

Beyond visual

Designing for motor impairments



Contents

1. Fine motor control
2. Touch targets
3. Tremors
4. Dragging movements
5. Focus
6. Improving keyboard accessibility
7. Wrap-up & Questions

Introduction

UX Designer turned **Accessibility Consultant**.

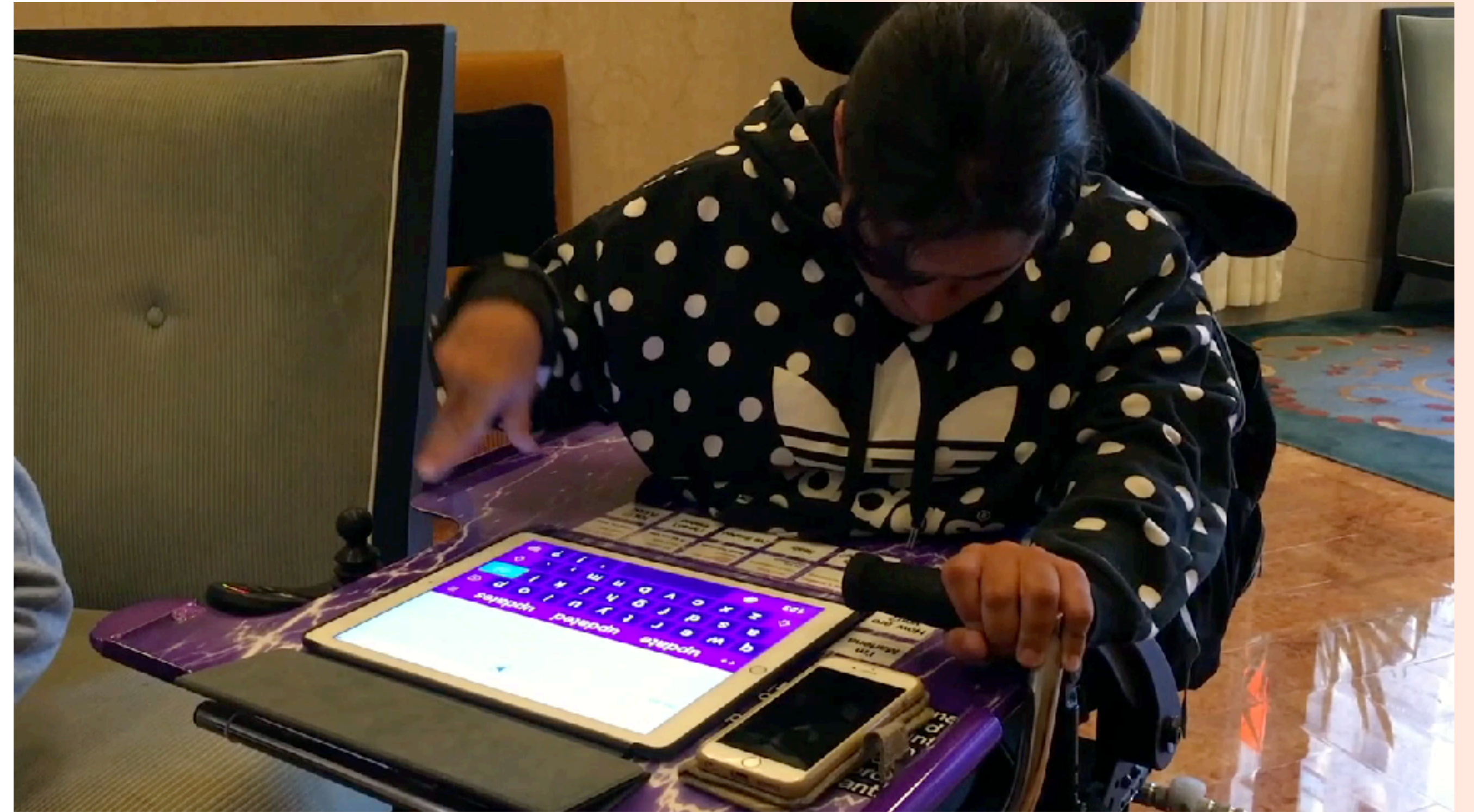
Designed apps for non-verbal people before moving into consulting for clients like KLM, Air France, Miro, Philips, eBay, Polestar and Skyscanner.



“Fine motor skills are activities in which you use the small muscles in your hands and wrists to make precise movements.”

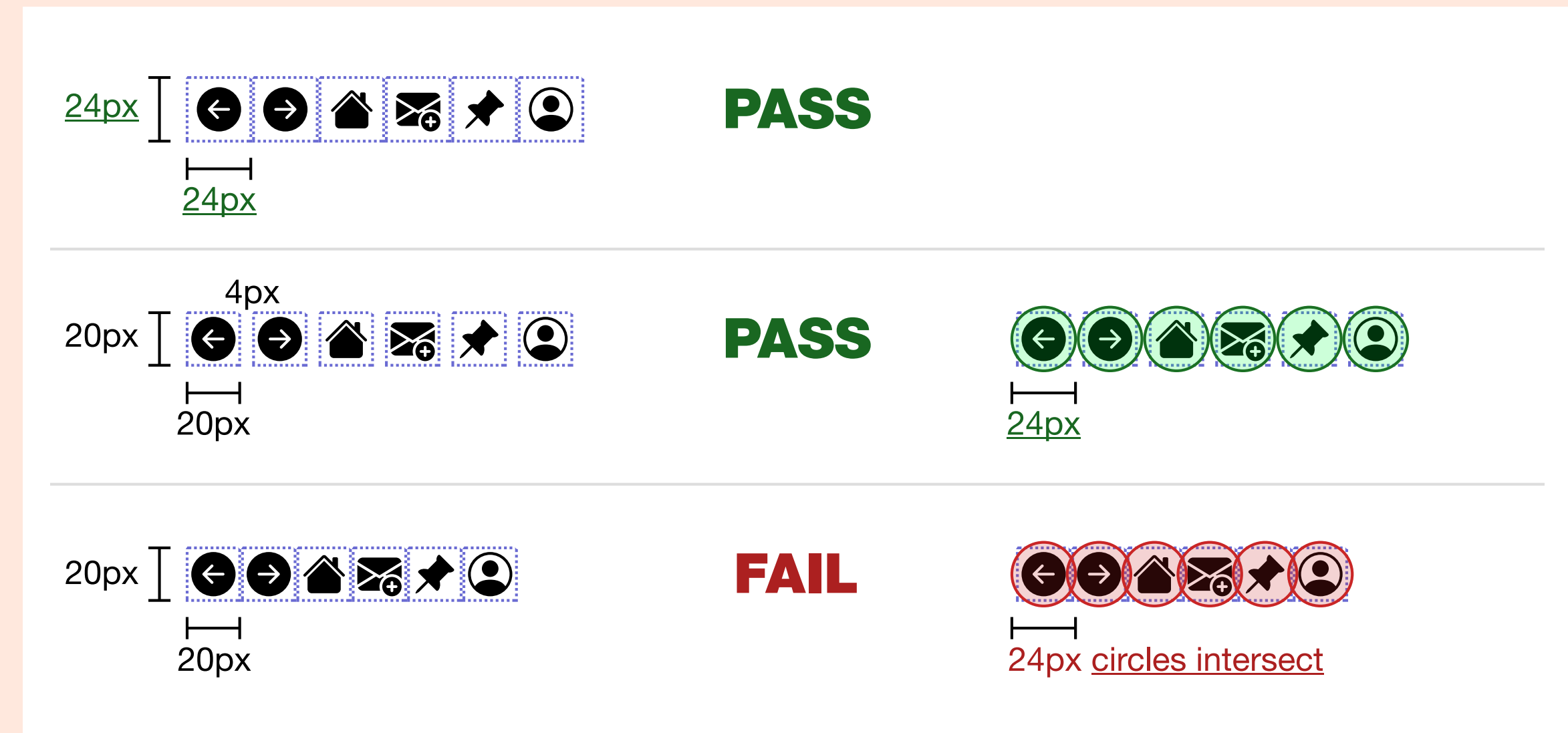
Fine motor control

- Follow device specific guidance on touch target sizes
- Test with a wide range of users
- Observe what is done



