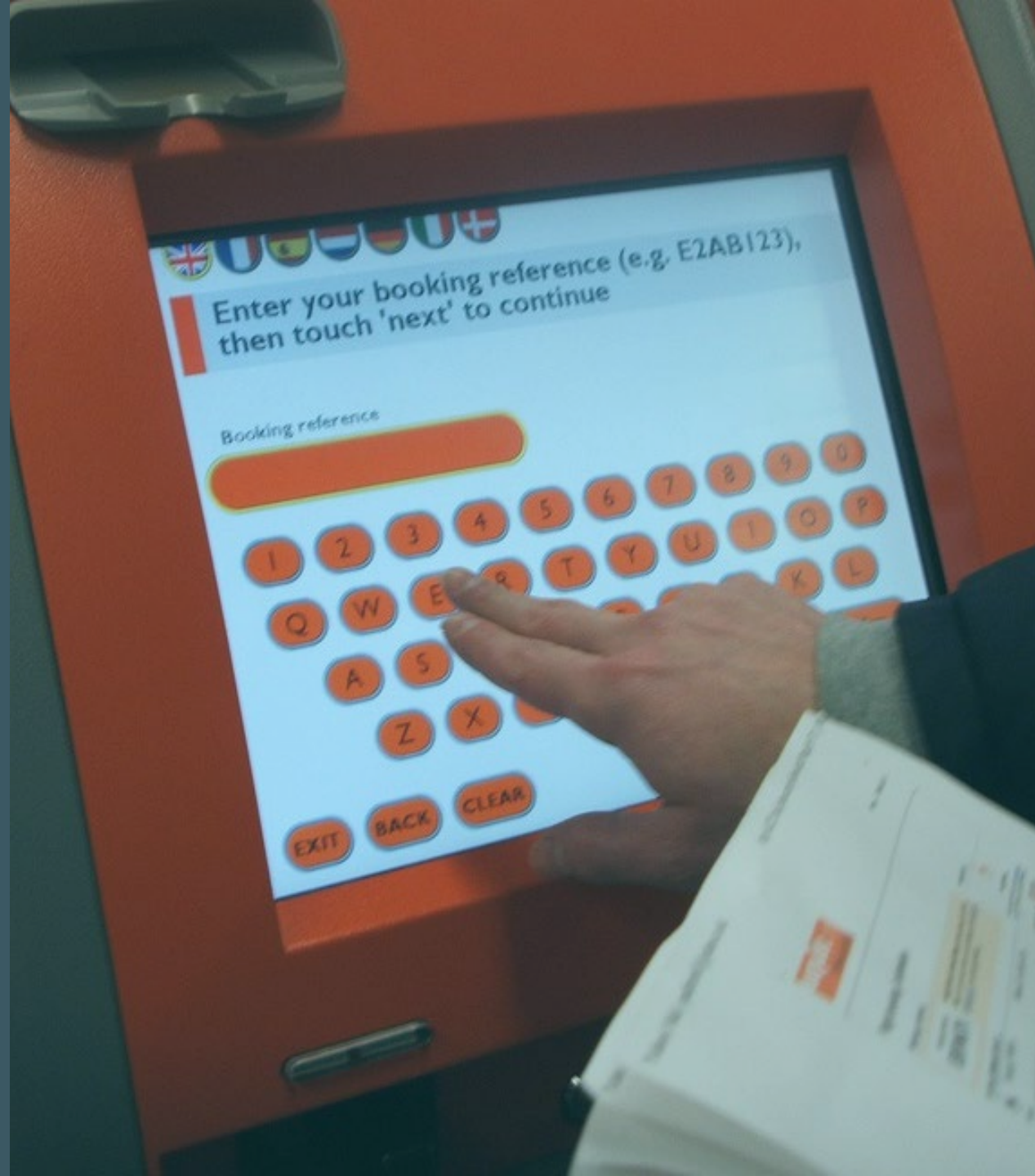


human computer interaction

Lecture 9:
Evaluating Without
Users

Dmitrijs Dmitrenko





Good design vs Bad design



bad design example



Dmitrijs Dmitrenko
@DoubleDmi

Another #BadDesign example for #HCISussex: a movement sensor to trigger flush in a public toilet that looks like a button you need to press. The text above the button says "Wave on". If you need text to explain the design, then it's probably not a #GoodDesign anymore... 🤔



wave on...



share your observations...

...on X or per email!

Use hashtags **#HCISussex #GoodDesign #BadDesign**

Tag me @DoubleDmi

Your examples will be featured in lectures!

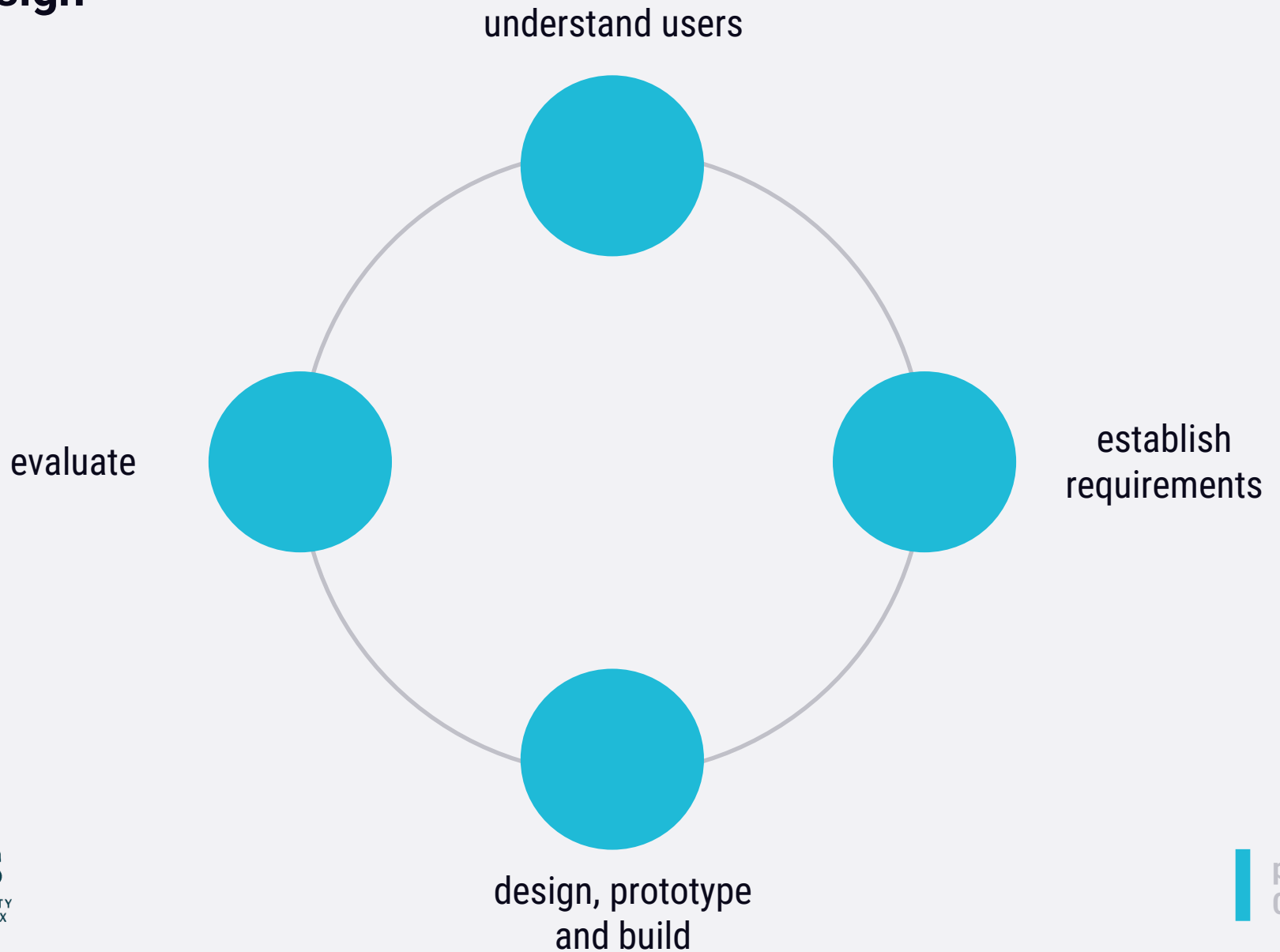
「Now back to today's
lecture...」

why, what, where & when to evaluate

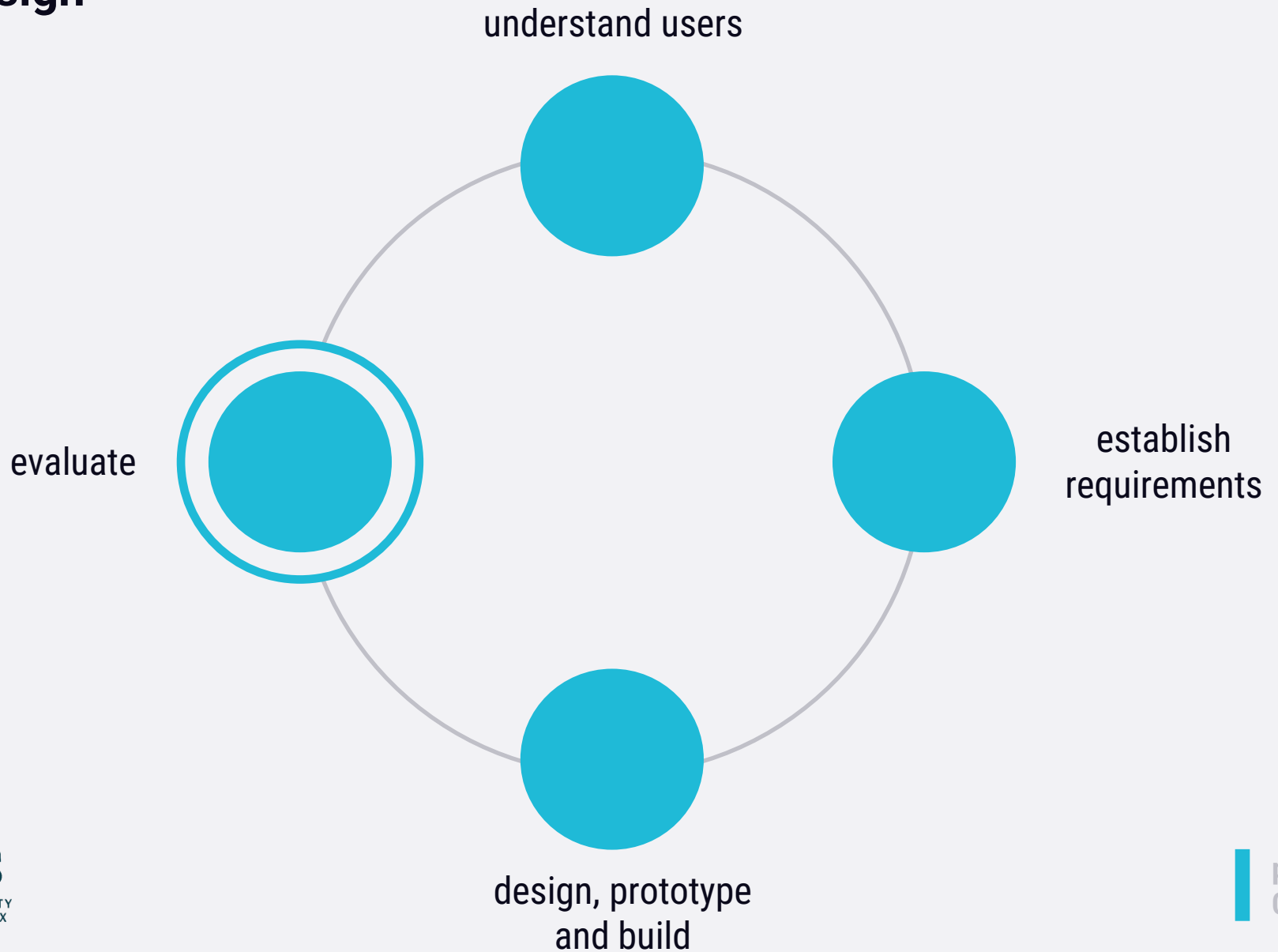
- ④ **why:** to check users' requirements, to **make improvements to a product**, to check whether users can use the product and whether they like it
- ④ **what:** a conceptual model, **early prototypes** of a new system, more complete prototypes, 'finished' products
- ④ **where:** in **natural and laboratory settings**
- ④ **when:** **throughout design process**; finished products can be evaluated to collect data to inform new versions/products

last week:
data analysis

user-centred design





user-centred design




types of evaluation

involving users:

-  **controlled settings** involving users, e.g. usability testing & experiments in laboratories or living labs
-  **natural settings** involving users, e.g. field studies to see how the product is used in the real world

not involving users:

-  any settings not involving users, e.g. expert inspections; to analyse, model & predict aspects of the interface

evaluation methods

method	controlled settings	natural settings	without users
observing	x	x	
asking users	x	x	
asking experts		x	x
testing	x		
modeling			x

evaluation without users

- ④ **expert inspections/critiques** can be **formal or informal**
- ④ experts use their knowledge of users & technology to review software usability
 - ④ **heuristic evaluation** is a review guided by a set of heuristics
 - ④ **cognitive walkthroughs** involve stepping through a pre-planned scenario noting potential problems (Nielsen & Mack, 1994, p. 6)
- ④ **use models/formulas** to derive various measures of user performance (e.g. GOMS, Fitts' Law)

heuristic evaluation

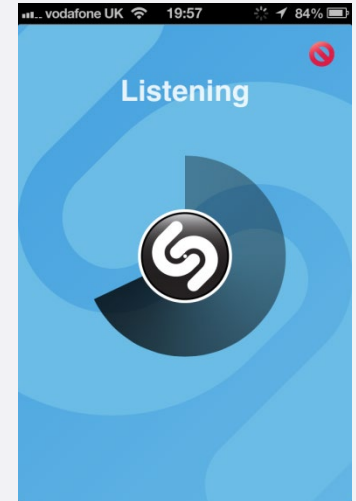
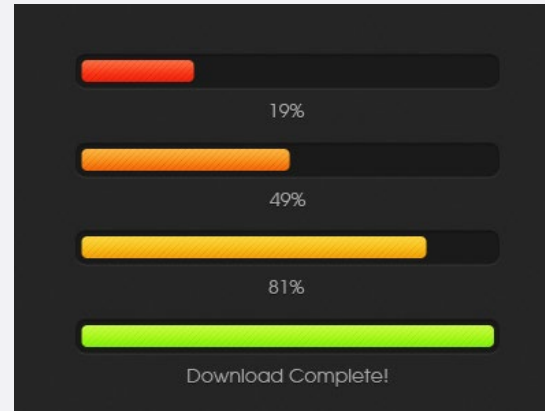
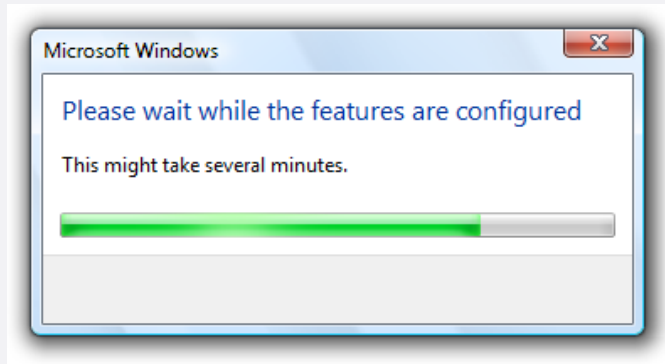
- ⊗ developed by Jakob Nielsen in the early 1990s
- ⊗ based on heuristics (rules of thumb) distilled from an empirical analysis of 249 usability problems
- ⊗ heuristics are **closely related to design guidelines**
- ⊗ original heuristics have been **revised** by Nielsen and others **for current technologies** such as mobile devices, wearables, virtual worlds, etc.
- ⊗ heuristic evaluation involves **experts examining** a design to see if guidelines are violated

Nielsen's heuristics

(revised 2014 for current technology)

1. visibility of system status
2. match between system & real world
3. user control & freedom
4. consistency & standards
5. error prevention
6. recognition rather than recall
7. flexibility & efficiency of use
8. aesthetic & minimalist design
9. help users recognise, diagnose & recover from errors
10. help & documentation

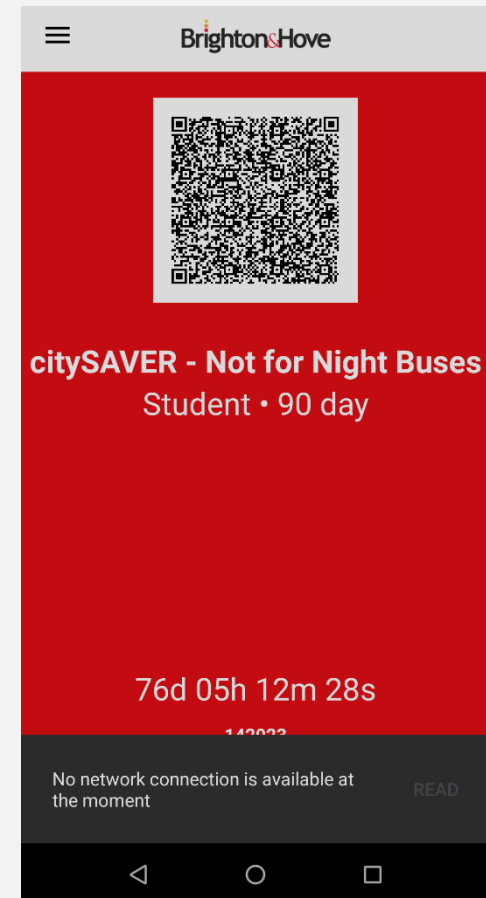
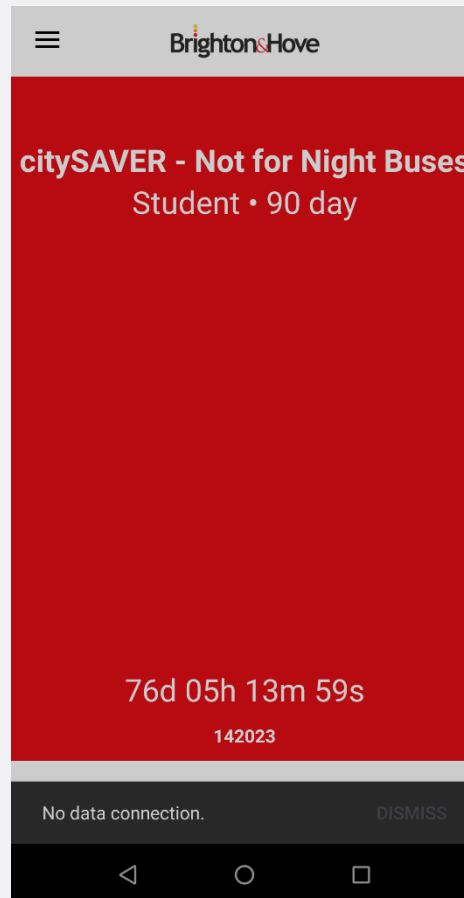
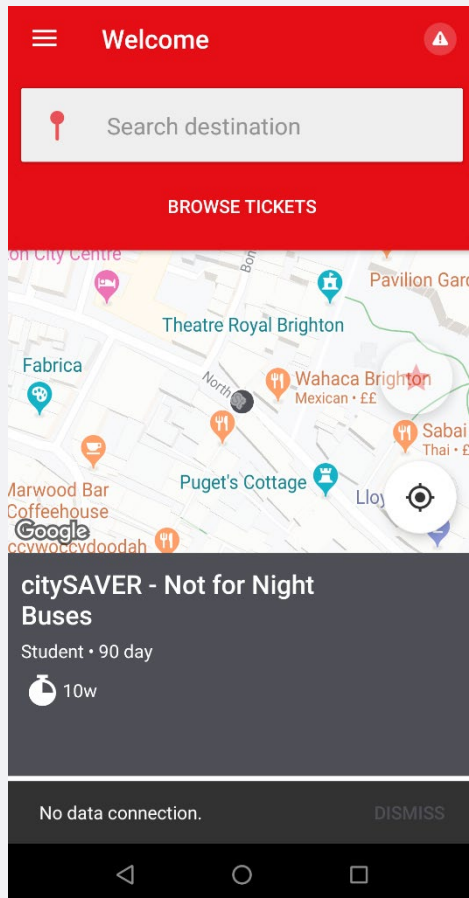
1. visibility of system status



what: the system should always keep users informed about what is going on.

how: through appropriate feedback within reasonable time (e.g. progress bars to show that an action is currently being carried out, or feedback messages shown when an action has been completed).

1. visibility of system status



1. visibility of system status: too much of it...

Sometimes there is too much visibility...

<p>▶ Double Room</p> <p> Last booked for your dates 5 hours ago on our site</p> <p>9.0 Superb</p> <p>1 double bed </p> <p> 279 ft² Bath Ensuite bathroom</p> <p> Flat-screen TV More</p> <p>Prices are per room for 2 nights Included: 13.5 % VAT, Breakfast</p>	<p></p> <p>£222 </p> <p>includes taxes and charges</p>	<p> Exceptional breakfast included </p> <p>✓ Partially refundable</p> <p>✓ NO PREPAYMENT NEEDED - pay at the property</p> <p>Last chance! Only 1 room left on our site!</p>	<p>0 ▼</p>
---	---	--	------------

Limited supply in Dublin for your dates: 1 four-star guest house like this is already unavailable on our site

Source: www.booking.com

1. visibility of system status: too much of it...



Source: [YouTube/Design Theory](https://www.youtube.com/watch?v=DesignTheory)

1. visibility of system status: too much of it...

Summary

The results of these studies supported the idea that scarcity's enhancement of value is mediated by assumed expensiveness. Study 1 found that scarcity enhanced the desirability of art prints only when subjects had been primed to think about the prints' prices. Study 2 found that scarcity enhanced the perceived expensiveness and desirability of a wine only when subjects were not told how much it cost.

These results suggested that a scarcity effect can be created by inducing people to think about the scarce commodity's price and that such an effect can be eliminated by prohibiting people from assuming that the commodity is more expensive when it is scarce. Although each study is inconclusive by itself, when combined with one another and with Verhallen's (1982, 1984) studies, they provide fairly strong evidence that scarcity effects on desirability are mediated by assumed expensiveness.

Source: Lynn, M., 1989. Scarcity effects on desirability: Mediated by assumed expensiveness?. *Journal of economic psychology*, 10(2), pp.257-274.

1. visibility of system status: too much of it...

Free shipping On all orders 08:15:28

Price adjustment Within 30 days

TEMU Best Sellers 5-Star Rated Black Friday New Arrivals Categories christmas gift box

Home > Toys & Games > Learning & Education > Engage Your Child's Imagin...

Engage Your Child's Imagination With This 2-Piece Montessori Busy Book Set - Dinosaur & Farm Themed Learning Toys!

1.1K+ sold, by Zebra Story(14K+ sold) ★★★★★ (902)

£7.64 -54% £16.79

Lightning Deal ✓ Free shipping on all orders left today 08:15:31

Items:

Animal Dinosaur Traffic Life

Qty: 1 Almost sold out

Hurry! Over 347 people have this in their carts

Add to cart

Sold by Zebra Story. Ships from Temu.

Shipping >

Standard: free on all orders
Delivery: Nov 30-Dec 12, 86.3% are ≤ 10 days
Get a £5.00 credit for late delivery
Courier company: Royal Mail, etc.

Express: £9.00
Delivery: Nov 28-Dec 11, 81.1% are ≤ 7 days
Get a £9.00 credit for late delivery
Courier company: UPS, EVRI, etc.

Free returns • Price adjustment >

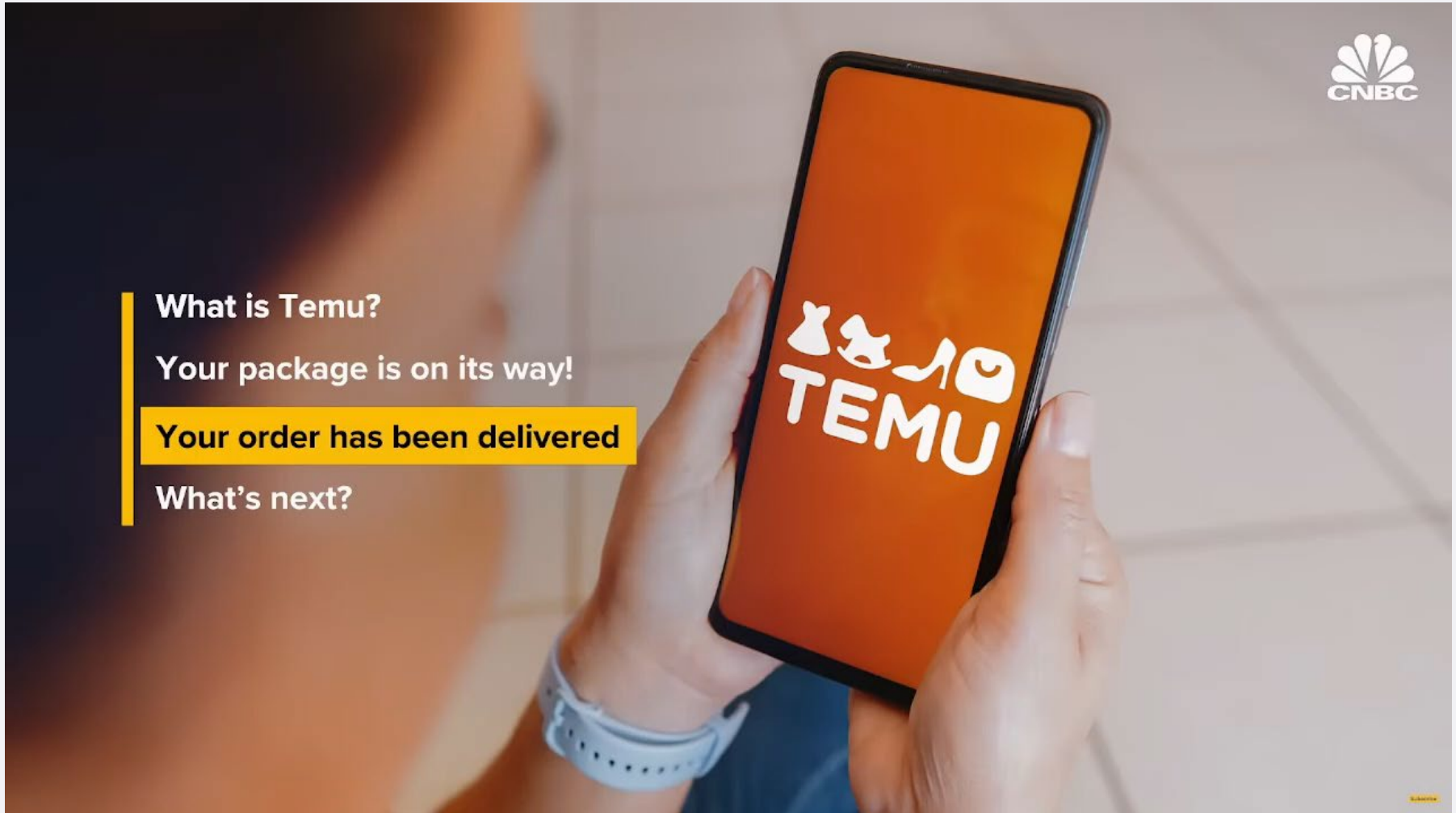
Sustainability at Temu >

902 reviews | 4.7 ★★★★★

All reviews are from verified purchases

Source: www.temu.com

1. visibility of system status: too much of it...



