



# Design Patterns

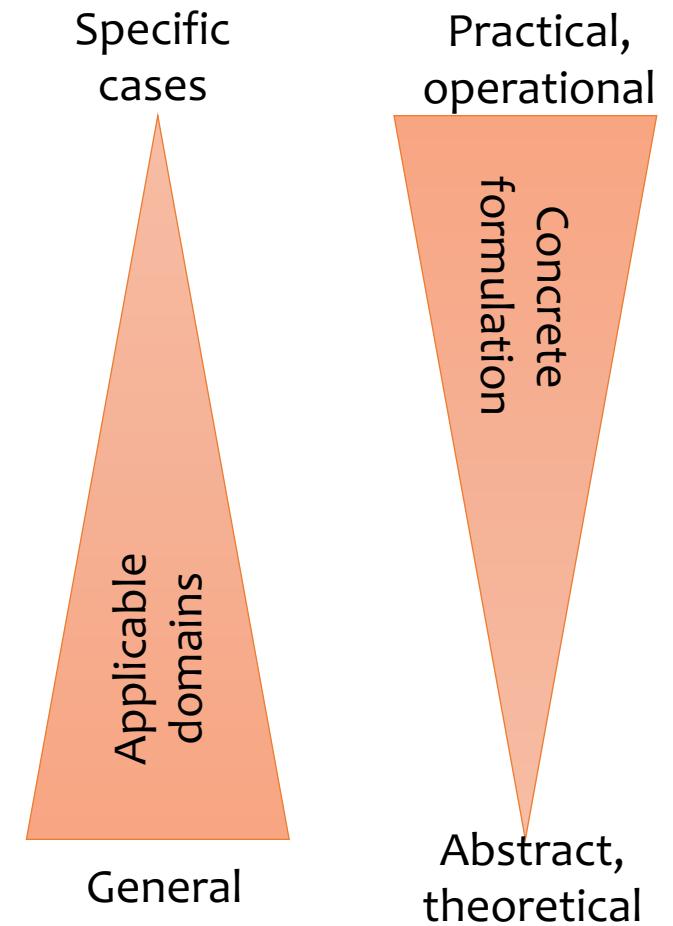
**Human Computer Interaction**

Alberto Monge Roffarello

Academic Year 2022/2023

# Generating Design Solutions

- **Guidelines:** Low-level focused advice about good practices and cautions against dangers.
- **Principles:** Mid-level strategies or rules to analyze and compare design alternatives.
- **Theories:** High-level widely applicable frameworks to draw on during design and evaluation, as well as to support communication and teaching.



# Generating Design Solutions

- Guidelines, practices
- Principles, comparisons
- Theories, drawings or models

support communication and teaching.

## What about “Design Patterns”?

Specific cases

Practical, operational

Concrete formulation

Ap

General

Abstract, theoretical

# Generating Design Solutions

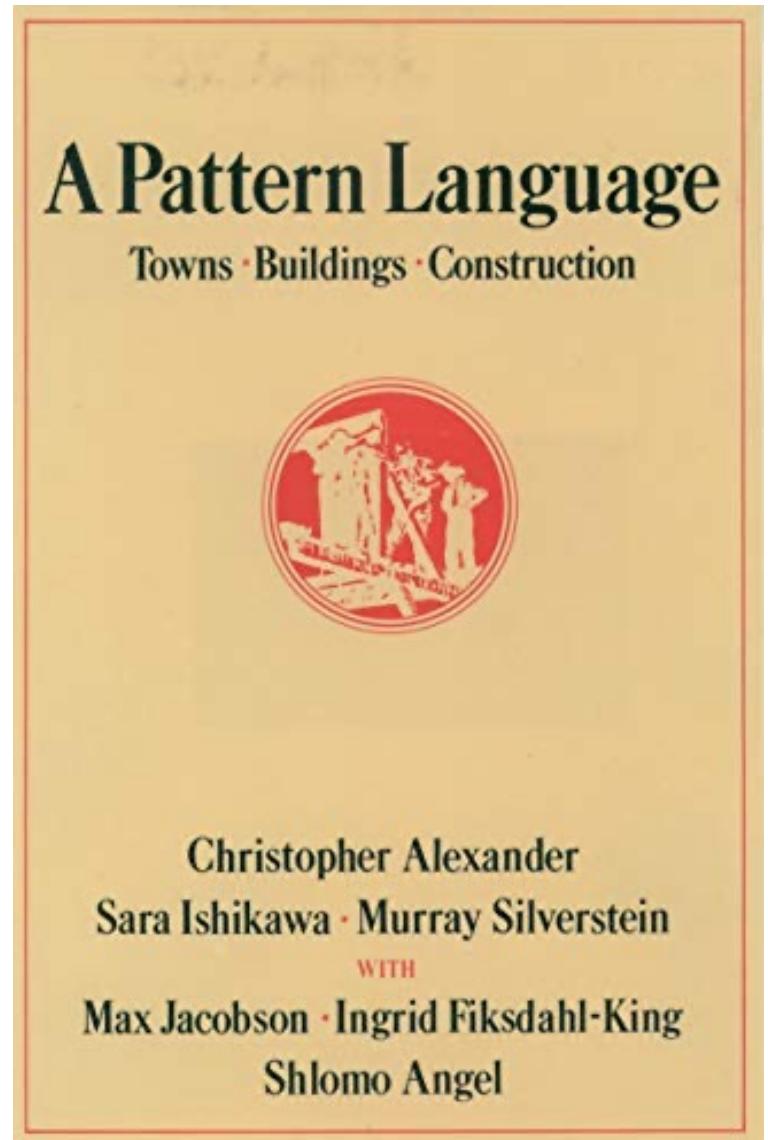
- **Design Patterns:** well-proven solutions that solve commonly recurring problems
  - they suggest a specific solution for the specific problem;
  - the solution has been tested by others;
  - the solution can be reused.

# Design = Solutions

- Design is about solution
- Unfortunately, designers often reivent things, so that it is hard to know:
  - **how** things were done before
  - **why** things were done in a certain way
  - **how** to reuse solutions

# Design Patterns

- Design patterns were first used in architecture
- The idea was introduced by the architect Christopher Alexander, who defined a design pattern in this way: "*Each pattern describes a problem that occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice.*"



# Design Patterns

- They are a way to communicate common **design problems** and **related solutions**
  - Design patterns are recurring solutions that solve common design problems
- They are not too general and not too specific
  - use a solution “a million times over, without ever doing it the same way twice”
- They are a ***shared language***
  - Design patterns are standard reference points for designers
  - They allow for debate over alternatives, where merely mentioning the name of a design pattern implicitly carries much more meaning than merely the name
  - They are readable by non-experts

# Design Patterns As a New Literary Form

- A *literary form* is an agreement between the writer and the reader
  - A letter always starts with “Dear ...” and ends with some letter closings (e.g., “Best regards”)
- We can think about design patterns as a new literary form
  - They define certain **things** to be in a certain **place** with a certain **meaning**

# Design Patterns Description

## 243 SITTING WALL\*\*



... if all is well, the outdoor areas are largely made up of positive spaces—**POSITIVE OUTDOOR SPACES** (106); in some fashion you have marked boundaries between gardens and streets, between terraces and gardens, between outdoor rooms and terraces, between play areas and gardens—**GREEN STREETS** (51), **PEDESTRIAN STREET** (100), **HALF-HIDDEN GARDEN** (111), **HIERARCHY OF OPEN SPACE** (114), **PATH SHAPE** (121), **ACTIVITY POCKETS** (124), **PRIVATE TERRACE ON THE STREET** (140), **OUTDOOR ROOM** (163), **OPENING TO THE STREET** (165), **GALLERY SURROUND** (166), **GARDEN GROWING WILD** (172). With this pattern, you can help these natural boundaries take on their proper character, by building walls, just low enough to sit on, and high enough to mark the boundaries.

If you have also marked the places where it makes sense to build seats—**SEAT SPOTS** (241), **FRONT DOOR BENCH** (242)—you can kill two birds with one stone by using the walls as seats which help enclose the outdoor space wherever its positive character is weakest.