Minimum touch target sizes

- Android recommends at least **48 x 48 dp**
- Apple recommends at least **44 x 44 pt**
- A new success criterion in WCAG 2.2 (AA) requires controls to be at least **24 x 24 px**
- A current success criterion in WCAG 2.1 requires controls to be at least **44 x 44 px**. This is a AAA recommendation



WCAG

- The Web Content Accessibility Guidelines
- Currently at version 2.1, 2.2 should be out before the end of the year
- Made up of 4 principles, 13 guidelines and 78 success criteria
- Three levels of conformance, A, AA and AAA

The image shows a screenshot of the WCAG 2.0 document. On the left, there is a vertical sidebar with the text 'W3C Recommendation'. Below it is a table of contents listing the four principles and their sub-guidelines. The main content area is titled '0.2 WCAG 2 Layers of Guidance' and contains three main sections: Principles, Guidelines, and Success Criteria and Sufficient and Advisory Techniques. The text explains the structure and purpose of each layer of guidance.

W3C Recommendation

1. Perceivable
1.1 Text Alternatives
1.1.1 Non-text Content
1.2 Time-based Media
1.2.1 Audio-only and Video-only (Prerecorded)
1.2.2 Captions (Prerecorded)
1.2.3 Audio Description or Media Alternative (Prerecorded)
1.2.4 Captions (Live)
1.2.5 Audio Description (Prerecorded)
1.2.6 Sign Language (Prerecorded)
1.2.7 Extended Audio Description (Prerecorded)
1.2.8 Media Alternative (Prerecorded)
1.2.9 Audio-only (Live)
1.3 Adaptable
1.3.1 Info and Relationships
1.3.2 Meaningful Sequence
1.3.3 Sensory Characteristics
1.3.4 Orientation
1.3.5 Identify Input Purpose
1.3.6 Identify Purpose
1.4 Distinguishable
1.4.1 Use of Color
1.4.2 Audio Control
1.4.3 Contrast (Minimum)
1.4.4 Resize text
1.4.5 Images of Text
1.4.6 Contrast (Enhanced)
1.4.7 Low or No Background Audio
1.4.8 Visual Presentation
1.4.9 Images of Text (No Exception)
1.4.10 Rellow
1.4.11 Non-text Contrast
1.4.12 Text Spacing
1.4.13 Content on Hover or Focus

2. Operable

0.2 WCAG 2 Layers of Guidance

The individuals and organizations that use WCAG vary widely and include Web designers and developers, policy makers, purchasing agents, teachers, and students. In order to meet the varying needs of this audience, several layers of guidance are provided including overall *principles*, general *guidelines*, testable *success criteria* and a rich collection of *sufficient techniques*, *advisory techniques*, and *documented common failures* with examples, resource links and code.

- **Principles** - At the top are four principles that provide the foundation for Web accessibility: *perceivable*, *operable*, *understandable*, and *robust*. See also [Understanding the Four Principles of Accessibility](#).
- **Guidelines** - Under the principles are guidelines. The 13 guidelines provide the basic goals that authors should work toward in order to make content more accessible to users with different disabilities. The guidelines are not testable, but provide the framework and overall objectives to help authors understand the success criteria and better implement the techniques.
- **Success Criteria** - For each guideline, testable success criteria are provided to allow WCAG 2.0 to be used where requirements and conformance testing are necessary such as in design specification, purchasing, regulation, and contractual agreements. In order to meet the needs of different groups and different situations, three levels of conformance are defined: A (lowest), AA, and AAA (highest). Additional information on WCAG levels can be found in [Understanding Levels of Conformance](#).
- **Sufficient and Advisory Techniques** - For each of the *guidelines* and *success criteria* in the WCAG 2.0 document itself, the working group has also documented a wide variety of *techniques*. The techniques are informative and fall into two categories: those that are *sufficient* for meeting the success criteria and those that are *advisory*. The advisory techniques go beyond what is required by the individual success criteria and allow authors to better address the guidelines. Some advisory techniques address accessibility barriers that are not covered by the testable success criteria. Where common failures are known, these are also documented. See also [Sufficient and Advisory Techniques in Understanding WCAG 2.0](#).

All of these layers of guidance (*principles*, *guidelines*, *success criteria*, and *sufficient and advisory techniques*) work together to provide guidance on how to make content more accessible. Authors are encouraged to view and apply all layers that they are able to, including the advisory techniques, in order to best address the needs of the widest possible range of users.

Note that even content that conforms at the highest level (AAA) will not be accessible to individuals with all types, degrees, or combinations of disability, particularly in the cognitive language and learning areas. Authors are encouraged to consider the full range of techniques, including the advisory techniques, as well as to seek relevant advice about current best practice to ensure that Web content is accessible, as far as possible, to this community. Metadata may assist users in finding content most suitable for their needs.


Beyond WCAG

- WCAG is more of a checklist
- Passing WCAG does not mean a good user experience. **Conformance does not equal experience**
- Remember that we're designing for people

INTRODUCTION TI

Choose a language: [English](#) [Español](#) [Français](#) [🇬🇧](#)

Inclusive Design Principles



Contributors: [Henry Swan](#), [Jan Pouncey](#), [Hayden Pickering](#), [Léonie Watson](#)

These Inclusive Design Principles are about putting people first. It's about designing for the needs of people with permanent, temporary, situational, or changing disabilities — all of us really.

They are intended to give anyone involved in the design and development of websites and applications - designers, user experience professionals, developers, product owners, idea makers, innovators, artists and thinkers - a broad approach to inclusive design.

The principles are also available to hang on your wall as [a set of illustrated posters \(2MB\)](#) by [@BarclaysAccess](#).

THE PRINCIPLES [EXPAND ALL](#)

Provide comparable experience +

Beyond WCAG

- Lives in Australia
- First skydived at 21, jumping from 14,000 feet above Byron Bay
- Became the first person with cerebral palsy to base jump



