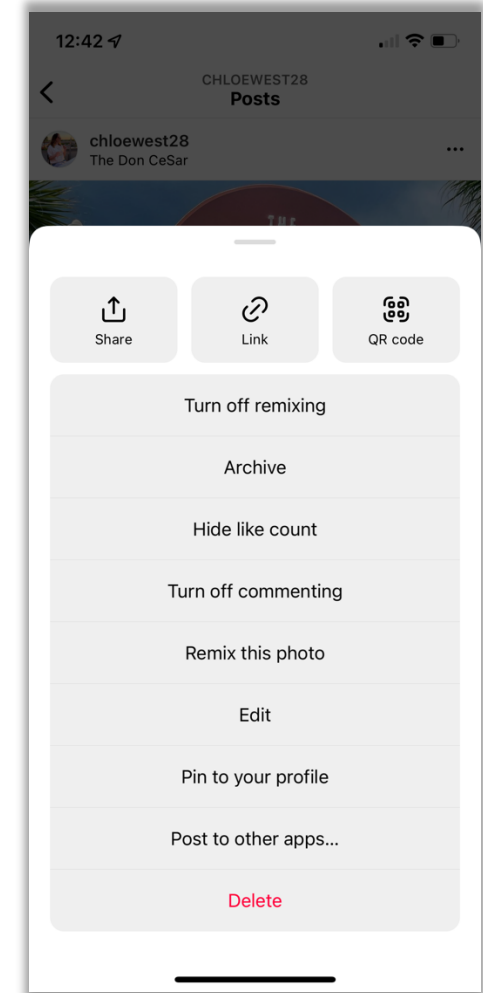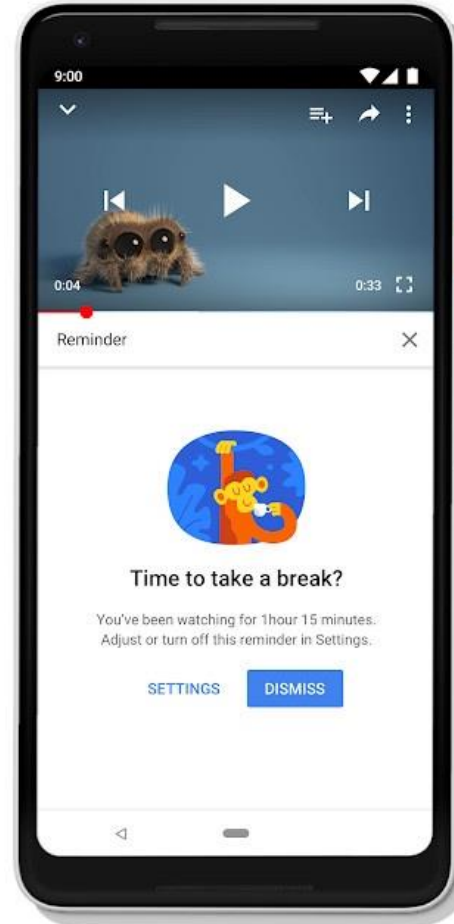
The Leverage Point Framework: Internal Governance

- Implemented by decision-makers within platforms to shift how internal systems and structure operate. Examples:
  - creating **boards** to supervise the safety of desing features;
  - changing **employee bonuses** to reward actions that increase peolple's digital wellbeing.

RESPONSIBILITIES ›

Artificial Intelligence at Google: Our Principles

Google aspires to create technologies that solve important problems and help people in their daily lives. We are optimistic about the incredible potential for AI and other advanced technologies to empower people, widely benefit current and future generations, and work for the common good.

TECHNOLOGY

Google hired Timnit Gebru to be an outspoken critic of unethical AI. Then she was fired for it.