What is Temu?

Your package is on its way!

Your order has been delivered

What's next?

1. visibility of system status: too much of it...

This study investigates factors that affect consumer continuous use intention toward online group buying and the degree that reciprocity and reputation of social exchange, trust, and vendor creativity affect consumer satisfaction and intention toward online purchasing. Data from 215 valid samples was obtained using an online survey. The research model is assessed using partial least squares (PLS) analysis. The results show that the intention to engage in online group buying is predicted collectively by consumer satisfaction, trust, and seller creativity. Consumer satisfaction with online group buying is predicted primarily by trust, followed by consumer reciprocity. The proposed research model explains 67.7% of variance for satisfaction and 39.7% of variance for intention to engage in online group buying. The results suggest that reciprocity, trust, satisfaction, and seller creativity provide considerable explanatory power for intention to engage in online group buying behavior.

Source: Shiau, W.L. and Luo, M.M., 2012. Factors affecting online group buying intention and satisfaction: A social exchange theory perspective. *Computers in Human Behavior*, 28(6), pp.2431-2444.

1. visibility of system status

 **Gary Parker**
@WiteWulf

Hi @V_and_A, your ticketing website is very unfriendly to #colourblind users. Please consider fixing it

12.45	13.00	13.15	13.30	13.45
15.30	15.45	16.00	16.15	16.30
18.00	18.15	18.30	18.45	19.00

 More than 15 tickets available  Less than 15 tickets available

♡ 6 1:11 PM - Oct 2, 2017

What happens if designers forget about colour-blindness?

Normal colour vision:

Select a time

10.00	10.15	10.30	10.45	11.00	11.15	11.30	11.45	12.00	12.15
12.30	12.45	13.00	13.15	13.30	13.45	14.00	14.15	14.30	14.45
15.00	15.15	15.30	15.45	16.00					

More than 15 tickets available Less than 15 tickets available Less than 5 tickets available

Red-blind protanopia:

Select a time

10.00	10.15	10.30	10.45	11.00	11.15	11.30	11.45	12.00	12.15
12.30	12.45	13.00	13.15	13.30	13.45	14.00	14.15	14.30	14.45
15.00	15.15	15.30	15.45	16.00					

More than 15 tickets available Less than 15 tickets available Less than 5 tickets available

Green-blind deuteranopia:

Select a time

10.00	10.15	10.30	10.45	11.00	11.15	11.30	11.45	12.00	12.15
12.30	12.45	13.00	13.15	13.30	13.45	14.00	14.15	14.30	14.45
15.00	15.15	15.30	15.45	16.00					

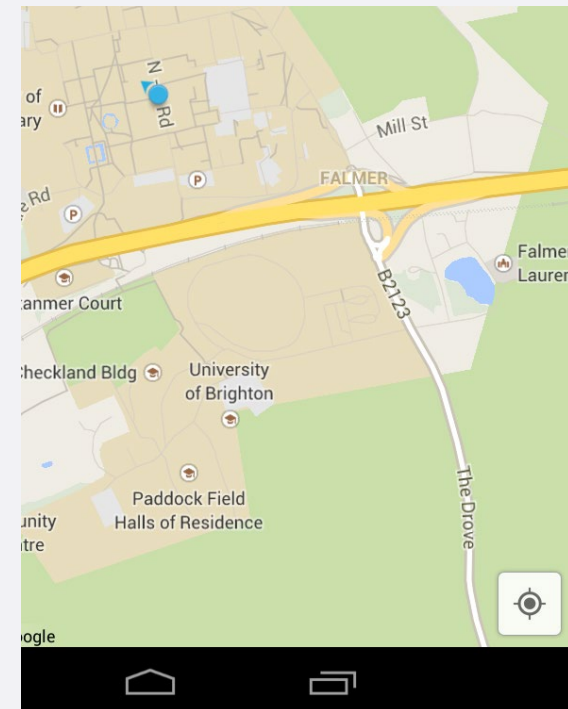
More than 15 tickets available Less than 15 tickets available Less than 5 tickets available

2. match between system and real world

what: the system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms

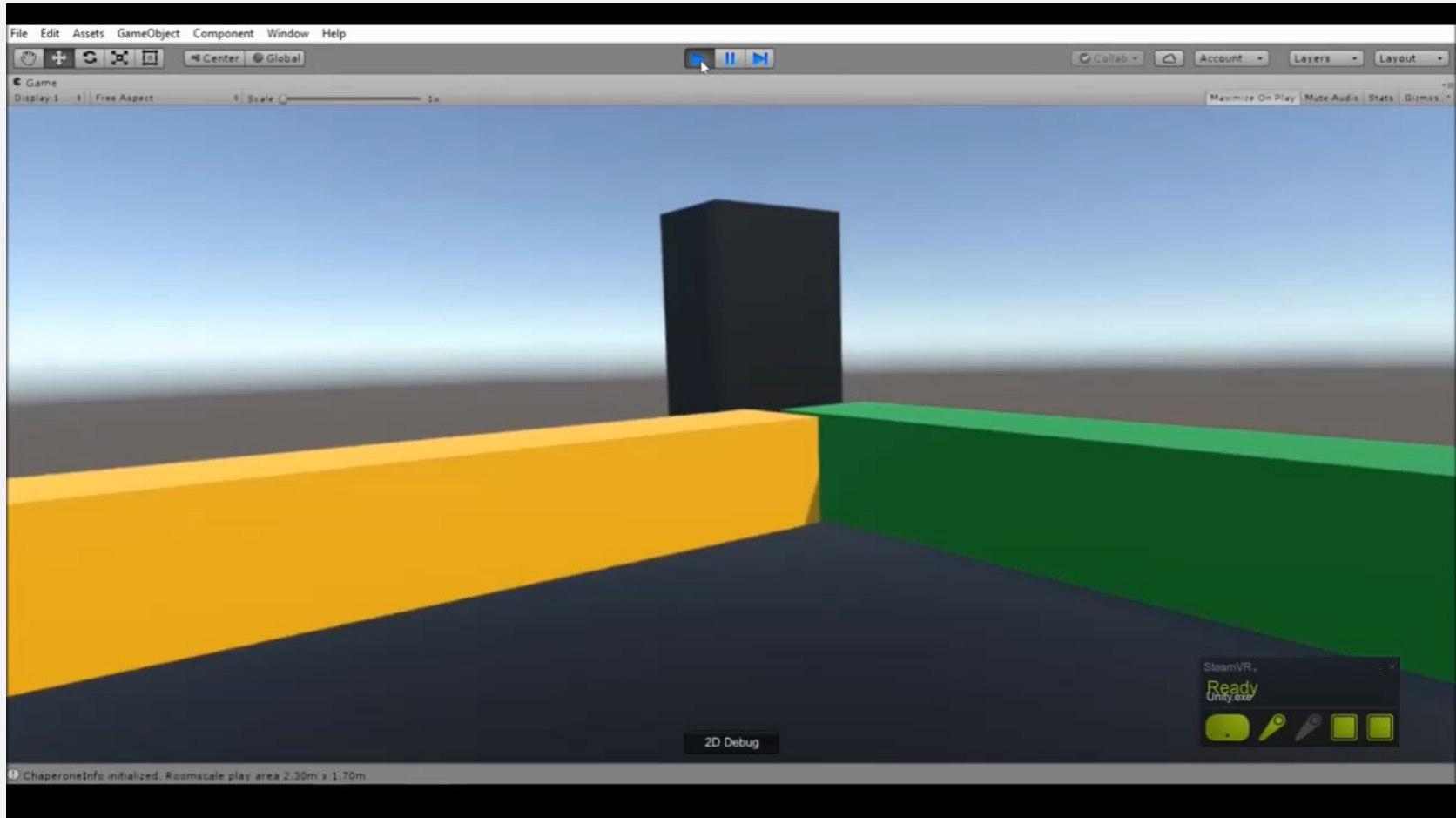
follow real-world conventions, making information appear in a natural and logical order