\* \* \*

In many places walls and fences between outdoor spaces are too high; but no boundary at all does injustice to the subtlety of the divisions between the spaces.

Consider, for example, a garden on a quiet street. At least somewhere along the edge between the two there is a need for a seam, a place which unites the two, but does so without breaking down the fact that they are separate places. If there is a high wall or a hedge, then the people in the garden have no way of being connected to the street; the people in the street have no way of being connected to the garden. But if there is no barrier at all—then the division between the two is hard to maintain. Stray dogs can wander in and out at will; it is even uncomfortable to sit in the garden, because it is essentially like sitting in the street.

1125

1124

## CONSTRUCTION

*The problem can only be solved by a kind of barrier which functions as a barrier which separates, and as a seam which joins, at the same time.*

A low wall or balustrade, just at the right height for sitting, is perfect. It creates a barrier which separates. But because it invites people to sit on it—it invites them to sit first with their legs on one side, then with their legs on top, then to swivel round still further to the other side, or to sit astride it—it also functions as a seam, which makes a positive connection between the two places.

Examples: A low wall with the children's sandbox on one side, circulation path on the other; low wall at the front of the garden, connecting the house to the public path; a sitting wall that is a retaining wall, with plants on one side, where people can sit close to the flowers and eat their lunch.

Ruskin describes a sitting wall he experienced:

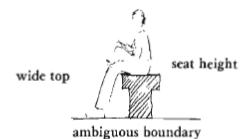
Last summer I was lodging for a little while in a cottage in the country, and in front of my low window there were, first, some beds of daisies, then a row of gooseberry and currant bushes, and then a low wall about three feet above the ground, covered with stone-cress. Outside, a corn-field, with its green ears glistening in the sun, and a field path through it, just past the garden gate. From my window I could see every peasant of the village who passed that way, with basket on arm for market, or spade on shoulder for field. When I was inclined for society, I could lean over my wall, and talk to anybody; when I was inclined for science, I could botanize all along the top of my wall—there were four species of stone-cress alone growing on it; and when I was inclined for exercise, I could jump over my wall, backwards and forwards. That's the sort of fence to have in a Christian country; not a thing which you can't walk inside of without making yourself look like a wild beast, nor look at out of your window in the morning without expecting to see somebody impaled upon it in the night. (John Ruskin, *The Two Paths*, New York: Everyman's Library, 1907, p. 203.)

Therefore:

Surround any natural outdoor area, and make minor boundaries between outdoor areas with low walls, about 16 inches high, and wide enough to sit on, at least 12 inches wide.

1126

## 243 SITTING WALL



\* \* \*

Place the walls to coincide with natural seat spots, so that extra benches are not necessary—**SEAT SPOTS** (241); make them of brick or tile, if possible—**SOFT TILE AND BRICK** (248); if they separate two areas of slightly different height, pierce them with holes to make them balustrades—**ORNAMENT** (249). Where they are in the sun, and can be large enough, plant flowers in them or against them—**RAISED FLOWERS** (245). . . .

1127

# Design Patterns Description

Name

243 SITTING WALL\*\*

Images



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The solution statement is:

Surround any natural outdoor area, and make minor boundaries between outdoor areas with low walls, about 16 inches high, and wide enough to sit on, at least 12 inches wide.

1126      1127

wide top      seat height

References to other patterns

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# Design Patterns Balance Forces

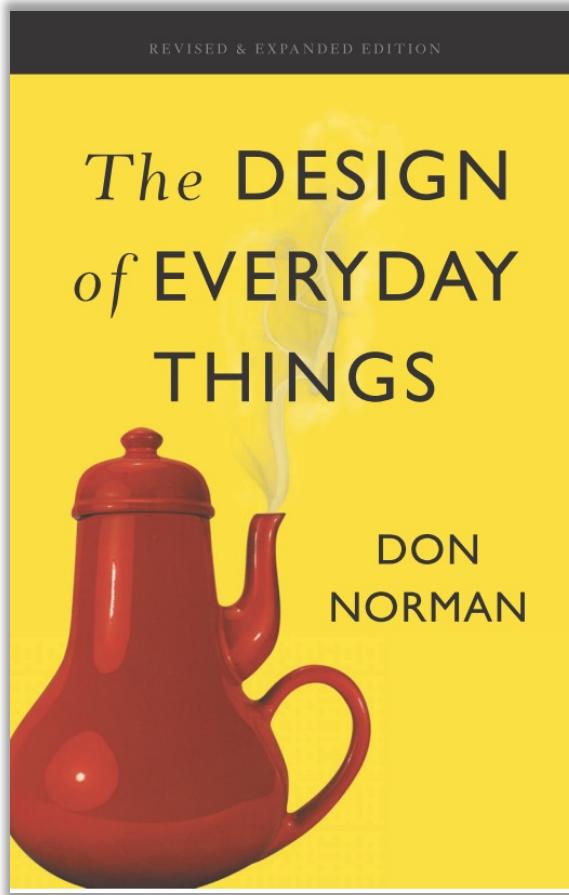
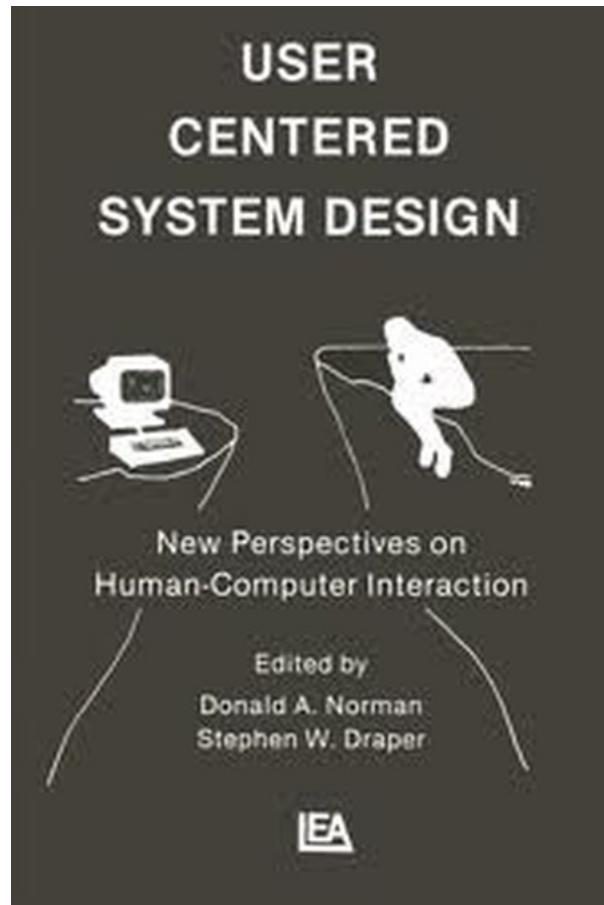
- Design patterns solve a problem **of conflicting forces**
- Example:
  - People are naturally drawn towards light
  - But like to sit

# Design Patterns Balance Forces

- Design patterns solve a problem **of conflicting forces**
- Example:
  - People are naturally drawn towards light
  - But like to sit
- Solution:
  - Alexander's **Window Seat** pattern



# Patterns in HCI



# UI Design Patterns

- Each user interface is unique and has its own set of goals and data, but...
  - This does not mean that we should force users to learn new conventions to operate them!
- With UI design patterns, we can accelerate our users understanding of the interface

# UI Design Patterns

## Design patterns

User Interface Design patterns are recurring solutions that solve common design problems. Design patterns are standard reference points for the experienced user interface designer.

Dive into the patterns below to learn a common language of web design.

