



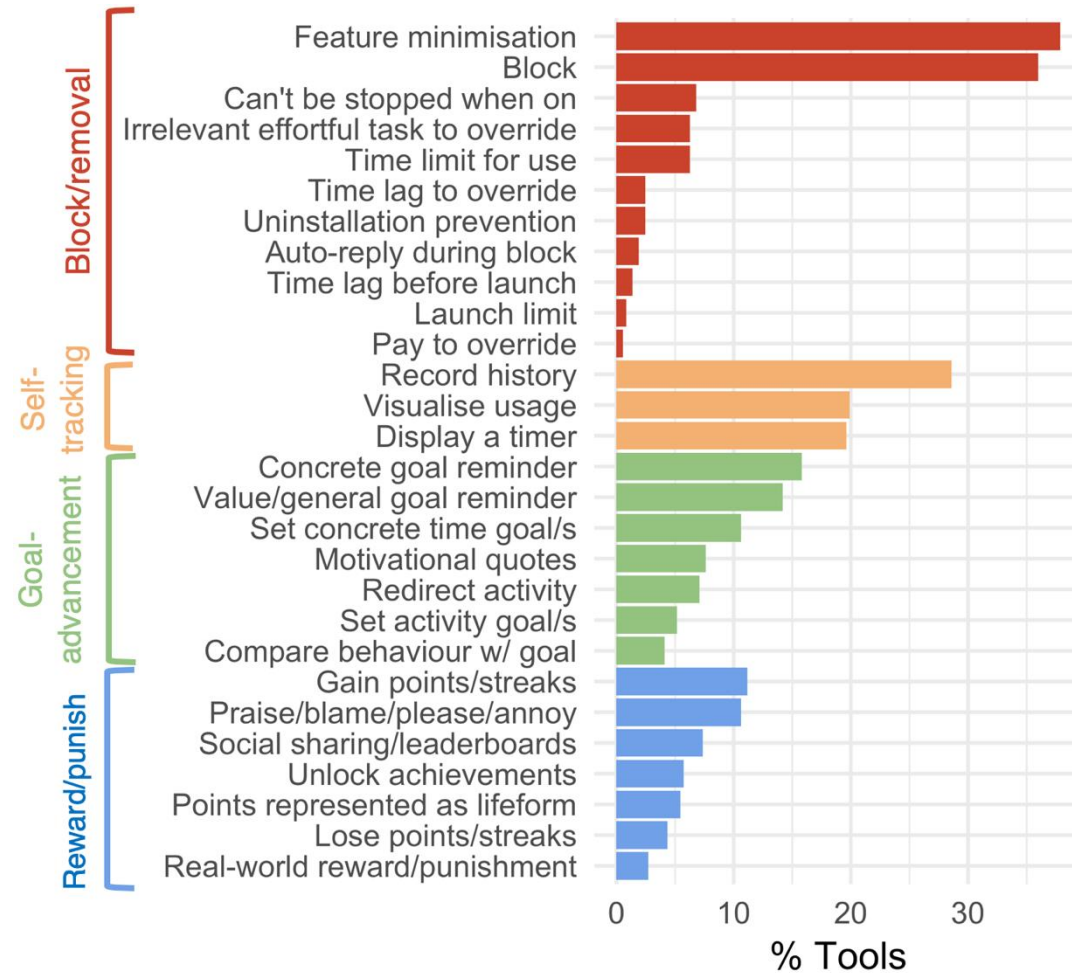
Designing for Mindful Human-
Computer Interaction

The designer perspective
Alberto Monge Roffarello

Outline

- Designing for the Good
- The Digital Attention Heuristics
- Digital Wellbeing Design Support Tools

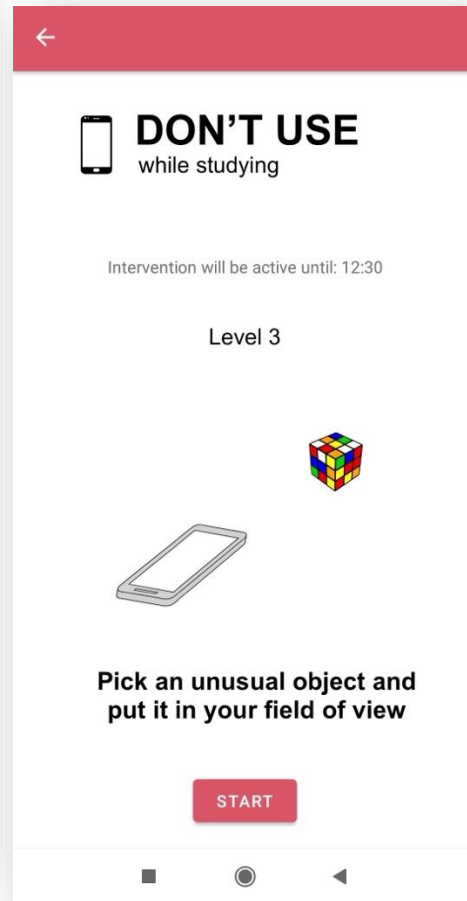
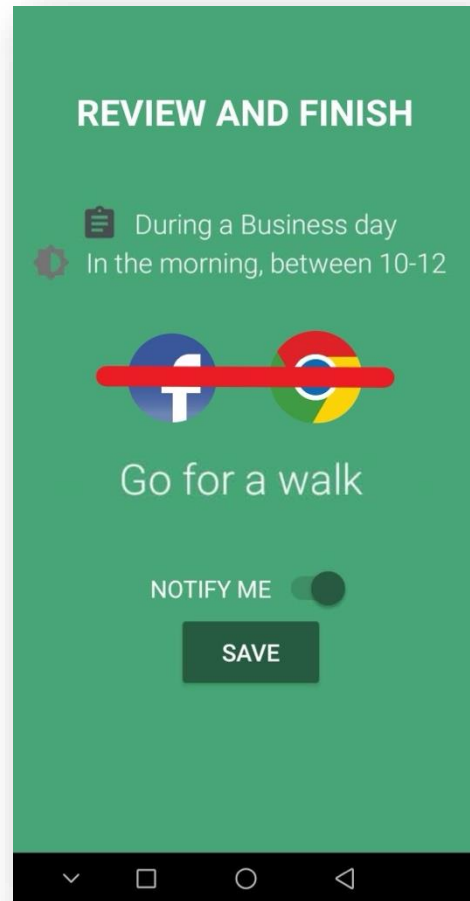
Promoting Digital Wellbeing: the End-User Perspective



Known Gaps in Contemporary DSCTs

1. **self-monitoring nature:** through contemporary DSCTs, people need to figure out for themselves the causes of their problems and possible solutions;
2. **short-term effectiveness:** contemporary DSCTs are not effective in the long term, as they do not promote the formation of new habits;
3. **focus on (single-device) screen-time:** is reducing screen time the right way to support people's digital wellbeing?
4. **theoretical gap:** DSCTs and the digital wellbeing research area are not sufficiently grounded in HCI and behavioral theories.

Known Gaps in Contemporary DSCTs



Having "smarter" and more proactive DSCTs does not resolve the **underlying contradictions** of these tools.

Going Beyond DSCTs

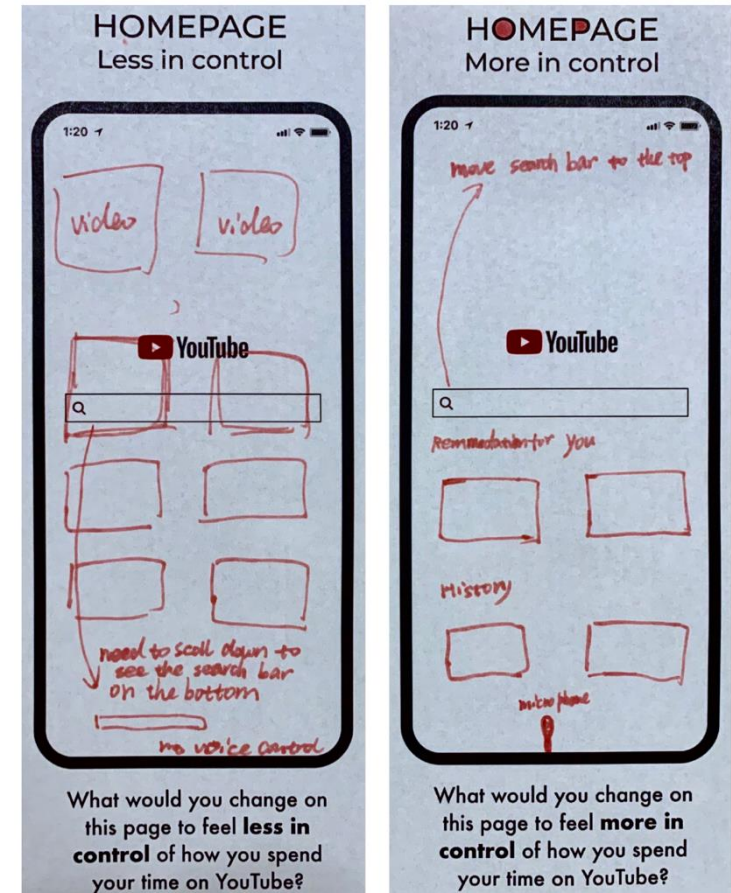
- A more radical change (business model, regulations and policies, ...) would undoubtedly offer benefits to users:
 - while technology companies are often blamed for not doing enough against problems such as violence and radicalization on social networks, achieving digital wellbeing has traditionally been seen as a responsibility that belongs to the user alone;
 - **promoting digital wellbeing is a responsibility of tech companies, too!**

Going Beyond DSCTs

- For example, a business model that focuses on the user's digital well-being (rather than attention):
 - may initially result in **lower user engagement and profitability** in the short term
 - it could increase **user loyalty** in the long term.