how: choose appropriate interface metaphors and familiar names for functions



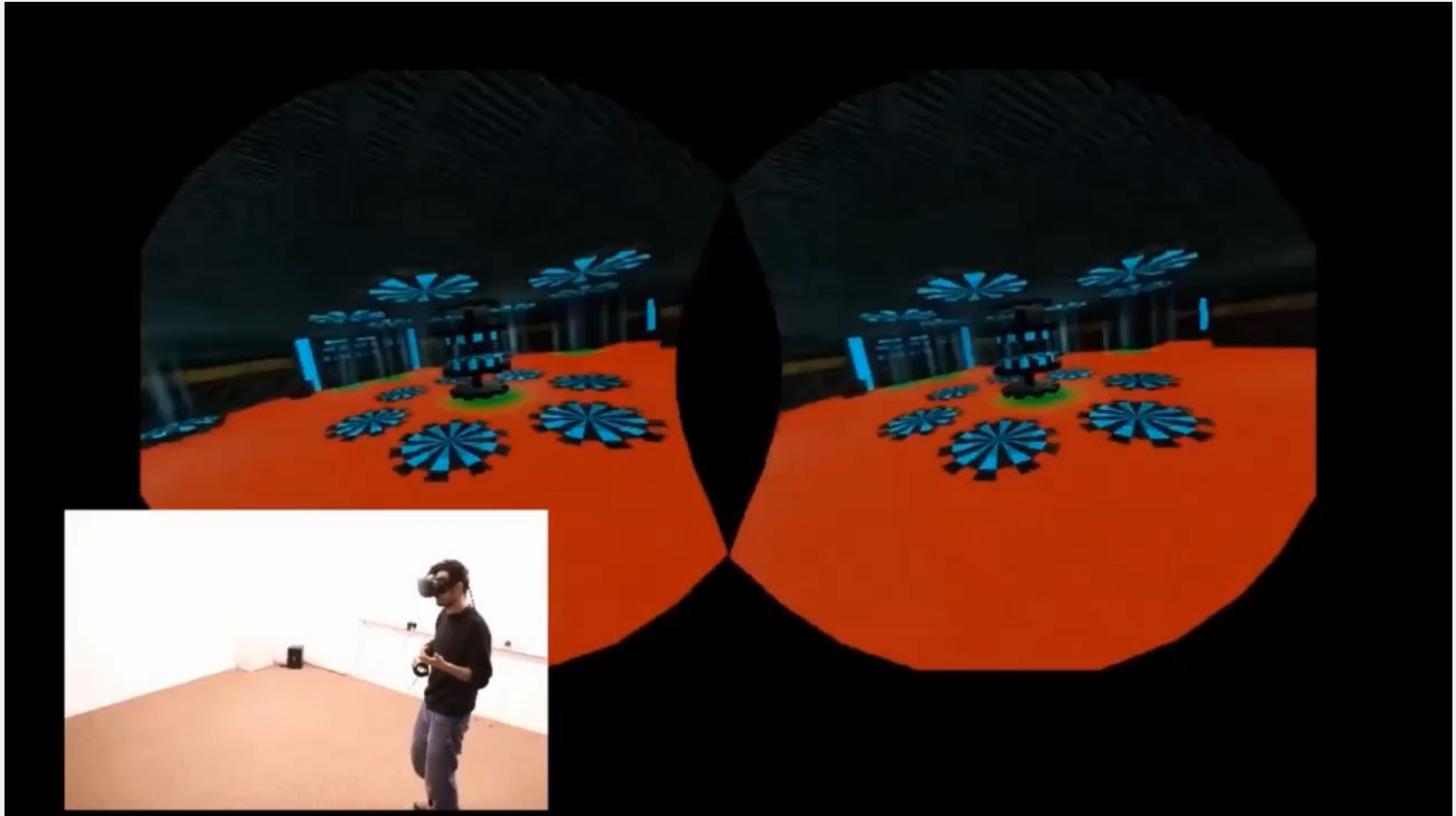
2. match between system and real world

VR teleportation \neq real world



2. match between system and real world

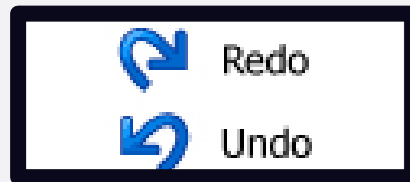
NaviFields \approx real world



3. user control and freedom

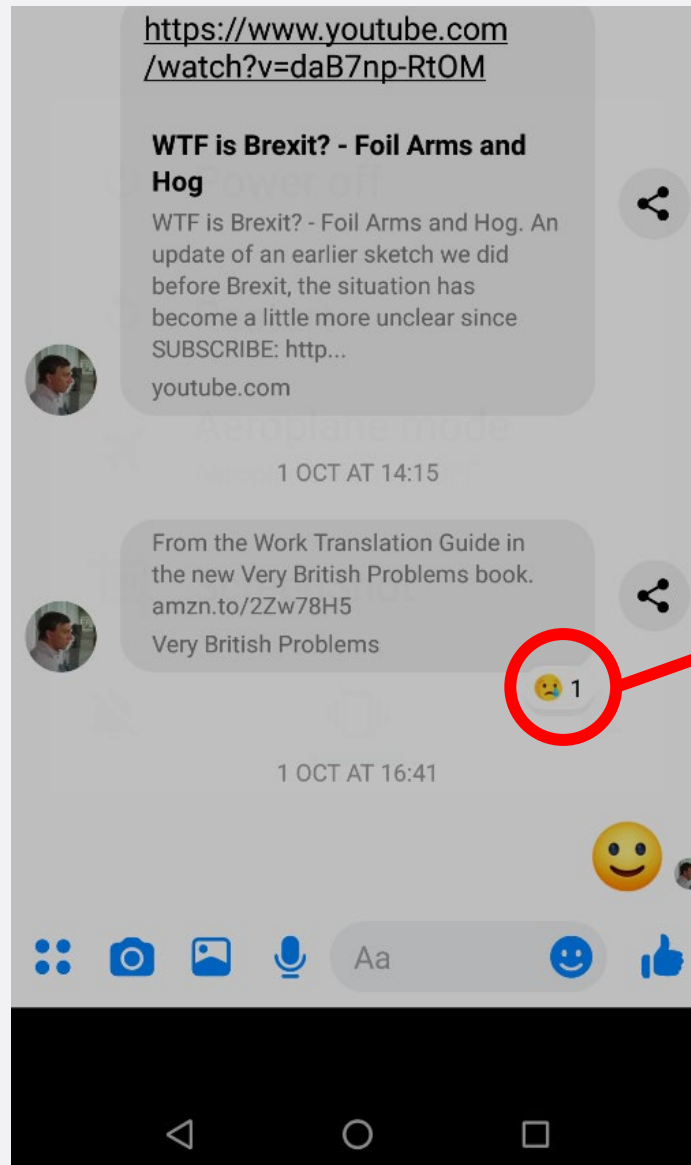
what: users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue

how: provide undo and redo buttons and a range of clear navigation options



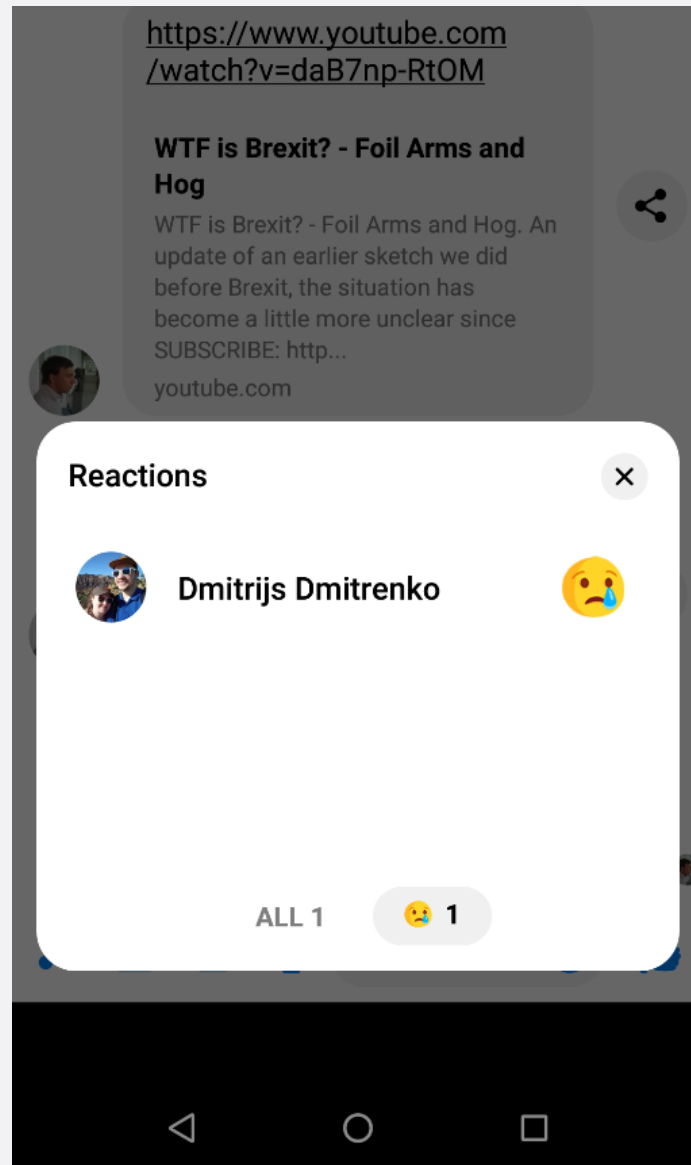
You are here: [Homepage](#) » [Home & Furniture](#) » [View all Furniture](#) »

3. user control and freedom



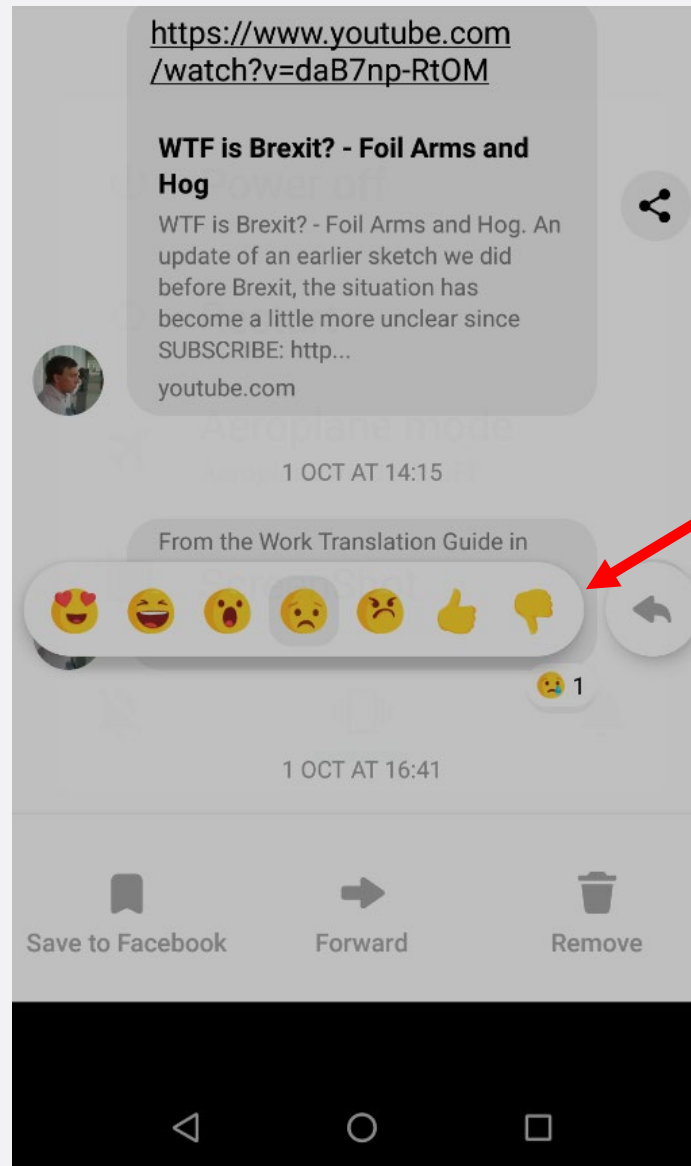
OMG! How do I undo this?

3. user control and freedom



After tapping
the emoji...

3. user control and freedom



After tapping and holding the message...

Finally, I was able to undo my mistake!


Not a great sense of control (aka agency)!



Quiz time!



Which heuristic is violated here?



Online Payments

Product & services

Home

Products & Services

All Categories


All Shops

Apply

Reset

Search

Showing All Items




Council Tax

Click the button below to make a payment.

To make a payment:
1/ Enter your reference number
2/ Click Validate
3/ Enter the a...

Item details




Business Rates (NNDR)

Business Rates

Click the button below to make a payment.

To make a payment:
1/ Enter your reference number
2/ Click Validate
3/ Enter the a...

Item details




Housing Rents & Other Payments

Housing

Click the button below to make a payment.

To make a payment:
1/ Enter your reference number
2/ Click Validate
3/ Enter the a...

Item details



Seaside Homes (Legacy)

Housing

Click the button below to make a payment.

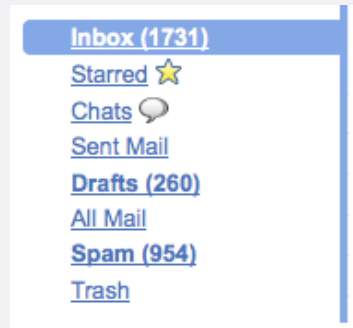
To make a payment:
1/ Enter your reference number
2/ Click Validate
3/ Enter the a...

Item details

1. visibility of system status
2. match between system & real world
3. user control & freedom

4. consistency and standards

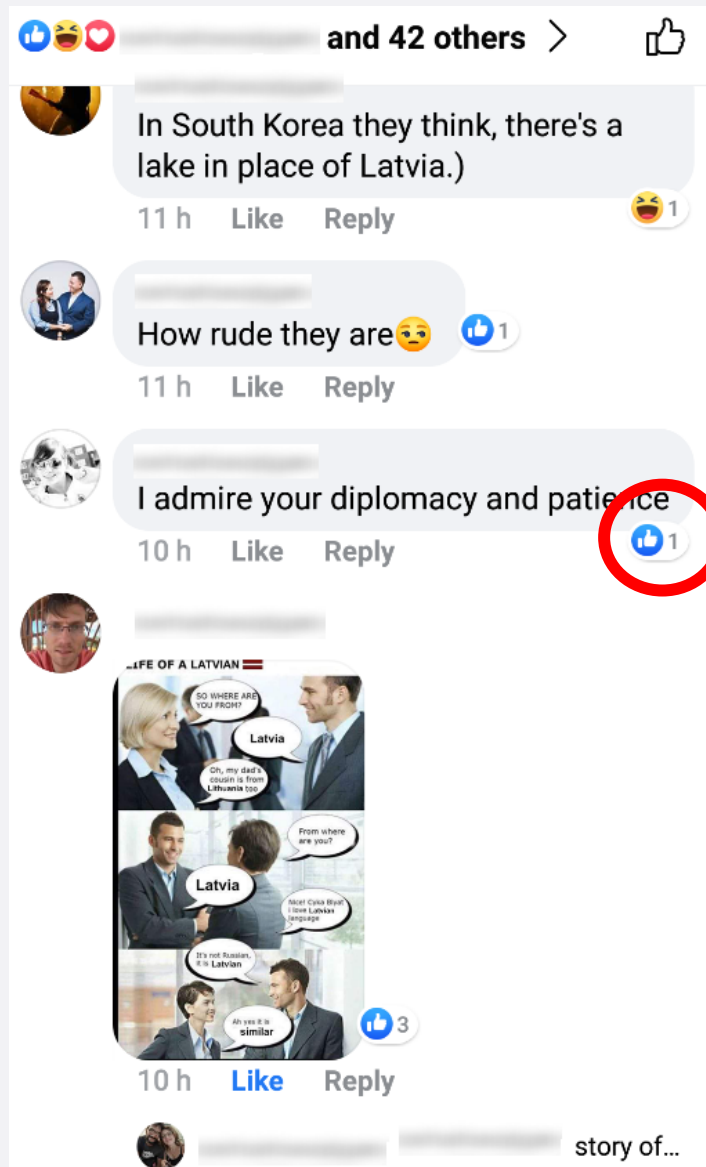
what: users should not have to wonder whether different words, situations, or actions mean the same thing



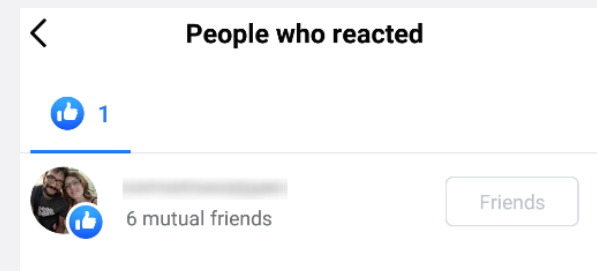
how: follow platform conventions, adhere to existing standards for names and icons



