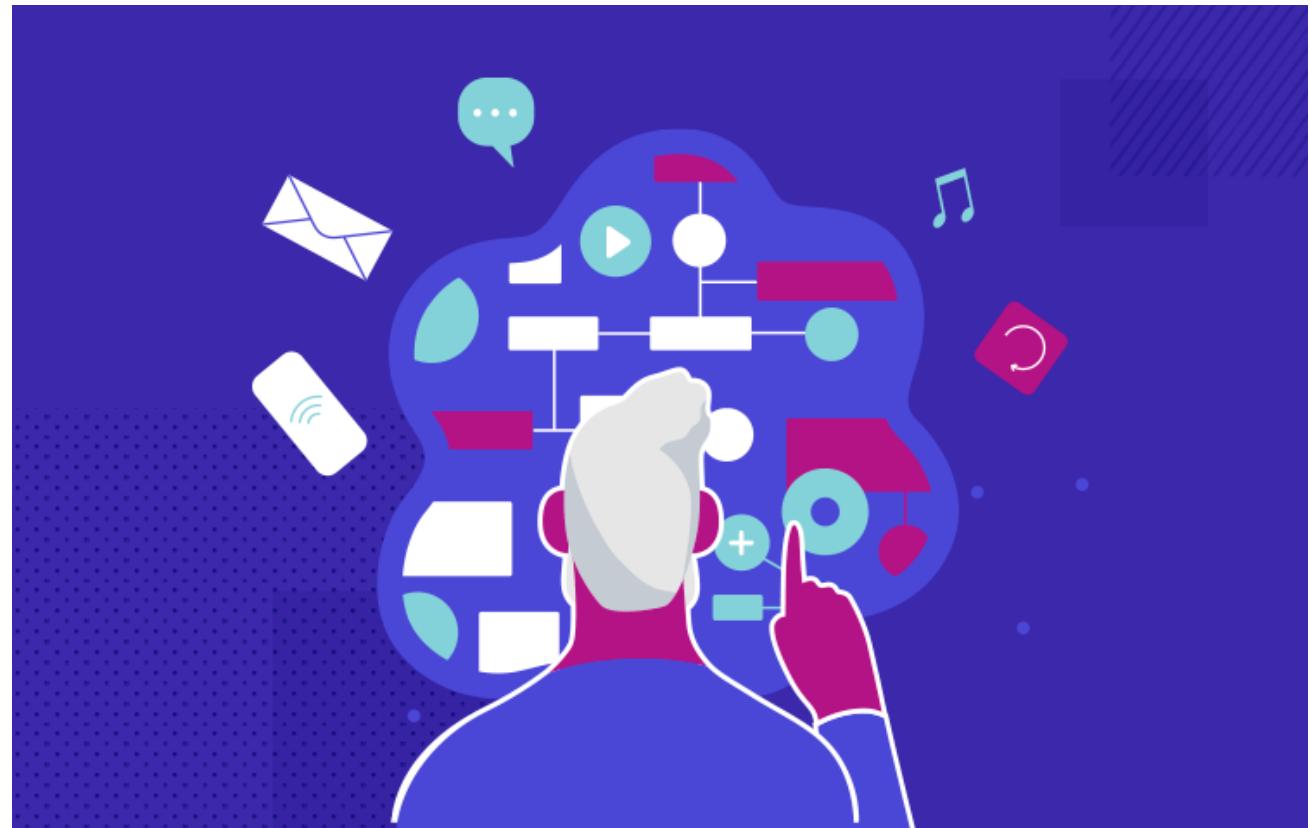


# Introduction to Interaction Design

## Lecture 2

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**Professor Matt-Mouley Bouamrane**  
**Professor of Health & Care  
Informatics & Implementation  
Science**  
**University of Stirling**



# Human Computer Interaction

---

...3 basic  
ingredients to HCI

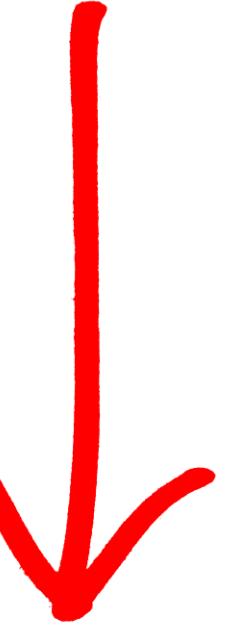
- HUMAN



- COMPUTER



...sounds  
simple,  
doesn't it?



- INTERACTION



# What is interaction design ?

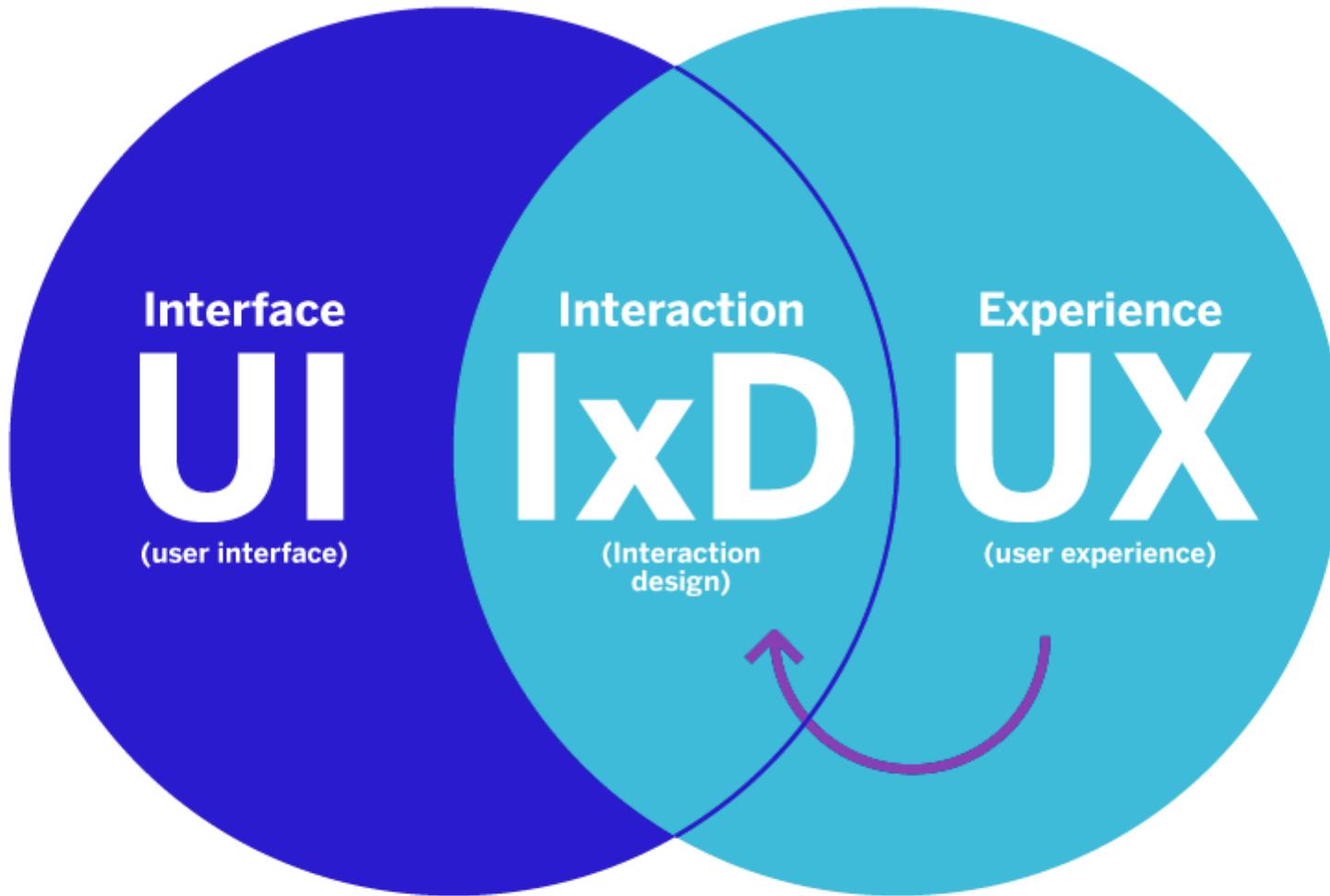
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**Interaction design (IxD) focuses on the point of interaction between humans and digital products...**



- **Interaction design** is about facilitating this dialogue between the end user and the system, and designing all the individual components that ensure the interaction is smooth, seamless, and efficient...
- The goal of interaction design is usually to make it easy and enjoyable (if appropriate) for people to interact with technology.
- It's about providing the end user with all the visual and functional elements they need to understand and navigate a product interface and **complete specific tasks**.