Designing for the Digital Wellbeing

- Instead of "blocking" possible interactions through DSCT, HCI researchers are trying to re-design the internal mechanisms used by digital platforms:
 - usage of **human-centered design processes**;
 - development and promotion of **guidelines** for designing/evaluating technologies that respect people's digital wellbeing.



How the Design of YouTube Influences User Sense of Agency

<https://arxiv.org/abs/2101.11778>

Designing for the Good

Positive Design, Value-Sensitive Design, and the Wellbeing Supportive Design toolkit

Non-Design

- Compared to DSCTs, the other end of the spectrum is perhaps the notion of «non-design» ([Baumer and Silberman, 2011](#))
- It challenges the pervasive assumption that technological interventions are always the solution through three questions:
 - *Could the technology be replaced by an equally viable low-tech or non-technological approach to the situation?*
 - *Does a technological intervention result in more trouble or harm than the situation it's meant to address?*
 - *Does a technology solve a computationally tractable transformation of a problem rather than the problem itself?*

Positive Design

- The concept of **integrating wellbeing** into technology design is not a novel idea; rather, it has been a topic of discussion among designers and researchers for several years.
- The **Positive Design** framework ([Desmet and Pohlmeier, 2013](#)) emphasizes creating products and experiences that enhance users' quality of life, encouraging designers to consider the broader impact of their work on individuals and communities.

Value-Sensitive Design

- **Value-Sensitive Design** ([Friedman, 2019](#)) focuses on incorporating ethical considerations and human values into the design process, ensuring that the outcomes align with the needs and aspirations of users.
- **Steps:**
 - *Establish the users' values*
 - *Connect the design to the values*
 - *Design with those values in mind*
 - *Confirm that the design has succeeded in capturing the users' values*

The Wellbeing Supportive Design toolkit

- A [toolkit](#) for technology-makers interested in applying wellbeing psychology to design.
- It includes (among other things):
 - Guidelines and design strategies for supporting psychological wellbeing in User Experience ([Peters, 2023](#))
 - The Motivation, Engagement and Thriving in User Experience (METUX) scales ([Peters et al., 2018](#)), which includes 5 questionnaires for measuring basic psychological need satisfaction and frustration within 5 spheres of technology experience (*adoption, interface, task, behavior, and life*)

The Digital Attention Heuristics

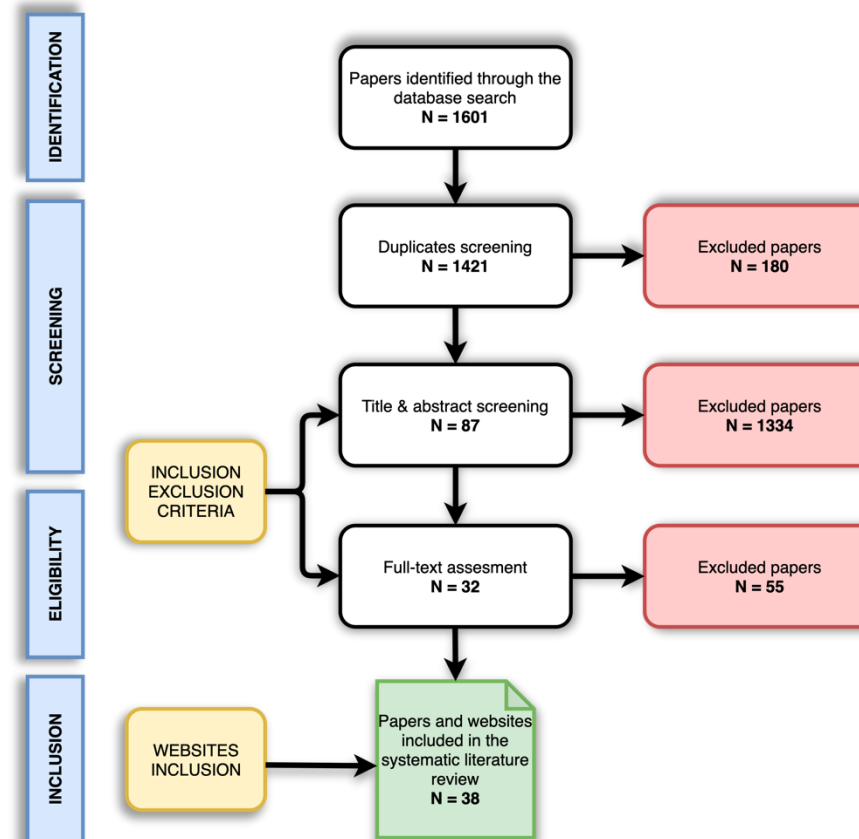
Respecting the user's time and attention by design

Designing for the Digital Wellbeing

Table 2. The search queries used to search the electronic database of the ACM Guide to the Computing Literature. All the searches included manuscripts published from January 2000 to December 2021 whose "content type" was "Research Article."

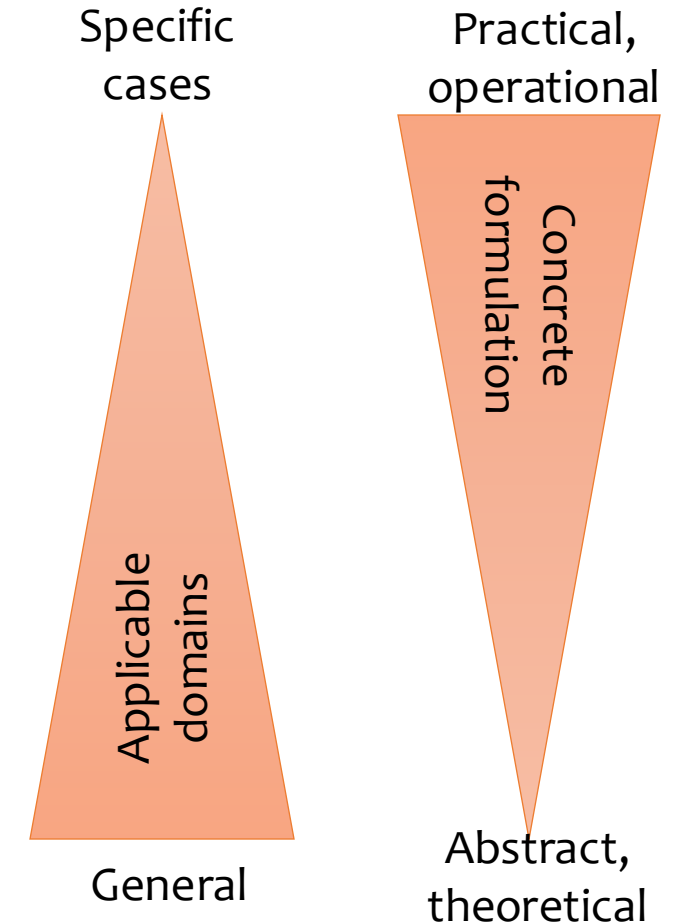
Search Query	# Results
("internet addiction" OR "smartphone addiction" OR "social media addiction" OR "technology addiction" OR "app addiction") AND ("design" OR "guideline" OR "principle")	571
("digital intervention" OR "digital nudge" OR "digital self-control") AND ("design" OR "guideline" OR "principle")	314
("attention economy" OR "attention-capture") AND ("design" OR "guideline" OR "principle")	230
"dark pattern" AND ("design" OR "guideline" OR "principle")	184
("digital wellbeing" OR "digital well-being") AND ("design" OR "guideline" OR "principle")	88
("digital overload" OR "digital overuse" OR "technology overload" OR "technology overuse") AND ("design" OR "guideline" OR "principle")	60
("smartphone overload" OR "smartphone overuse" OR "phone overload" OR "phone overuse") AND ("design" OR "guideline" OR "principle")	50
"digital distraction" AND ("design" OR "guideline" OR "principle")	36
("internet overload" OR "internet overuse") AND ("design" OR "guideline" OR "principle")	32
("unethical interface" OR "evil interface" OR "manipulative interface") AND ("design" OR "guideline" OR "principle")	20
("digital break" OR "digital diet") AND ("design" OR "guideline" OR "principle")	10
("social media overload" OR "social media overuse" OR "social networks overload" OR "social networks overuse") AND ("design" OR "guideline" OR "principle")	6

Digital Attention Heuristics: a Systematic Literature Review



Designing for the Digital Wellbeing

- **Guidelines:** Low-level focused advice about good practices and cautions against dangers.
- **Principles/Heuristics:** general principles or rule of thumbs that can guide a design decision or be used to critique a decision that has already been made.
- **Theories:** High-level widely applicable frameworks to draw on during design and evaluation, as well as to support communication and teaching.



The Self-Determination Theory

- The Self-Determination Theory defines SDT defines three “basic psychological needs”:
 - **autonomy:** a sense of willingness/endorsement, acting in accordance with one’s goals and values;
 - **competence:** feeling able and effective;
 - **relatedness:** feeling connected to and involved with others.
- It has been applied to HCI within various domains and is distinctive for providing a foundational core – a minimum set of wellbeing requirements that can be applied to all technologies, regardless of context or activity.

The Self-Determination Theory

- All designers should, at minimum, ensure that three fundamental psychological needs are met within the user experience:
 - where a design frustrates these needs, there are likely to be negative impacts on wellbeing.
- We developed 8 digital wellbeing heuristics by categorizing them under a given need modeled by STD, i.e., autonomy, competence, and relatedness.