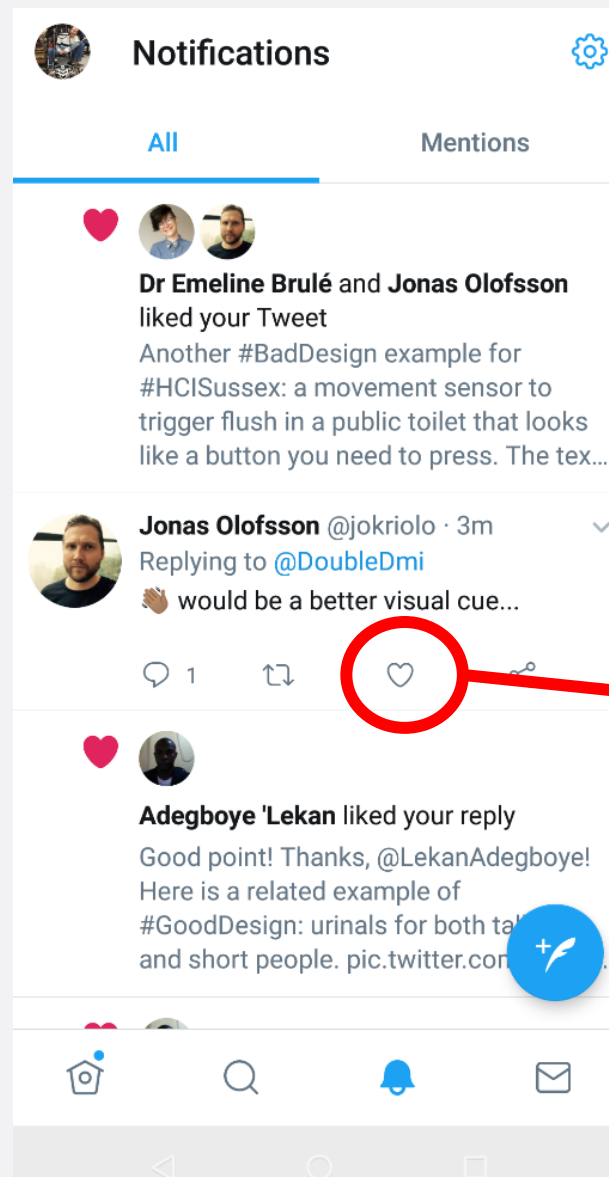
4. consistency and standards



Facebook:
Tapping a “like” button will show who liked the comment

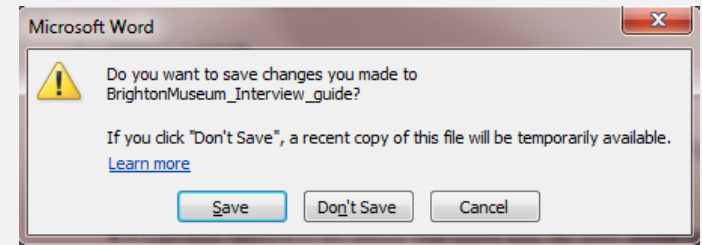
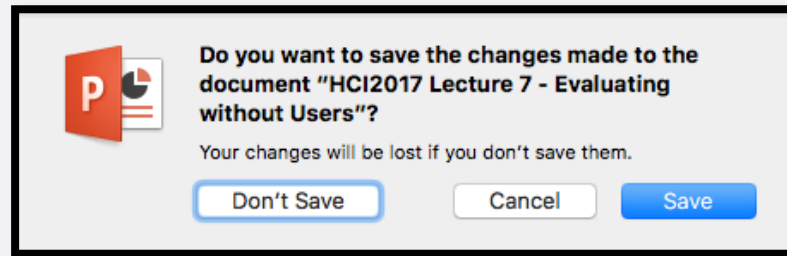


4. consistency and standards



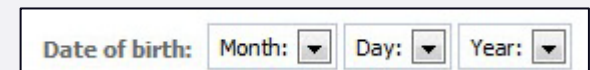
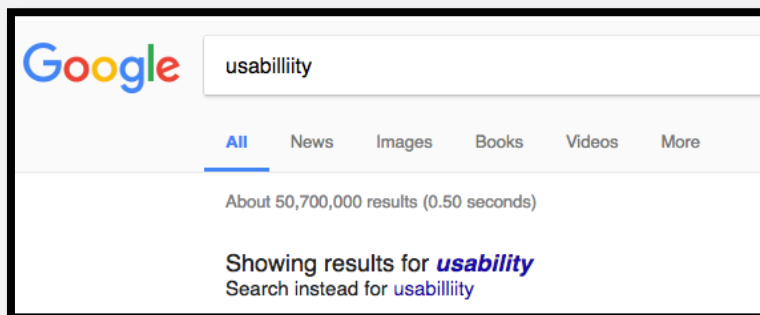
Twitter:
Tapping a “like”
button will unlike
the tweet

5. error prevention

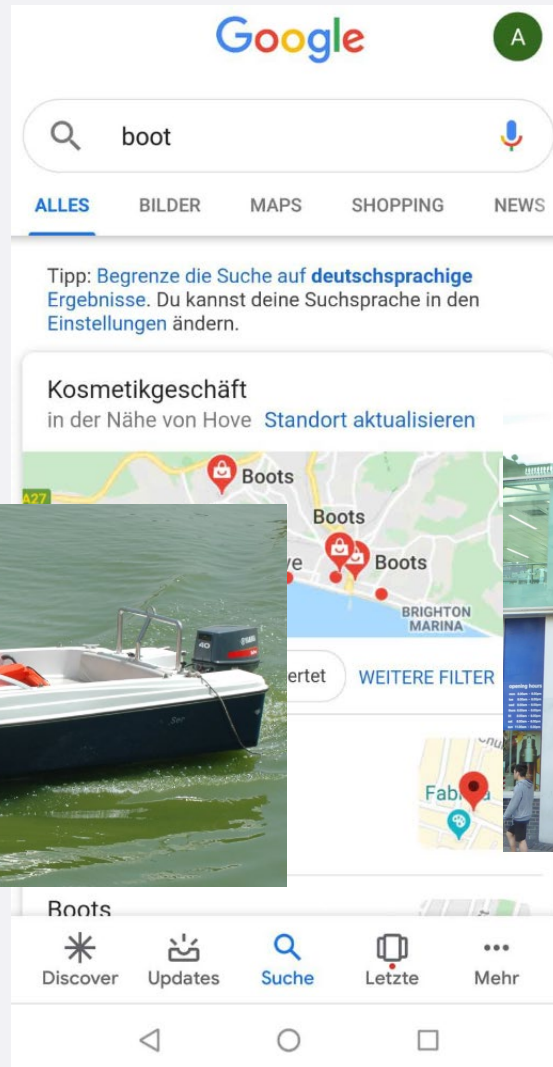


what: even better than allowing recovery from errors is a careful design that prevents a problem from occurring in the first place

how: either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action (e.g. cancel options, restricting entry or auto correct functions)

A screenshot of a "Date of birth:" form. It consists of a label "Date of birth:" followed by three dropdown menus: "Month:", "Day:", and "Year:". Each dropdown menu has a small downward arrow icon.

5. error prevention



5. error prevention

Details

Questions

Group

Pick 14 questions, 1 pts per question

Cancel

Update group

Questions will be pulled from the bank: **Demos Part 2**

+ New question

+ New question group

Find questions

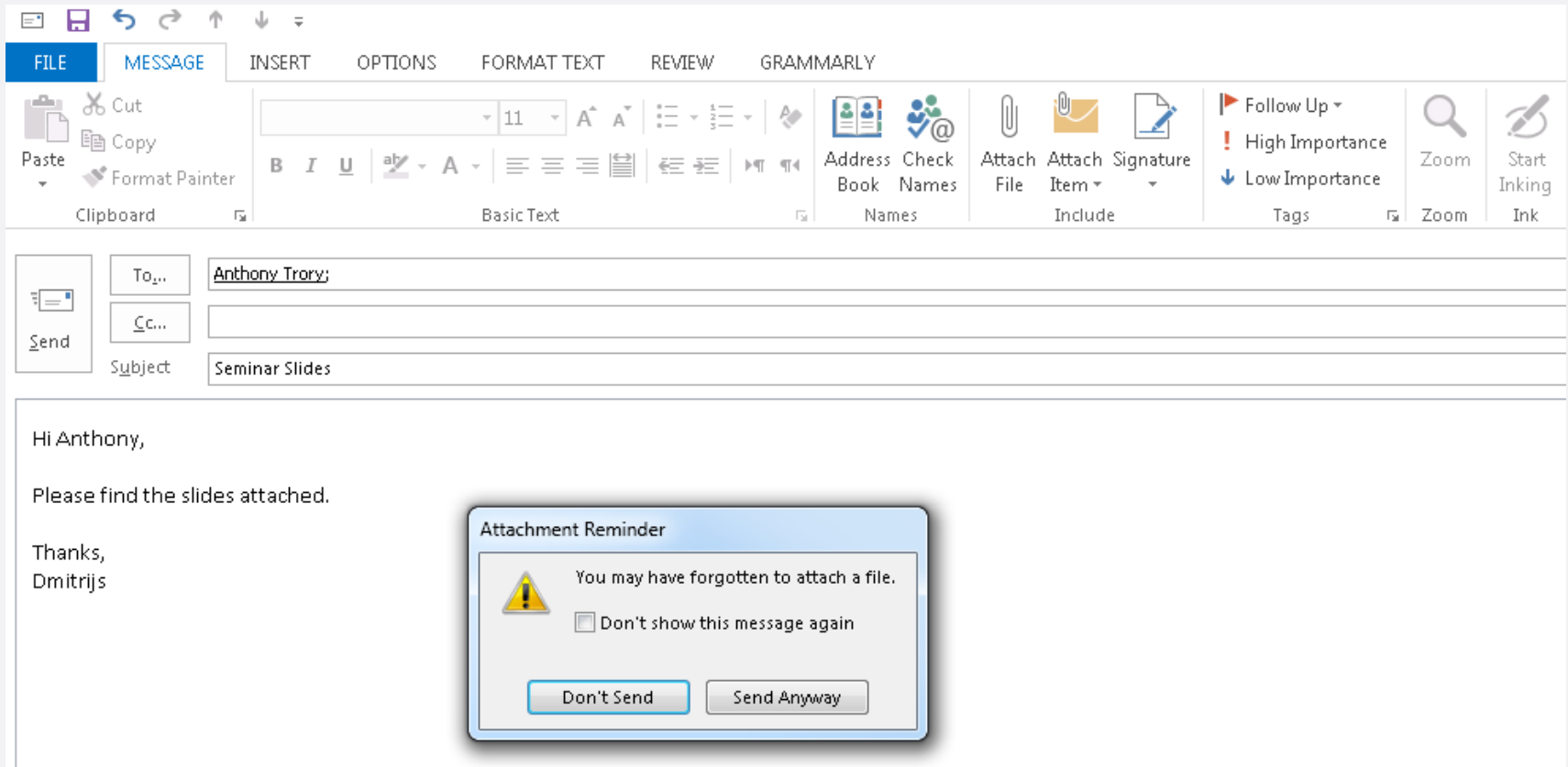
☐ Notify users this quiz has changed

Cancel

Save

Confusing red buttons on Canvas

5. error prevention

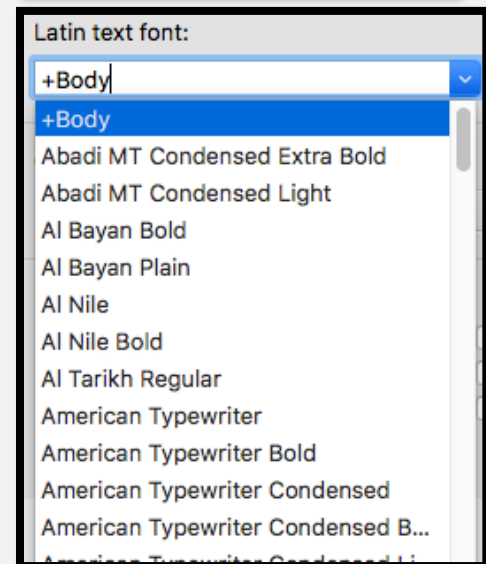
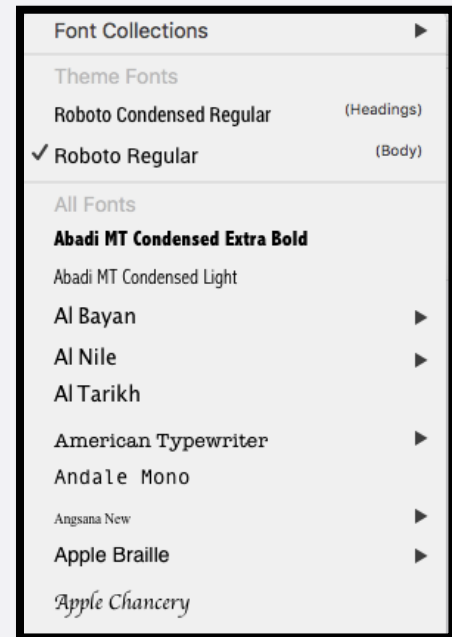