Gebru is one of the most high-profile Black women in her field and a powerful voice in the new field of ethical AI, which seeks to identify issues around bias, fairness, and responsibility.
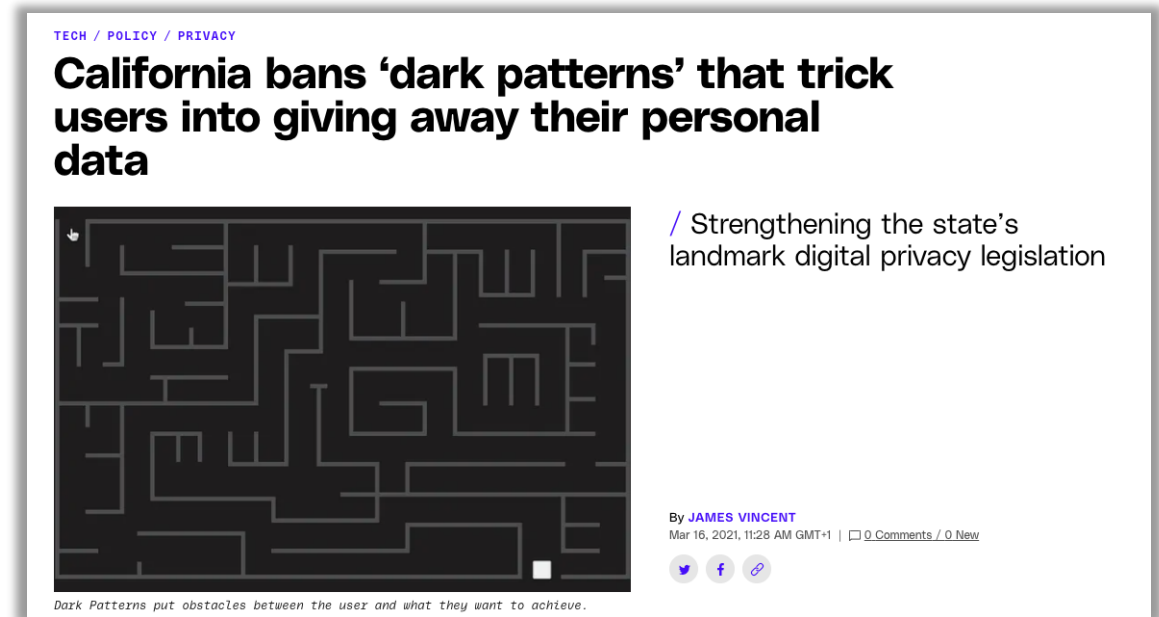
By Nitasha Tiku

December 23, 2020 at 2:15 p.m. EST

The Leverage Point Framework: External Regulation

- Outside forces, such as legislators or regulators, that set up **boundaries** for tech companies and ban unsafe business practices:
  - take **longer** to enact;
  - more **enduring** and with a **higher** impact.

TECH / POLICY / PRIVACY

California bans 'dark patterns' that trick users into giving away their personal data

/ Strengthening the state's landmark digital privacy legislation

By JAMES VINCENT
Mar 16, 2021, 11:28 AM GMT+1 | ☐ 0 Comments / 0 New

Dark Patterns put obstacles between the user and what they want to achieve.

The Leverage Point Framework: Business Model

- Changes that shift the fundamental operations and profit structures of a firm:
  - a company that moves to a **subscription model** instead of exploiting ads, only;
 - solutions to **redirect flows of capital** from investors.

TECH

Apple is turning privacy into a business advantage, not just a marketing slogan

PUBLISHED MON, JUN 7 2021·6:52 PM EDT | UPDATED TUE, JUN 8 2021·12:30 AM EDT

Kif Leswing
@KIFLESWING

SHARE

The Leverage Point Framework: Economic Goal

- **Redefining economic success** can radically alter how systems behave:
  - this happens when economic systems reward new, more humane ways of creating value;
  - …or when they **penalize** harms that were previously ignored