### User Interface Design Patterns

Getting input	Navigation	Dealing with data	Social
<b>Forms</b> Password Strength Meter Structured Format Captcha Rule Builder Keyboard Shortcuts Drag and drop Inplace Editor Preview Expandable Input Autosave Input Prompt Good Defaults Fill in the Blanks WYSIWYG Input Feedback Color Picker	<b>Tabs</b> Navigation Tabs Module Tabs  <b>Jumping in hierarchy</b> Breadcrumbs Fat Footer Notifications Modal Home Link Shortcut Dropdown  <b>Menus</b> Vertical Dropdown Menu Accordion Menu Horizontal Dropdown Menu  <b>Content</b>	<b>Tables</b> Alternating Row Colors Sort By Column Table Filter  <b>Formatting data</b> Frequently Asked Questions (FAQ) Dashboard Copy Box  <b>Images</b> Gallery Slideshow Image Zoom  <b>Search</b> Autocomplete Search Filters	<b>Reputation</b> Collectible Achievements Testimonials Leaderboard  <b>Social interactions</b> Activity Stream Auto-sharing (Mini) Friend list (Mini) Reaction Chat Follow Invite friends Friend  Miscellaneous

<https://ui-patterns.com/patterns>

# UI Design Patterns

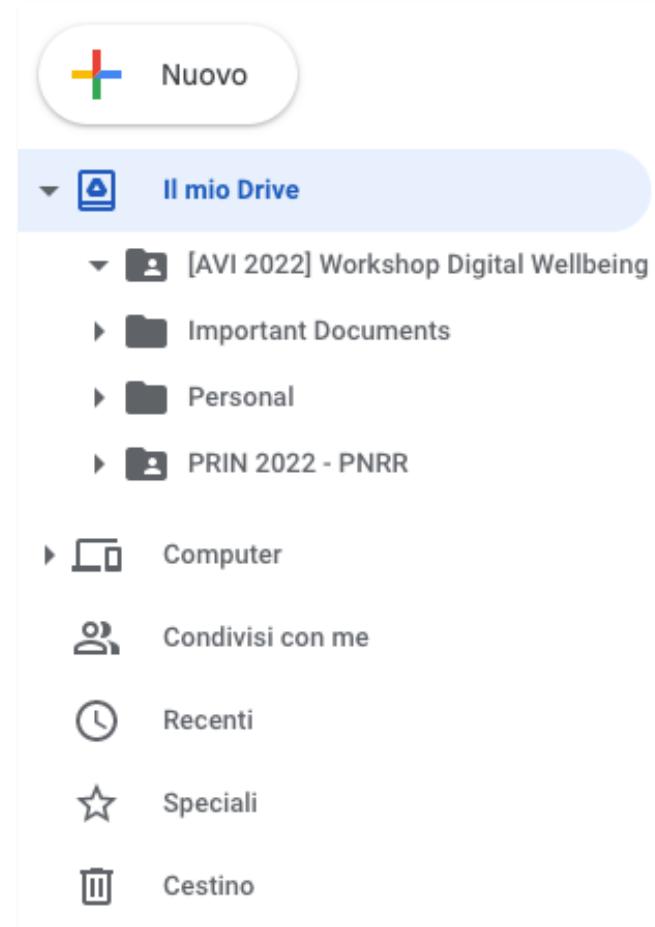
ACCORDION MENU

DROPDOWN MENU

CARDS

BREADCRUMBS

THE HAMBURGER



# UI Design Patterns

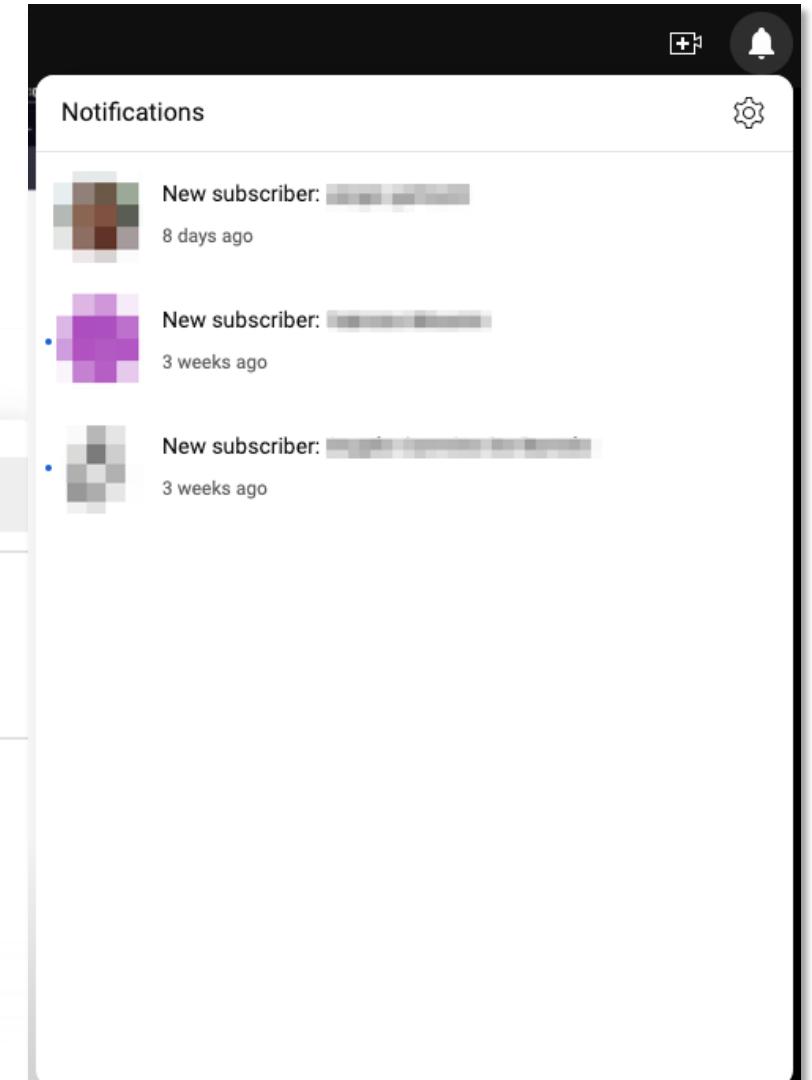
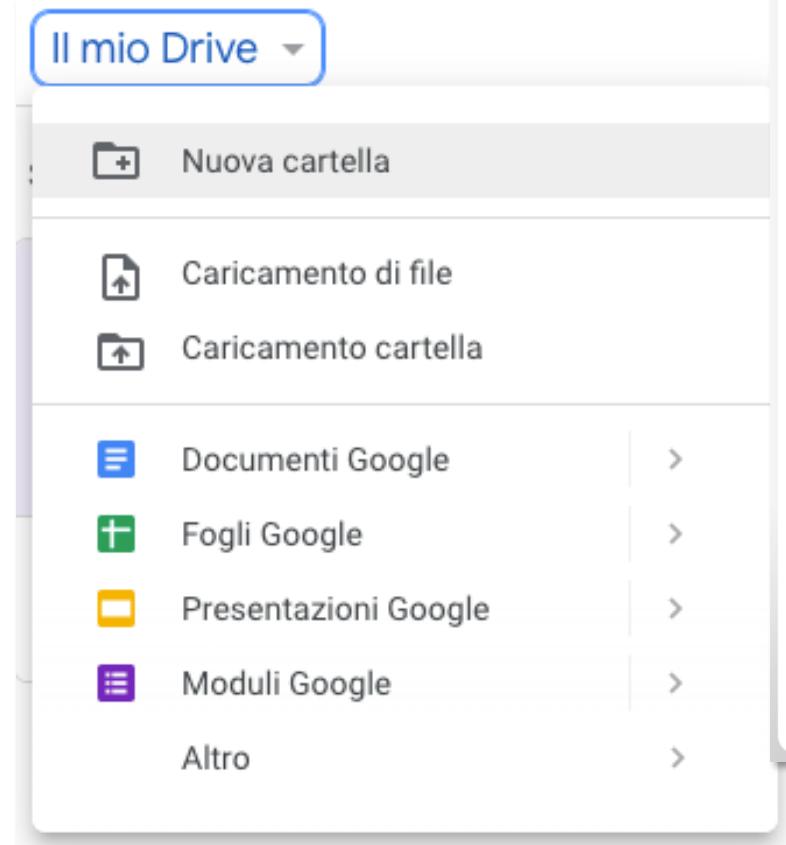
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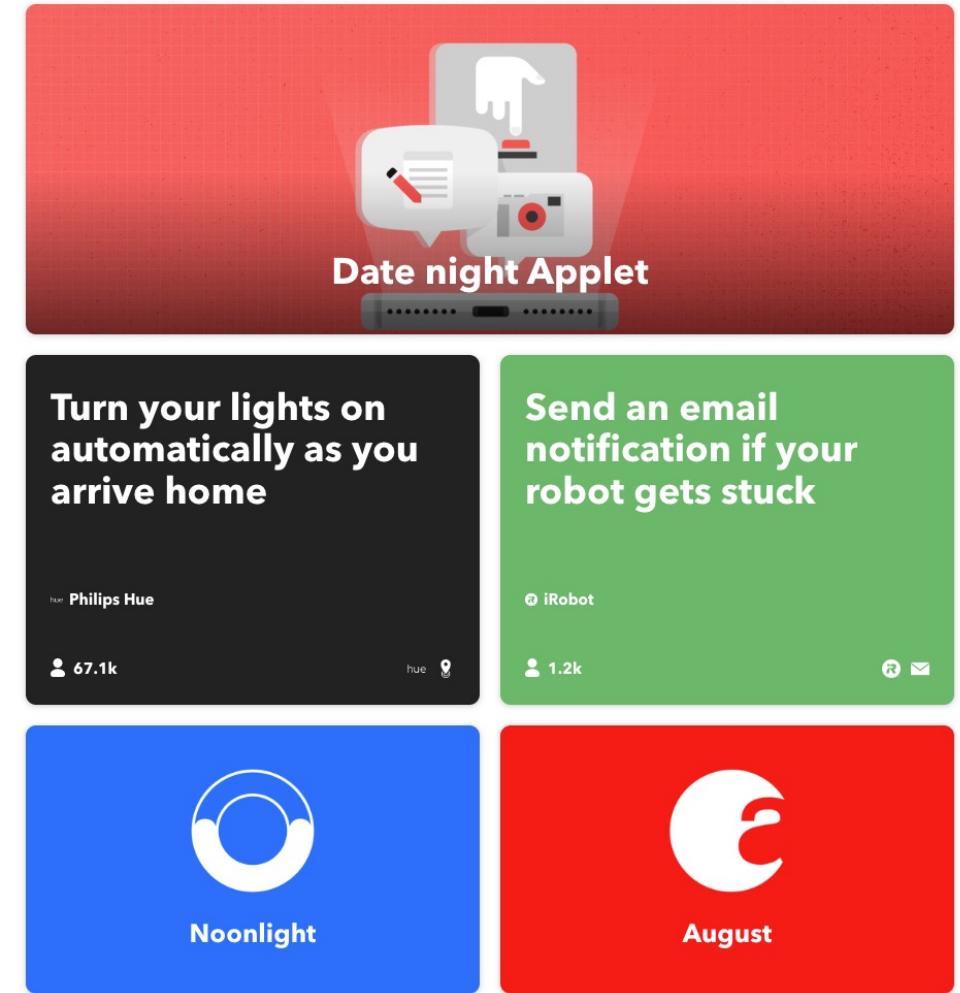
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THE HAMBURGER