This flight emits 17% less CO₂ than a typical flight on this route



10:55
AMS

2h



Direct

12:55
ARN



13:40
ARN

2h 05



Direct

15:45
AMS

12 deals from
408 €

Select →

**“If you design for the
edges, you get the centre
for free.”**

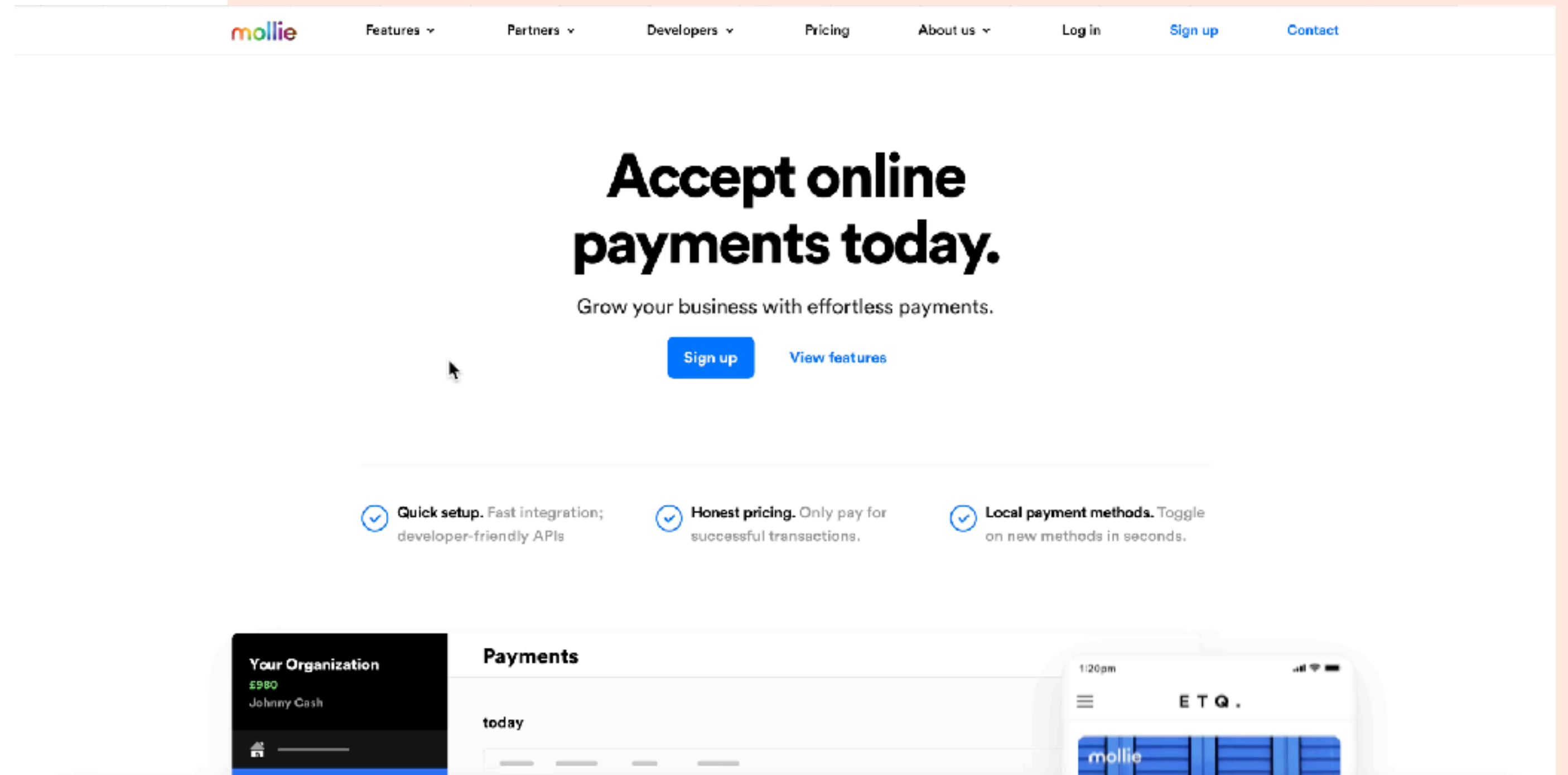


Christopher Patnoe

Head of Accessibility and Disability Inclusion, Google

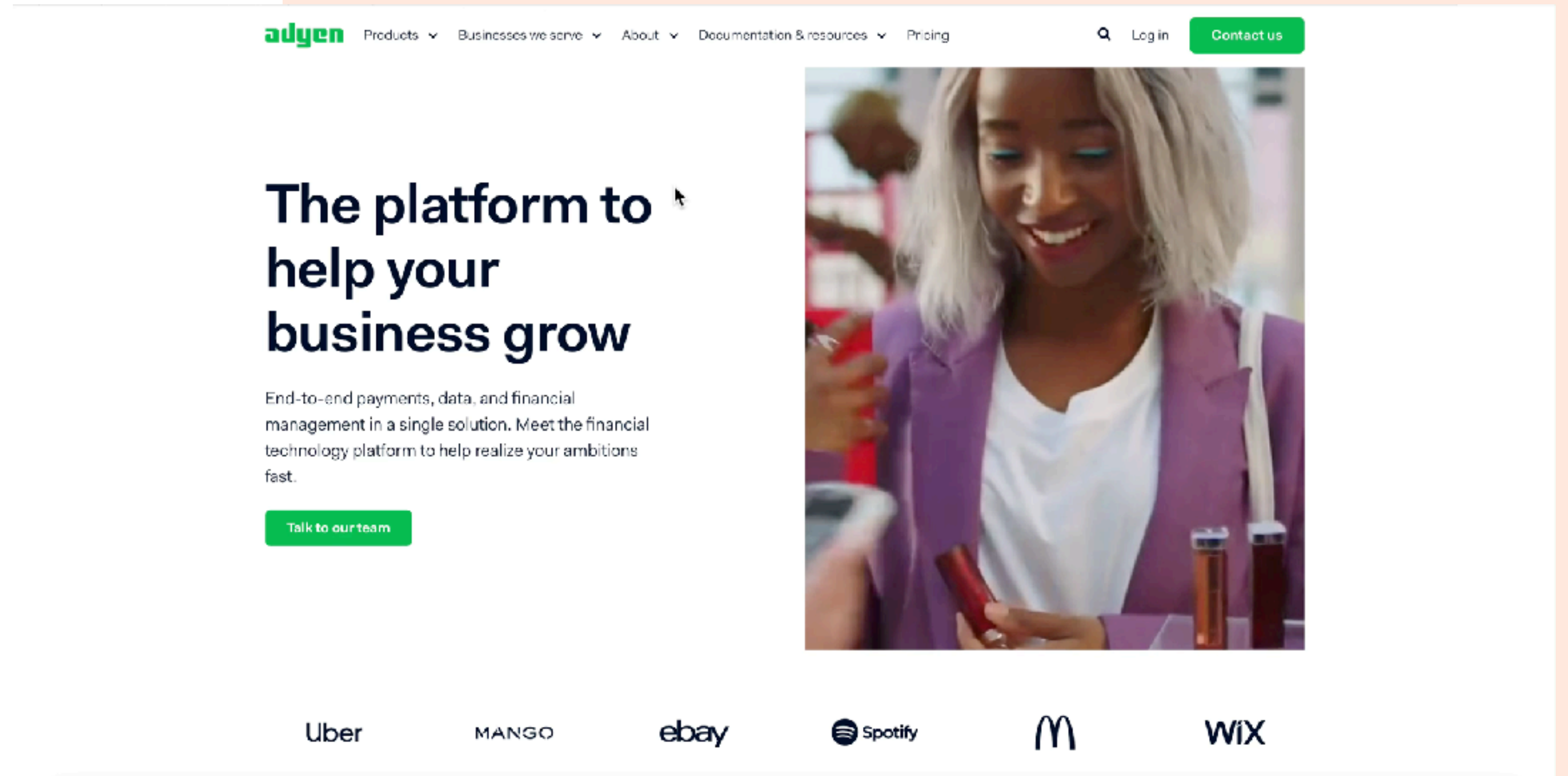
Tremors

- Tremors are neurological disorders that causes shaking in one or more parts of the body
- Tremors can happen to all, but are more common across middle-aged and older adults
- There are over 20 types of tremor. Essential tremor affect an estimated **5% of people worldwide**



Tremors

- Make use of white space
- Be forgiving in your designs
- Hover often requires precision (but **don't forget people who don't use a mouse**)