The Leverage Point Framework: Culture & Paradigm

- Changes that are the highest leverage point and generally the most difficult to shift:
  - they need a widespread change in core beliefs, values, and operating norms;
  - they need a mass shift in consumer sentiment, such as with Big Tobacco and cigarettes.
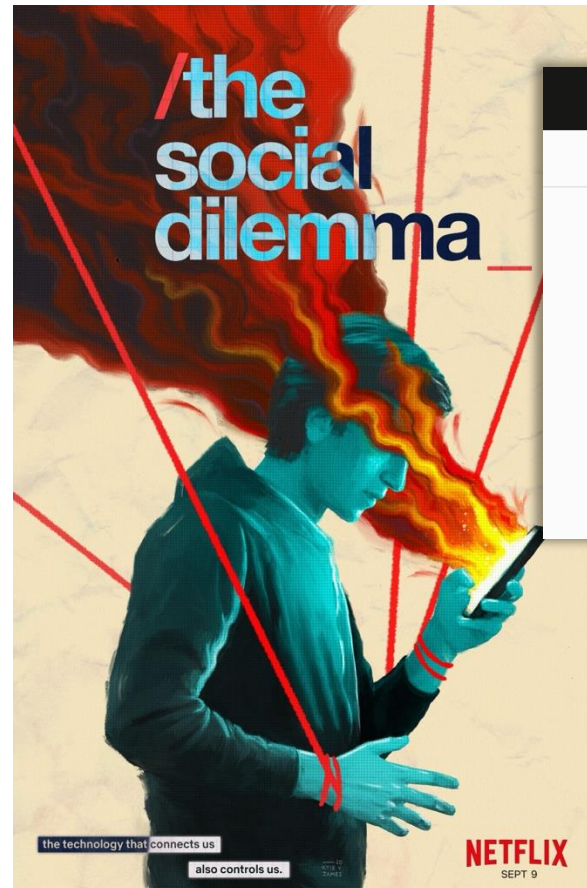
Persuasive Technology

- Persuasive technology is broadly defined as technology that is designed to change attitudes or behaviors of the users through persuasion and social influence.

- Defined by Brian **Jeffrey Fogg**, a behavior scientist at Stanford University.

- According to the original definition, persuasive technology is used to influence user's behavior without explicitly using **deception or coercion.**

Exploiting Psychological Vulnerabilities and Biases

▪ A cognitive bias is a **systematic error** in thinking that occurs when people are processing and interpreting information in the world around them and affects the decisions and judgments that they make.
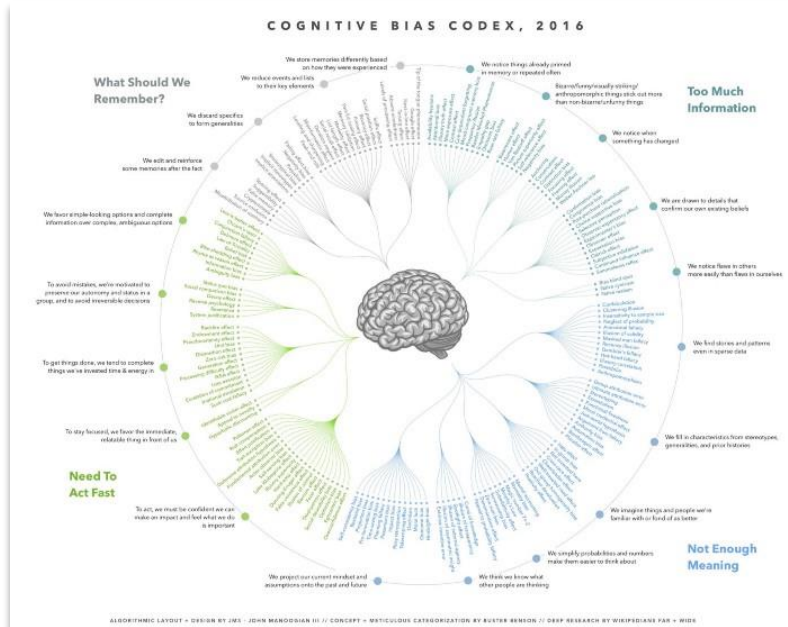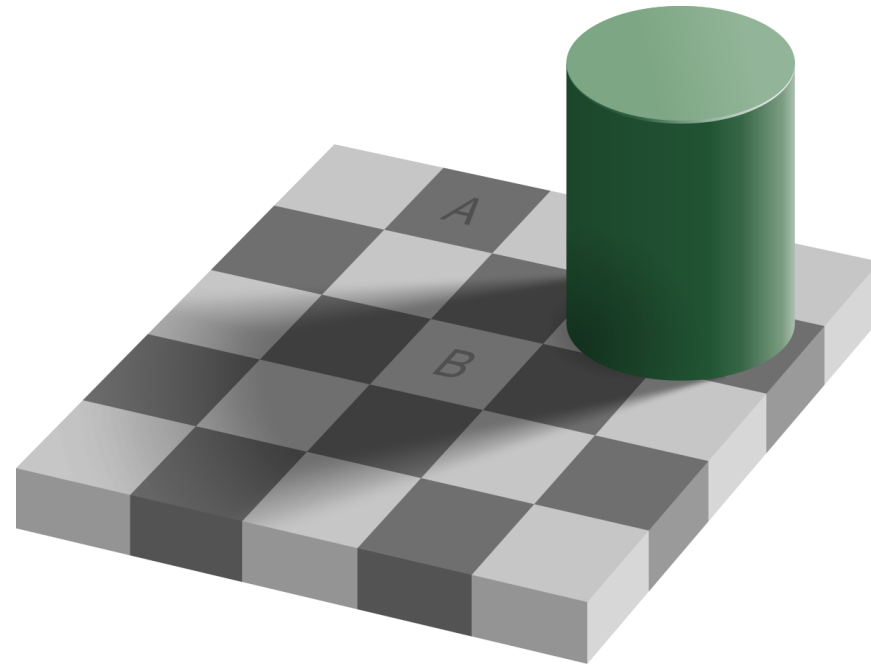