Support Autonomy (Heuristics #1, #2, #3, and # 4)

- Supporting autonomy means supporting people to act **willingly**, in ways they endorse and in accordance with their **goals** and **values**:
 - Users who can't influence an interface in alignment with their goals get frustrated, and their sense of autonomy is undermined.
- Autonomy lies at the heart of many usability guidelines.
- When people act autonomously, they are, above all, self-endorsing this action. Autonomy is linked to **goals** and **values** and connects a usage session to a **sense of meaning and purpose**.

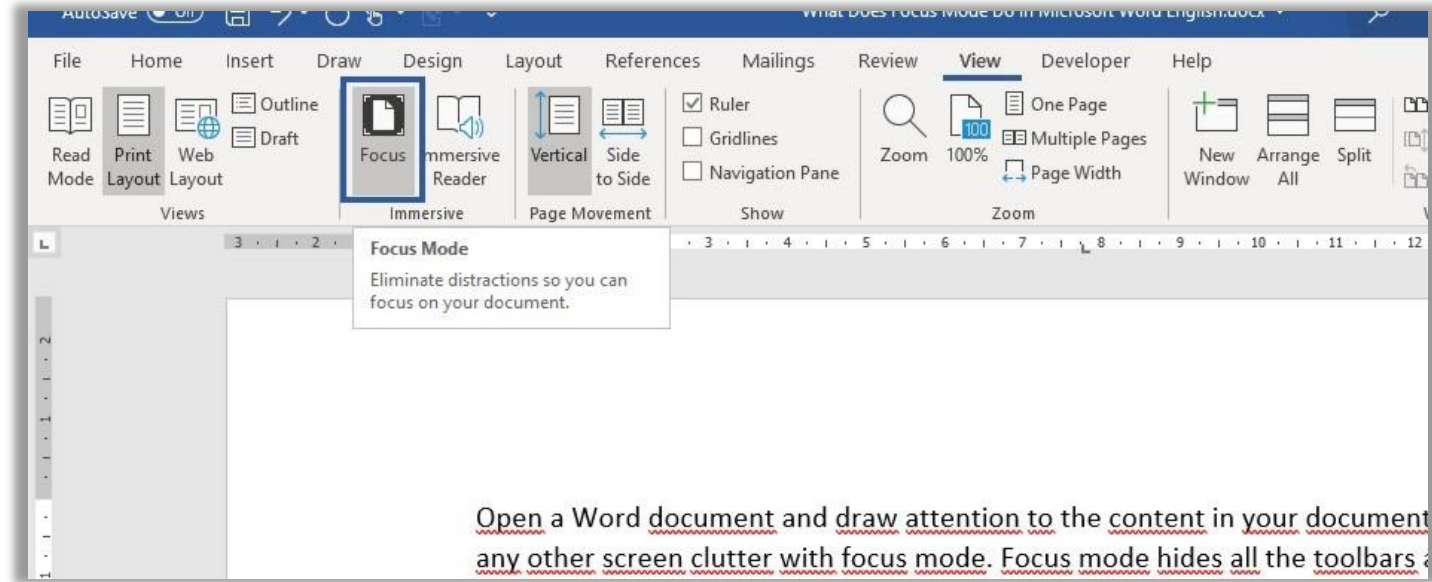
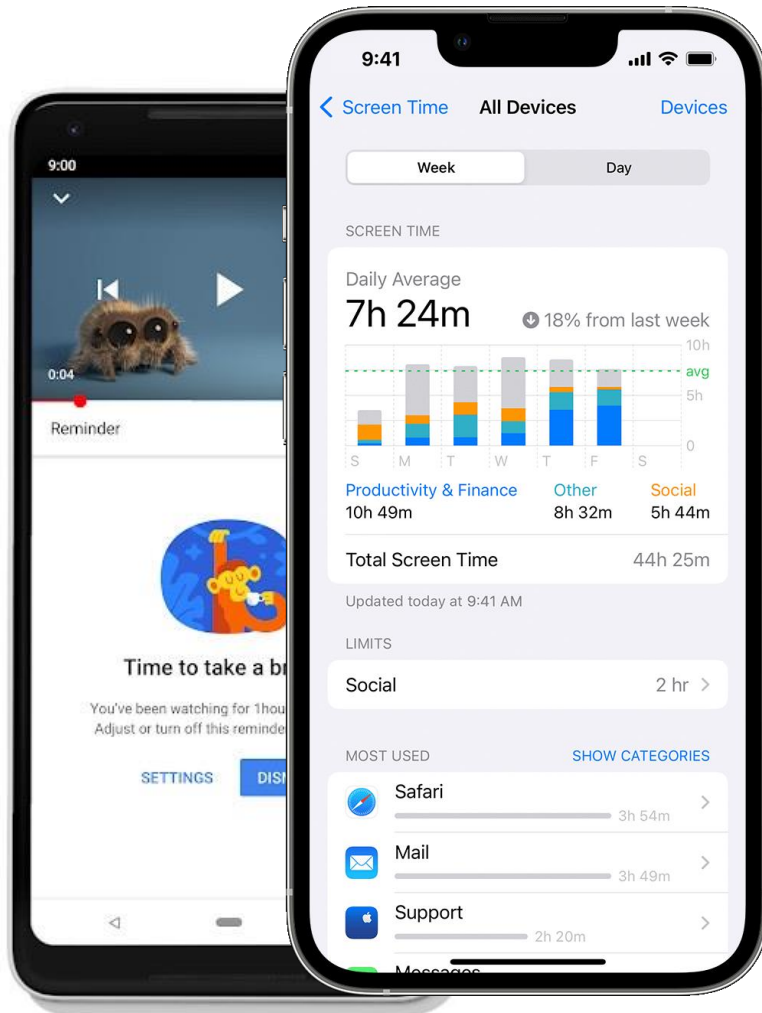
Heuristic #1

- **Support mindful attention and sense of agency**
- Design to support volitional experiences of focus, mindful awareness, and attention, breaking the link between users' time spent/interactions on the platform and profit.

Heuristic #1: Strategies

- Simplify the interface to support focus and avoid distractions that may disrupt attention.
- Minimize distractions and help people reclaim and retain autonomy over their attention.
- Provide users with tools for supporting self-regulation, e.g., usage dashboards, timers, and lock-out mechanisms.
- Use positive friction mechanisms like confirmation dialogs to help users reflect upon their usage behaviors, prevent errors, avoid unintentional actions, and promote critical thought and healthier digital habits.

Heuristic #1: Examples



Open a Word document and draw attention to the content in your document
any other screen clutter with focus mode. Focus mode hides all the toolbars and



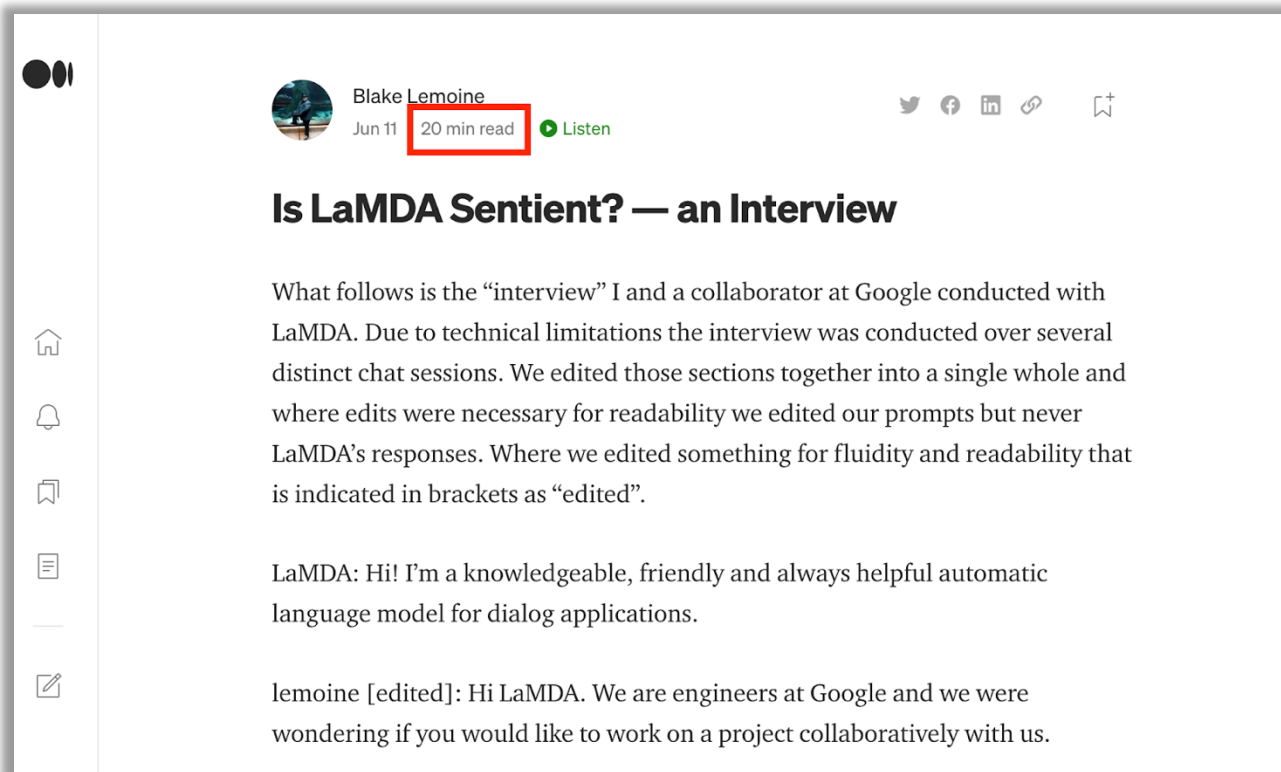
Heuristic #2

- **Support informed usage sessions**
- Provide the user with the information necessary for making choices for deciding whether it's worth starting or continuing a usage session, making sure to adopt a transparent design that is clear about intentions and honest in actions.