**What happens  
on the screen**



**What happens in  
front of the screen**



**Device**

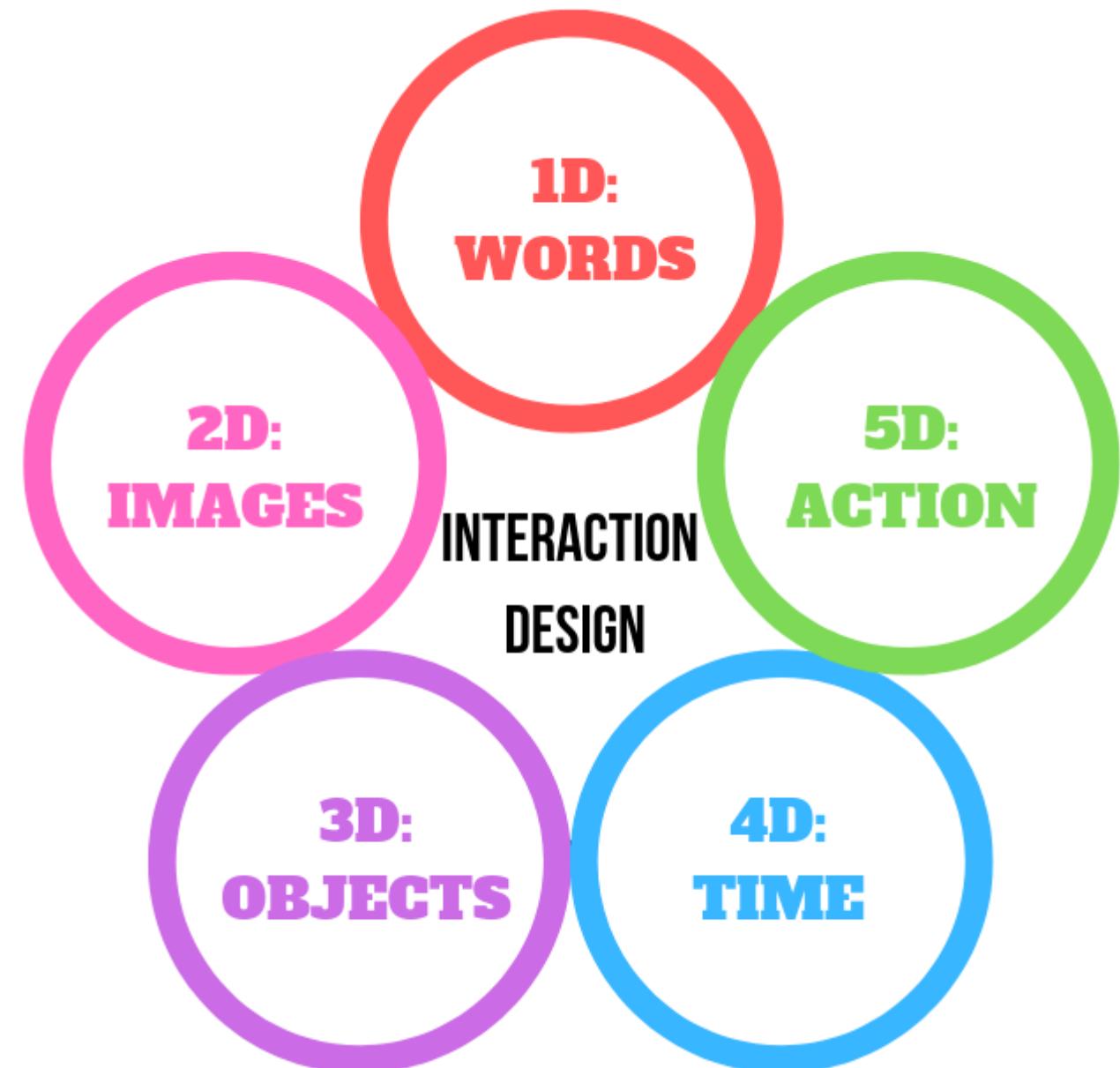


**User**

# 5 Dimensions of IxD

Interaction Design can be modelled through 5 core modalities:

1. Words
2. Images & Visual Representations
3. Space & Physical Objects
4. Time-dependant Media
5. Action & Behaviour



# Words...



- Words — especially those used in interactions, like button labels — should be **meaningful and simple to understand**.
- They should communicate information to users, but not too much information to overwhelm the user.
- A **text label** should communicate what the button does in the interface.
- For example, a button with the label “Download” indicates the initiation of the download process after the user clicks on it

# Images & Visual representations

---



These include graphical elements like images, typography and icons that users interact with.

These usually supplement the words used to communicate information to users.

These elements can be as meaningful as words, as we are capable of processing imagery quickly and interpreting meaning within a split second.

# Space & Physical Objects

---

This dimension usually refers to the physical means of interaction...

...as well as the interaction setting (e.g. home, work, public space, etc.)

A physical interface can include a keyboard on a computer, touch-screen, mouse, game controller, keypad etc.



# Space & Physical Objects

Setting of interaction can affect the way we interact with a digital products in a range of ways...

...focus, concentration, privacy, data sensitivity, social norms, etc.





# Space & Physical Objects

Setting of interaction can affect the way we interact with a digital products in a range of ways...

...focus,  
concentration,  
privacy, data  
sensitivity, social  
norms, etc.

## Time dependant Media

---

This dimension refers to dynamic media that changes with time (i.e. animation, videos, sounds).



LOADING.....

Motion and sounds play a crucial role in giving visual and audio feedback to users' interactions.

Also relevant is the amount of time a user spends interacting with the product:

...can users track their progress, or resume their interaction some time later?



## Action & Behaviour

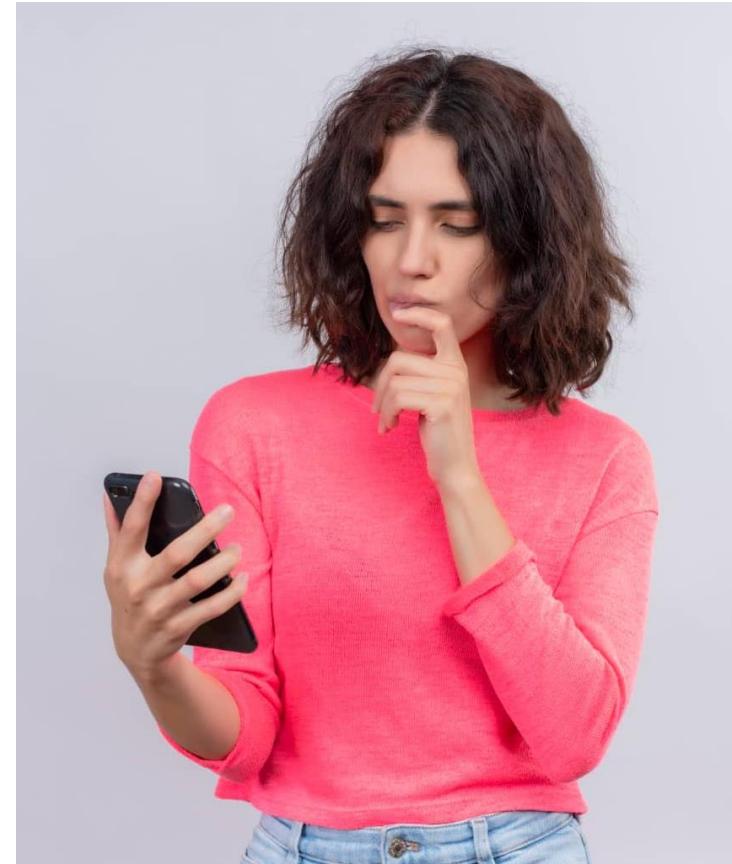
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User behaviour refers to users' actions, decisions and interactions while they use a digital product or service.

User behaviour encompasses the way users navigate through interfaces and choices they make.

It includes the underlying motivations and needs that drive their behaviour too.

Designers must understand user behaviour and get insights into user preferences, 'pain points' and opportunities for improvement.



# Using the Interaction Dimensions for Interaction Design

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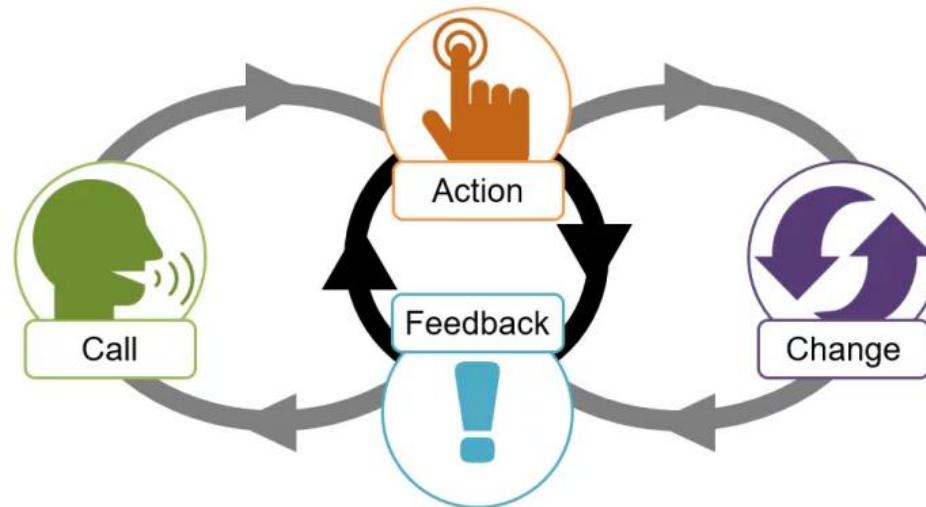
Using the 5 dimensions of interaction is useful when thinking of how users will interact with your product.

This can be done through the use of standard sets of questions that cover the range of dimensions

- **What can a user do with their mouse, finger, or stylus to directly interact with the interface?** This helps us define the possible user interactions with the product.
- **What about the appearance (colour, shape, size, etc.) gives the user a clue about how it may function?** This helps us give users clues about what behaviours are possible.
- **Do error messages provide a way for the user to correct the problem or explain why the error occurred?** This lets us anticipate and mitigate errors.

# Using the Interaction Dimensions for Interaction Design

## Action / Feedback Loop



- **What feedback does a user get once an action is performed?** This allows us to ensure that the system provides feedback in a reasonable time after user actions.
- **Are the interface elements a reasonable size to interact with?** Questions like this helps us think strategically about each element used in the product.
- **Are familiar or standard formats used?** Standard elements and formats are used to simplify and enhance the **learnability** of a product.

# Hick's Law

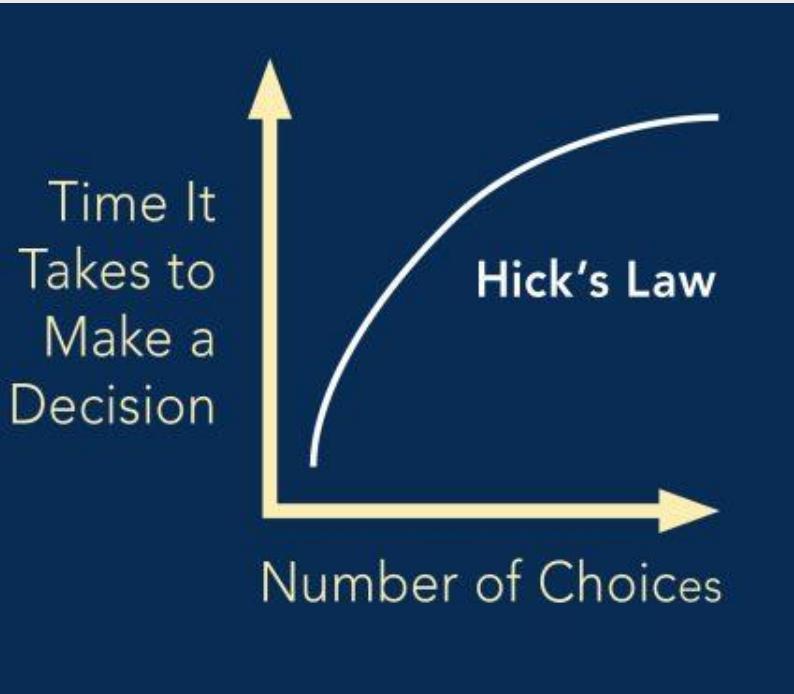
...originates from the field of cognitive psychology...

Hick's Law posits that users bombarded with too many choices take longer to make decisions or complete their tasks...

...or may give up entirely!



# Hick's Law



- Apart from **slowing them down**, having too many options can be **cognitively tiring** for users and makes their experiences **less enjoyable**.
- When a user logs in for the first time, give them **only the basic information** that they need to start using the product.
- *Else they may just give up...*
- To avoid this, make sign-up process as simple as possible and only request the information necessary to personalise their experience.
- **Simplifying and uncluttering the UI** will reduce the cognitive load on users and allow them to complete their tasks in less time.