Dragging movements

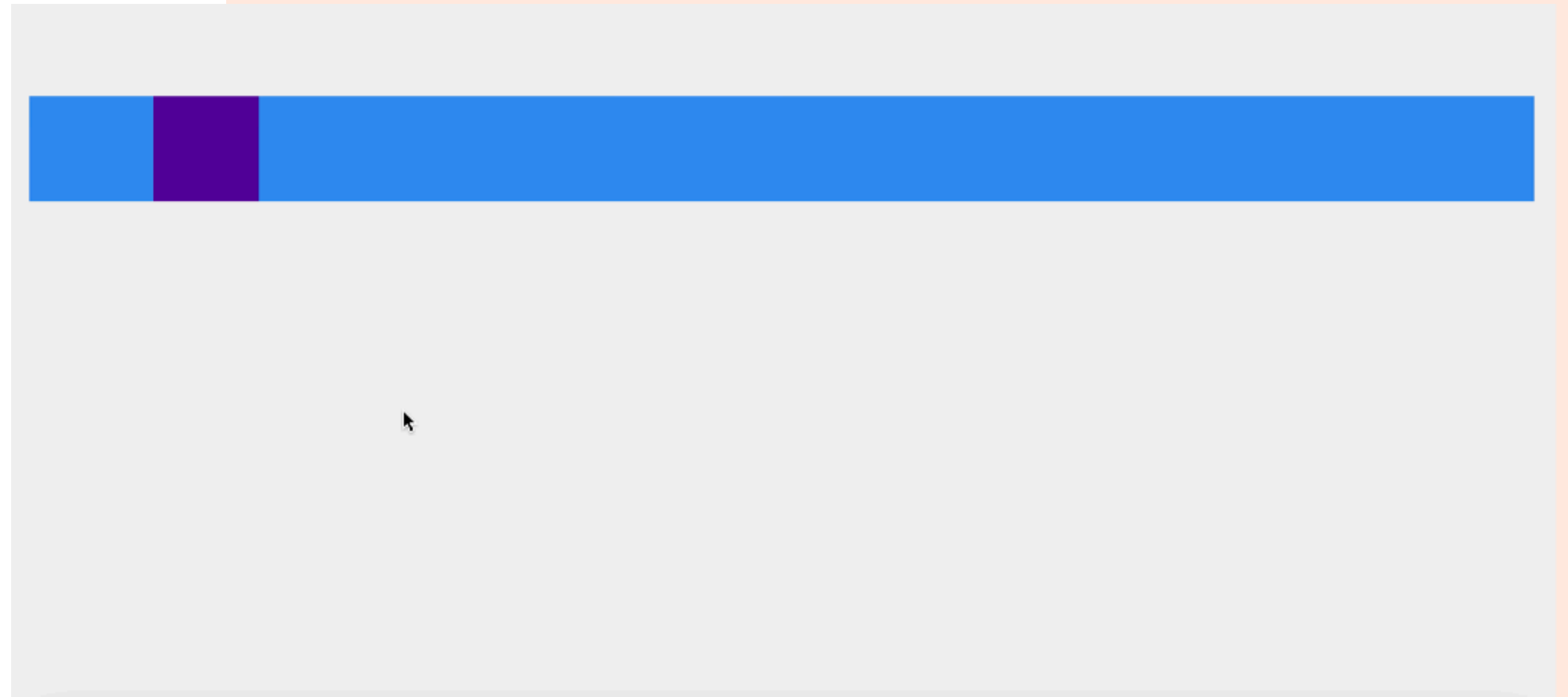
- **Difficult to perform** by people with upper body mobility impairments, tremors, or people using alternative pointing devices such as a head wand, or mouth stick
- Pressing (or clicking), holding down, moving and releasing are **complex interactions**

The screenshot displays the Booking.com search results page for South Yorkshire. The search criteria are: South Yorkshire, dates from Saturday, June 24 to Monday, June 26, and 2 adults, 1 child, 1 room. The page shows 192 properties found, sorted by 'Top picks for families'. A notification indicates that 72% of places are unavailable for the selected dates. Two hotel listings are visible:

- Best Western Plus Pastures Hotel**: 3 stars, 8.2 rating (Very good), 1,444 reviews. Price: €398 for 2 nights, 2 adults, 1 child. Includes taxes and charges. Features: 2x Standard Double Room, 2 large double beds. Free cancellation - no prepayment needed.
- Hilton Garden Inn Doncaster Racecourse**: 4 stars, 8.6 rating (Fabulous), 2,577 reviews. Price: €199 for 2 nights, 2 adults, 1 child. Includes taxes and charges. Features: Queen Family Room, 2 beds (1 sofa bed, 1 large double). Free stay for your child. Free cancellation - no prepayment needed.

Dragging movements

- Dragging can include drag & drop, volume sliders, carousels, etc.
- WCAG 2.2 SC 2.5.7 Dragging movements (AA) **requires a single input gesture**
- **All functionality** should be achieved without dragging

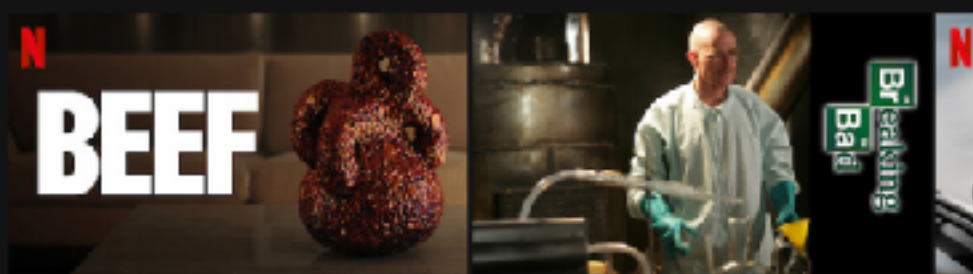


21:30

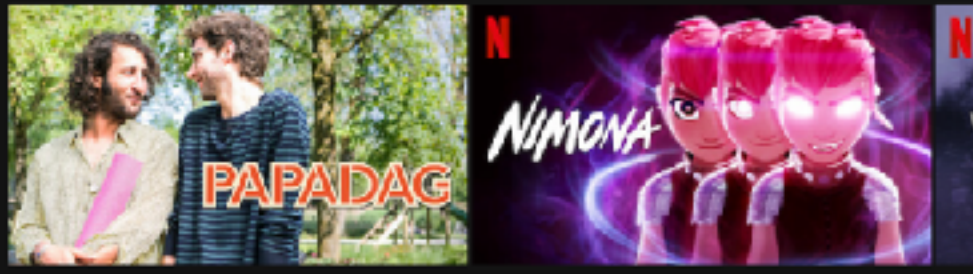


netflix.com

NETFLIX Critically Acclaimed Binge-worthy TV Programmes Search



New Releases



Comedy Films



Critically Acclaimed Binge-worthy US TV Programmes



Top Picks for Dean



Hardware solutions

Hardware solutions to remove digital barriers include (ergonomic) keyboards, head pointers, mouth sticks, sip and puff devices, eye tracking, voice input, switches, and many, many more.



Switches

Switches are primarily used by people with motor impairments, they can be:

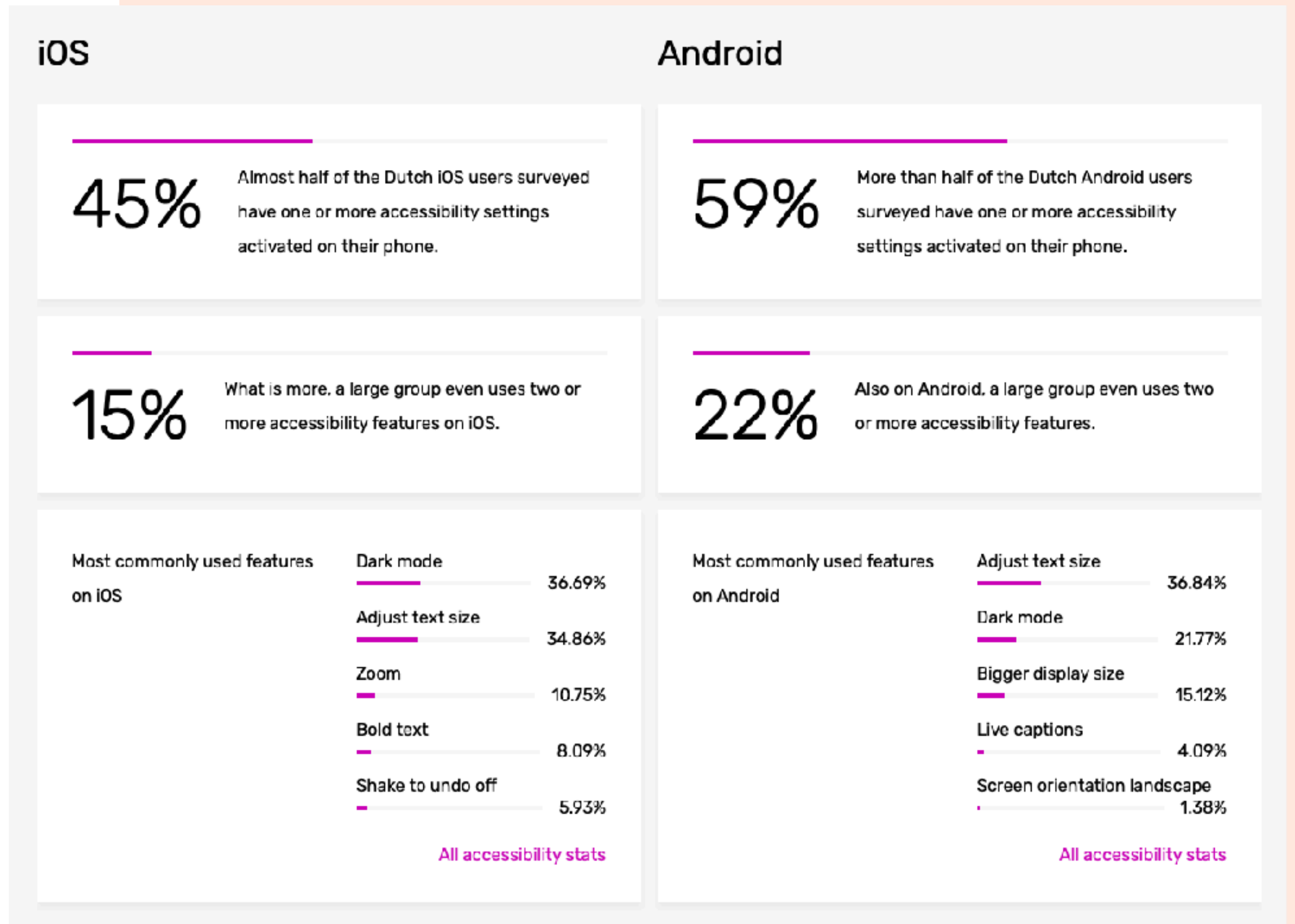
- A single switch.
- Multiple switches.
- Sip-and-puff is a type of switch.
- Switches can be operated in multiple ways.



Device settings

Device settings can be made on both iOS and Android devices. Research in the Netherlands found:

- **59% of Android users** had at least one accessibility setting turned on.
- **45% of iOS users** had at least one accessibility setting turned on.



Threads example

- Does not allow user-generated alternative text.
- Does not allow for captioning of videos.
- Does not respect user settings for people with motion disabilities.
- ...or user settings for dynamic text, font scaling.....etc.



Time limits

- Some people need longer to complete a task
- ..this could be someone with a motor impairment, cognitive impairment, low literacy, reading content in a second language or...
- ...someone distracted, multi tasking, etc.

ticketmaster®

1 Additional Items 3 4 5

DEC 16 2023 SATURDAY 20:00 Hauschka TivoliVredenburg, Utrecht

Additional Items

Alpine Hearing Products

Geniet van de muziek, bescherm je oren
Please note: This product can only be sent to a Dutch or
⊕ More Info

Item	Price	Quantity (Max: 8)
A. PartyPlug Pro Natural	29.95 EUR	0
B. PartyPlug	16.90 EUR	0
C. PartyPlug transparent Duopack	27.90 EUR	0

Continue

You will not be charged

Your order

Time left to complete order **03:29**

Tickets 1 ✕

⊕ Hauschka 27.78 EUR
16-12-2023 20:00

TOTAL 27.78 EUR

Physical world example: Green Man +

- Green Man+ is a service for pedestrians in Singapore who need more time to cross the road
- People who need more time can apply for a card to activate the service
- Tapping the card at a pedestrian crossing extends the green man time by 3 - 13 seconds



Time limits

- Allow people to extend the time
- ...manually adjust the time
- ...or turn off, when appropriate
- Save progress and allow people to carry on from where they left off
- See WCAG guideline 2.2 for more information

The screenshot shows a ticket purchase interface for a concert on December 16, 2023, at TivoliVredenburg, Utrecht. The event is by Hauschka, starting at 20:00. A red error message box is overlaid on the page, stating: "You've run out of time". The message explains that the time limit is for fairness and that the user's preferences are saved. It offers two options: to try to retrieve the same tickets or to start a new ticket search. A blue button labeled "Try again now" is located at the bottom right of the message box. The background shows a list of items (A, B, C, D) including PartyPlug, ALPINE, and Giftcard, along with a "Your order" summary on the right.

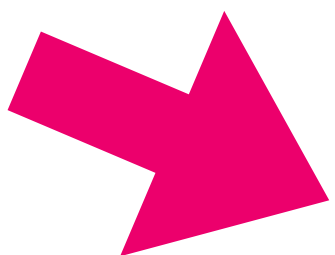
Keyboards

Keyboards are the main form of input for:

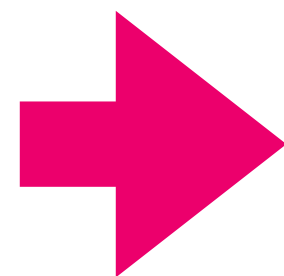
- Most computer users
- Screen reader users
- People with some motor impairments, who find it difficult to grasp or move a mouse



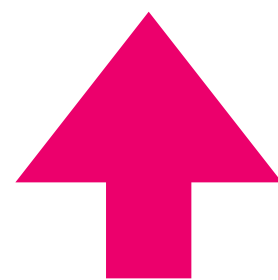
Esc



TAB



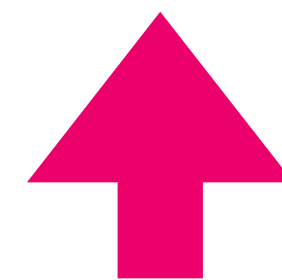
Spacebar



Enter

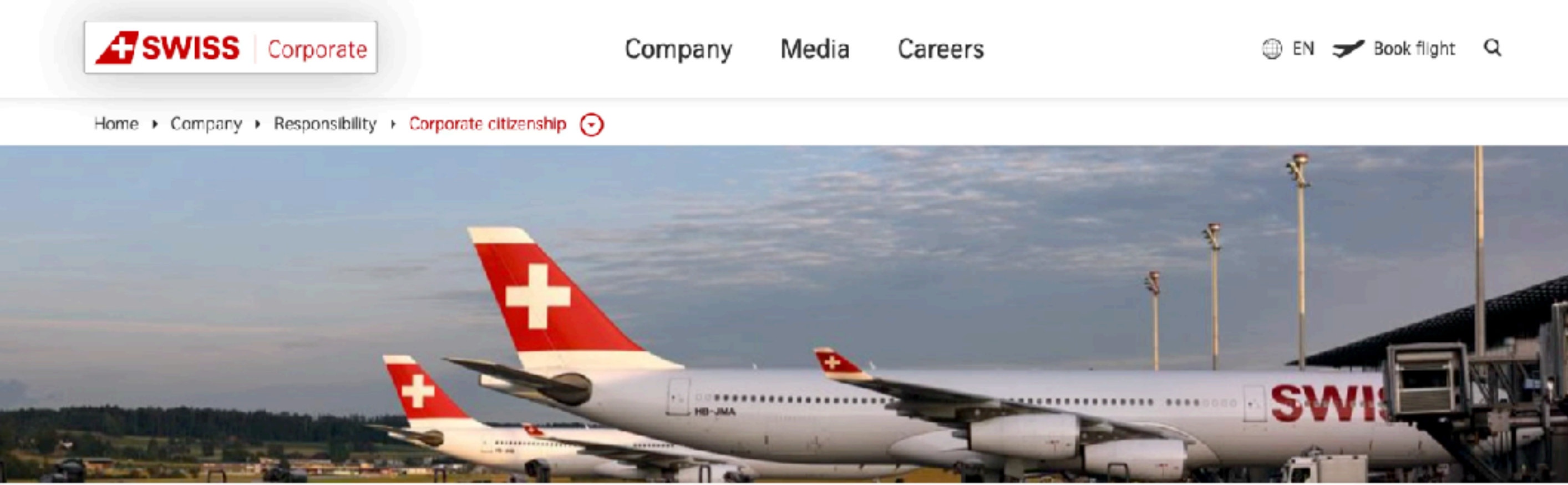


Arrow keys



Focus states

- Focus states allow keyboard users to see what they are interacting with prior to actioning them
- **All interactive elements should be focusable**, elements that do not trigger an action should not be in the focus order
- Focus order should be logical
- Focus should be visible at all times