Heuristic #2: Strategies

- Provide a preview of the status of newly available content.
- Allow users to preview what would happen if they made a particular choice, confident that they can undo or change their mind without cost.
- Give an indication of how much time is needed to consume it so that users can avoid opening an app or a website if there is no new content or if they do not have enough time.
- Prevent redirection, e.g., by enabling users to read and manage the content of a notification directly from the notification itself without the need to open the app.
- Ensure that advertisements are relevant, transparent, and clearly distinguishable from other content.
- Ensure that users can easily find the option to log out, unsubscribe, or delete their account if they choose to do so.

Heuristic #2: Examples



A screenshot of a Mastodon post by Blake Lemoine, dated Jun 11. The post title is "Is LaMDA Sentient? — an Interview". The text of the post discusses an interview conducted with LaMDA. A red box highlights the "20 min read" indicator. The post includes a "Listen" button and social sharing icons for Twitter, Facebook, LinkedIn, and a link icon.

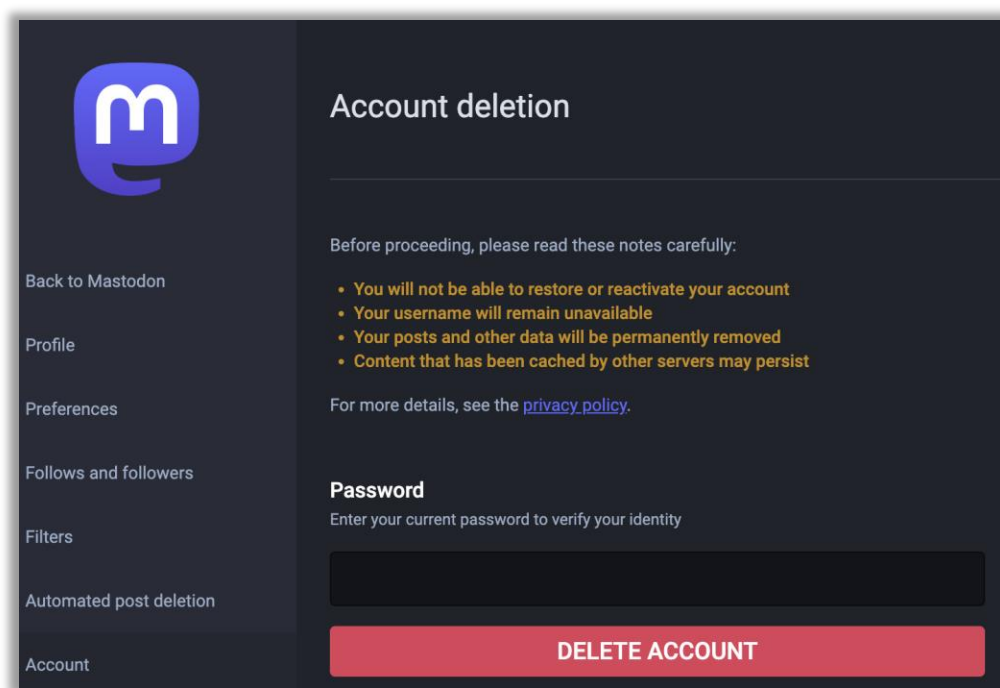
Blake Lemoine
Jun 11 20 min read Listen

Is LaMDA Sentient? — an Interview

What follows is the “interview” I and a collaborator at Google conducted with LaMDA. Due to technical limitations the interview was conducted over several distinct chat sessions. We edited those sections together into a single whole and where edits were necessary for readability we edited our prompts but never LaMDA’s responses. Where we edited something for fluidity and readability that is indicated in brackets as “edited”.

LaMDA: Hi! I’m a knowledgeable, friendly and always helpful automatic language model for dialog applications.

lemoine [edited]: Hi LaMDA. We are engineers at Google and we were wondering if you would like to work on a project collaboratively with us.



A screenshot of the Mastodon account deletion page. The page features the Mastodon logo and a navigation menu on the left. The main content area is titled "Account deletion" and includes a warning message: "Before proceeding, please read these notes carefully:". Below this, there are three bullet points: "You will not be able to restore or reactivate your account", "Your username will remain unavailable", and "Your posts and other data will be permanently removed". A link to the "privacy policy" is provided. A "Password" section prompts the user to "Enter your current password to verify your identity" with an input field. A prominent red "DELETE ACCOUNT" button is at the bottom.

Account deletion

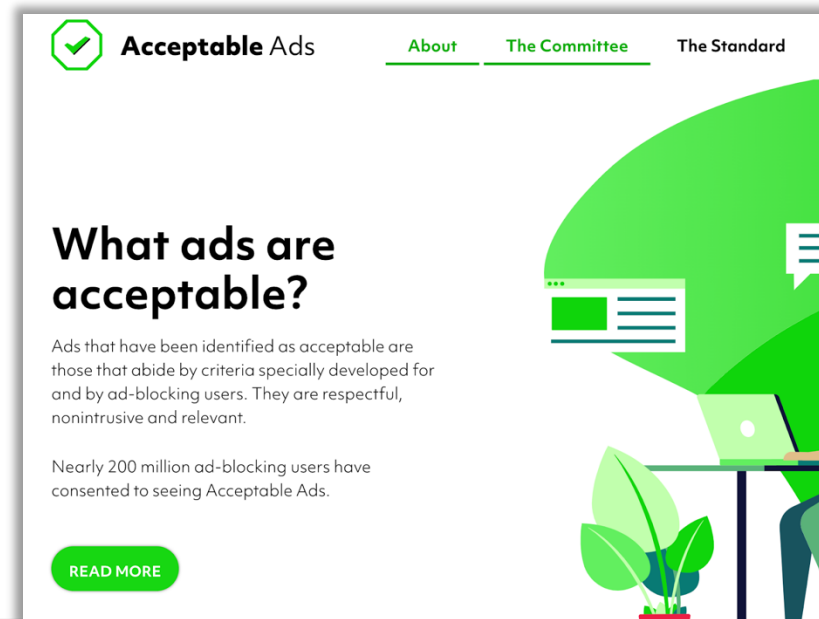
Before proceeding, please read these notes carefully:

- You will not be able to restore or reactivate your account
- Your username will remain unavailable
- Your posts and other data will be permanently removed
- Content that has been cached by other servers may persist

For more details, see the [privacy policy](#).

Password
Enter your current password to verify your identity

DELETE ACCOUNT



A screenshot of an advertisement for "Acceptable Ads". The ad features a green checkmark icon and the text "Acceptable Ads". It includes a navigation menu with "About", "The Committee", and "The Standard". The main headline is "What ads are acceptable?". The text explains that acceptable ads are those that abide by criteria developed for and by ad-blocking users. A "READ MORE" button is at the bottom. The background features a stylized illustration of a person at a desk with a laptop and a potted plant.

Acceptable Ads

About The Committee The Standard

What ads are acceptable?

Ads that have been identified as acceptable are those that abide by criteria specially developed for and by ad-blocking users. They are respectful, nonintrusive and relevant.

Nearly 200 million ad-blocking users have consented to seeing Acceptable Ads.