6. recognition rather than recall

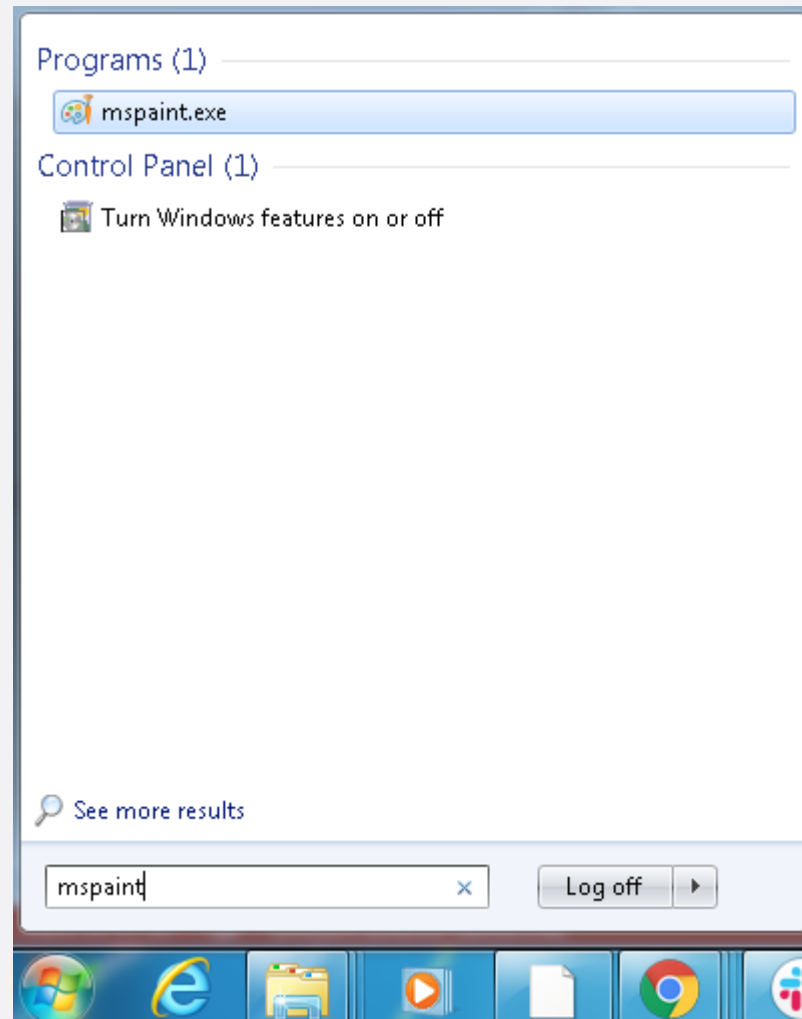
what: minimise the user's memory load by making objects/actions/options visible

user should not have to remember information from one part of the system to another

how: instructions for use of the system should be visible or easily retrievable whenever appropriate (e.g. previewing fonts while choosing)



6. recognition rather than recall



6. recognition rather than recall

Think of Gestalt principles!

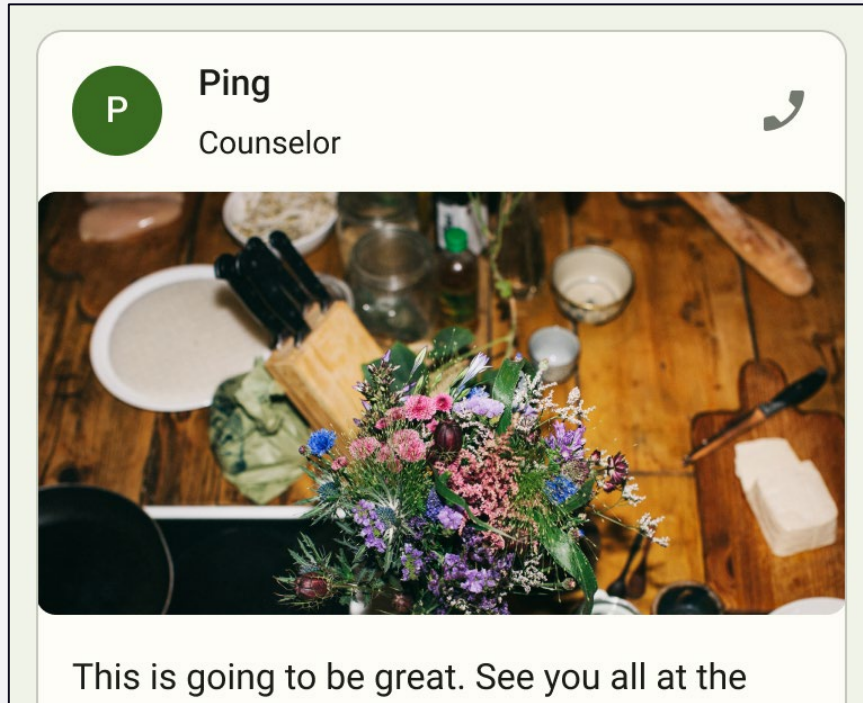
	Subscribe	Unsubscribe
Education and Training ?	<input type="radio"/>	<input checked="" type="radio"/>
Events and Trade Shows ?	<input type="radio"/>	<input checked="" type="radio"/>
Industry Solutions ?	<input type="radio"/>	<input checked="" type="radio"/>
Newsletters ?	<input type="radio"/>	<input checked="" type="radio"/>
Offers and Promotions ?	<input type="radio"/>	<input checked="" type="radio"/>
Press Releases ?	<input type="radio"/>	<input checked="" type="radio"/>
Product Updates ?	<input type="radio"/>	<input checked="" type="radio"/>
Surveys ?	<input type="radio"/>	<input checked="" type="radio"/>
Webinars ?	<input type="radio"/>	<input checked="" type="radio"/>
Unsubscribe all		

Email Frequency Settings

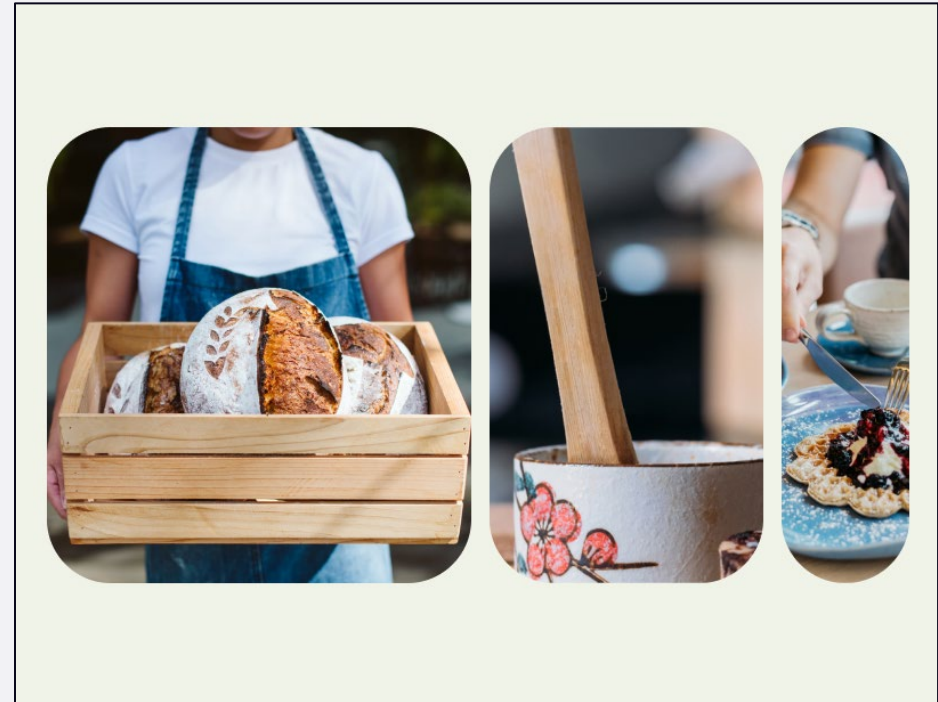
Save all your changes? [Cancel](#) [Confirm ✓](#)

6. recognition rather than recall

Think of Gestalt principles!



Explicit grouping



Implicit grouping

6. recognition rather than recall: F-pattern reading

about us

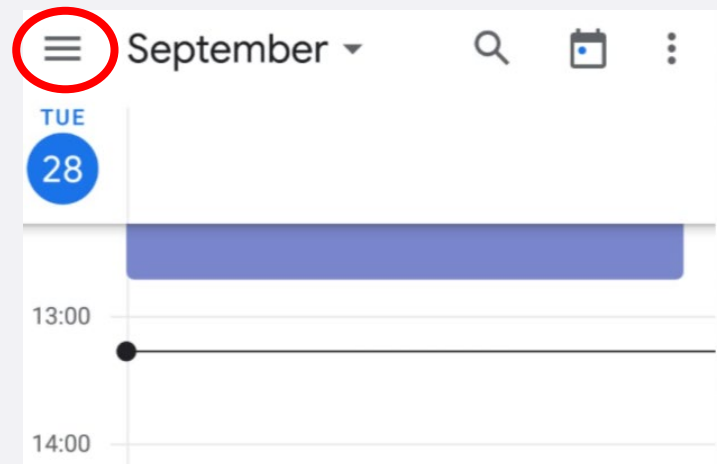
product page

search results



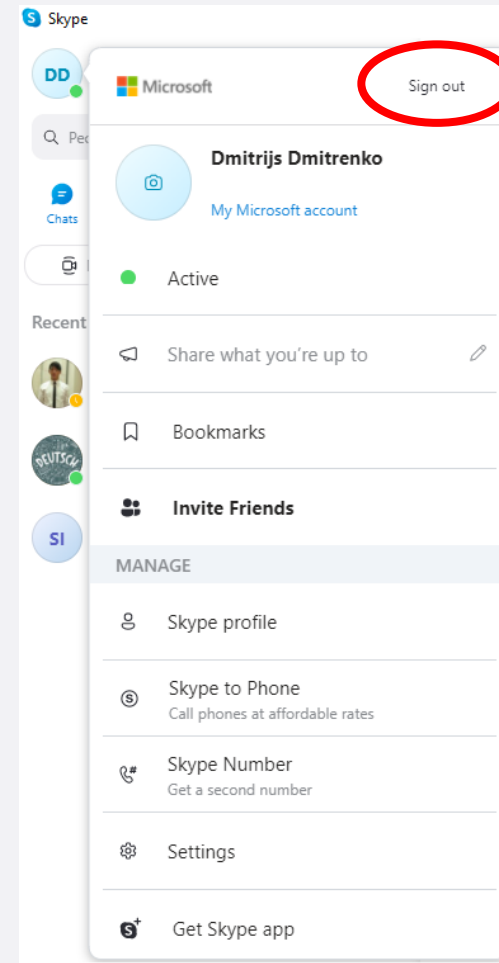
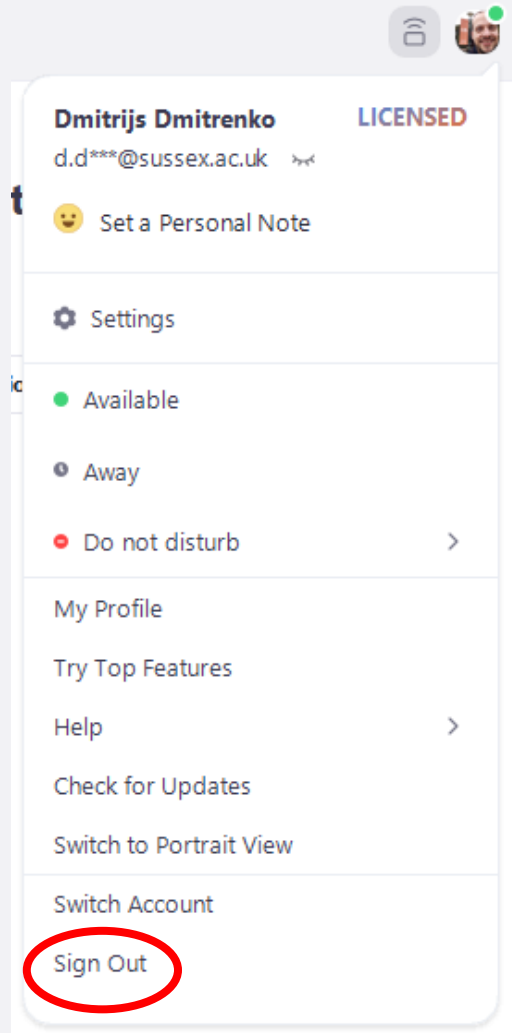
6. recognition rather than recall: F-pattern reading

**Burger menu in
the top-left corner**



Source: Google Calendar

6. recognition rather than recall: F-pattern reading





Quiz time!



Which heuristic is violated here?