# Hick's Law



- Design **progressive onboarding experiences** to gradually introduce features that are relevant to users.
- Don't introduce complex functionalities until users can use the basic features competently.
- By **tracking** product usage, for example, interactions with features or page views, you can identify which parts of the product are most relevant for users and which of them are underutilized.
- **Heatmaps** give you instant insights into where users may be encountering friction.
- To choose the best UI design for products with lots of users, you can use **A/B tests**. However, make sure to test one variable at a time.

# Hick's Law

- Prioritise the most important features and present users with fewer choices, this will reduce users' reaction time.

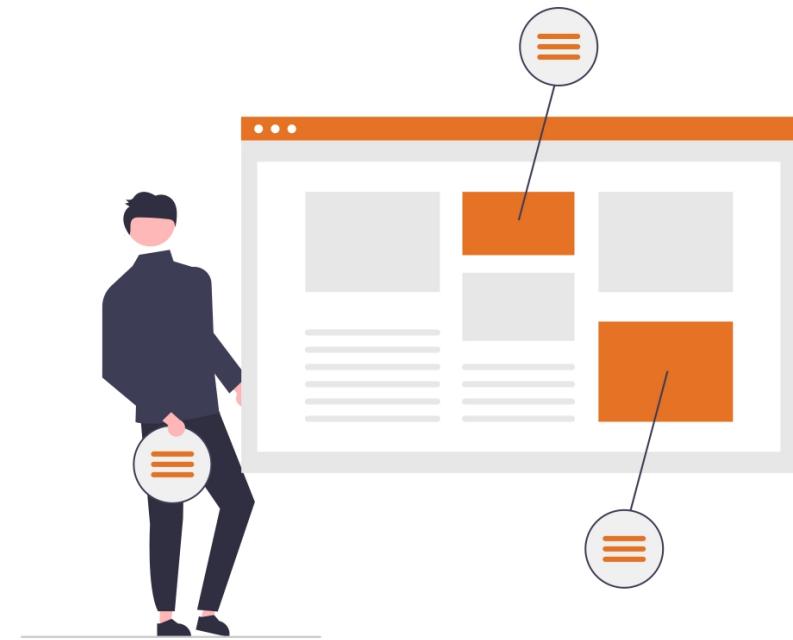


- Keep welcome surveys short and simple
- Long questionnaires are unlikely to be completed in full
- Include icons only for key features.
- Build collapsible navigation menus and group items in categories.
- Use lots of white space...



# Hick's Law

- Use visual hierarchy, like different font sizes, to focus on the most important elements.
- Highlight the recommended options.
- Create shortcut buttons to eliminate some of the steps needed to complete the task.



# What is a Visual Hierarchy?

- *Visual hierarchy is the principle of arranging elements to show their order of importance...*

- Designers structure visual characteristics —e.g., menu icons— so users can understand information easily.
- *By laying out elements logically and strategically, designers influence users' perceptions and guide them to:*



**...the  
desired  
actions!**

# Progressive Onboarding...

---

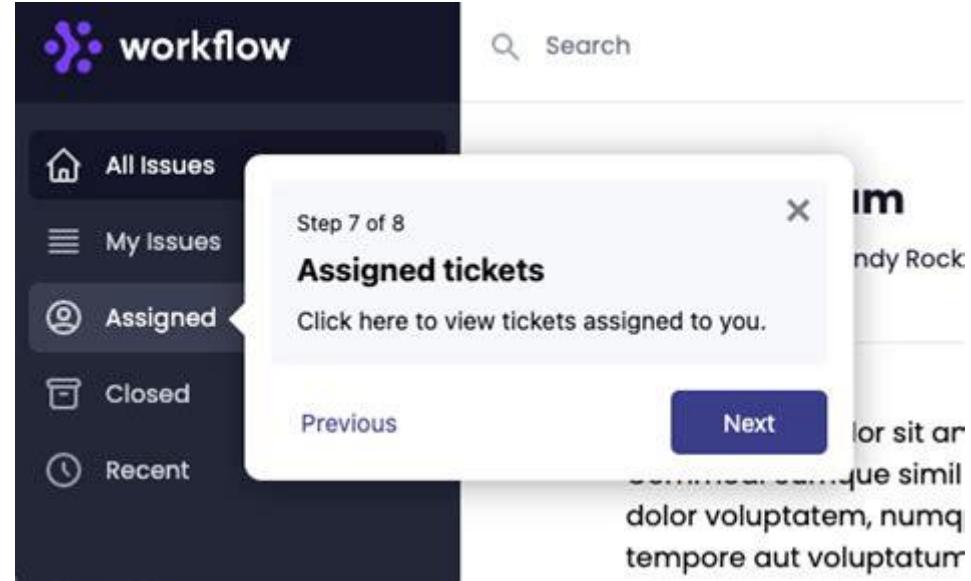
Don't try to introduce all of your product features at once...

...as it's another easy way to lose your users.

- Progressive onboarding break the process into stages and begin by giving only the guidance that's essential to start using the product.
- **Use tooltips and checklists** to showcase the key functionality and reduce the time to value.
- Only once users master the key features and start experiencing value, you can start secondary onboarding and introduce more complex functionality.

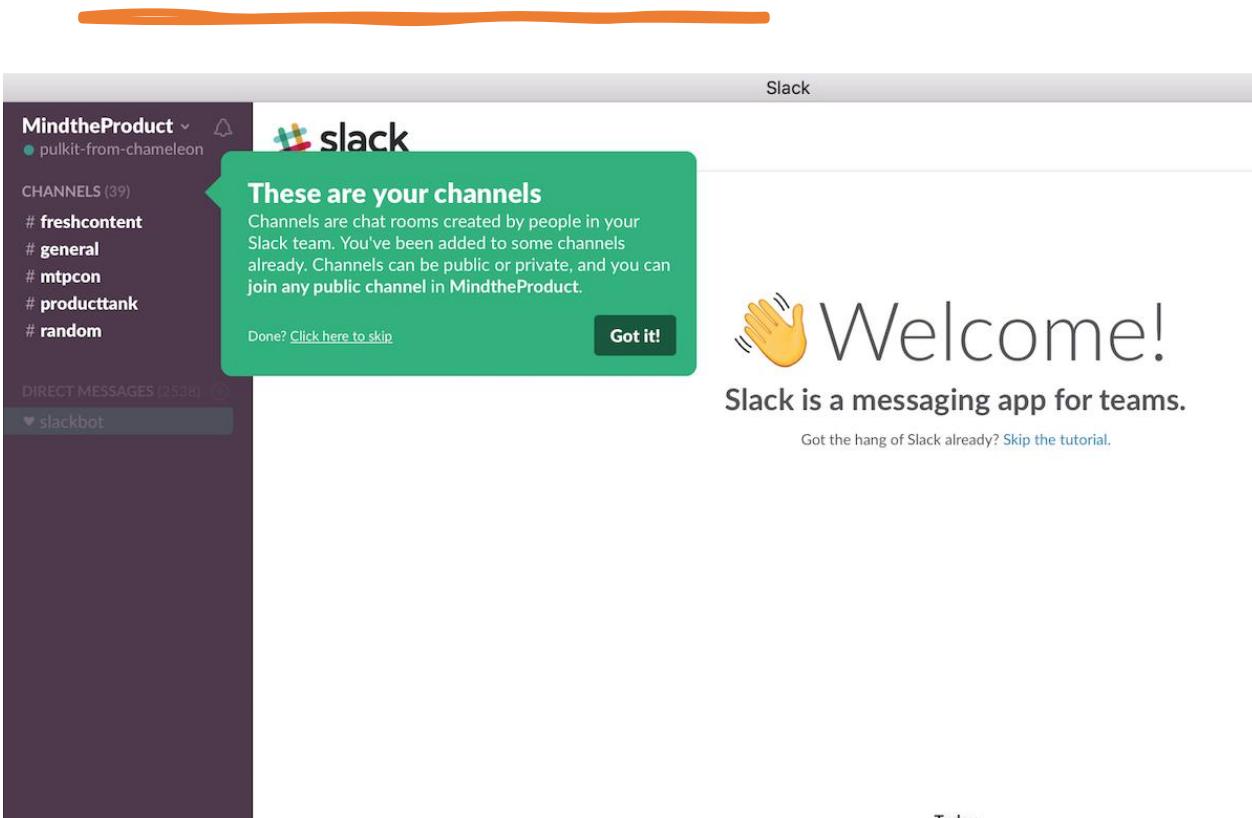
# Onboarding Tooltips...

An onboarding tooltip is a type of targeted popup enabling existing and new users to understand new features in a contextual way – they are often used to create interactive product tours for beginners...



The primary aim of an onboarding tooltip is to help the user understand **what they need to do next** by guiding them to the next stage of a task or activity, boosting product adoption.