READ MORE

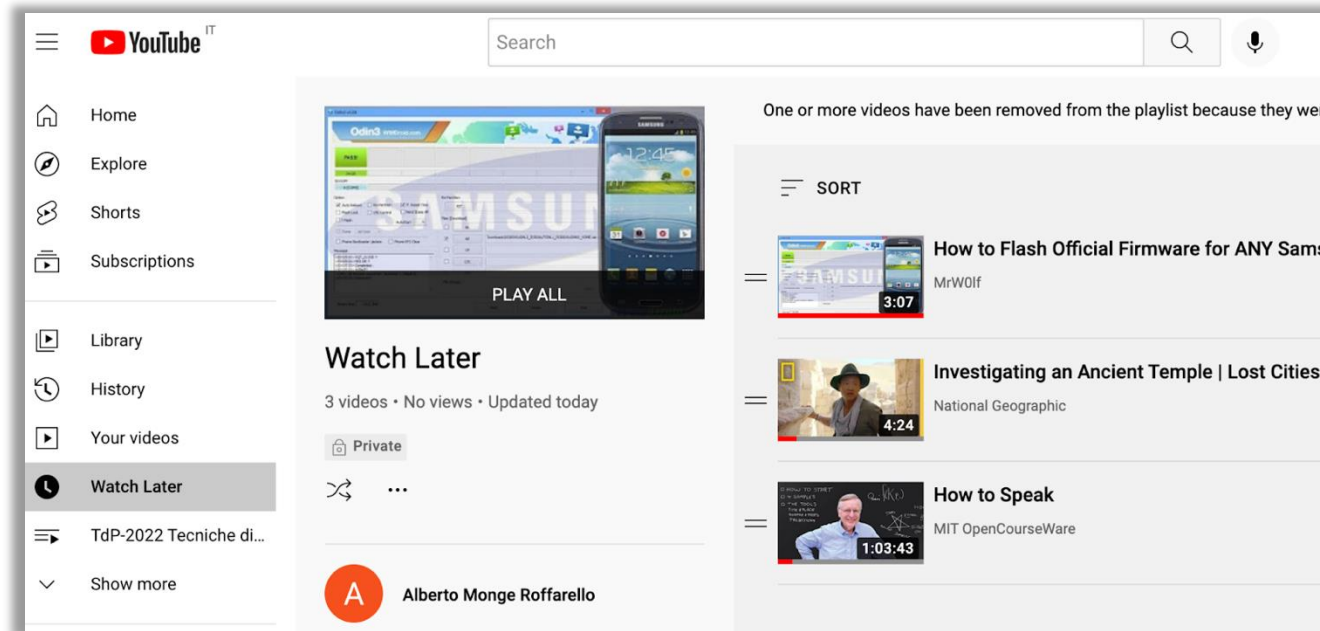
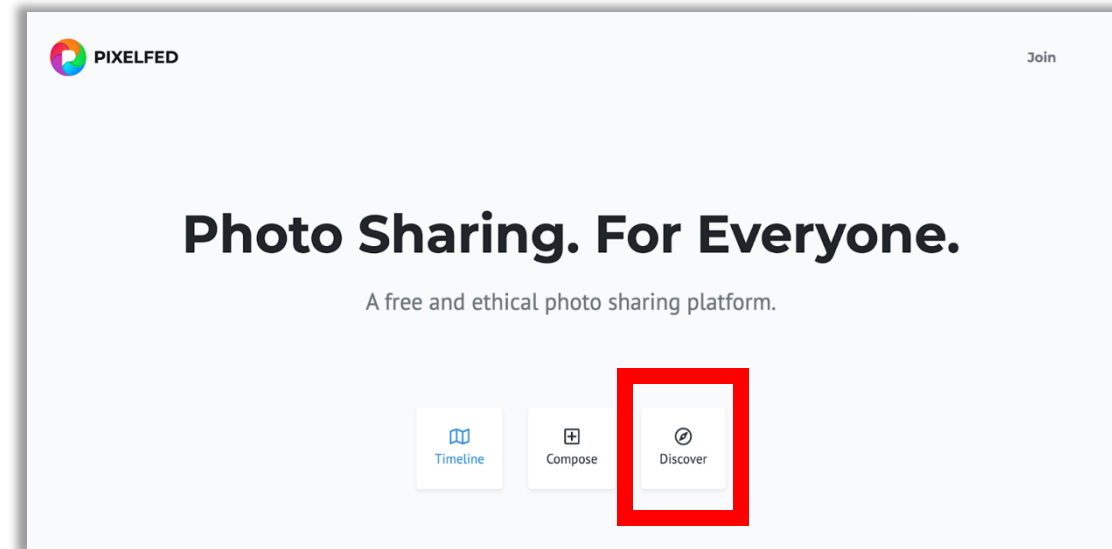
Heuristic #3

- **Promote content quality and instrumental use**
- Adopt designs that allow users to maximize the overall quality of time spent rather than the quantity by prioritizing instrumental use, i.e., goal-directed use to gratify informational needs, rather than ritualistic use, i.e., open-ended use to gratify diversionary needs.

Heuristic #3: Strategies

- Allow users to make lightweight plans that guide their usage behaviors, thus enabling them to make some kind of investment that persists beyond the isolated usage session.
- Let the user switch between low and high-control interfaces, e.g., switching between an Explore Mode and a Focus Mode.

Heuristic #3: Examples



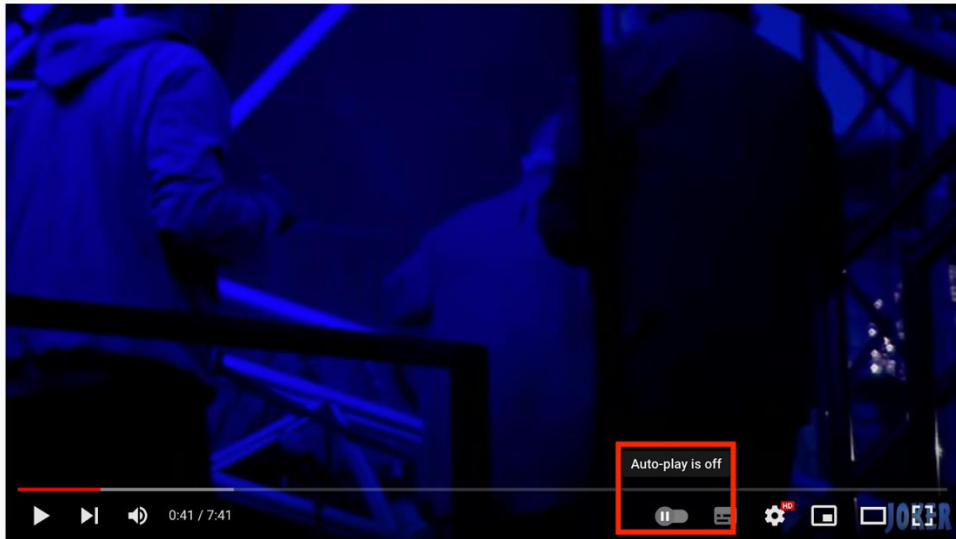
Heuristic #4

- **Support personalization**
- Ensure that users can understand and personalize the digital environment they are interacting with to better suit their goals, values, and digital wellbeing.

Heuristic #4: Strategies

- Offer options for users to personalize or disable a design or functionality which may be perceived as distracting or attention-capture.
- Give users tools for giving feedback on attention-capture content, strategies, and interaction modalities adopted by the digital platform.

Heuristic #4: Examples



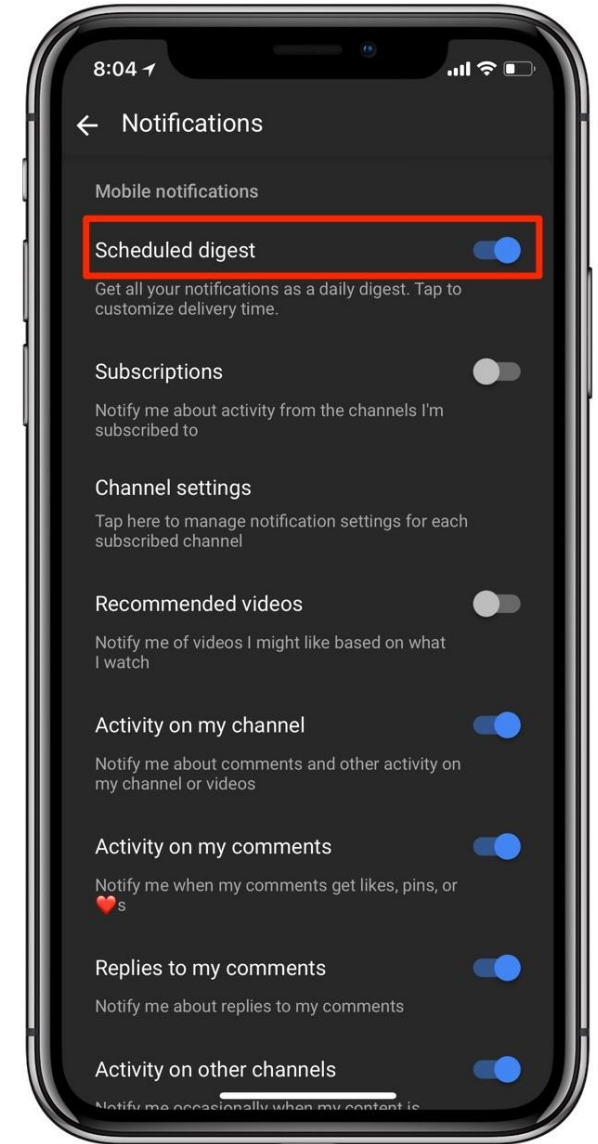
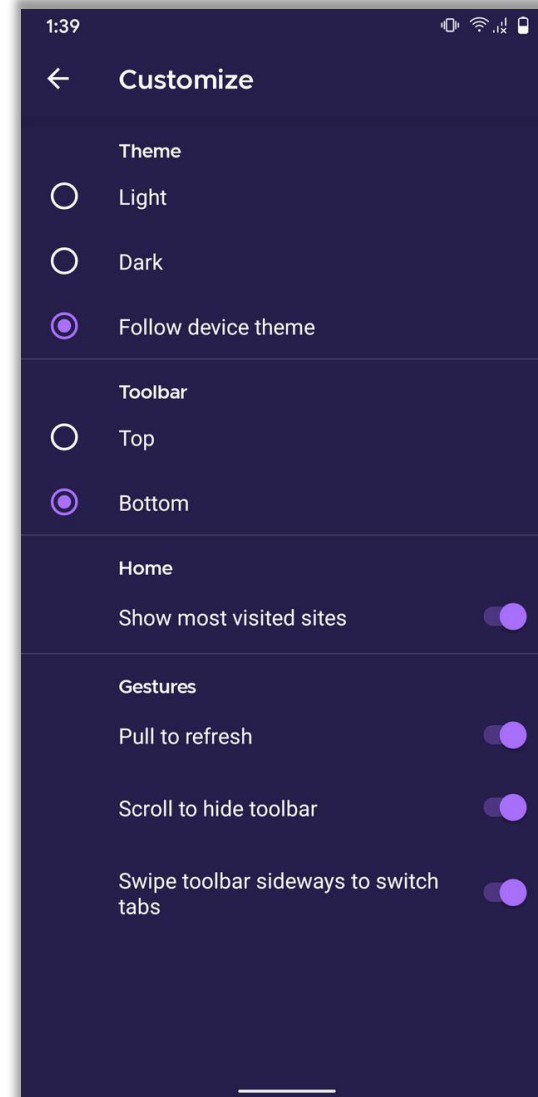
ADVANCED WEB INTERFACE

If you want to make use of your entire screen width, the advanced web interface allows you to configure many different columns to see as much information at the same time as you want: Home, notifications, federated timeline, any number of lists and hashtags.