SWISS | Corporate

Company Media Careers

EN Book flight

Home > Company > Responsibility > Corporate citizenship

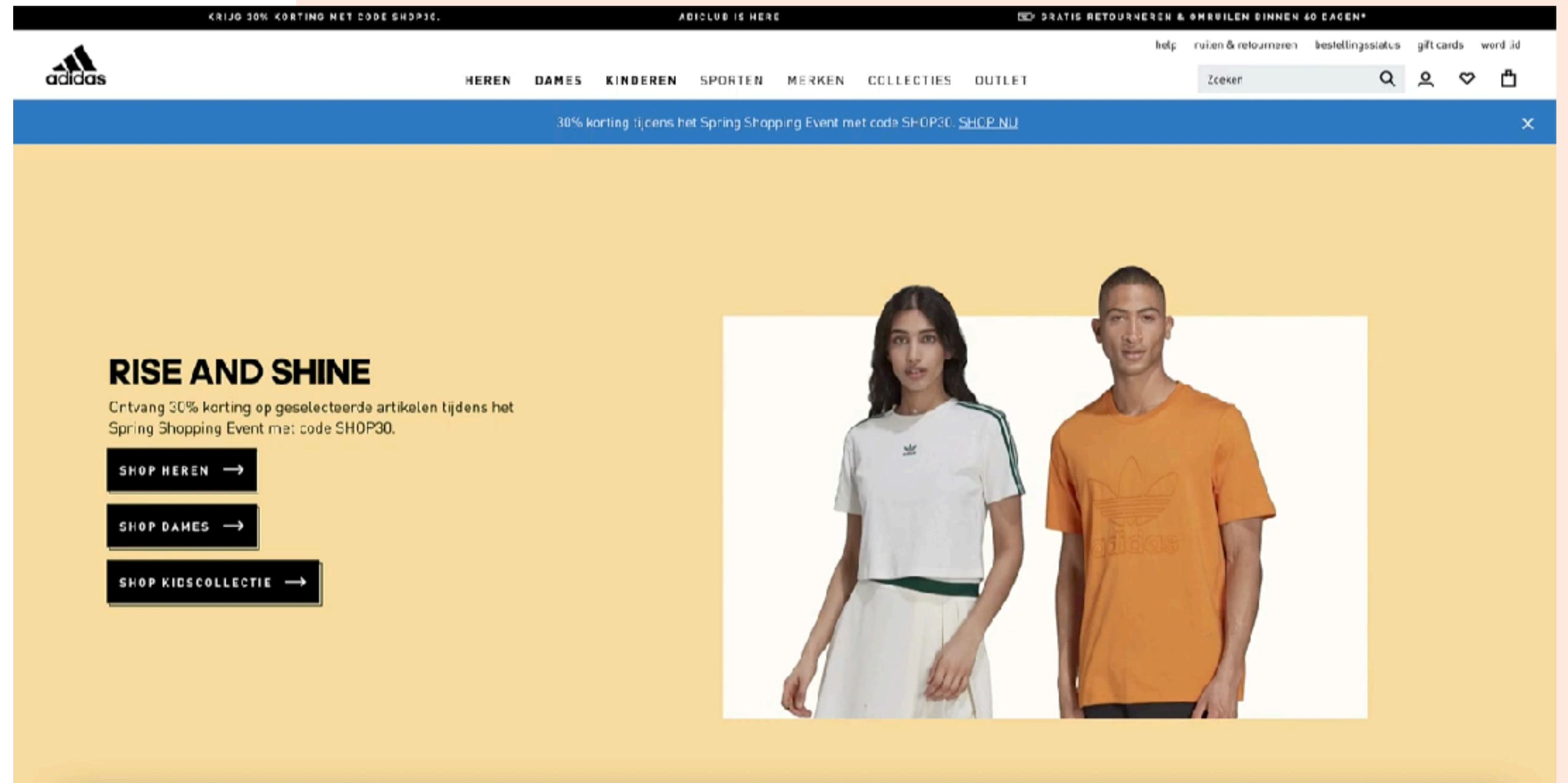


Corporate citizenship

SWISS supports people and institutions at home. The company is involved with communities close to the airport, invests in children and young adults, and supports employee-driven charity projects.

Focus states

- Default focus states are defined by the browser, but many are weak signifiers
- When focus states are removed then it makes it very difficult / impossible for someone to know what they will interact with



Key presses

- Annotating focus order can help us see how many tab stops have been introduced in our designs
- ...this can help us to see if there are ways to reduce them, and **make our designs more efficient**

The screenshot displays the KLM website's flight search interface. At the top, the KLM logo and 'Royal Dutch Airlines' are visible, along with navigation links for 'Contrast on', 'Ireland - EN', 'Log in', and 'Sign up'. A breadcrumb trail shows the current page: 'Search' -> 'Outbound flight' -> 'Return flight' -> 'Passengers' -> 'Extra options' -> 'Payment'. The 'Outbound flight' section is highlighted, showing a calendar of dates from Mon 26 Jun to Sun 2 Jul, with 'Thu 29 Jun' selected and a price of 'from EUR 218'. Below this, there are filters for 'Economy Class' and 'Sort by: Departure time'. A section for 'Direct flights (5)' is shown, with the first flight card highlighted. This card displays flight details for KLM Cityhopper KL0932 from Dublin (DUB) to Amsterdam (AMS) on Thu 29 Jun, with a departure time of 05:55 and an arrival time of 08:35. The price for 1 passenger is shown for both Economy (From EUR 287) and Business (From EUR 704) classes. A 'View flight details' button is also present. A 'Feedback' button is visible on the right side of the page.