# Onboarding Tooltips...

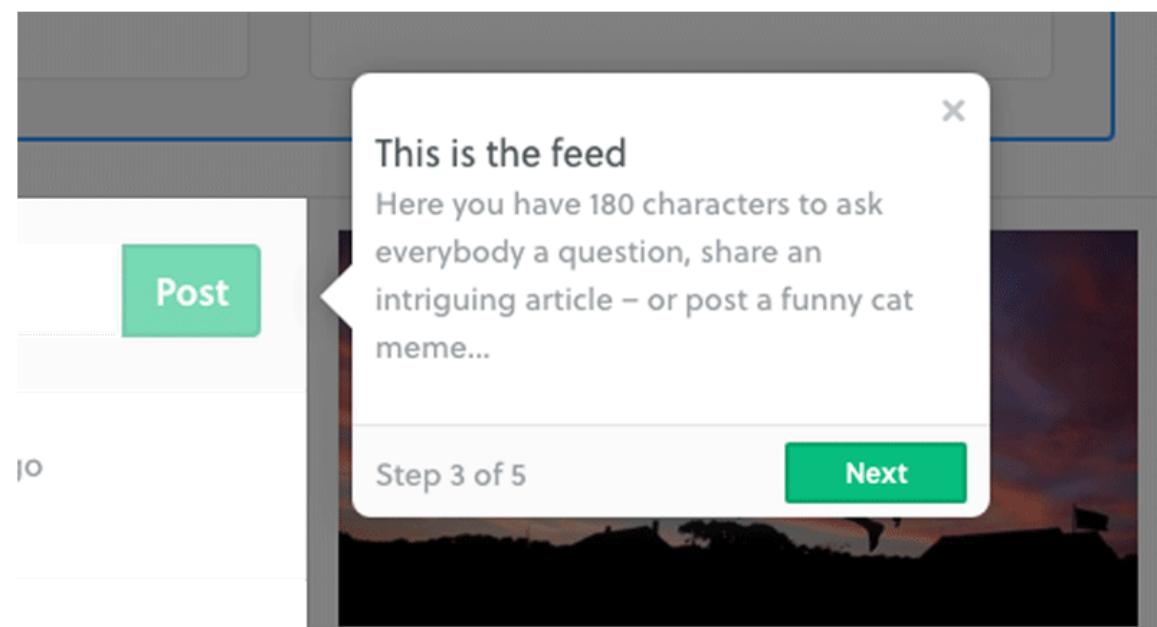
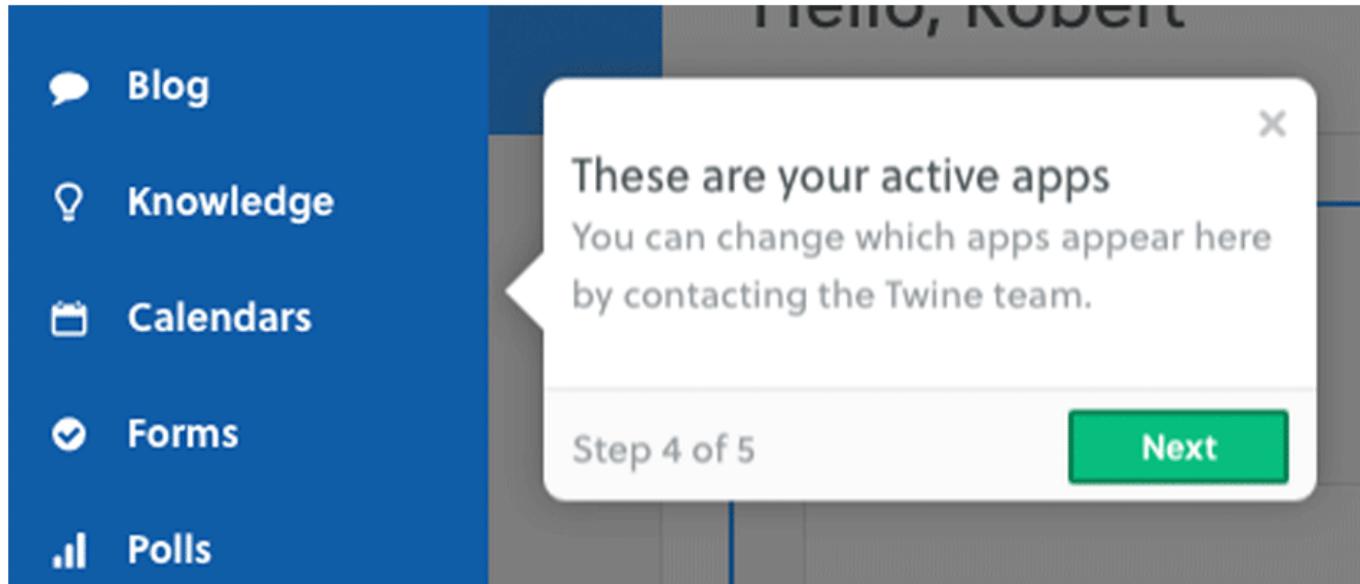


You can use tooltips in a range of scenarios, including:

- launching product tours,
- announcing key features that are newly released or updated,
- running interactive guides,
- triggering in-app contextual help to enable self-service,
- or upselling a new feature.

# Onboarding Tooltips...

You can use tooltips to get users to interact with specific features of your application...



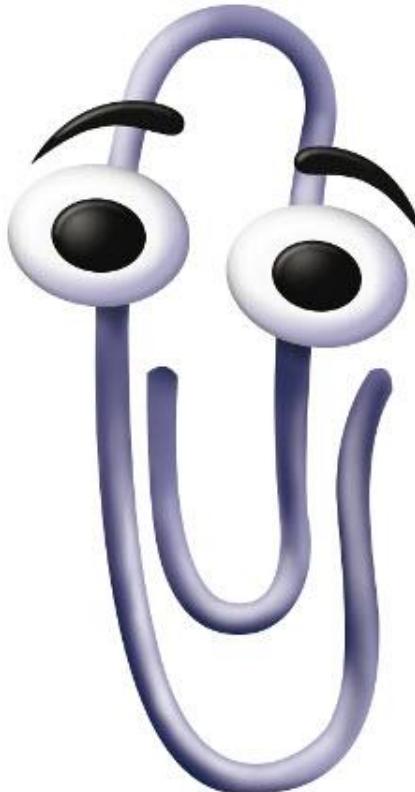
# Onboarding Tooltips...

Need to be used with  
care...

---

...as can quickly become  
a nuisance if the advice  
provided is redundant or  
not needed...

...so needs a easy way to  
switch off!



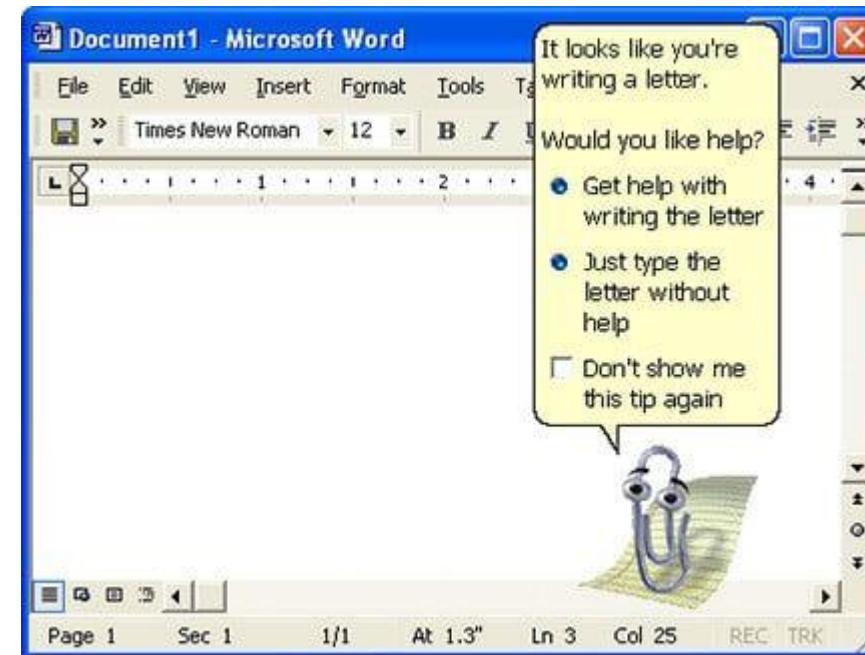
Sometimes I just popup for  
no reason at all. Like now.

# Example: Microsoft 'Clippy'

---

'Clippy' the paperclip was a simplistic virtual assistant who offered tips and advice to Microsoft Office users, from 1997 and until the mid-2000s.

Its constant pop-ups to suggest "help" with the simplest of tasks - such as writing a letter - annoyed many...



# Interaction Analytics

- Interaction analytics are data-driven methods that can provide valuable insights into user interactions.
- User interactions generate a wealth of data that can reveal interaction patterns, users' preferences, and pain points.
- **Clickstream analysis** tracks the sequence of user interactions on a website or app. It's important as it gives insights into user navigation patterns, popular pages and drop-off points.
- **Heatmaps** visually represent user behaviour patterns, highlighting areas of a website or app that get the most attention or interaction. This information can help designers find areas of interest, user preferences—and potential usability issues.
- **A/B Testing:** compare two or more variations of a design to see which performs better in terms of user behaviour and desired outcomes.

# Clickstream Analysis

- Clickstream data includes the following types of web analytics information...

- whether the individual is a unique or repeat visitor to the website;
- the terms an individual plugs into a search engine;
- what page the individual lands on first;
- the amount of time a user spends on a page;
- the features on the page the user clicks on and engages with;
- when and where an item is added or removed from a cart;
- where the user goes next; and
- when the back button is used.
- Etc.

# Clickstream Analysis

- Clickstream data collected from a single session of a user interacting with a website may not be useful.
- However, an organisation can use aggregate data gathered from many visitors to improve its website or service...

## Traffic analytics

This analysis operates at the server level. It collects and analyses the following data sets:

- *how many pages are served to a user;*
- *how long it takes each page to load;*
- *how often the user hits the browser's back button; and*
- *how much data is transmitted before the user moves to a different webpage.*

# eCommerce Analytics

- This analysis uses clickstream data to determine the effectiveness of a website in terms of '*conversions*' and '*transactions*'.

## eCommerce analytics

- It is concerned with the following data points:
- what pages the shopper lingers on;
- what the shopper puts in or takes out of a shopping cart;
- what items the shopper purchases;
- whether the shopper belongs to a loyalty program;
- whether the shopper uses a coupon code; and
- the shopper's preferred method of payment.
- Etc.

# Benefits of clickstream data analysis

- The data collected can include:

*search terms used, pages landed on, webpage features used and the addition or removal of items from a cart,*

*...all of which can lead to more actionable insights.*

**User routes:** Organisations can use data analysis to view the different routes their online visitors or customers take to reach a page or to make a purchase.

**Customer trends and insights:** Collecting and analyzing the clickstreams of a large number of visitors lets an organization identify trends in the following areas:

- how visitors get to the website;
- what they do once there;
- how long they stay on a page;
- the number of page visits visitors make;
- the number of unique and repeat visitors.

## Category

All

Films &amp; TV

DVDs &amp; Blu-rays

More +

Show more +

6,800+ results for period dvd boxsets

 Save this search

Postage to FK81AA

All

Auction

Buy it now

Condition ▾

Item location ▾

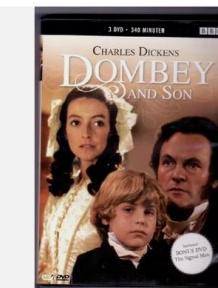
Delivery options ▾

Sort: Best Match ▾

☰

## Edition

- Box Set (5,975)
- Standard Edition (2,514)
- Steelbook (110)
- Collector's Edition (1,177)
- Special Edition (650)
- Limited Edition (456)
- Extended Edition (557)
- Promo (277)

[see all](#)

DVD - Dombey and Son - Julian Glover et al

Pre-owned

£19.40

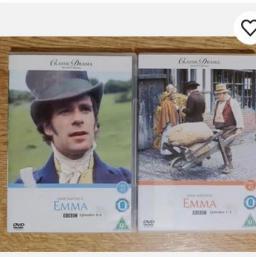
[Buy it now](#)

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books2africacharityshop3 (393) 99.7%

Sponsored



BBC classic period dramas Emma By Jane Austen 1972 Complete Series DVD Bundle

New (other)

£4.99

[Buy it now](#)

+ £2.26 postage

speedyheron (1,194) 99.8%

**GREAT PRICE**

Doctor Zhivago DVD - Kris Marshall 2002 Period Drama Mini-Series - New &amp; Sealed

Brand new

£4.99 (£4.99/Unit)

[Buy it now](#)

Free 3 day postage

Get it by Fri 20 Sep

jma3691 (15,226) 100%



GENTLEMAN JACK - Complete Series 2 -BBC Period Drama Box Set DVD -Suranne Jones

New (other)

[14 product ratings](#)

£4.99

0 bids · 6h 25m left (Today 18:41)

+ £2.50 postage

bambootao (1,662) 100%

## see all

## Sub-Genre

- Family (1,995)
- British (1,211)
- Mystery (1,164)
- Language (952)
- Boxing (915)
- Filming (795)
- Music (655)
- Life Story (554)

[see all](#)

## Features



9 results for "60s-70s british rock vinyl"

Sort by: Featured

## Eligible for free delivery

 Free UK Delivery by Amazon  
Get FREE delivery on eligible orders dispatched by Amazon

## Amazon AutoRip

 AutoRip

## Department

CDs & Vinyl  
Rock  
Pop

## Customer Review

&amp; Up

## Artist

The Beatles

## Price

£27 – £120+



Go

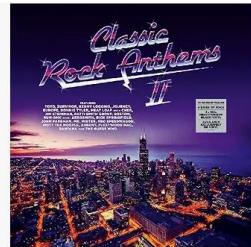
## Music Format

Vinyl

## Music Import

 Imports

## Results



[VINYL]

by Classic Rock Anthems 2 | 2017

399

Vinyl



Natural Magick

by Kula Shaker | 2024

102

Vinyl

£21<sup>99</sup>

Get any 3 for £55.00.