# UI Design Patterns

ACCORDION MENU

DROPDOWN MENU

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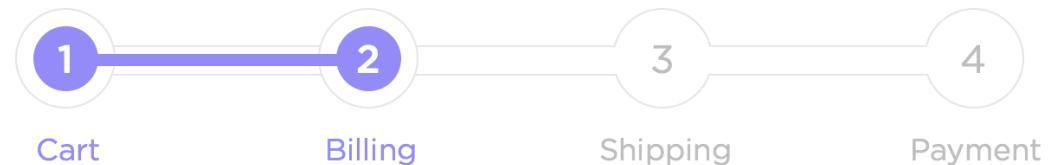
BREADCRUMBS

THE HAMBURGER

Cart > Billing > Shipping > Payment



Cart / Billing / Shipping / Payment



# UI Design Patterns

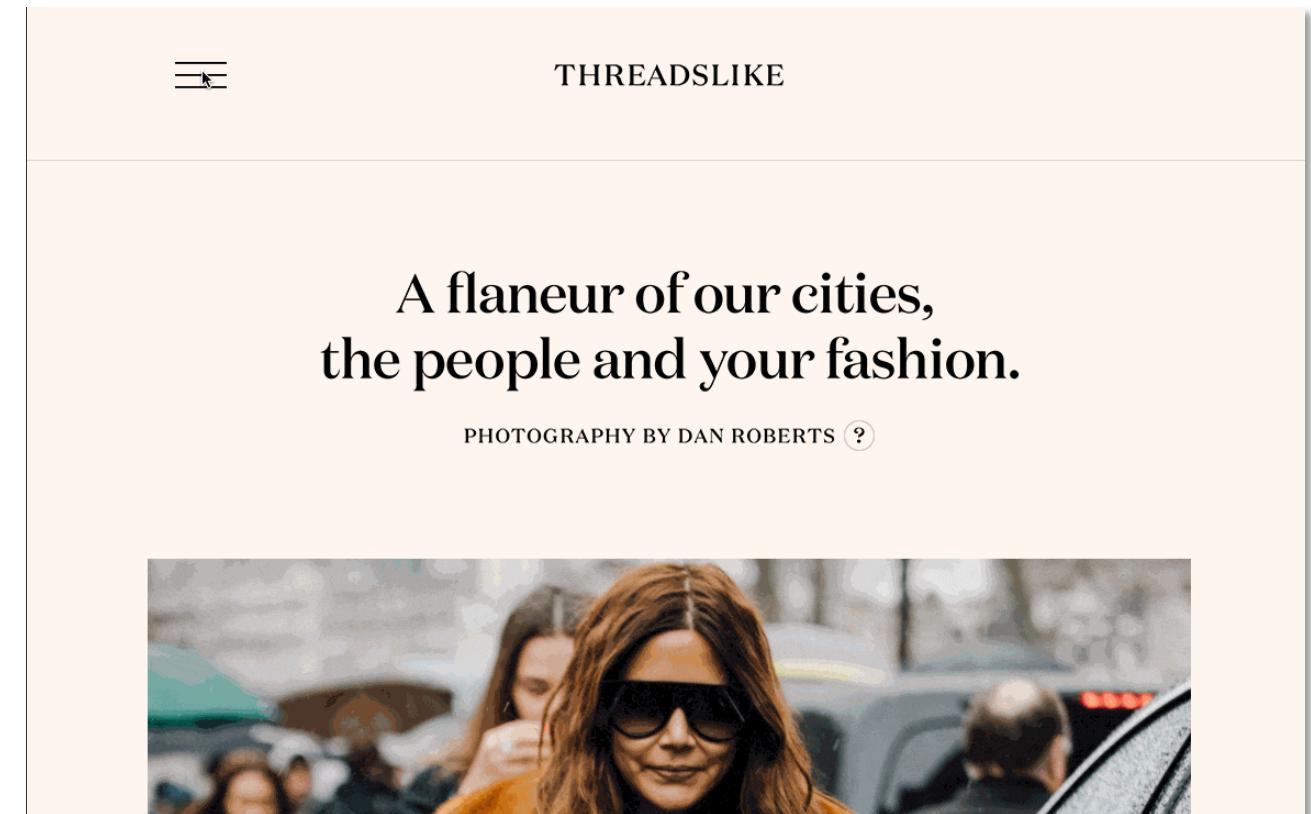
ACCORDION MENU

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CARDS

BREADCRUMBS

THE HAMBURGER