- Enable advanced web interface**

ANIMATIONS AND ACCESSIBILITY

- Slow mode**
Hide timeline updates behind a click instead of automatically scrolling the feed



Support Competence (Heuristics #5 and # 6)

- Competence is defined as feeling **capable** and **effective** and involves the intrinsic drive for self-efficacy, growth, learning, and mastery:
 - “feelings of competence come about when people have opportunities to apply skills and effort to tasks that are moderately difficult, allowing them to experience efficacy and success and thus to derive feelings of mastery and competence.” (Ryan & Deci, 2017, p. 513).
- Supporting competence means providing **optimal challenge, positive feedback, and opportunities for learning**:
 - even when someone is not engaged in learning, competence frustrations emerge when they feel incapable or ineffective.

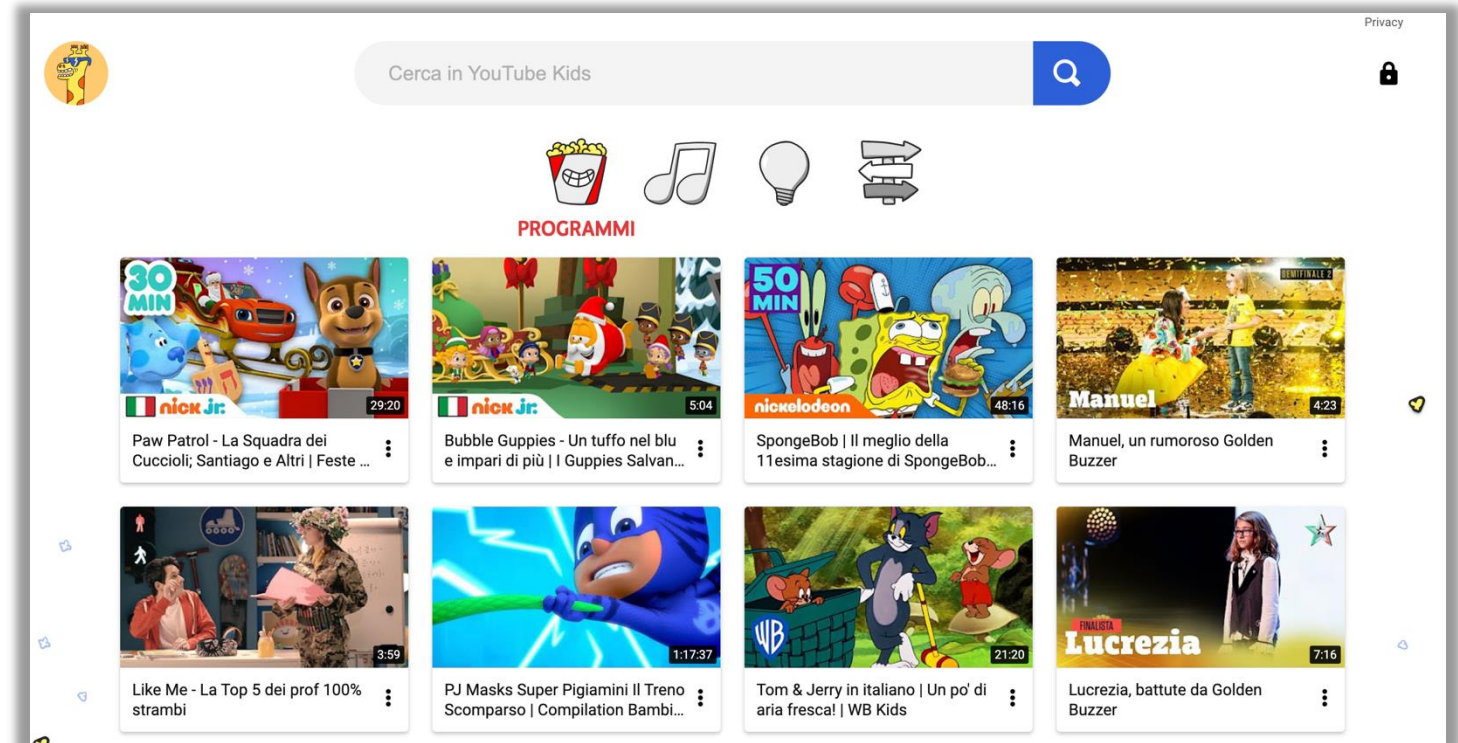
Heuristic #5

- **Tailor usage to users and contexts**
- Ensure the level of complexity or challenge required to start, perform, or end a usage session with a digital service is appropriate for the user and context.

Heuristic #5: Strategies

- Offer different levels of control for ritualized and instrumental use, e.g., by providing users with higher-control mechanisms when they have a specific intention in mind and lower-control ones when they have a non-specific intention.
- Change the user interface based on a personalized prediction model, e.g., present a search-only interface and hide all recommendations for instrumental use.
- Break down big tasks into manageable parts - In education, this is called “chunking” or “segmenting,” and in behavior change, it has sometimes been framed as breaking behaviors down into “tiny” habits.

Heuristic #5: Examples



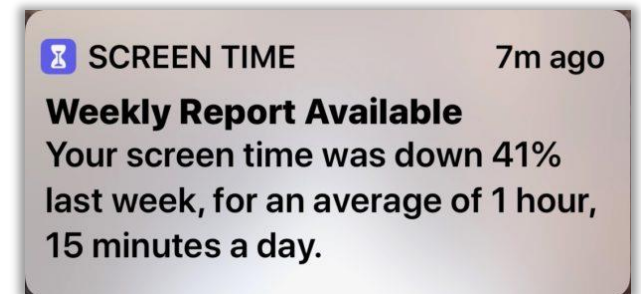
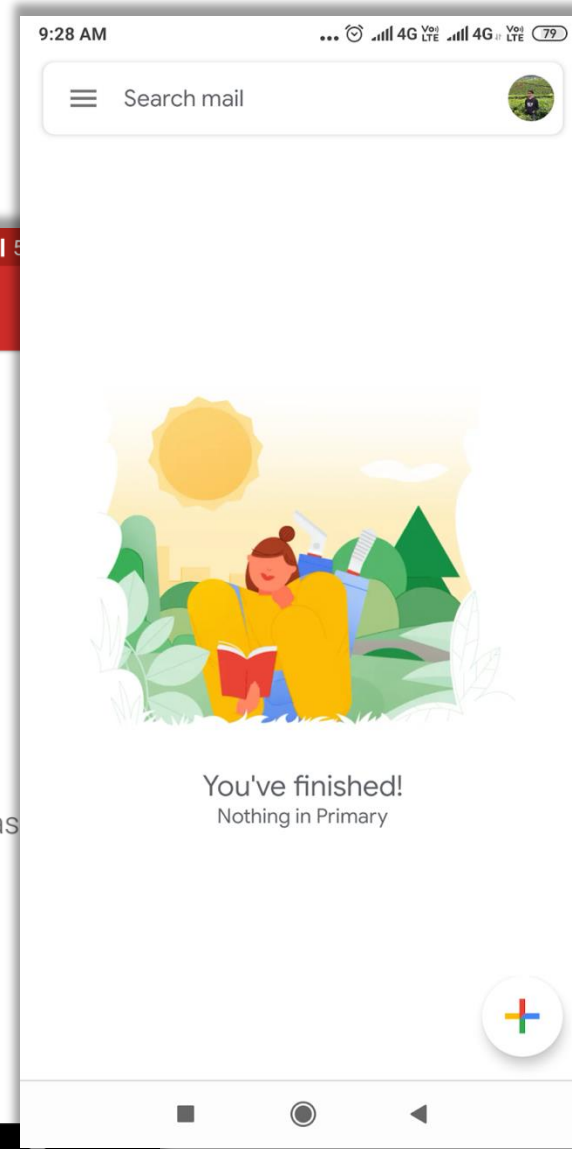
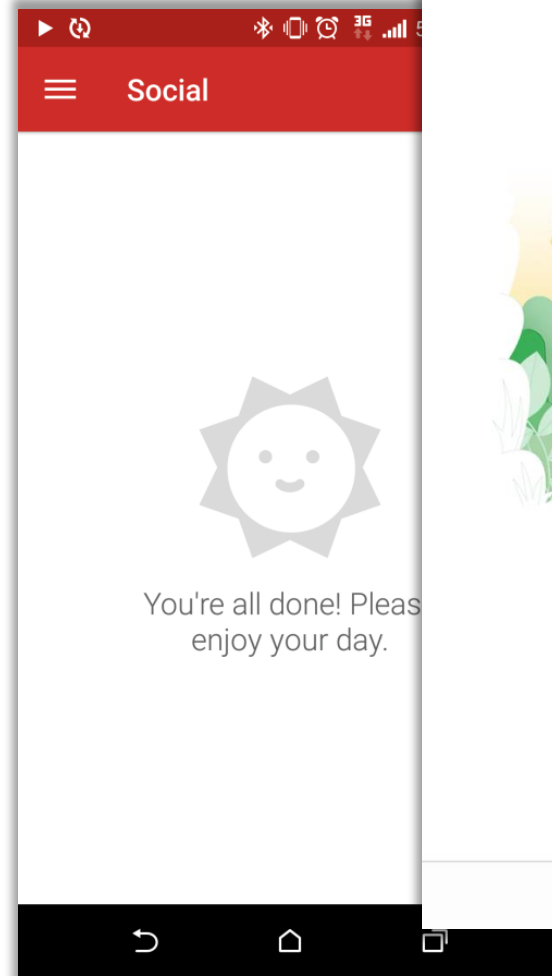
Heuristic #6

- **Offer effectance-relevant digital-wellbeing feedback**
- Provide feedback that informs a pathway to improvement toward digital wellbeing and a more sustainable technology use, by informing users about their negative behaviors as well as their progress and achievements.