https://commons.wikimedia.org/wiki/File:Cognitive_bias_codex_en.svg

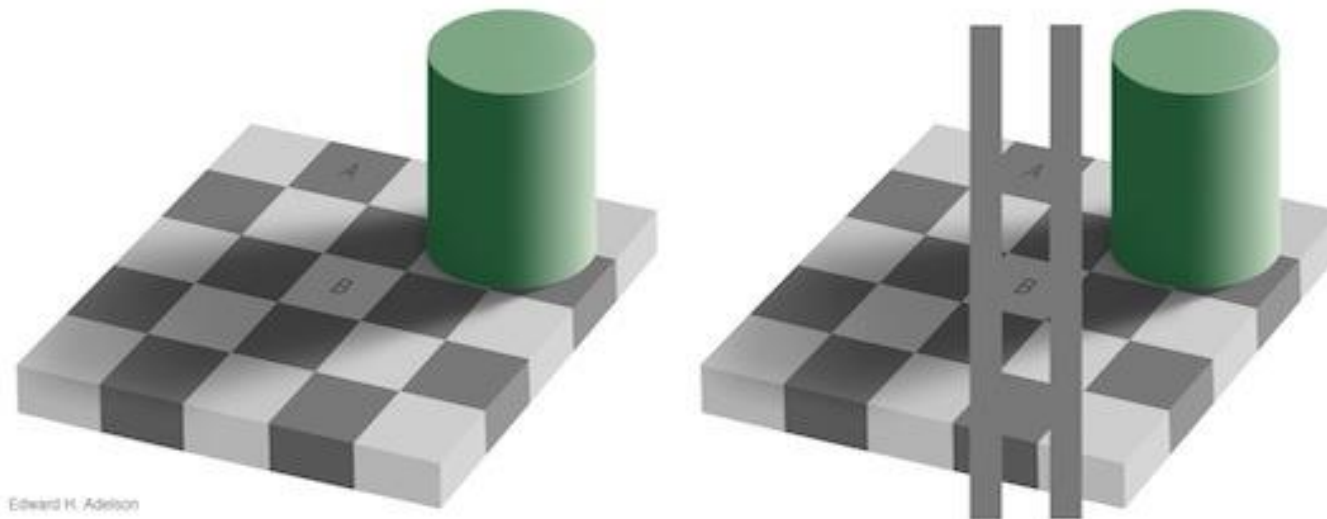https://betterhumans.pub/cognitive-bias-cheat-sheet-55a472476b18

Exploiting Psychological Vulnerabilities and Biases

- **EXAMPLE:** What we perceive as true depends on the context in which we see it!