# Design Patterns in (Android) Mobile Apps

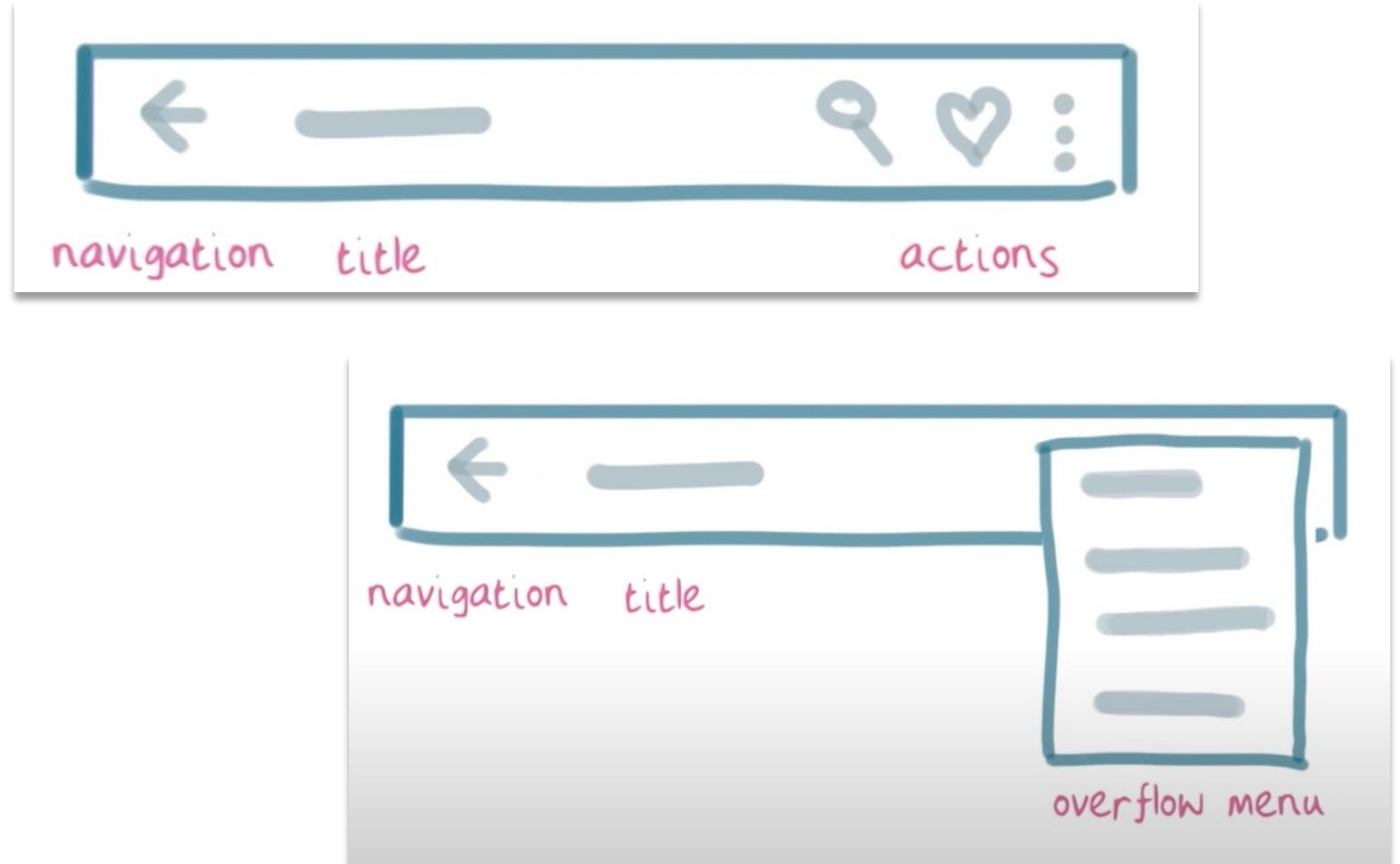
TOOLBAR

APP BAR

TABS

NAVIGATION DRAWER

SCROLLING AND PAGING



# Design Patterns in (Android) Mobile Apps

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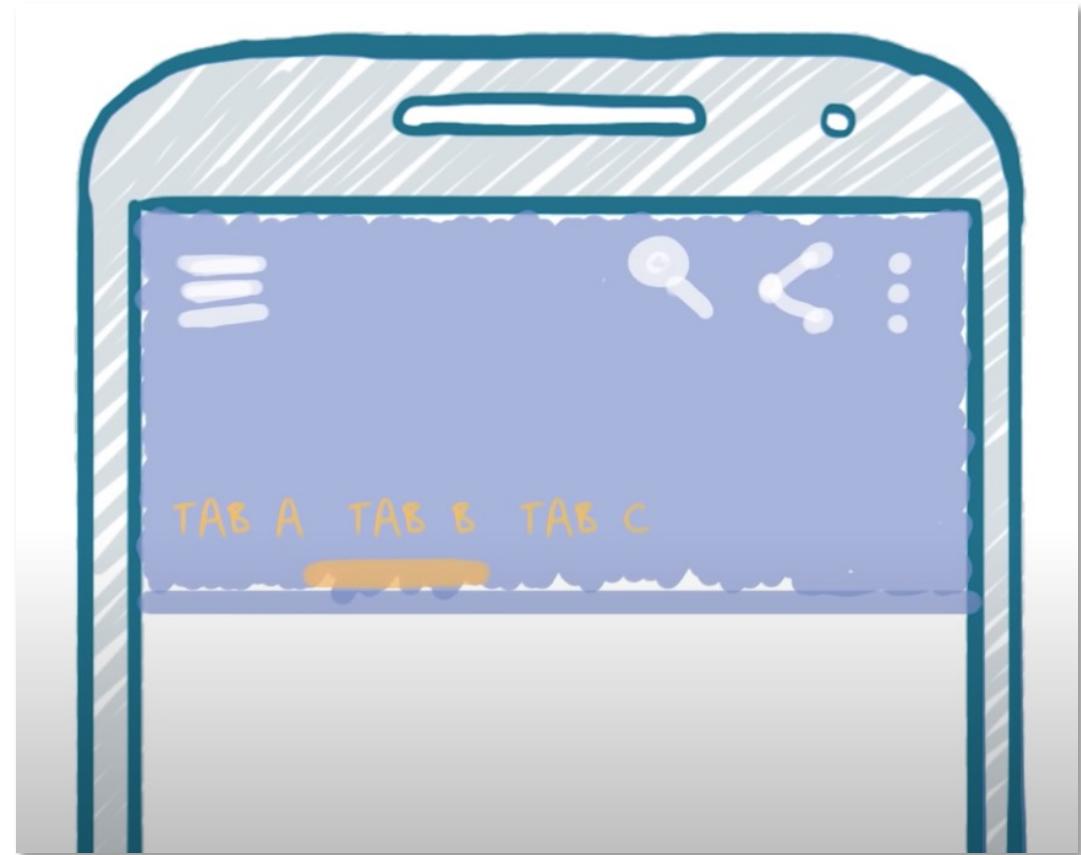
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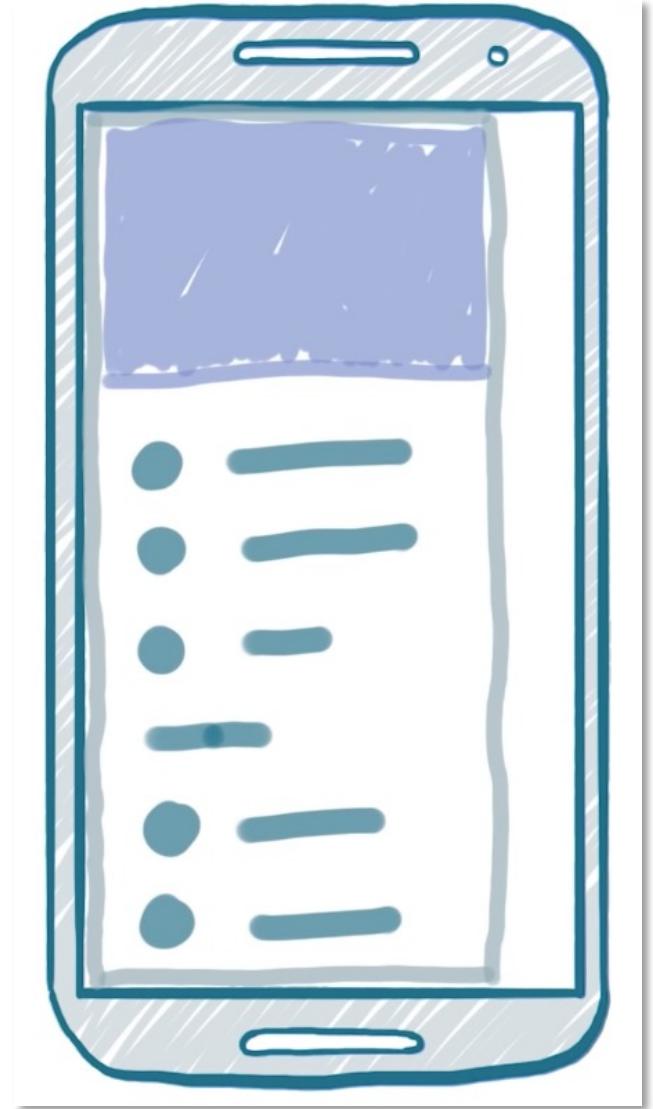
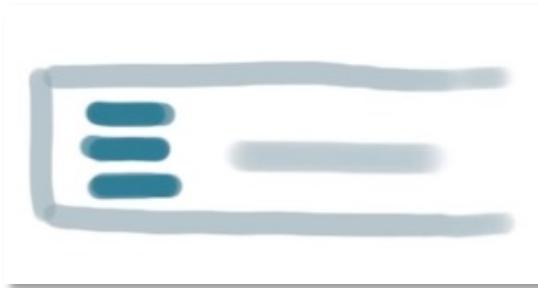
TOOLBAR