FREE delivery Fri, 20 Sept on your first eligible order to UK or Ireland  
Or fastest delivery Tomorrow, 18 Sept

More buying choices

£15.94 (10 used &amp; new offers)

## MP3 Download

Listen with Music Unlimited

Or £5.49 to buy MP3 album

## Audio CD

£9<sup>99</sup>FREE delivery Fri, 20 Sept on your first eligible order to UK or Ireland  
Or fastest delivery Tomorrow, 18 Sept

Hawkwind

by Hawkwind | 1969

304

Vinyl

£31<sup>72</sup>

£1.26 delivery 2 - 9 Oct

More buying choices

£29.23 (12 used &amp; new offers)

## Audio CD

£45<sup>00</sup>

£1.26 delivery 21 - 25 Sept

Only 1 left in stock.

More buying choices

# Where do you want to go?

Return  1 adult  Economy  0 bags

Edinburgh (EDI)  

Copenhagen, Denmark (C...

Thu 17/10

Thu 24/10

Search

Compare vs momondo

Expedia

Direct flights only

## What momondo brings to the table.



### Big names, great deals

Search 100s of travel sites to compare prices.



### Search without worry

The prices you see aren't affected by your searches.



### Filter for what you want

Free Wi-Fi? Early arrival? Instantly customise your results.



### Trusted and free

We're completely free to use – no hidden charges or fees.

## Explore the world from Edinburgh

Find flights departing Thu 17/10/24 and returning Thu 24/10/24

See all



### Receive our newsletter.

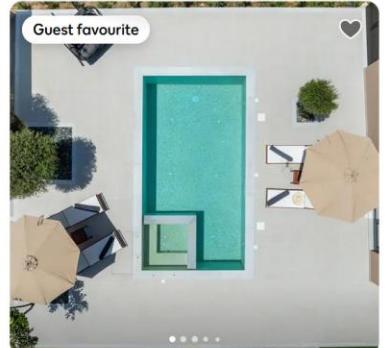
Sign up for email updates with travel recommendations and Private Deals.

Enter your email address

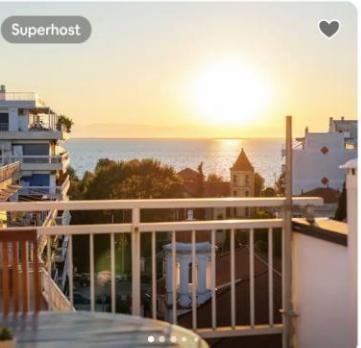
Let's do this



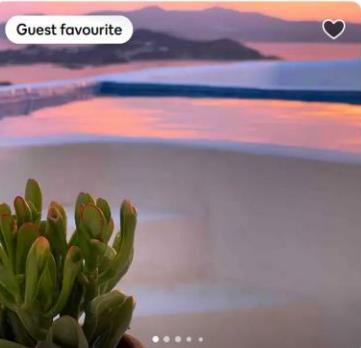
Over 1,000 places



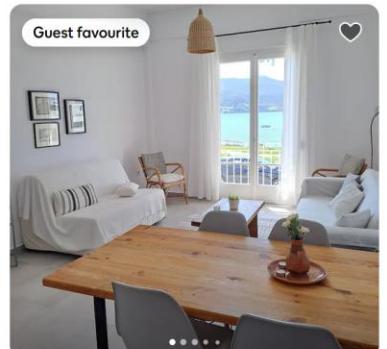
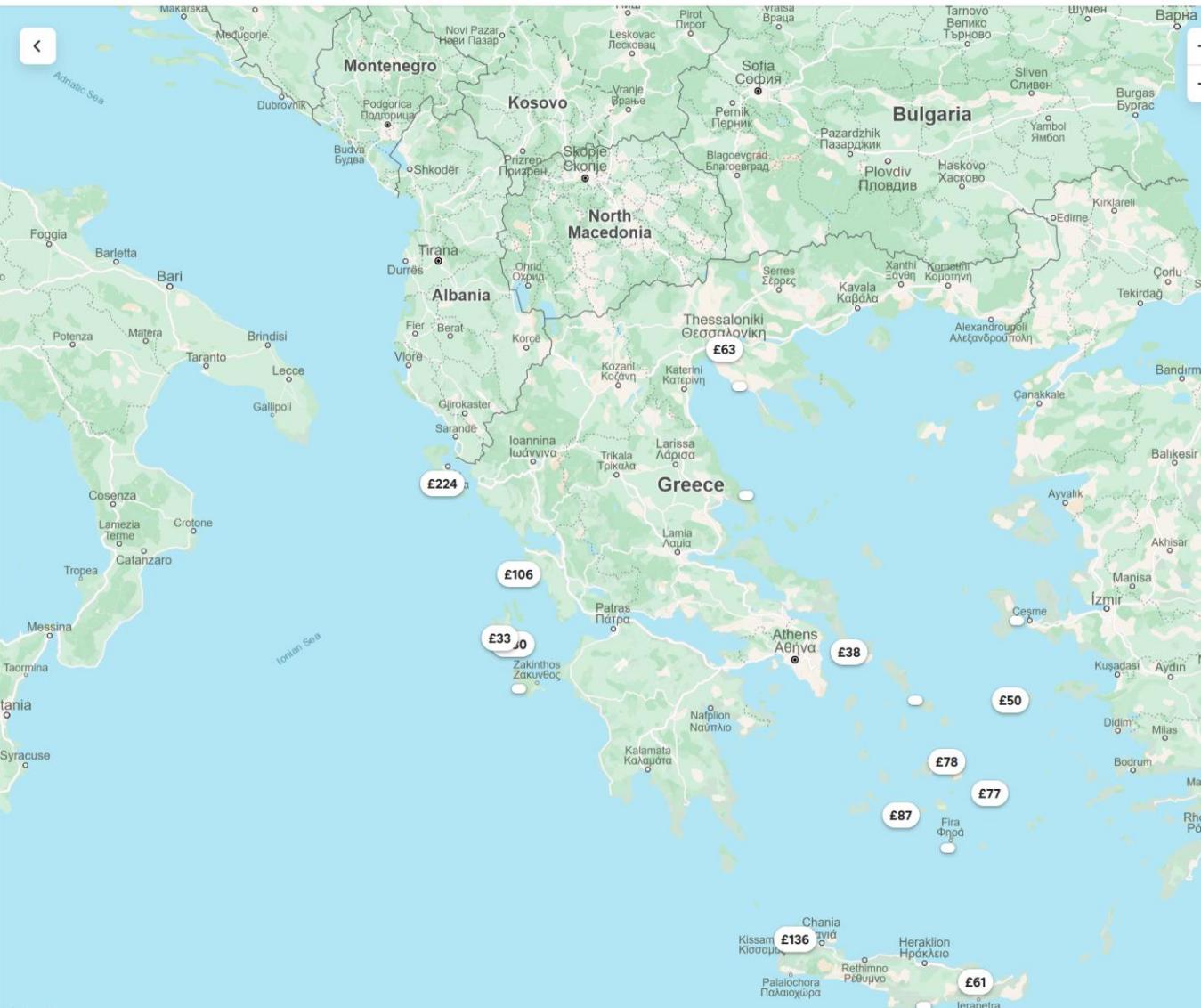
**Villa in Nydri**  
Luxury Waterfalls Villa Privet Pool Jacuzzi  
Free cancellation  
Individual Host  
£160 £106 night · £630 total



**Apartment in Thessaloniki**  
Sea View 360° Sunset Apartment  
2 beds  
Individual Host  
£63 night · £373 total



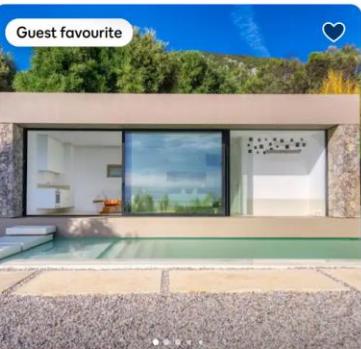
**Place to stay in Naxos**  
Eye of Naxos Aleria suite.  
1 bed  
Professional Host  
£102 £78 night · £468 total



**Flat in Marmari**  
2 Room apartment with Sea View Marmari-Evia...  
Free cancellation  
Individual Host  
£57 £38 night · £227 total