Your Reference

Please use this box to provide any additional relevant information on the applicant, for example, performance in the workplace, or suitability for the programme applied for, or if they have not yet graduated, what final degree classification or grade he/she is expected to achieve. If providing a written reference, it is recommended you paste a previously prepared reference into this field. If typing directly in the box below **please take a copy of your text** prior to pressing next. Note that you will be emailed a copy of your reference for UCL after pressing next.

Erica also did very well in the individual assignment, achieving the mark of 74% as the overall mark for the module. This module also involved a lot of brainstorming, creative thinking, background and user research, prototyping, user testing, data acquisition and analysis.

Currently, Erica is also taking part in my Informatics Project Management and Technology-Enhanced Learning Environments modules, where she demonstrated herself as a pro-active learner, approaching me with questions about the modules' content and asking for clarification.

Erica is proactive also in extracurricular activities. She has been a Student Representative for Informatics for over three years, a Student Ambassador for two years, and a Chair Representative at the Library Consultative Group for one year. Furthermore, she has helped other students with their coursework-related issues. She has recently started a new role as a TSR (The Student Room) Official Rep for the University of Sussex, where she helps prospective students with their questions about university life in general and answers their queries.

Erica will be a very good fit for this degree as she enjoys collaborating and connecting with people. This is a skill that is a must for becoming a good User Experience/User Interface designer. Due to her background in Computer Science and Artificial Intelligence and the help of strong interpersonal skills and knowledge of multiple languages, she can put these abilities into practice and contribute to any design project she engages in. I also know that she is already doing that by working on an app design project together with a friend on the MSc programme and become a strong professional in this field. I share her passion for the topic and wish her all the best for her future career.

Your reference will be treated in confidence as far as is reasonably practicable. However UCL may be required to disclose a reference under certain circumstances, for example if required to do so by law or to meet a request by a court or third party. As such, UCL cannot guarantee that your data will be treated in confidence please see UCL's Privacy Policy pages at: <https://www.ucl.ac.uk/legal-services/privacy>.

Next

Back

4. consistency & standards
5. error prevention
6. recognition rather than recall

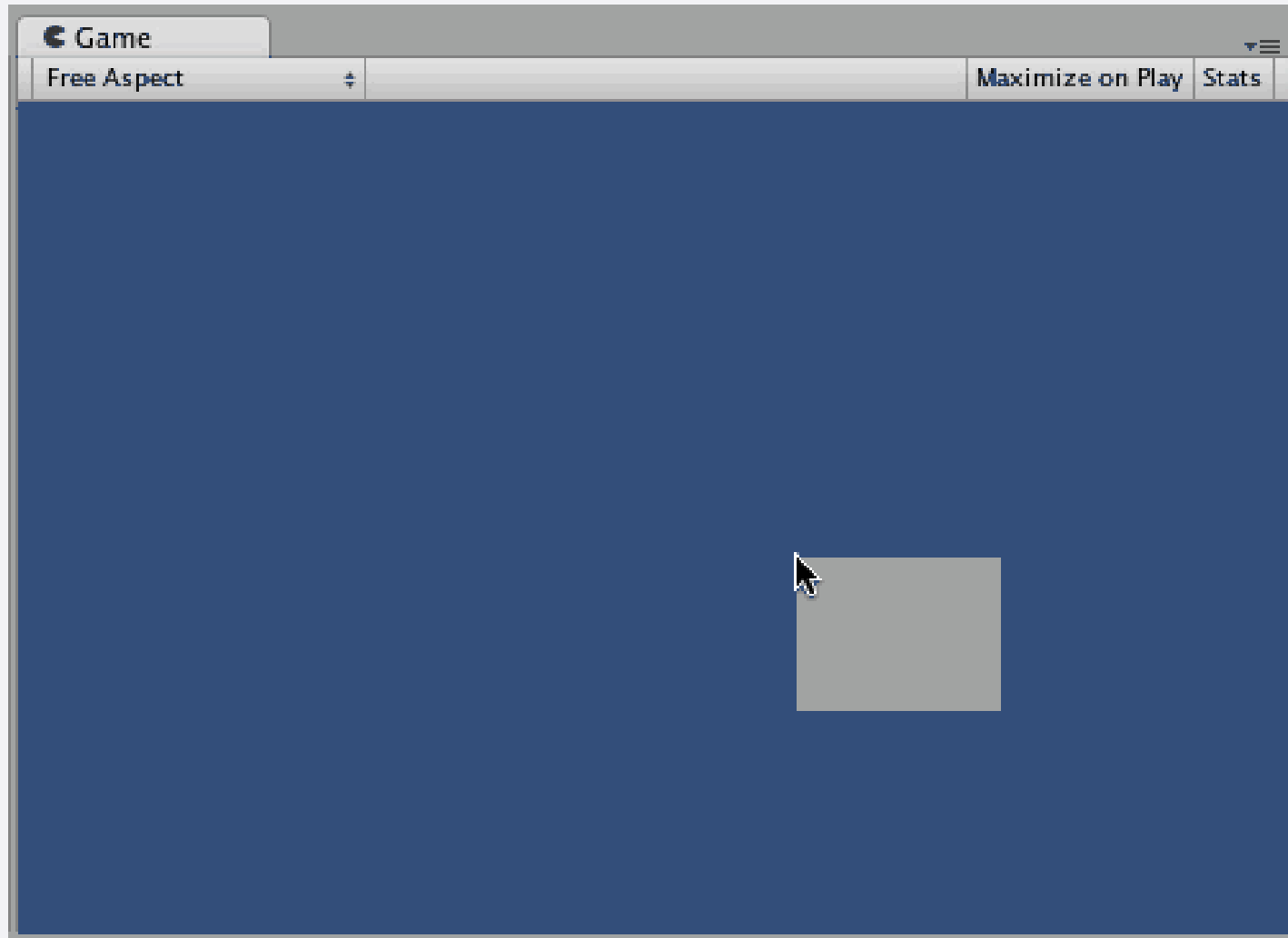
7. flexibility and efficiency of use



what: accelerators - unseen by the novice user - may often speed up the interaction for the expert user such that the system can cater to inexperienced and experienced users

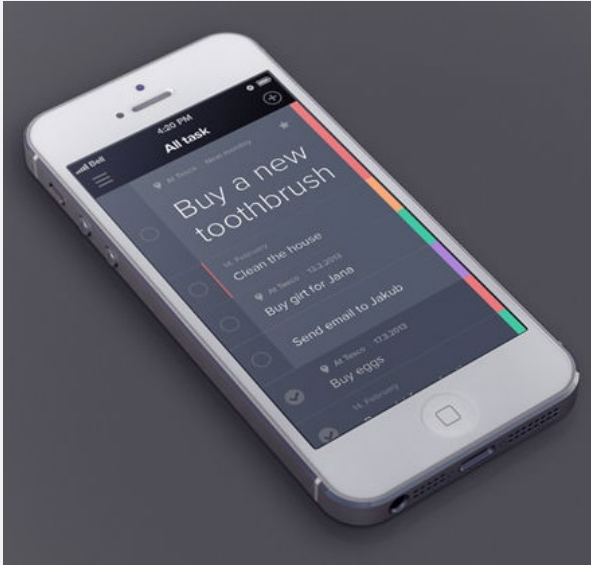
how: allow users to tailor frequent actions (e.g. customisable shortcuts and macros)

7. flexibility and efficiency of use



Source: <https://docs.unity3d.com/Manual/CustomizingYourWorkspace.html>

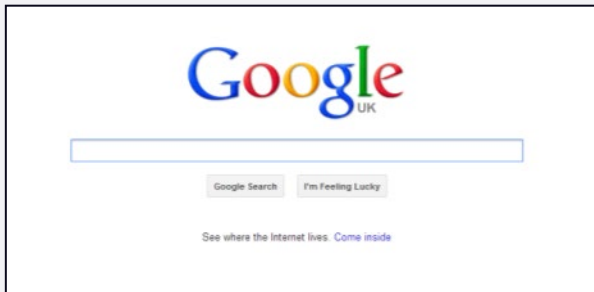
8. aesthetic and minimalist design



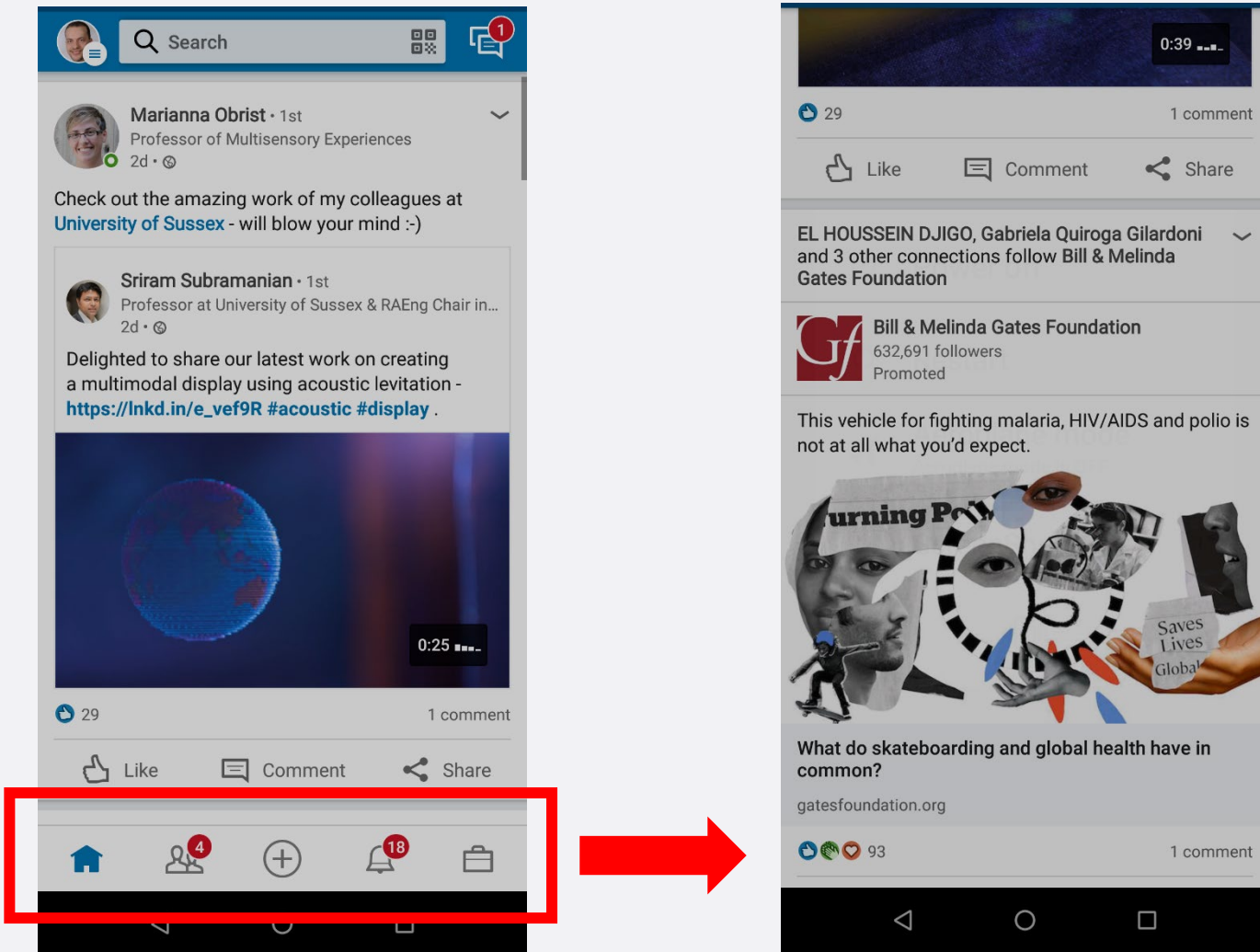
what: screens and dialogs should not contain information which is irrelevant or rarely needed

every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility

how: visual layout should respect the principles of contrast, repetition, alignment, and proximity



8. aesthetic and minimalist design



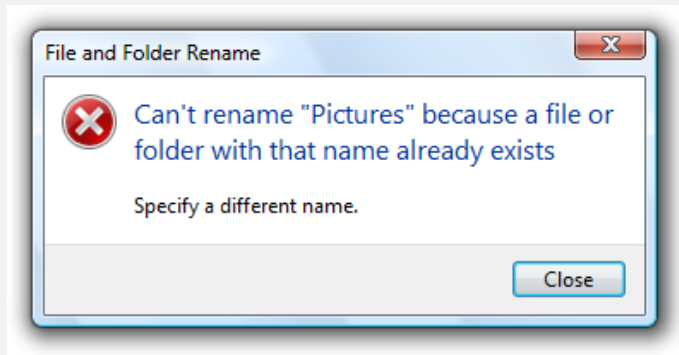
The bottom menu bar disappears as you scroll down in the LinkedIn app.