APP BAR

TABS

## NAVIGATION DRAWER

SCROLLING AND PAGING



# Design Patterns in (Android) Mobile Apps

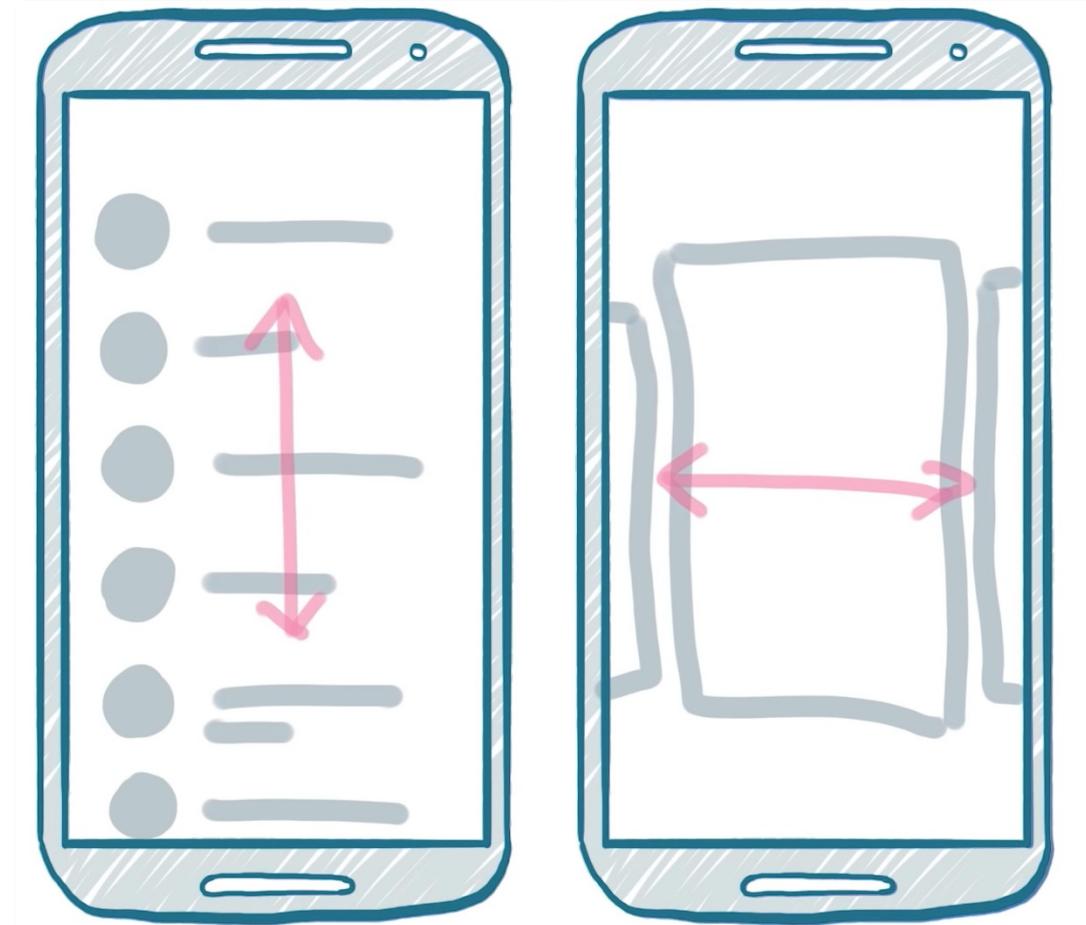
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NAVIGATION DRAWER

## SCROLLING AND PAGING

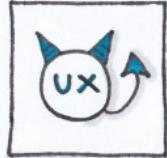


# Dark Patterns

Deceptive designs that go against users' best interests

# Dark Patterns

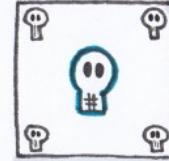
- The term “dark pattern” was coined in 2010 by **Harry Brignull**, a design practitioner
- The aim was to include all those designs that are **deliberately** adopted to promote choices that are not in the user’s best interest



# DARK PATTERNS

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WWW.SKETCHINGFORUX.COM

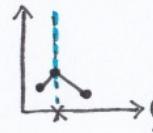
UX Knowledge Base Sketch #29



DARK PATTERNS ARE  
TRICKS  
THAT MAKE THE USERS DO  
THINGS THEY DID NOT MEANTO.

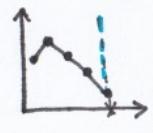
FINE LINE BETWEEN  
INFLUENCING USERS'  
BEHAVIOR AND  
TRICKING THEM!

DARK PATTERNS CAN WORK  
IF SOMEONE IS LOOKING FOR  
SHORT-TERM RESULTS.



ONLY INITIAL  
SUCCESS, NOT  
SUSTAINABLE

VS.  
USING DARK PATTERNS  
HAS A NEGATIVE IMPACT  
IN THE LONG-TERM



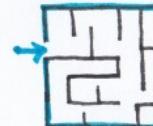
USERS WILL  
SWITCH TO  
MORE ETHICAL  
PRODUCTS / SERVICES

## THE MOST COMMON TYPES



### FORCED CONTINUITY

FREE TRIAL → CHANGES  
TO A PAYING SCHEME WITHOUT  
WARNING



ROACH MOTEL  
THE START IS EASY  
(SIGN UP/SUBSCRIPTION),  
QUITTING IS HARD



### GROWTH HACKING THROUGH SPAMMING

YOU BECOME THE SPAMMER  
WITHOUT KNOWING IT



### DELIBERATE MISDIRECTION

FOCUSING THE USERS' ATTENTION  
ON THE MORE EXPENSIVE OPTION,  
HIDING THE CHEAPER WAY



OBSCURED PRICING  
MAKING IT HARD TO  
COMPARE THE PRICES



SNEAK INTO BASKET  
A RANDOM ADDITIONAL ITEM  
APPEARS IN YOUR BASKET  
(WITHOUT YOUR CONSENT)



### BAIT & SWITCH

USE A CONVENTION, PATTERN  
IN A WAY TO MAKE THE USER  
FALSELY ASSUME SOMETHING



DISGUISED ADS  
AN AD LOOKING LIKE  
ANOTHER TYPE OF CONTENT  
/NAVIGATION



ROADBLOCK  
A POP-UP INTERRUPTS YOUR  
INTENDED ACTION



### HIDDEN COSTS

AT THE CHECKOUT, A NEW,  
UNEXPECTED COST APPEARS



PRIVACY ZUCKERING  
SHARING MORE PRIVATE INFO  
THAN YOU WANT



MISINFORMATION  
E.G. CONFUSING  
COLOR, CONTRAST  
LANGUAGE  
TRICK QUESTIONS  
CHECK BOX TREACHERY

# Dark Patterns

- **Harry Brignull** published a gallery of dark patterns on the [www.darkpatterns.org](http://www.darkpatterns.org)
- He launched an hall of shame campaign on Twitter using the hashtag **#darkpatterns**