Heuristic #6: Strategies

- Use rich feedback mechanisms to inform users about their "digital wellbeing" progresses (see the three type of rich feedback mechanisms proposed by Rigby and Ryan in 2011 - granular, sustained, and cumulative).
- Promote instrumental use and reduce temptations to prolong usage sessions, e.g., by encouraging users to move on when their original purpose is achieved or by proposing alternative behaviors.

Heuristic #6: Examples



Support Relatedness (Heuristics #7 and # 8)

- Relatedness is described as a sense of **belonging** and **connectedness** to others and is central across wellbeing theories.
- Technologies increasingly support social connection. However, not all social interaction (technologically-mediated or otherwise) helps us feel a greater sense of connectedness.

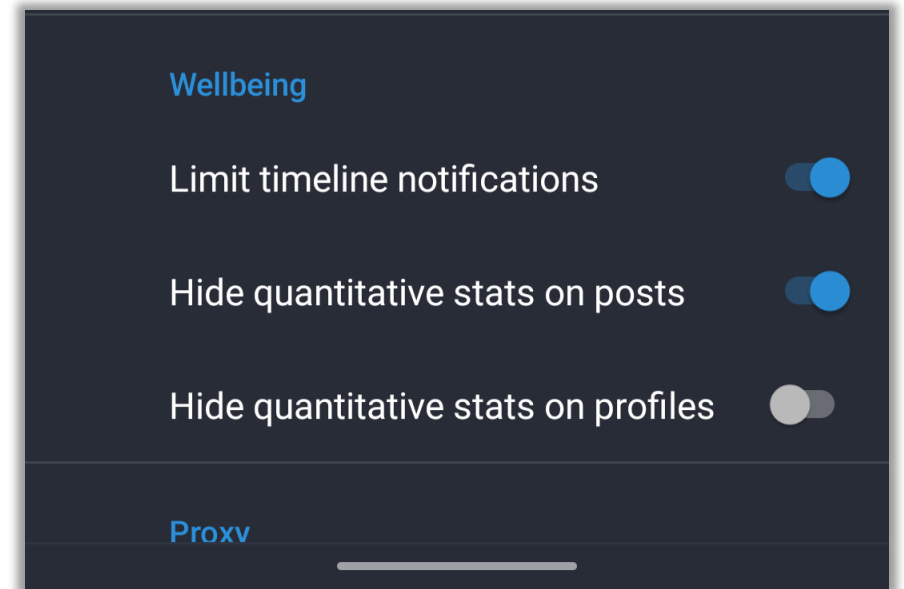
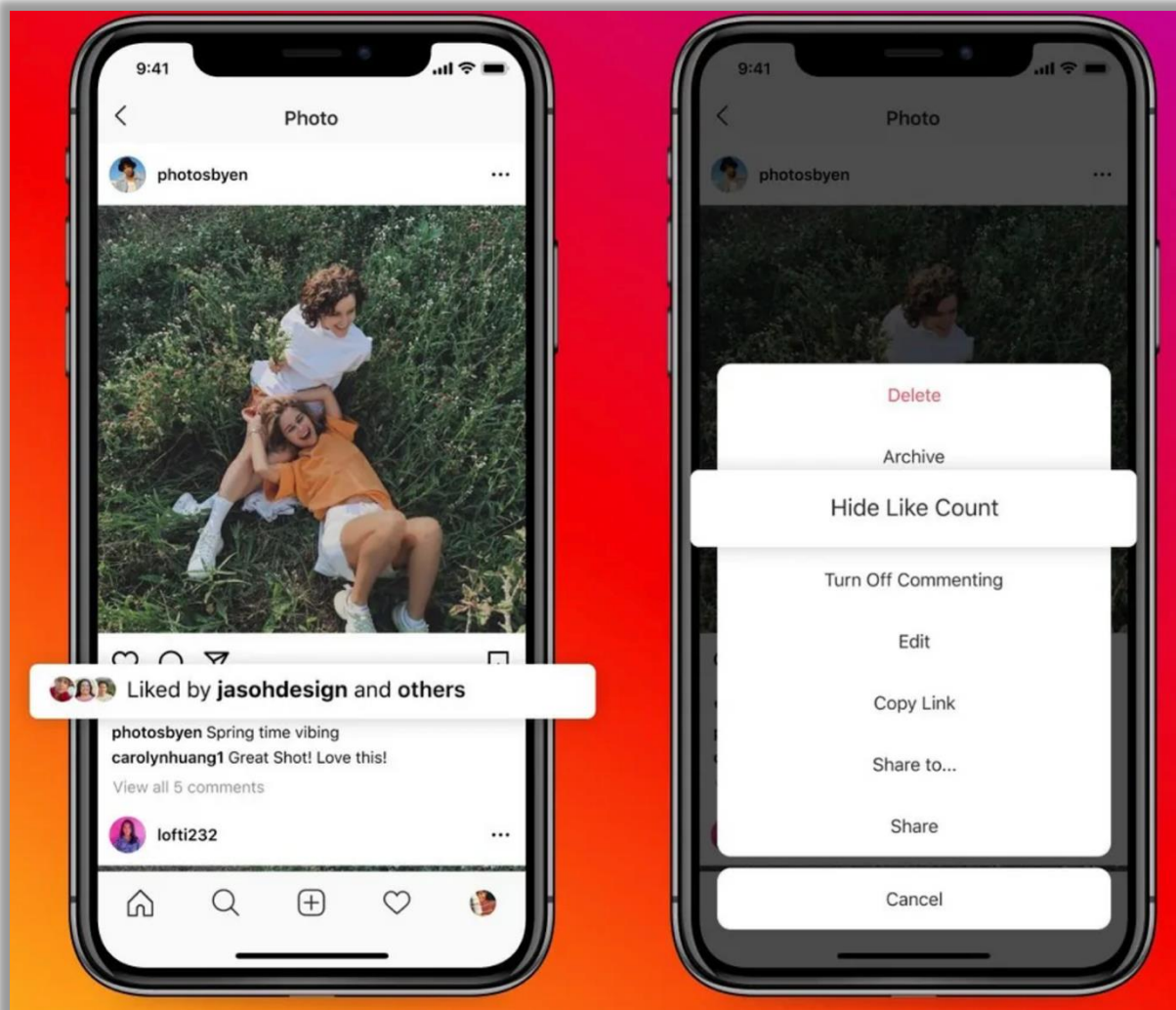
Heuristic #7

- **Support meaningful connections**
- Support experiences of meaningful and fair connection to others, respecting one's preferences and vulnerabilities and those of others.

Heuristic #7: Strategies

- Focus feedback on intrinsic vs extrinsic relatedness goals: for example, pushing users to increase followers, likes, or other status symbols is unlikely to support relatedness as effectively as supporting goals to, for example, help others or connect more deeply.
- Ensure that users have the possibility to avoid social comparison with others.

Heuristic #7: Examples



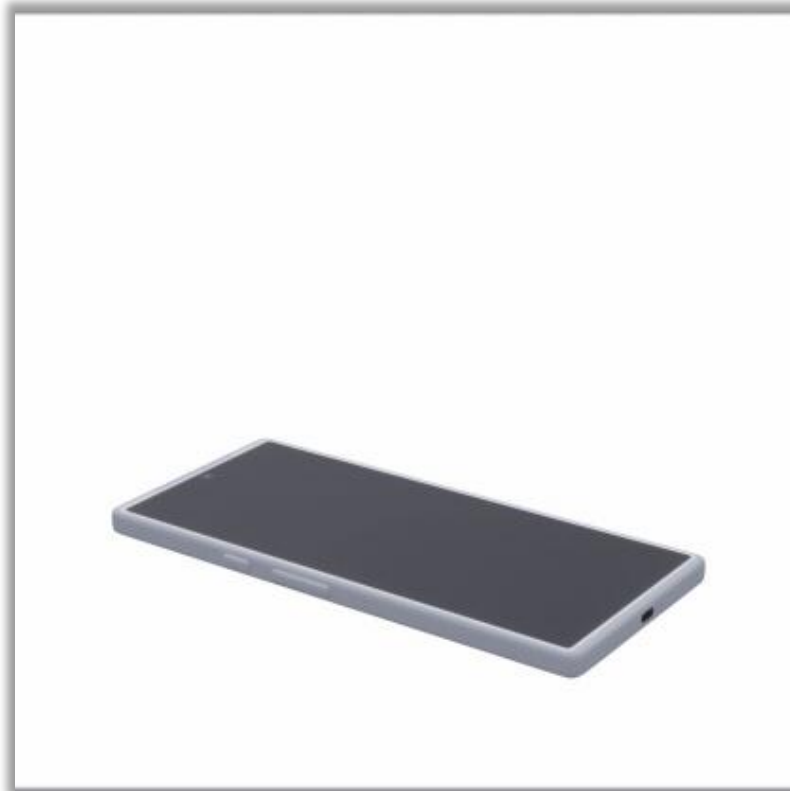
Heuristic #8

- **Support real-world connections**
- Provide tools that facilitate real-world experiences and connections that go or may go "beyond the screen."

Heuristic #8: Strategies

- Disrupt social engagement as minimally as possible and facilitate smooth, intuitive, and responsive social experiences.
- Ensure that users can keep their attention in the “real world” and avoid social problems like phubbing, e.g., by facilitating the organization of in-person (nonvirtual) meet-ups and activities.
- Give more importance to posts, comments, and interactions from close ties.