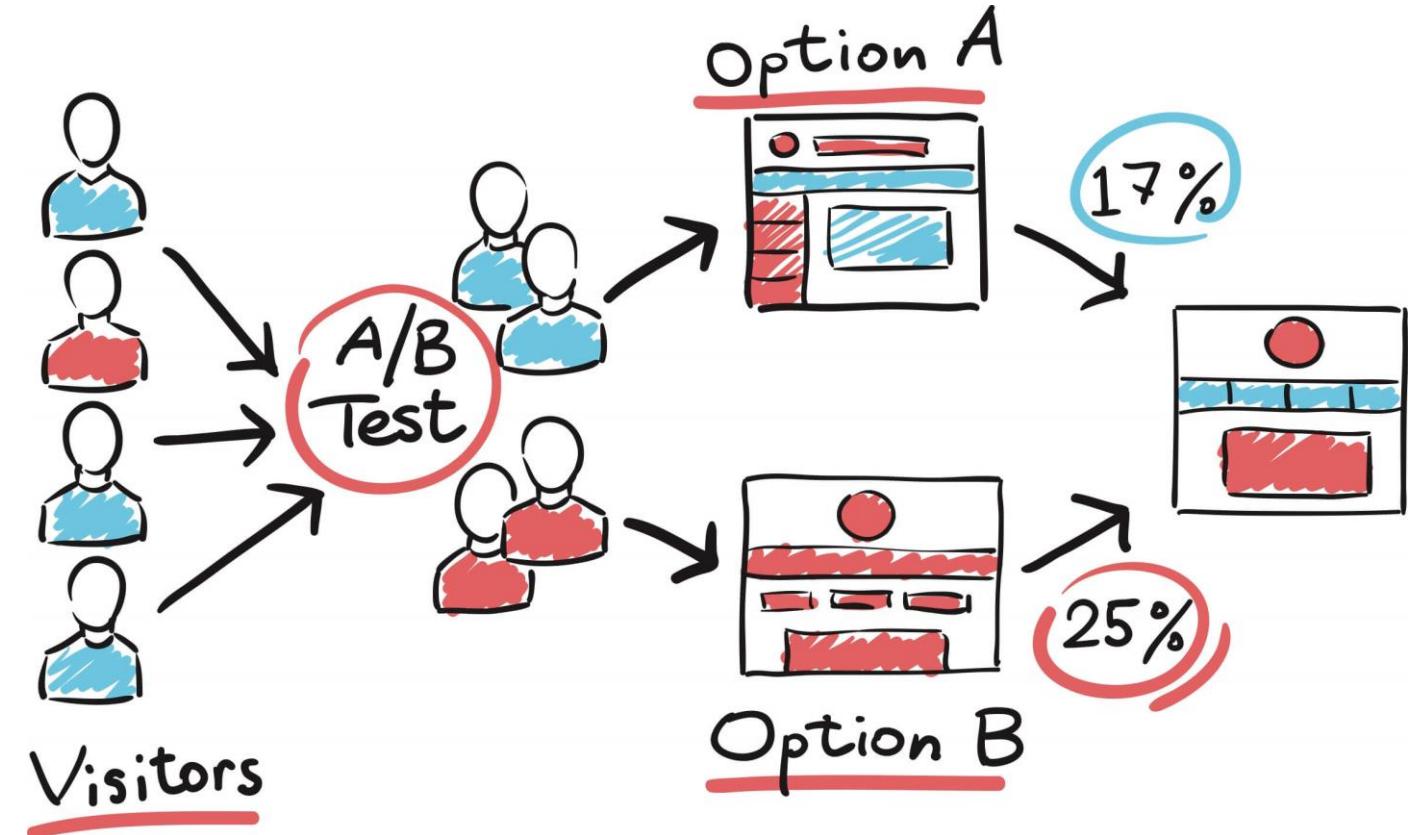
**Home in Ravidoucha**  
Sea Star-seafront  
2 beds  
Individual Host  
£136 night · £815 total



**Home in Agios Mattheos**  
Rouvelas Waterfront Nest  
Free cancellation  
Professional Host  
£283 £224 night · £1,343 total

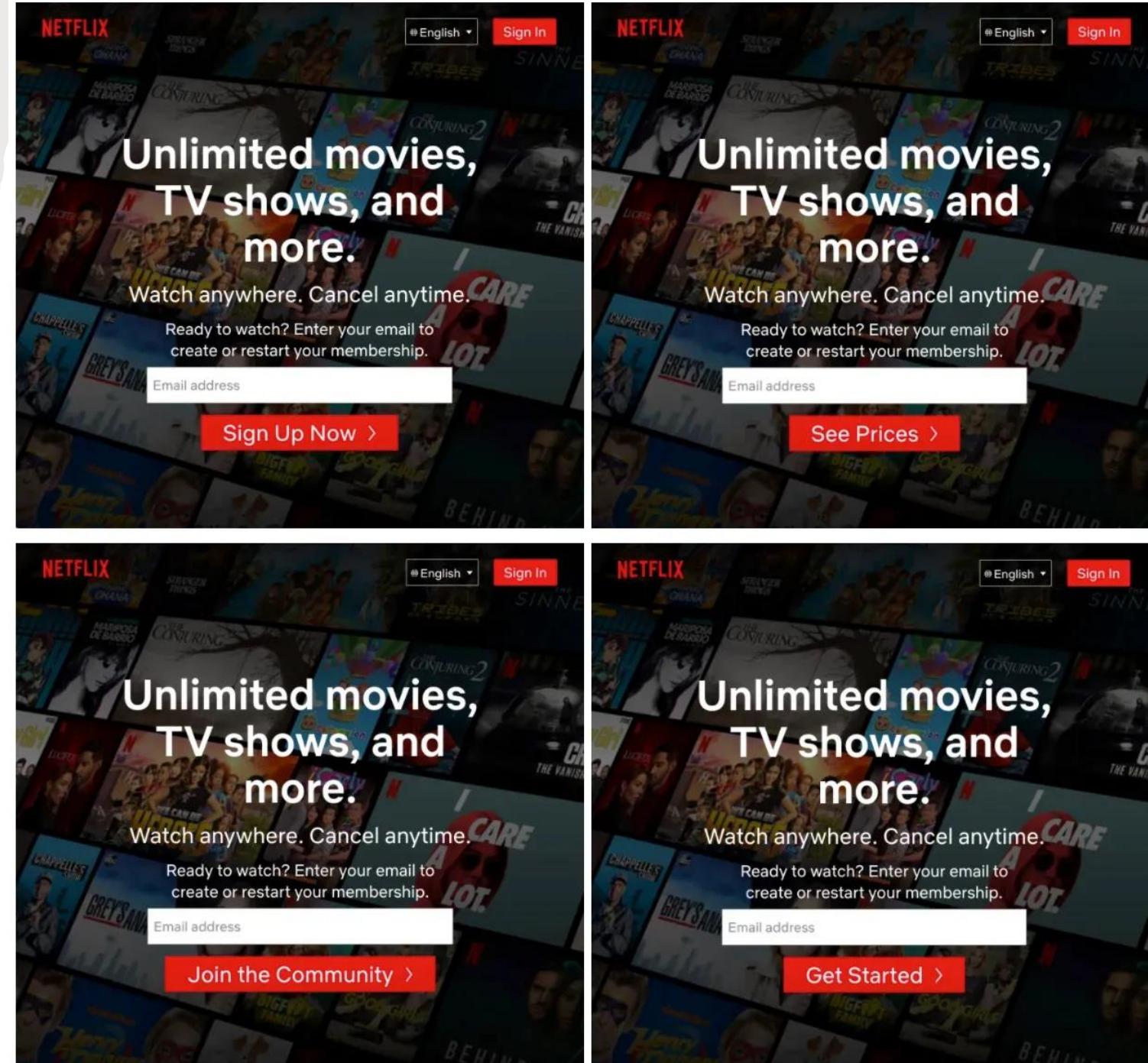
# A / B Tests

- A/B testing calls for designers — or user researchers — to compare two or more variations of a design to see which performs better in terms of user behaviour and desired outcomes.
- It's a helpful way to test different design elements, content or user flows—so that designers and design teams can make solid data-informed decisions.



# A / B Tests

- A/B testing, or split testing, is a quantitative user research method.
- In A/B testing, researchers show different users two versions of a related design to identify which one performs better.
- The A refers to the original design, while the B refers to the variation of the A design.
- Focus on ONE specific variation at a time



# A / B Tests

- Simple, straightforward and inexpensive test
- Only so many things that can be evaluated this way
- However, the UI or interaction permutations are potentially limitless...

Example	Variable 1	Variable 2	Variable 3
<a href="#"><u>Navigation menus</u></a>	Style (horizontal vs. vertical)	Icons vs. text	Placement (top, bottom, side)
<a href="#"><u>Page layouts</u></a>	Number of columns	Above-the-fold content	Sidebar presence and position
<a href="#"><u>Buttons</u></a>	Color	Shape and size	Text (“Add to Cart” vs. “Buy Now”)
<a href="#"><u>Forms</u></a>	Number of fields	Field types (dropdowns, text input)	Layout and ordering of fields
<a href="#"><u>Typography</u></a>	Font styles and sizes	Text color and contrast	Line spacing and text alignment

# A / B Tests

- Simple, straightforward and inexpensive test
- Only so many things that can be evaluated this way
- However, the UI or interaction permutations are potentially limitless...

Images and videos	Placement and size	Static vs. carousel	Thumbnails vs. full-size images
<u>Color schemes</u>	Overall color theme	Contrast ratios	Button and link colors
CTA (call-to-action) elements	Placement on the page	Wording and urgency	Design and visibility
Content strategy	Headlines and subheadings	Length and style of copy	Use of bullet points vs. paragraphs
<u>Accessibility</u>	Alt text for images	Keyboard navigation	Screen reader friendliness
Error messages	Wording and tone	Instructions for resolution	Sound effects
<u>Search functionality</u>	Search box placement and design	Search algorithms	Filters and sorting options

# A / B Tests

- Simple, straightforward and inexpensive test
- Only so many things that can be evaluated this way
- However, the UI or interaction permutations are potentially limitless...

Pop-ups and modals	Timing and frequency	Offer types (newsletter sign-up, discount codes)	Exit-intent vs. timed display
Email capture forms	Placement and timing	Incentives (discounts, ebooks)	Design elements
Push notifications	Timing and frequency	Content and call to action	Sound effects
<u>SEO elements</u>	Meta titles and descriptions	Headings structure (H1, H2, H3)	Keyword placement

# A / B Tests Limitations

- Not suitable for more qualitative aspects of user experience design such as...
- **Satisfaction.**
- **Comprehension.**
- **Emotional response**
- Etc.

*... and we look at these in more details in week 4 (user-centred design)*

- A/B testing can show users spend more time on a page but cannot explain **why** users feel more engaged.
- When researchers want to understand the 'why' behind user behaviours, they use other research methods (e.g. *user interviews, usability testing, focus groups, surveys, etc.*)



# A / B Tests Limitations

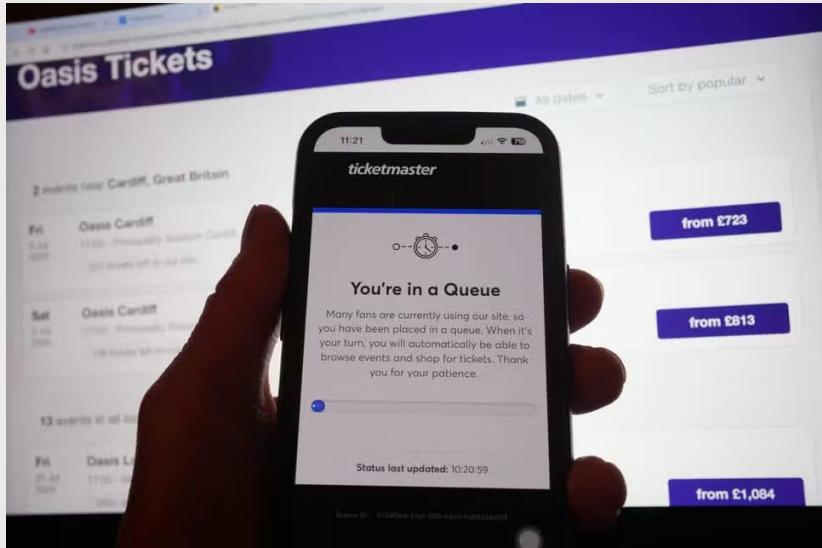
- A/B tests require a large user base.
- A/B testing only provides reliable results with a sufficient user pool.
- Without enough people, it might take longer to get results, or the findings might not be reliable.