# Dark Patterns ... or Deceptive Designs

- Many organizations are moving away from the oppressive terminology typical in computer science
  - For example from “master/slave” to “parent/child” and from “blacklist” to “block list”
- In the case of “dark patterns,” the association of “dark” with harm is problematic
  - it may reinforce the racist heuristic of viewing people with darker skin tones as evil (i.e., the “bad is black” effect)
- There are nowadays alternative names for dark patterns as well, such as **deceptive designs**

# **Attention-Capture Damaging Patterns**

A particular kind of dark patterns

# 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

## 2020 *This Is What Happens In An Internet Minute*



## 2021 *This Is What Happens In An Internet Minute*



# Attention-Capture Damaging Patterns: Definition

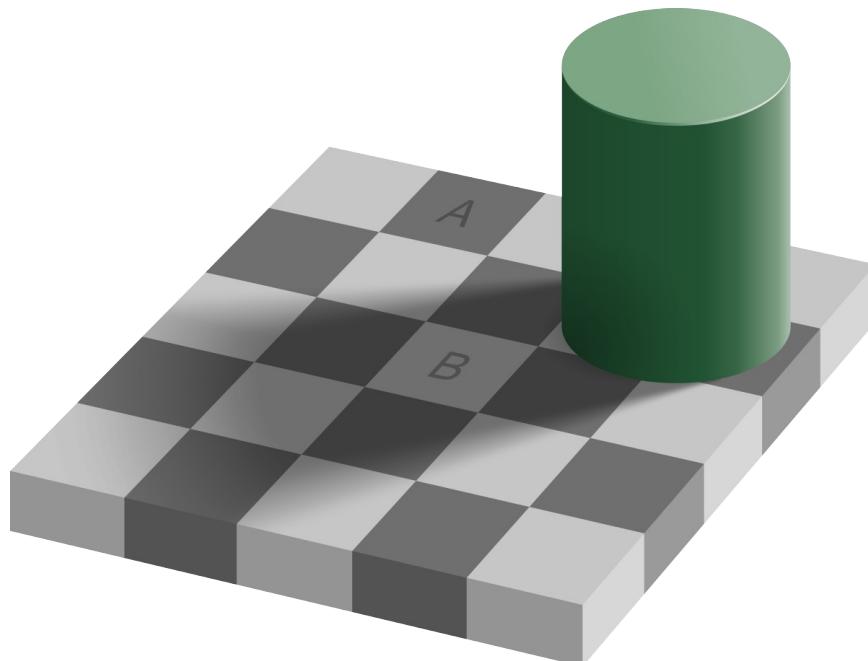
- A recurring pattern in digital interfaces that a designer **uses to** exploit psychological vulnerabilities and **capture attention**, often leading the user to lose **track of their goals**, lose their **sense of time and control**, and later **feel regret**
- The goal of ACDPs is to maximize continuous usage, daily visits, and (e.g., clicks, shares, likes, etc.).
- They make users more likely to visit a digital service again and click on similar types of rewarding content, thus creating a «**trap**» for the user that enables the **stakeholder's goal**

# Attention-Capture Damaging Patterns: Strategies

- Typically, they ACDPs the need for autonomous decision making by "automating" processes and functions
- Paradoxically, they can **improve the usability** of a platform
- They exploit users' **psychological vulnerabilities**:
  - Variable reward
  - Immediate gratification
  - [...]

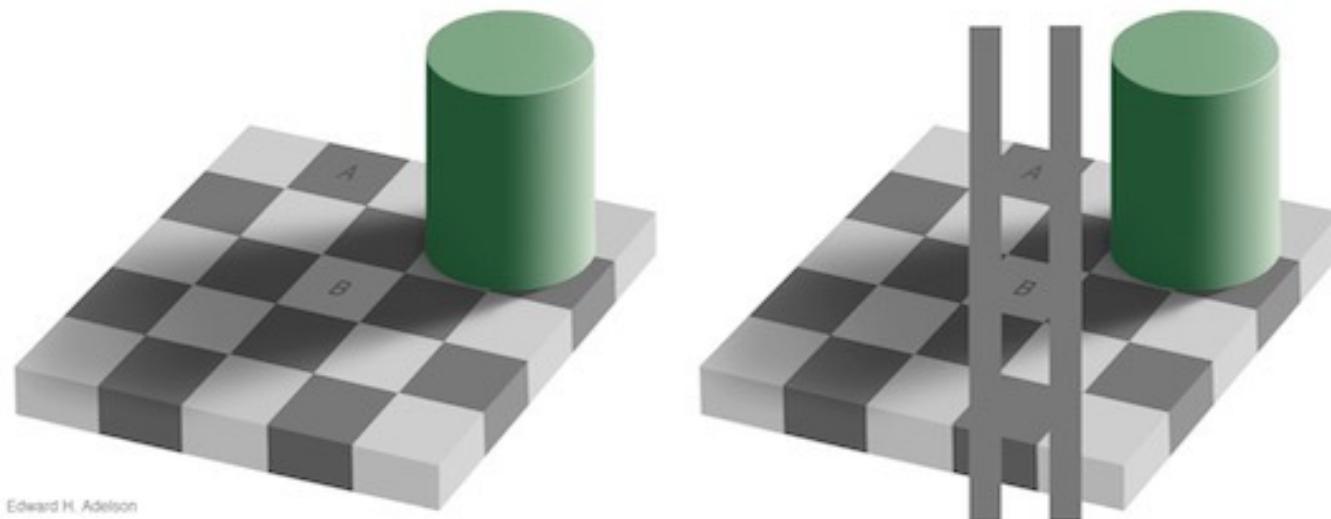
# Attention-Capture Damaging Patterns: Strategies

- ACDPs exploit **psychological vulnerabilities** and “**cognitive biases**” of users
  - What we perceive as true depends on the context in which we see it!



# Attention-Capture Damaging Patterns: Strategies

- ACDPs exploit **psychological vulnerabilities** and “**cognitive biases**” of users
  - What we perceive as true depends on the context in which we see it!



[Checkershadow Illusion](#)

# Attention-Capture Damaging Patterns: Strategies

- The exploited psychological vulnerabilities can be of various type:
  - Notifications (with their vibrations, flashing LEDs ...) mimic danger signals that we may experience in “offline” life
  - The possibility of receiving new comments or likes keeps us in a persistent state of alert (**variable reward**)
  - Every time we receive a comment or a “like,” our brain gets a dose of dopamine, prompting us to compare ourselves with others (**social influence**)
  - In general, today’s technology is designed to keep us “engaged,” offering us a mix of old and new content each time
    - a mechanism that is used by **slot machines**, too

# Attention-Capture Damaging Patterns: Impacts

- ACDPs may negatively affect people's digital well-being
  - They promote "**digital addiction**"
  - They undermine users' **attention and productivity**
  - They undermine users' **sense of agency** and self-control
  - They result in a later **sense of regret**