Exploiting Psychological Vulnerabilities and Biases

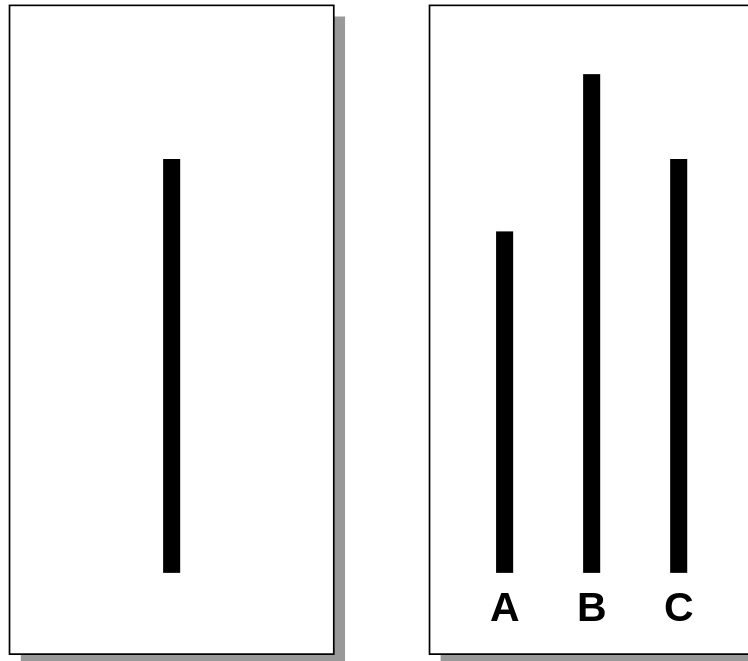- **EXAMPLE:** What we perceive as true depends on the context in which we see it!

Checkershadow Illusion

Exploiting Psychological Vulnerabilities and Biases

- **EXAMPLE:** match a reference line (on the left) to one of three comparison lines (on the right)

A   B   C

Exploiting Psychological Vulnerabilities and Biases

- **EXAMPLE:** match a reference line (on the left) to one of three comparison lines (on the right):

  o In the Solomon Asch experiment, participants were asked to perform the task after having listened to some actors giving a wrong answer.

  o Over 36% of the experiment participants chose the wrong line!

  o This is a form of **conformity bias**: we tend to want to conform to the social norms around us.
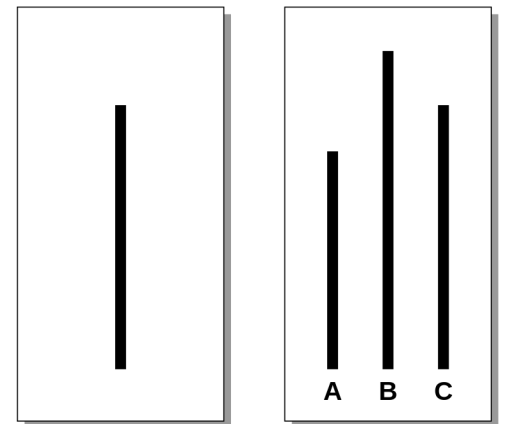
The Role of Persuasive Technology in the Attention Economy

- **Attention** is one of the most valuable resources of the digital age:
  - most of the contemporary digital services, e.g., social networks, are free! How do we pay for them?