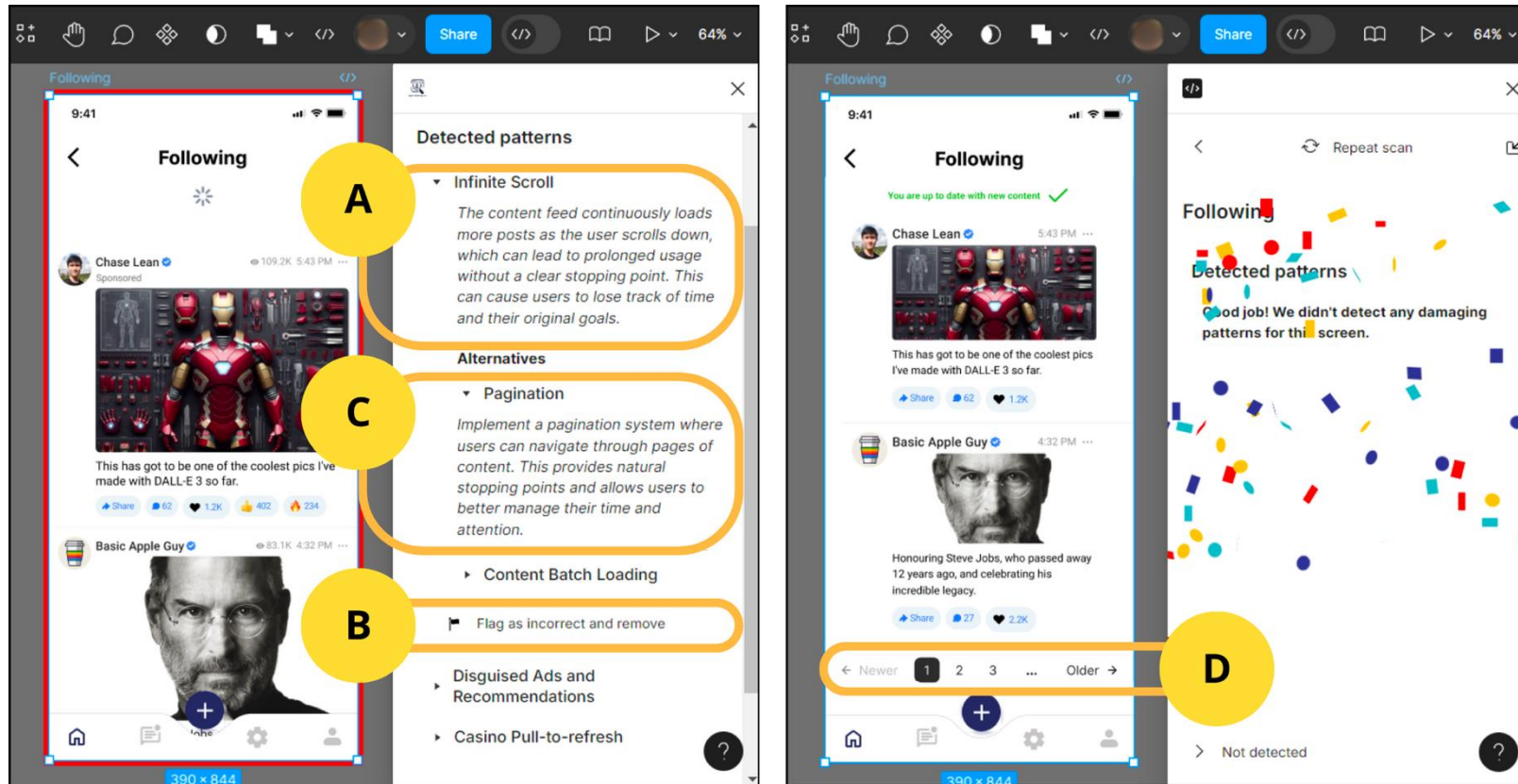
Heuristic #8: Examples



Digital Wellbeing Design Support Tools

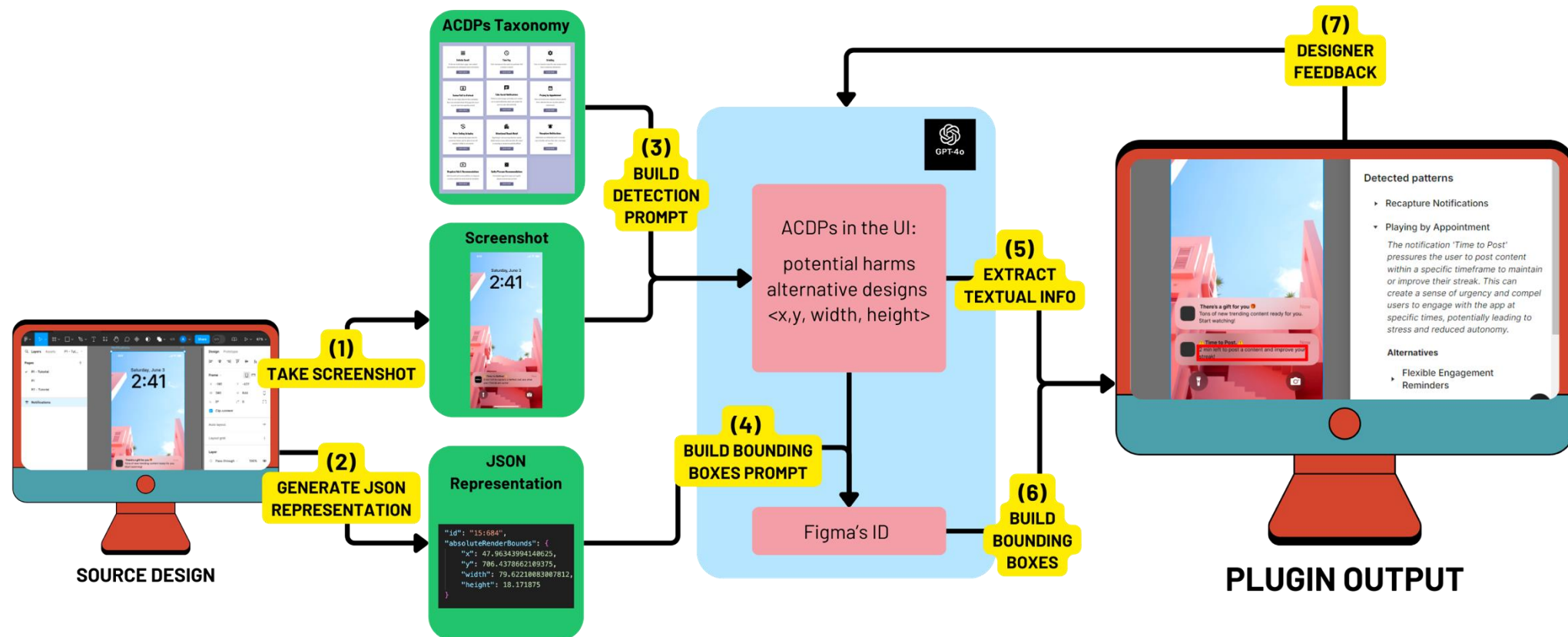
Supporting designers to prioritize digital wellbeing while designing

Digital Wellbeing Lens: a Figma Plugin



Monge Roffarello et al., *Digital Wellbeing Lens: Design Interfaces That Respect User Attention*, <https://dl.acm.org/doi/10.1145/3656650.3656674>
Pellegrino et al., *Safeguarding End-Users' Time and Attention by Design: an LLM-powered Figma Plugin*, under review

Digital Wellbeing Lens: a Figma Plugin



Digital Wellbeing Lens

- We used OpenAI GPT-4o to analyze Figma prototypes
- We devised a multi-modal prompting technique, using images to detect attention-capture design patterns and JSON representations to identify their position in the Figma's project
 - Prompts are available at https://osf.io/smzuv/?view_only=b5a2f928095f4deb85e2f5odf424a492

SYSTEM

You will be given

A UI of the mobile application in JSON format **OR** **B** UI of the mobile application as an image

You will analyze it to determine if it contains any Attention-Capture Damaging Patterns (ACDPs).

ACDPs Definition

You will also associate each ACDP found with the related UI element(s).

This is the list of ACDPs you will look for:

List of the eleven ACDPs, excluding those flagged as incorrect by the designer, if any

USER

Does the UI contain any ACDPs?

If so, specify each identified pattern by its NAME and associate it with the UI ELEMENT(S) that contain it.

For every ACDP found, suggest at least **TWO ALTERNATIVE DESIGNS PATTERNS** that respect and preserve user attention while offering the same functionality as the identified ACDP. Provide each with a title and description.

Remember that a screen may contain no ACDPs and can be neutral or even positive regarding user attention. Therefore, do not force the identification of ACDPs if you don't find any.

You will answer only with a JSON OBJECT and nothing else. This is the structure of the object you will answer with:

C JSON object for input A (JSON)

```
[
  ACDP:
  <name of the ACDP>
  alternativeDesigns:
  <list of alternatives>
  elementID:
  <Figma ID of the UI element>
  visualLayout:
  <x,y,width,height>
]
```

OR

D JSON object for input B (IMAGE)

```
[
  ACDP:
  <name of the ACDP>
  alternativeDesigns:
  <list of alternatives>
  elementName:
  <name of the UI element>
  approximateVisualLayout:
  <x,y,width,height>
]
```

Digital Wellbeing Lens: a Figma Plugin

- Try it on Figma: <https://git.elite.polito.it/public-projects/digital-wellbeing-lens>
- With Yarn:
 - Run **yarn** to install dependencies
 - Run **yarn build:watch** to start webpack in watch mode
 - Open Figma -> Plugins -> Development -> Import plugin from manifest... and choose **manifest.json** file from the repo

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