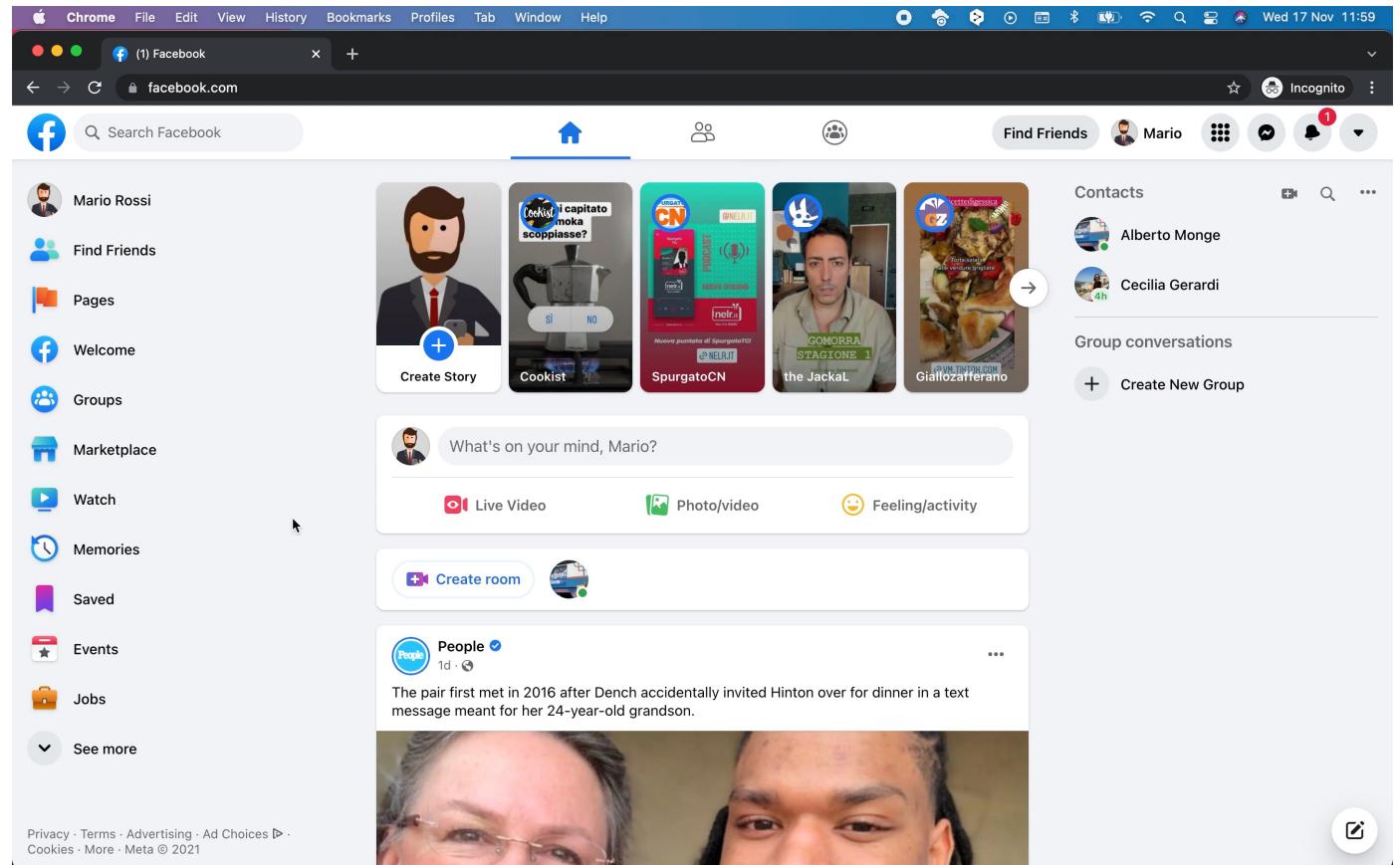
# Attention-Capture Damaging Patterns: Examples

**GUILTY-PLEASURE  
RECOMMENDATIONS**

NEVERENDING AUTOPLAY

CASINO PULL-TO-REFRESH

INFINITE SCROLLING



# Attention-Capture Damaging Patterns: Examples

## GUILTY-PLEASURE RECOMMENDATIONS

NEVERENDING AUTOPLAY

CASINO PULL-TO-REFRESH

INFINITE SCROLLING

- They are based on:
  - Previous user's interactions (**Content-Based**)
  - Preferences of similar users (**Collaborative Filtering**)
- Recommendations are useful if the goal of the platform matches the user's goals (**value-alignment problem**)
- They can become a «**trap**» for keeping the user's attention on the platform against the user's will
- They exploit **variable reward techniques**

# Attention-Capture Damaging Patterns: Examples

GUILTY-PLEASURE  
RECOMMENDATIONS

NEVERENDING  
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CASINO PULL-TO-REFRESH

INFINITE SCROLLING



# Attention-Capture Damaging Patterns: Examples

GUILTY-PLEASURE  
RECOMMENDATIONS

NEVERENDING  
AUTOPLAY

CASINO PULL-TO-REFRESH

INFINITE SCROLLING

- A new video is **automatically played** when the current one finishes. There is never a point for the user to **stop** and **reflect**, and the option to turn off autoplay is hidden or non-existent
- Autoplay may be **useful** in some circumstances, e.g., listening to music on YouTube while working
- It can **prolong** usage sessions (*«let me see this new video and then I will close the app!»*)
- It exploits **variable reward techniques**
- Reduces the **user's autonomy**

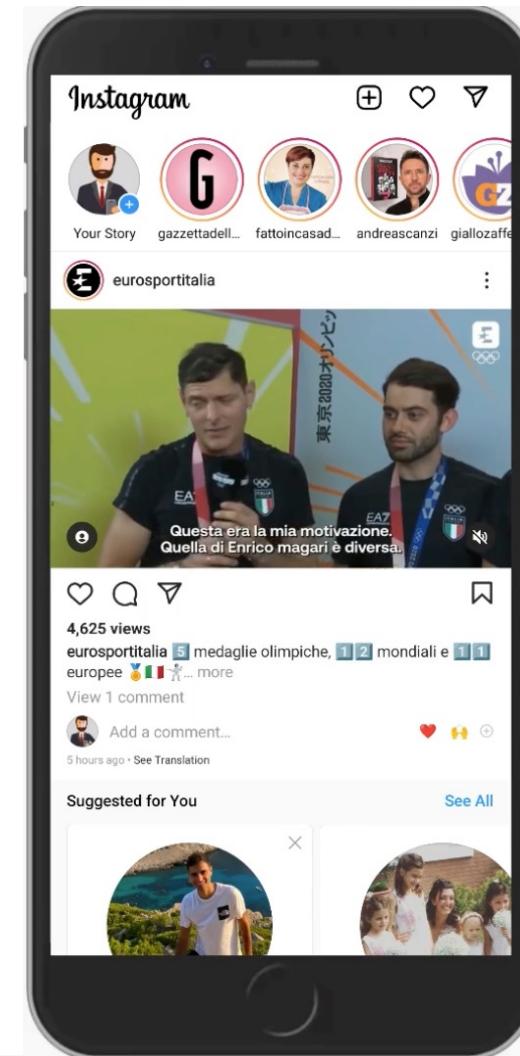
# Attention-Capture Damaging Patterns: Examples

GUILTY-PLEASURE  
RECOMMENDATIONS

NEVERENDING AUTOPLAY

CASINO PULL-TO-  
REFRESH

INFINITE SCROLLING



# Attention-Capture Damaging Patterns: Examples

GUILTY-PLEASURE  
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**CASINO PULL-TO-  
REFRESH**

INFINITE SCROLLING

- When the user **swipes down** on their smartphone, there is an **animated reload** of the page that **may or may not** reveal new appealing content.
- Users may be tempted to refresh compulsively, hoping to receive new content
- It exploits **variable reward techniques**
- Similar to **slot machines**

# Attention-Capture Damaging Patterns: Examples

GUILTY-PLEASURE  
RECOMMENDATIONS

NEVERENDING AUTOPLAY

CASINO PULL-TO-REFRESH

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# Attention-Capture Damaging Patterns: Examples

GUILTY-PLEASURE  
RECOMMENDATIONS

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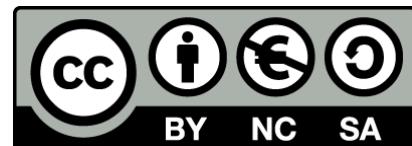
CASINO PULL-TO-REFRESH

**INFINITE SCROLLING**

- As the user scrolls down a page, more content **automatically and continuously loads at the bottom.**
- It **decreases the effort** required to browse content
- Promotes “**endless**” usage sessions
- It exploits **variable reward techniques**

# References

- Some material from
  - <https://hci.stanford.edu/courses/cs147/2022/wi/lectures/16-design-patterns.pdf>
  - <https://hci.rwth-aachen.de/cthci-ss2020>
  - [https://www.youtube.com/watch?v=aB6us\\_txi54](https://www.youtube.com/watch?v=aB6us_txi54)



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