Question

✈ Direct flights (5)

<p>KLM Cityhopper KL0932</p> <p>Dublin Amsterdam</p> <p>DUB ✈ AMS</p> <p>05:55 1h40 08:35</p> <p>Trip duration: 1h40 #1 View flight details ></p>	<p>Economy #2</p> <p>#3</p> <p>From EUR 287</p> <p>Price for 1 passenger</p>	<p>Business #4</p> <p>#5</p> <p>From EUR 704</p> <p>Price for 1 passenger</p>
<p>KLM Cityhopper KL0934</p> <p>Dublin Amsterdam</p> <p>DUB ✈ AMS</p> <p>08:50 1h40 11:30</p> <p>Trip duration: 1h40 #6 View flight details ></p>	<p>Economy #7</p> <p>#8</p> <p>From EUR 284</p> <p>Price for 1 passenger</p>	<p>Business #9</p> <p>#10</p> <p>From EUR 630</p> <p>Price for 1 passenger</p>
<p>KLM Cityhopper KL0936</p> <p>Dublin Amsterdam</p> <p>DUB ✈ AMS</p> <p>13:20 1h40 16:00</p> <p>Trip duration: 1h40 #11 View flight details ></p>	<p>Economy #12</p> <p>Lowest fare</p> <p>#13</p> <p>From EUR 218</p> <p>Price for 1 passenger</p>	<p>Business #14</p> <p>#15</p> <p>From EUR 630</p> <p>Price for 1 passenger</p>

✈ Direct flights (5)

Find the perfect seat for you. [Compare our seats](#) #1

<p>KLM Cityhopper KL0932</p> <p>Dublin Amsterdam</p> <p>DUB ✈ AMS</p> <p>05:55 1h40 #2 08:35</p> <p>Trip duration: 1h40 View flight details ></p>	<p>#3</p> <p>Economy</p> <p>From EUR 287</p> <p>Price for 1 passenger</p>	<p>#4</p> <p>Business</p> <p>From EUR 704</p> <p>Price for 1 passenger</p>
<p>KLM Cityhopper KL0934</p> <p>Dublin Amsterdam</p> <p>DUB ✈ AMS</p> <p>08:50 1h40 #5 11:30</p> <p>Trip duration: 1h40 View flight details ></p>	<p>#6</p> <p>Economy</p> <p>From EUR 284</p> <p>Price for 1 passenger</p>	<p>#7</p> <p>Business</p> <p>From EUR 630</p> <p>Price for 1 passenger</p>
<p>KLM Cityhopper KL0936</p> <p>Dublin Amsterdam</p> <p>DUB ✈ AMS</p> <p>13:20 1h40 #8 16:00</p> <p>Trip duration: 1h40 View flight details ></p>	<p>#9</p> <p>Economy</p> <p>Lowest fare</p> <p>From EUR 218</p> <p>Price for 1 passenger</p>	<p>#10</p> <p>Business</p> <p>From EUR 630</p> <p>Price for 1 passenger</p>

Form considerations

- Avoid repetition (WCAG 2.2 SC 3.3.9 Redundant entry)
- Allow copy & paste
- Remove optional fields where possible

Billing address

First name:

Last name:

Address line 1:

Address line 2:

Address line 3:

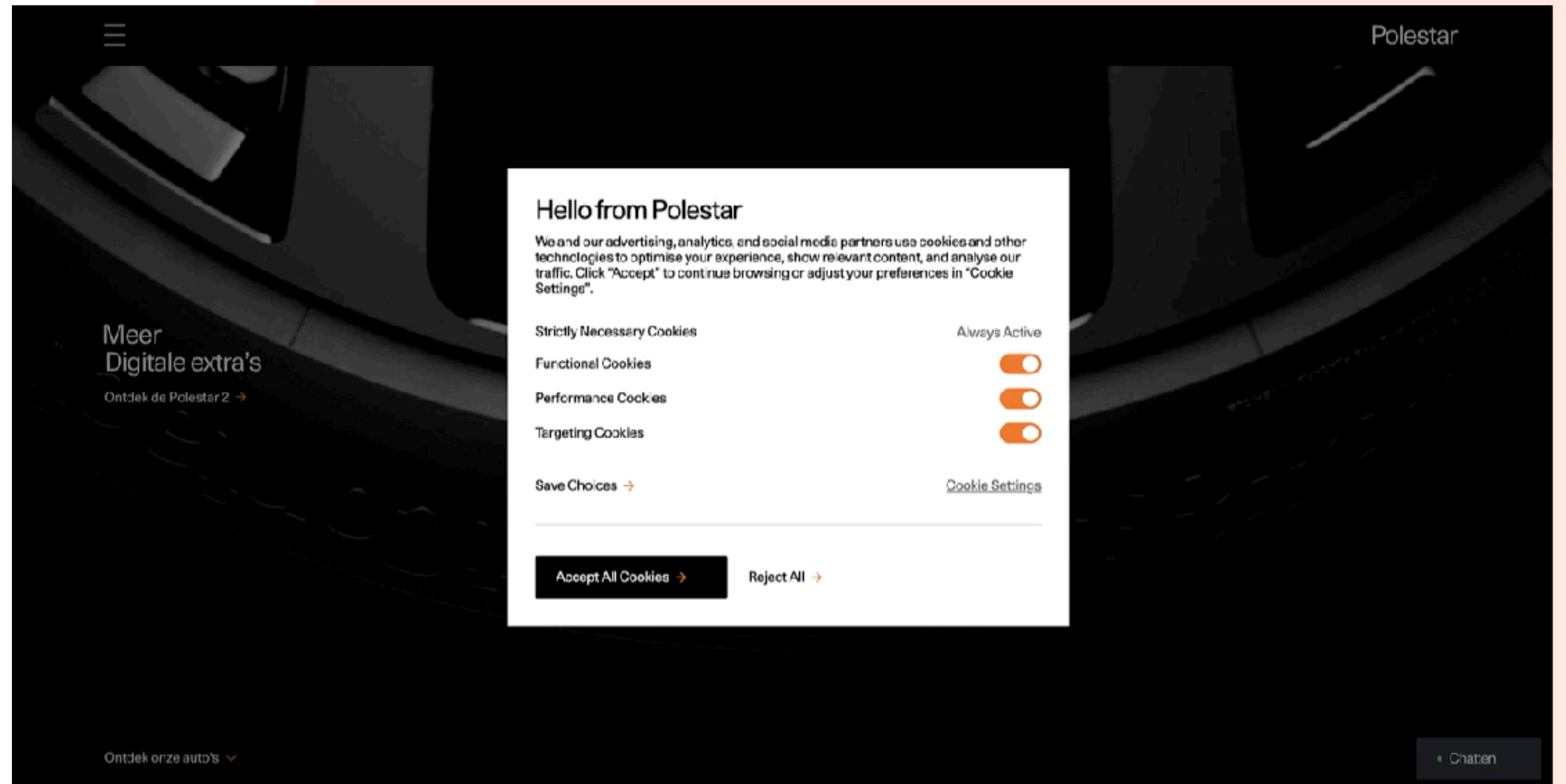
Town / city:

Postcode:

Delivery address is the same as the billing address

Trapping focus

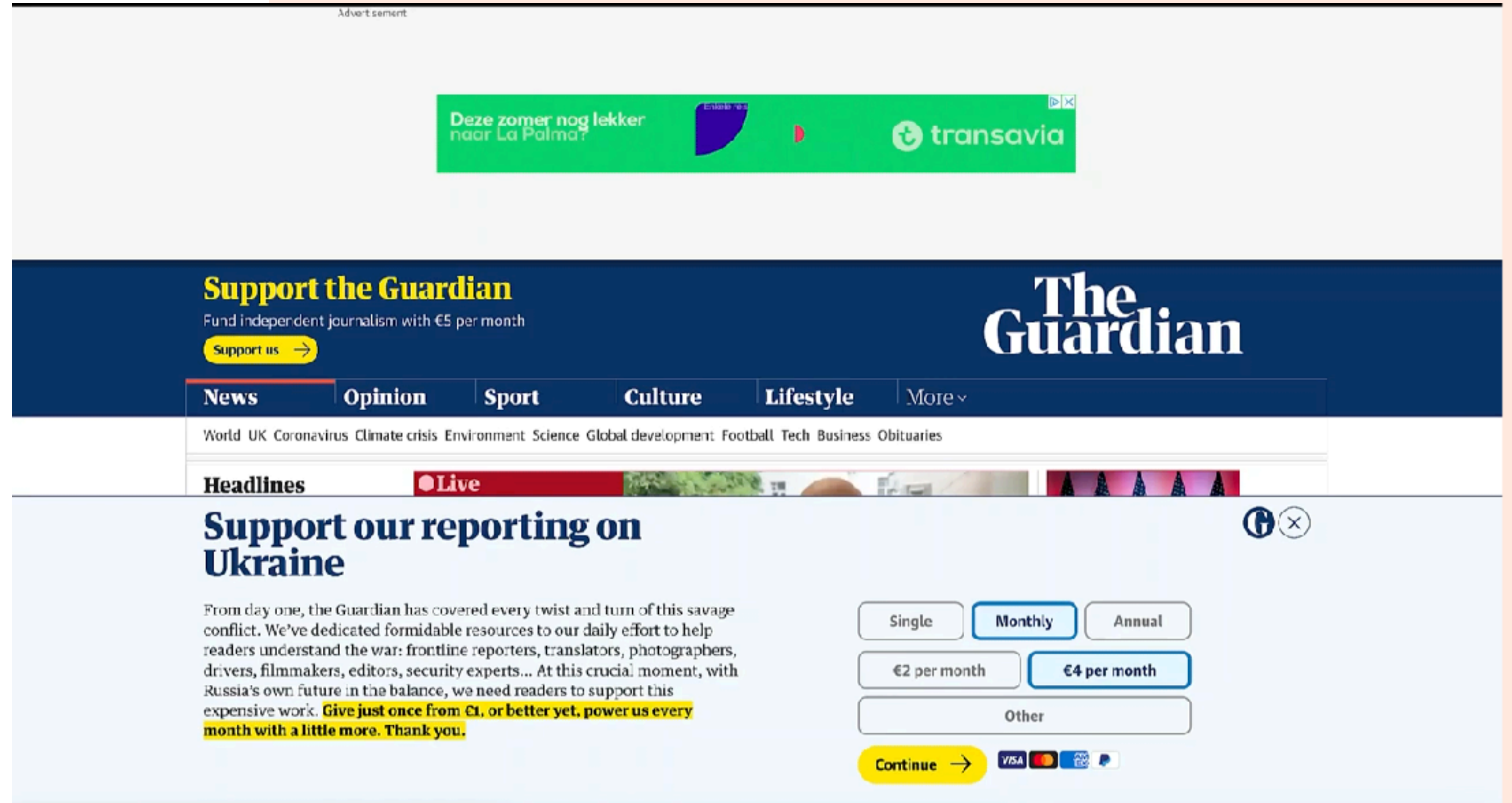
- Content outside of the current task should (often) be removed from focus
- Modals, cookie banners, and (sometimes) slide in menus are instances where focus should be trapped



Focus not obscured

- New success criteria coming in WCAG 2.2, SC 2.4.11 Focus not obscured (minimum)
- Affects sticky elements, such as footers, headers, sidebars, tooltips, slide in menus
- Ensure that at least **part of the focused element is visible**

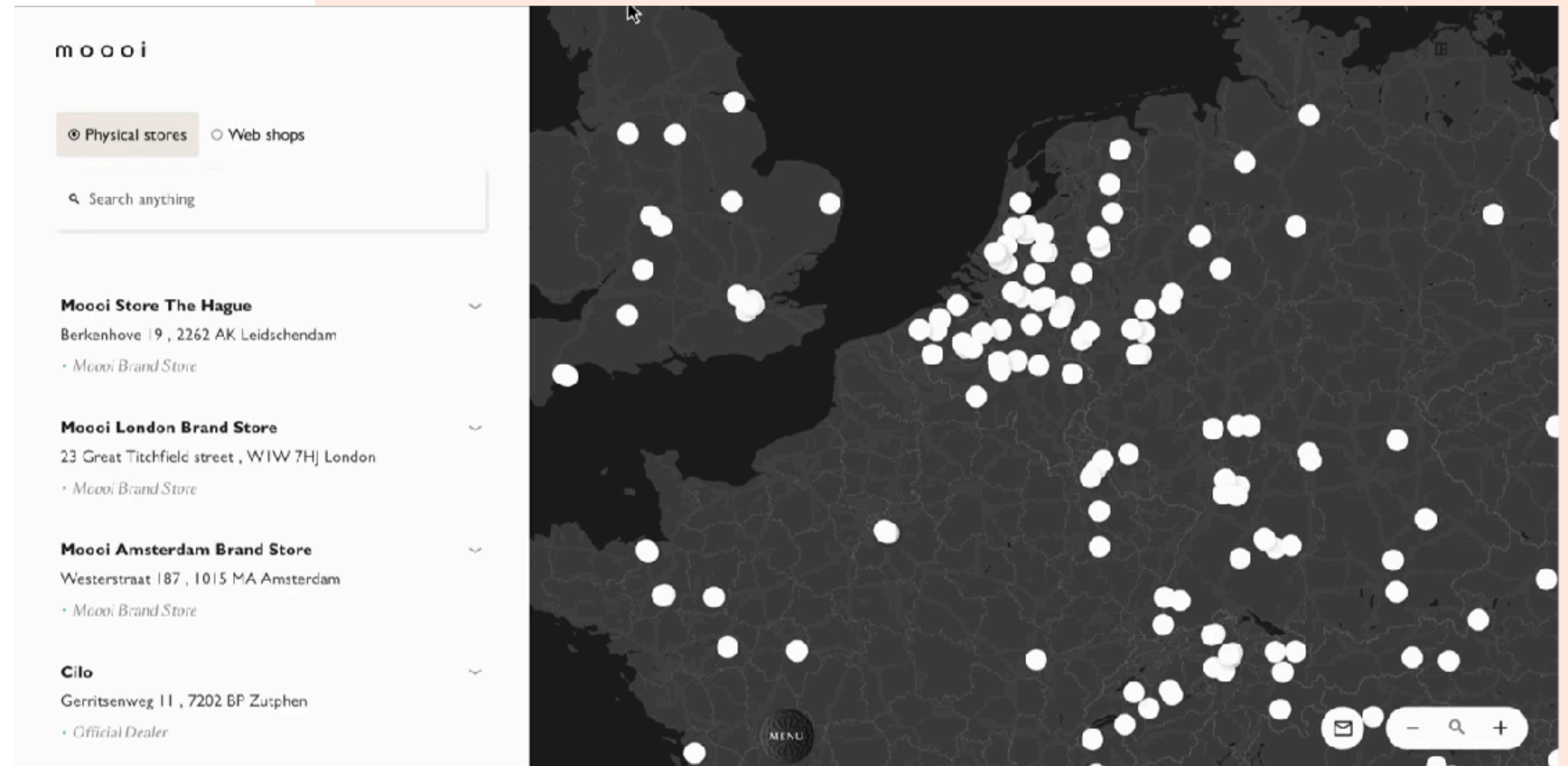
Advertisement



The screenshot shows a portion of the Guardian website. At the top, there is a green advertisement for transavia with the text "Deze zomer nog lekker naar La Palma?". Below this is a dark blue navigation bar with the Guardian logo on the right and menu items: News, Opinion, Sport, Culture, Lifestyle, and More. A secondary navigation bar lists categories: World, UK, Coronavirus, Climate crisis, Environment, Science, Global development, Football, Tech, Business, and Obituaries. The main content area is a light blue box titled "Support our reporting on Ukraine" with a close button. The text in this box describes the Guardian's commitment to covering the conflict in Ukraine and asks for support. A "Live" indicator is visible above the headline. To the right of the text are three buttons for "Single", "Monthly", and "Annual" donation options. Below these are two buttons for "€2 per month" and "€4 per month". At the bottom of the form is a "Continue" button and icons for payment methods: VISA, Mastercard, American Express, and PayPal.

Moooi map example

- Pressing (or clicking), holding down, moving and releasing are complex interactions
- Zooming in and out, and choosing a store could all be performed with a single gesture
- **Adding arrows** to navigate the map would **include more people**



Moooi map example

- An input box gives a different way to get to the same information
- This design decision includes a wider audience, such as visually impaired screen reader users, power users, and people who prefer to use inputs over dragging a map



Contact

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Business chat

<https://calendly.com/deanbirkett/introduction>

Office hours

<https://calendly.com/deanbirkett/15min>