- Researchers point out that this attention capture is *by design.*

- Through persuasive technology, digital platforms can **deliberately** change users' opinions, attitudes, or behaviors to meet their goals:
  - because social media apps are fighting for our attention, they tend to promote more provocative, attention-grabbing content;
  - social networks and video streaming platforms make extensive use of attention-capture **"dark patterns"**, e.g., infinite scroll and content autoplay.
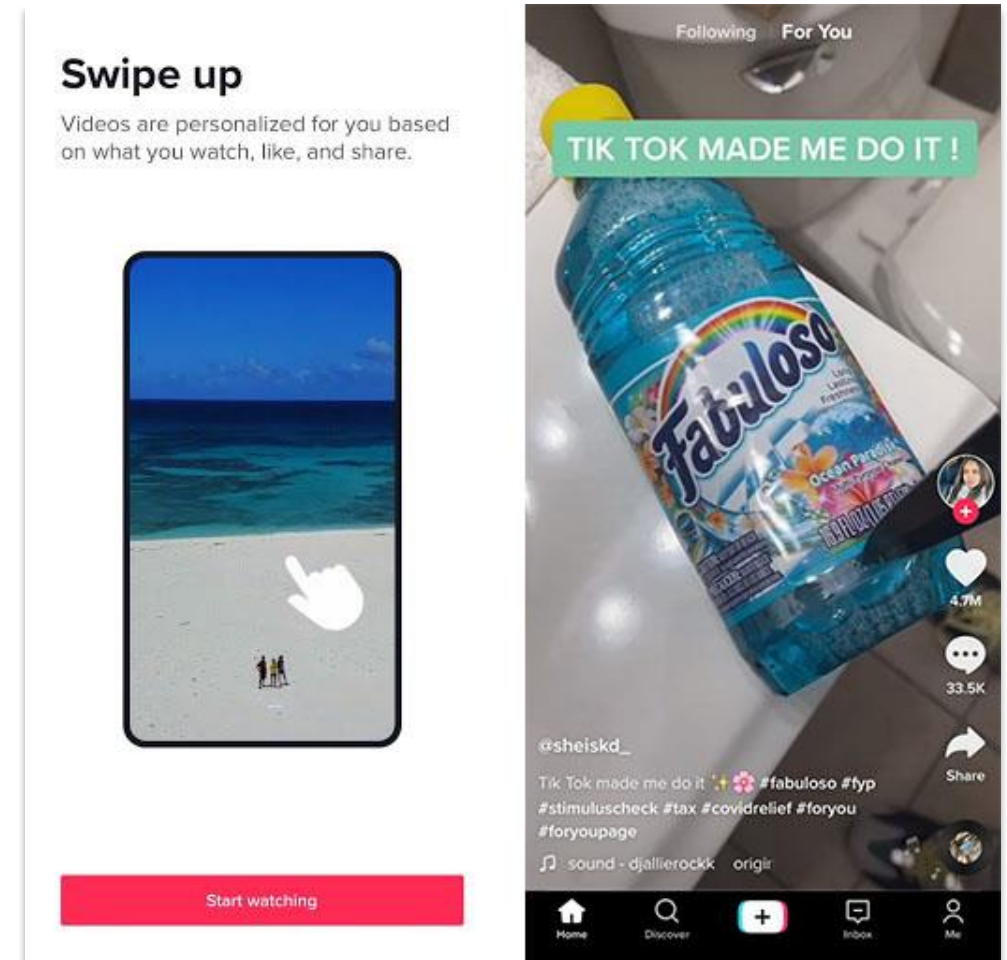
The Role of Persuasive Technology in the Attention Economy

- **EXAMPLE:** ByteDance, the company that owns TikTok and several other apps worldwide, is a persuasive AI company – not a social media company.
  - Their success as a business comes from the sophisticated algorithms their apps are built on.
  - They study how people use TikTok, considering everything about their users from the websites they browse to how they type to keystroke rhythms and patterns.
  - These algorithms have made ByteDance the most valuable startup in the world.

SOURCES:
https://www.humanetech.com/youth/persuasive-technology

https://www.bloomberg.com/news/articles/2021-04-22/who-is-tiktok-owner-bytedance-the-chinese-tech-giant

The Role of Persuasive Technology in the Attention Economy

- Persuasive technology is designed to exploit psychology and push users towards certain behaviors:

  o **value-alignment problem:** the challenge of ensuring that the values and goals of an intelligent system are aligned with those of the people who are building, using, or interacting with the system.

- Examples of challenging value-alignment problems in our context :

  o the possibility of new comments or "likes" keeps us compulsively monitoring for updates, seeking feelings of pleasure and reward.

  o design features like infinite scroll (where when you reach the bottom of the page and more content loads automatically) keep us continuously engaged.

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