- **Outside factors can influence results.** External factors like seasonal changes and new trends can negatively affect results.
- **Focuses on short-term goals.**
- A/B testing typically focuses on immediate results, like how many people click on a button. Long-term goals like customer happiness and brand loyalty are difficult to assess.

For instance: a news website runs an A/B test comparing two headline styles to see which generates more clicks.

One style leads to a higher click-through rate but relies on clickbait titles that may erode trust over time.

# A / B Tests Limitations



- **Ethical Concerns.**

Some tests significantly change what users experience or how products handle their privacy.

In these scenarios, researchers must consider ethical practices.

For example, an e-commerce site tests an alternative checkout process that adds a last-minute upsell offer.

The offer could frustrate users who want to complete their purchases quickly.

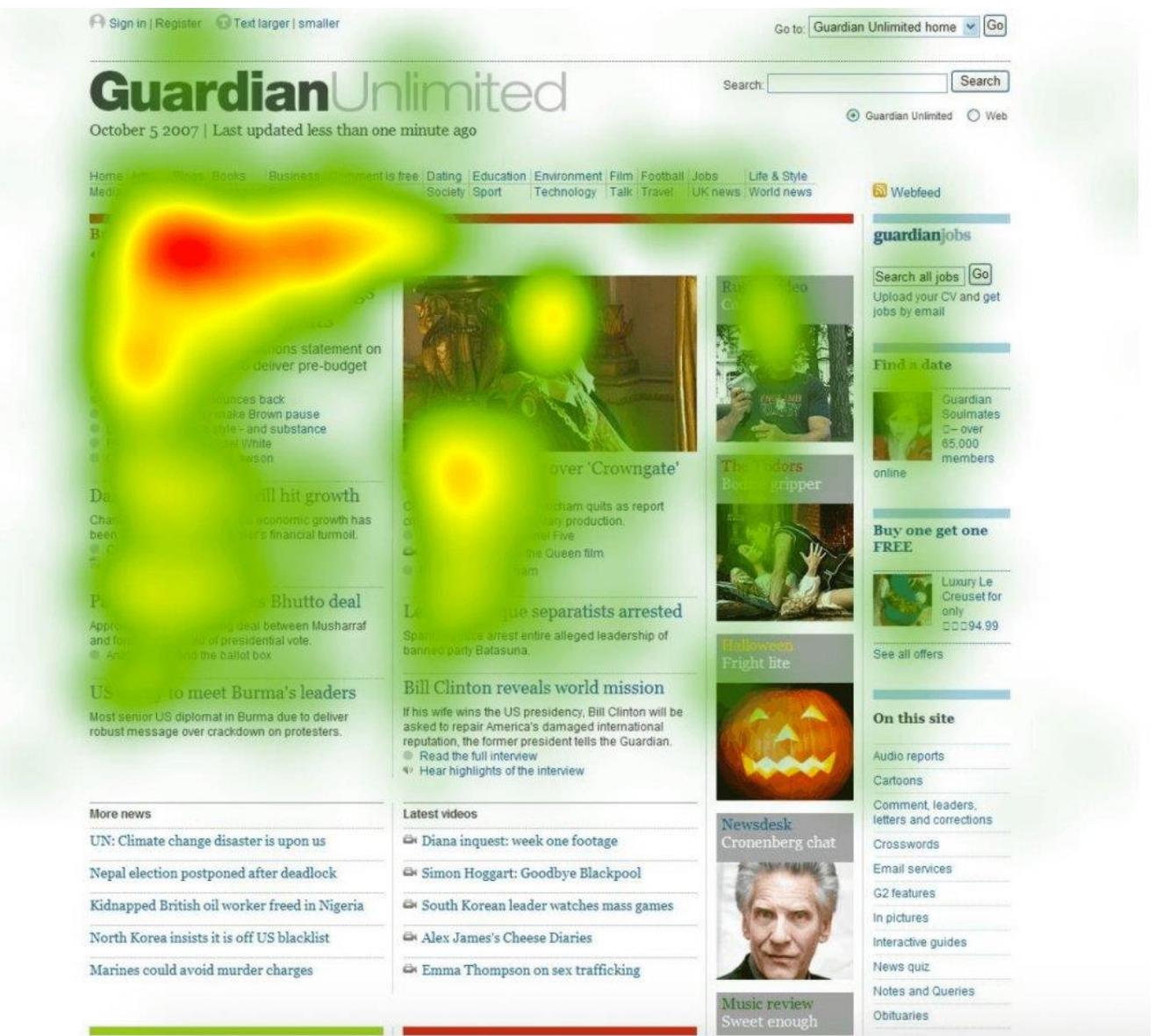
...or pressure users to pay more than they had initially planned...

...and may breach consumer protection legislation...

# HeatMaps

- A heatmap (or heat map) is a data visualization that shows how website users click, scroll, and move on the page.

The ‘heat’ part of the name comes from the colour scale: red depicts popular (hot) areas of the page, and blue less popular (cold) areas.



# HeatMaps Data

- **Click maps**

highlight where users click  
the mouse (or tap on mobile  
devices)

- **Scroll maps**

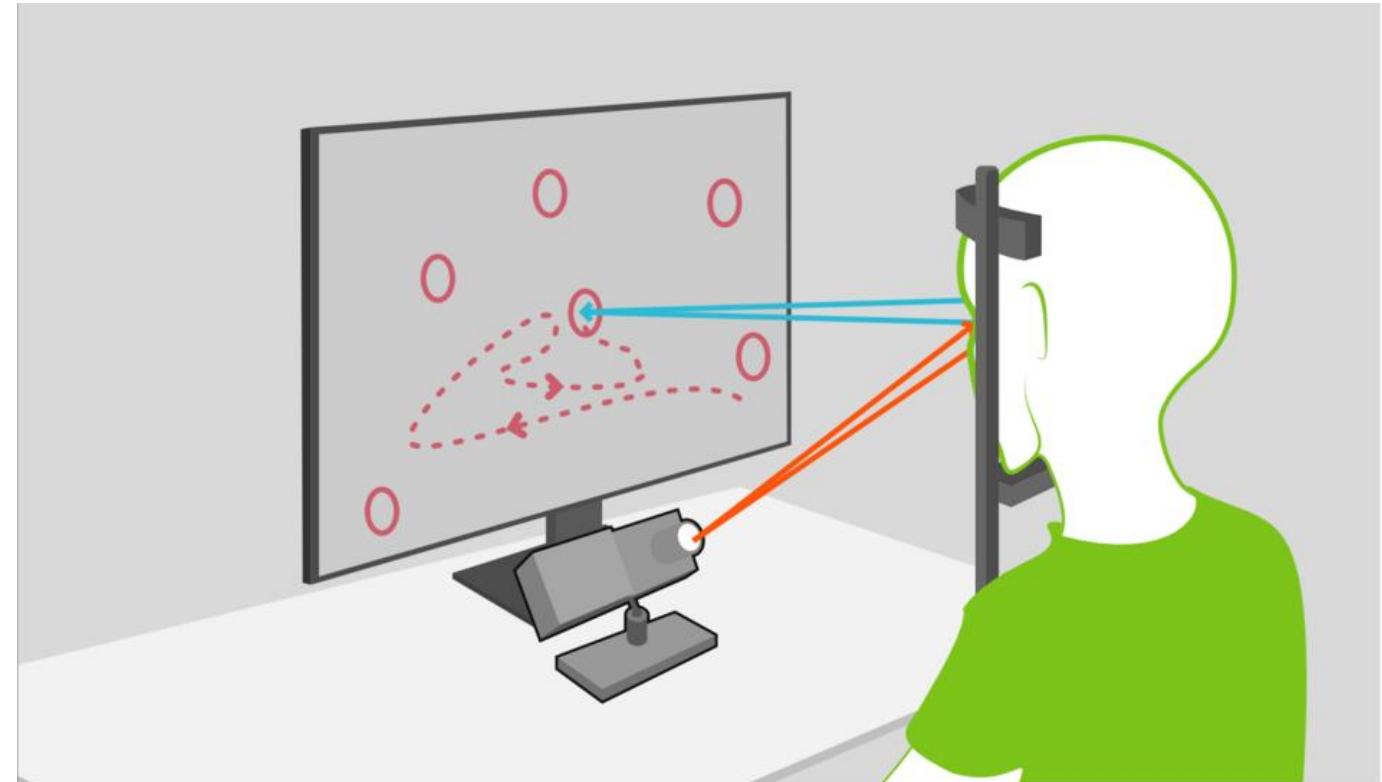
highlight where users scroll  
on a page

- **Move maps**

highlight user mouse  
movement (without clicking)

- **Gaze maps**

highlight what users look at...



Heatmaps can

- Help identify areas of improvement or optimization within a website and product.
- Track user behavior in-app and helps improve user experience by analyzing user paths.
- Help find friction points and reduce customer churn by analyzing the dead click map.
- Optimize page design and conversion rates

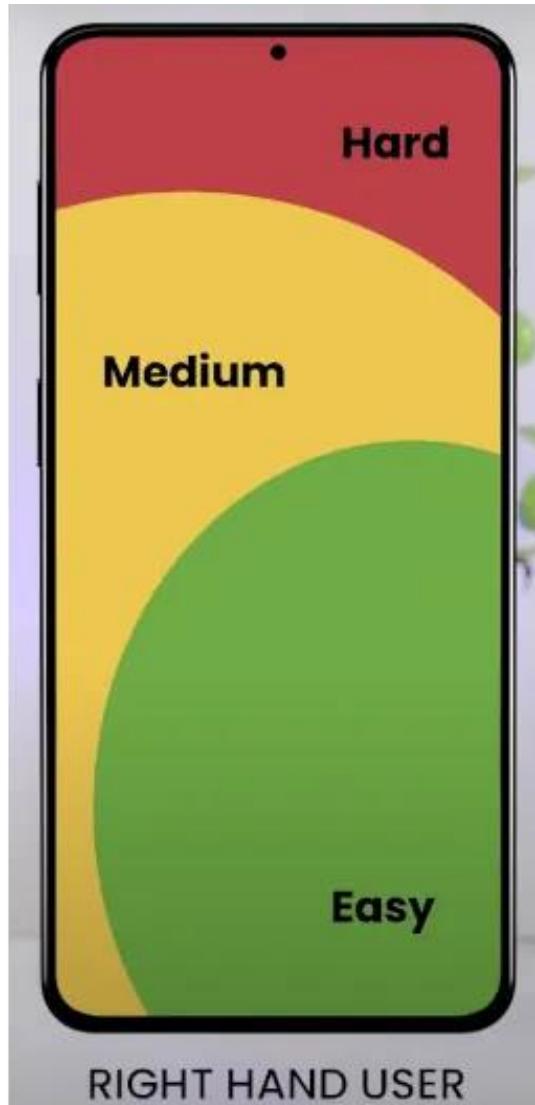
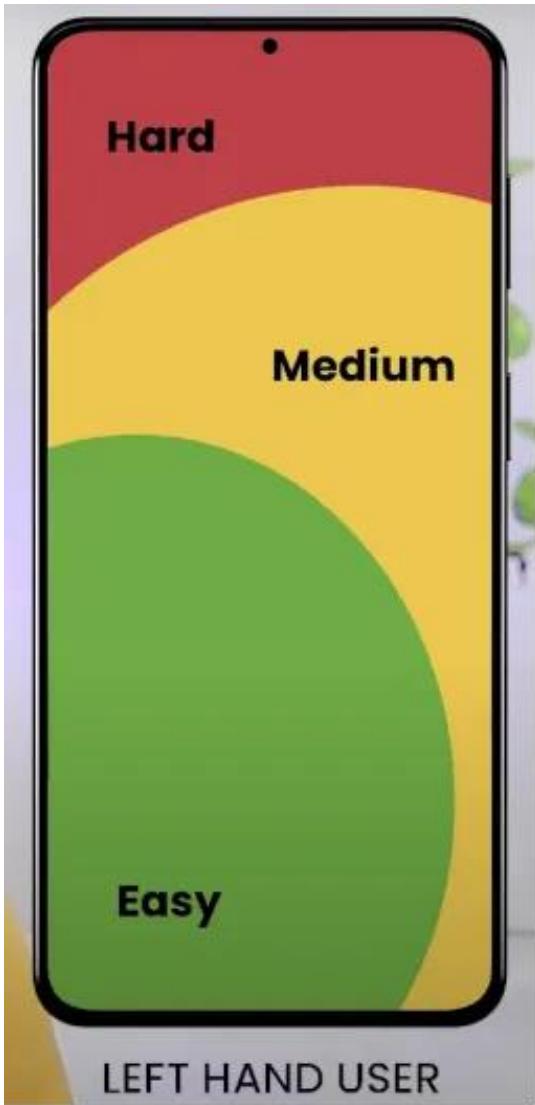
# HeatMap Analysis



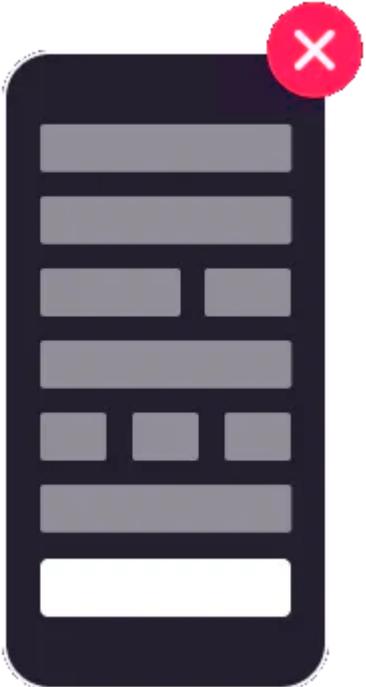
# Fitts' Law

- The amount of time needed for a user to move a cursor or pointer is affected by how far away the objects are and how small they are.
- In Interaction Design, it means that smaller buttons are harder to click and objects farther away are more time-consuming for users to click.
- Therefore, buttons should be larger and related tasks should be kept together for efficiency.
- Google applies this principle by making their icons big enough to reduce error, and the distance between icons small enough to save time.

# Fitts' Law



# Tesler's Law

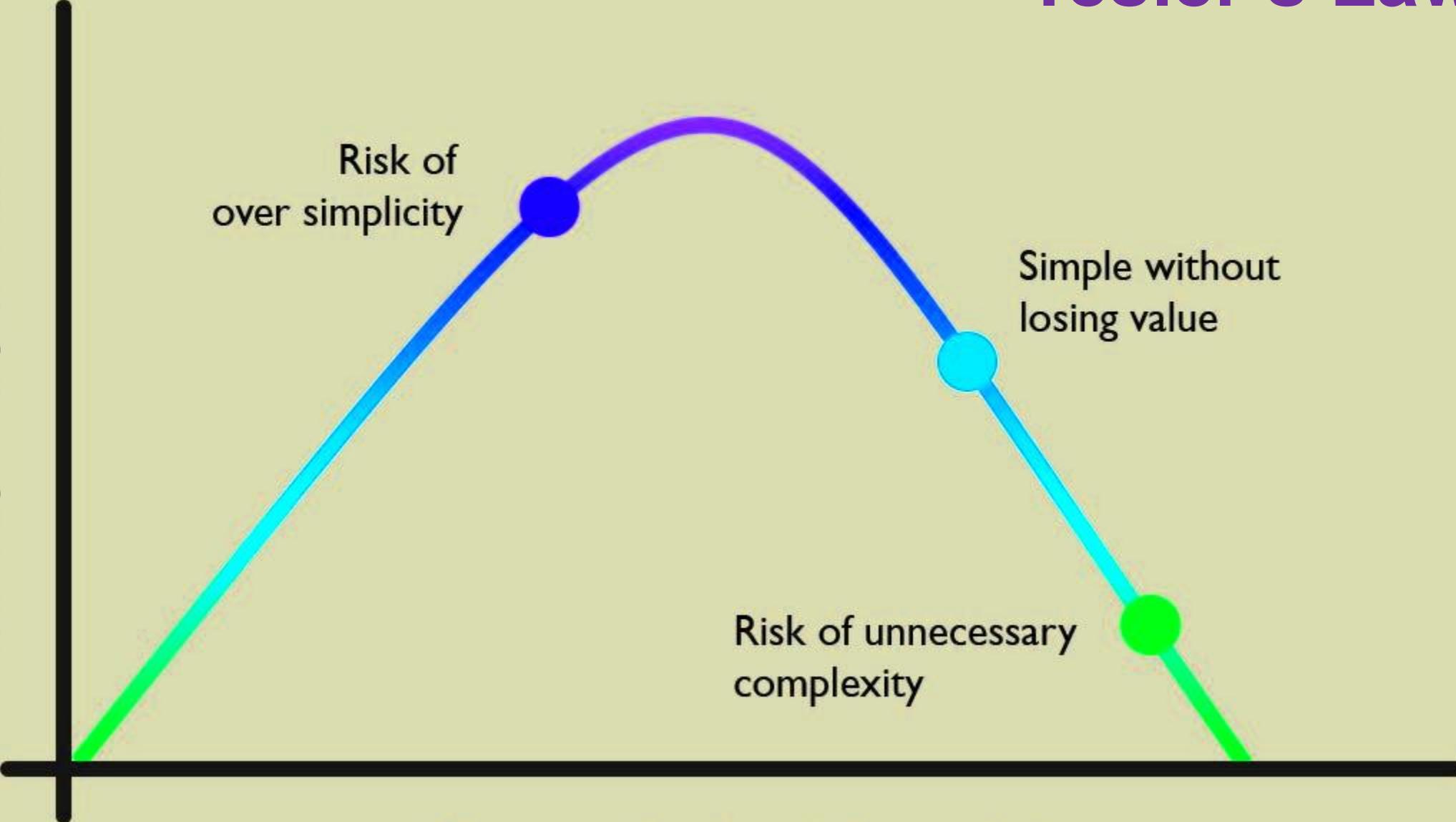


- Tesler's Law relates to the management of complexity in a computing system...
- In Interaction Design, this means moving complexities to the back-stage processes, away from the user.
- Airbnb applies this principle by presenting users with simple tasks like searching for a place, choosing dates, and indicating the number of guests before moving on to more detailed processes.
- Applying the concept makes guiding users along the process easier, promoting a product's ease of use.



# Tesler's Law

How simple can you make it?

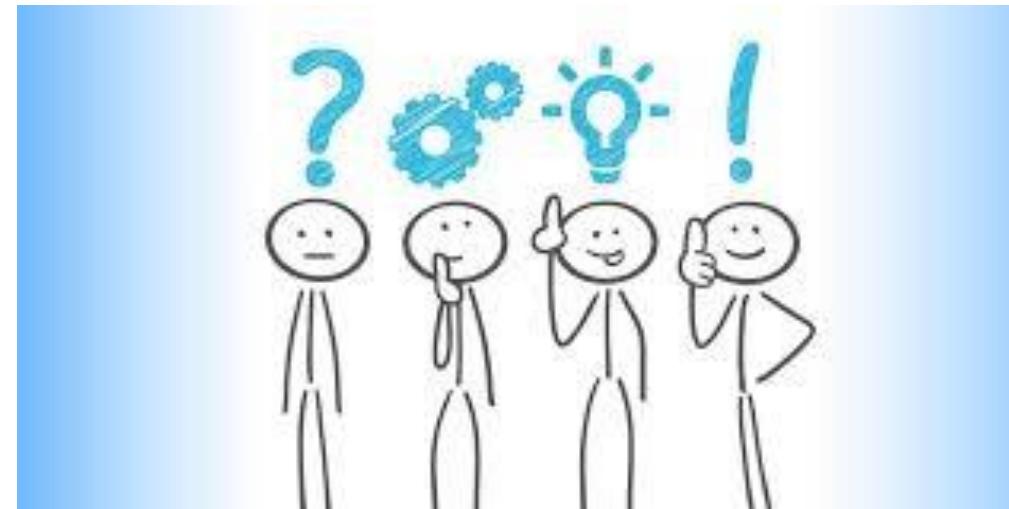


How complex does it have to be?

# Conclusion

- In Interaction Design, having too many interaction choices results in sensory & cognitive overload, and instead of enjoying the experience, we get confused, hesitate and cognitively frustrated.
- Frustrated users may not enjoy their experience, may abandon their task and may not return to your site / application
- You can use progressive onboarding to introduce your users only to the features that are relevant to their use cases,
- Don't overload them with unnecessary information,
- Limit the amount of interactive modalities and make the UI clear and easy to navigate.
- You can use interactive analytics to get a better understanding of what interactive features are most popular with users and those that are not...

# THANK YOU!



## ...QUESTIONS?