8. aesthetic and minimalist design



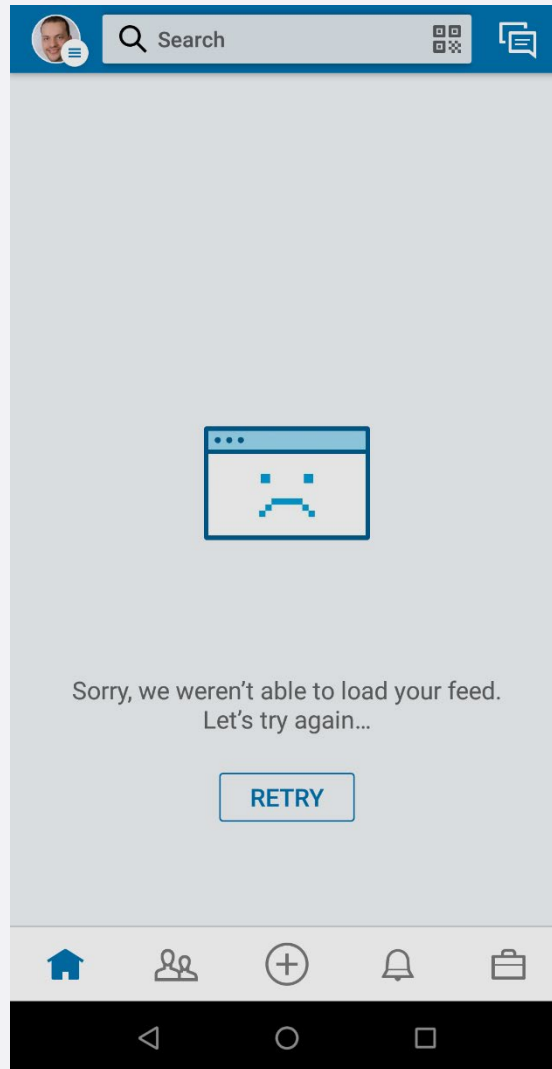
Check this page for more detail: https://articles.uie.com/death_of_relaunch/

9. help users recognise, diagnose and recover from errors



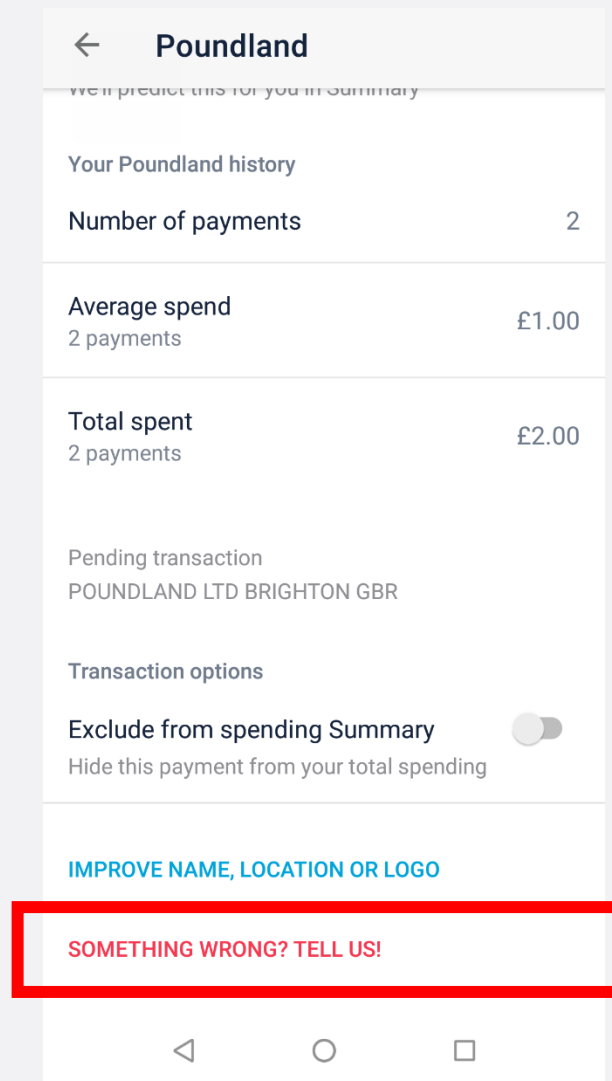
what/how: error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution

9. help users recognise, diagnose and recover from errors



Source: LinkedIn app

9. help users recognise, diagnose and recover from errors



Source: Monzo app

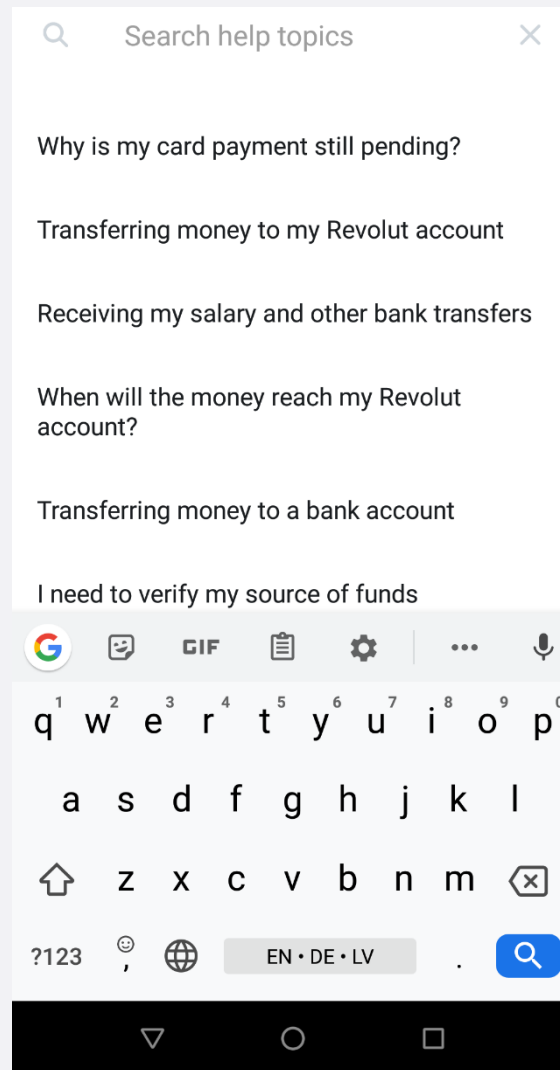
10. help & documentation

what: even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation

how: any such information should be easy to search, focused on the user's current task, list concrete steps to be carried out, and not be too large (e.g. contextual help, tooltips, short walkthroughs)



10. help & documentation



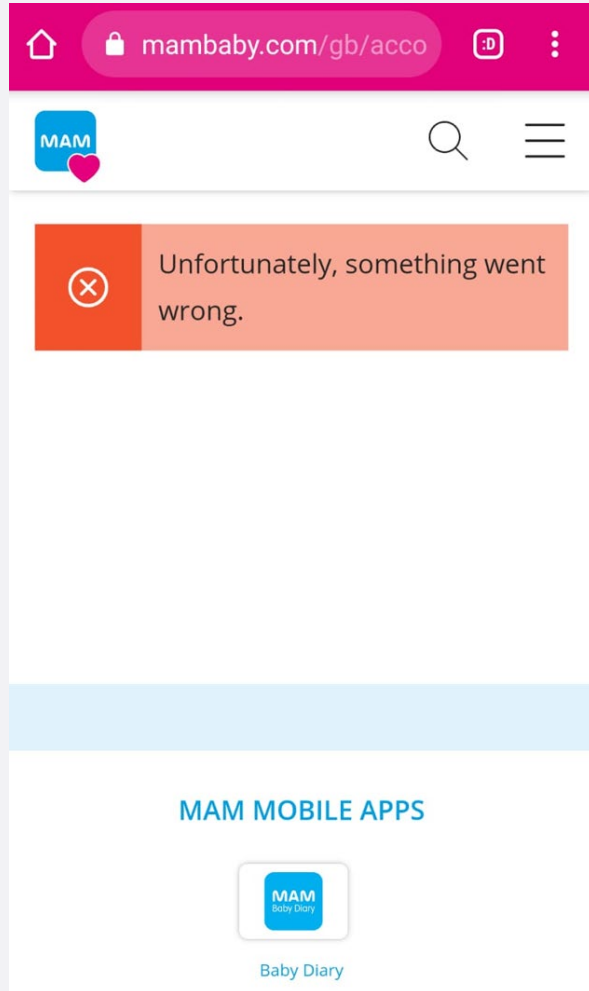
Source: Revolut app



Quiz time!



Which heuristic is violated here?



- 7. flexibility & efficiency of use
- 8. aesthetic & minimalist design
- 9. help users recognise, diagnose & recover from errors
- 10. help & documentation

how to do heuristic evaluation

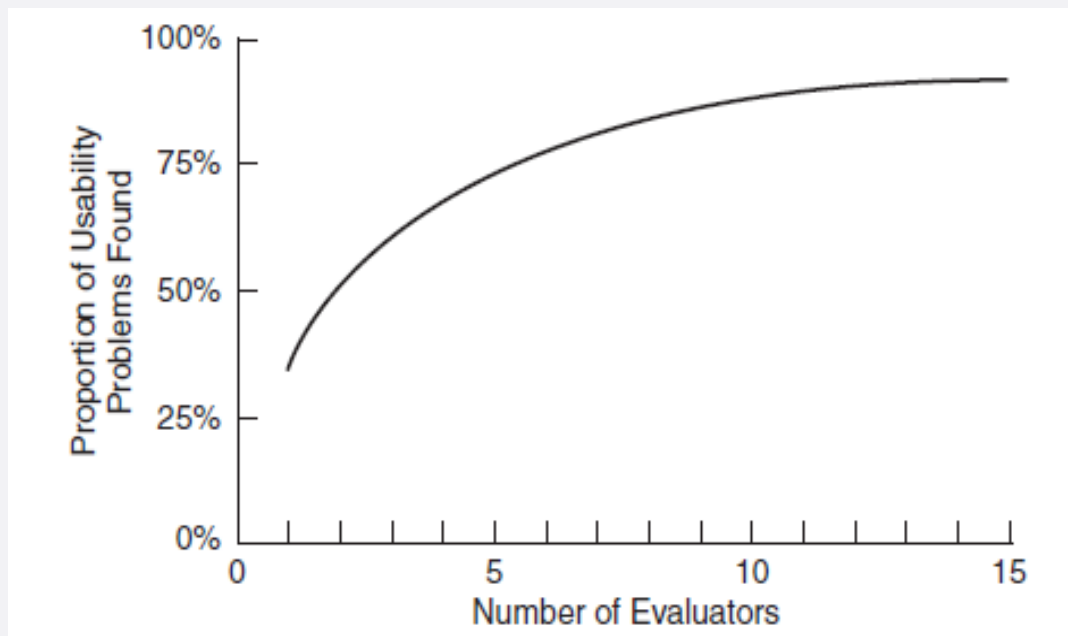
- ④ briefing session to **tell experts what to do**
(prepared script can be useful)
- ④ **evaluation** period of **1-2 hours** in which:
 - ④ each expert works separately
 - ④ make **one pass** to get a **feel for the product**
 - ④ make a **second pass** to **focus on specific features** and **identify potential usability problems**
- ④ debriefing session in which experts work together to **prioritise problems**

levels of severity

- 0 - don't agree that this is a usability problem
- 1 - cosmetic problem
- 2 - minor usability problem
- 3 - major usability problem; important to fix
- 4 - usability catastrophe; imperative to fix

number of evaluators

- 🕒 Nielsen suggests that on average **5 evaluators identify 75-80% of usability problems.**
- 🕒 Cockton and Woolrych (2001) point out that the number of users needed to find 75-80% of usability problems **depends on the context and nature of the problems.**



cognitive walkthroughs

“Cognitive walkthroughs involve **simulating a user’s problem-solving process** at each step... checking to see if the user’s goals and memory for actions can... lead to the next correct action.” (Nielsen & Mack, 1994, p. 6).

- ⊕ aims to **evaluate first use experiences**
- ⊕ focus is on **ease of learning**

cognitive walkthroughs: process

- ④ **designer** presents an aspect of the **design & usage scenarios**
- ④ **expert** told **assumptions about user populations**, context of use, task details
- ④ **one or more experts walk through the design prototype** with the scenario
- ④ experts guided by **three questions**:

the three questions

1. will the **correct action** be sufficiently **evident to the user**?
2. will the user **notice** that the **correct action is available**?
3. will the user **associate and interpret the response** from the action correctly?

as the experts work through the scenario, they note problems

pluralistic walkthrough

- ⊕ variation on the cognitive walkthrough theme
- ⊕ **users, developers and usability experts work together,** stepping through a task scenario
- ⊕ the **panel of experts begins by working separately**
- ⊕ then there is managed **discussion that leads to agreed decisions**
- ⊕ the approach lends itself well to participatory design

advantages & problems of expert inspections

- ④ **few ethical & practical issues** to consider because users not involved
- ④ **best experts have knowledge of application domain & users**
- ④ **can be quicker and less resource intensive** than user studies
- ④ BUT...
- ④ can be **difficult & expensive to find experts**
- ④ important **problems may get missed**
- ④ many trivial problems are often identified
- ④ **experts have biases**

evaluation using predictive models

use formulas to derive various measures of user performance:

Fitts' Law

- **predicts time taken to reach a target** using a pointing device
- can help designers decide **size and placement of** physical/digital **buttons**, etc.

GOMS

- used to improve interaction efficiency by **eliminating useless or unnecessary interactions**.
- could be a strong **analysis benchmark** of user's behaviours

Fitts' Law

🌀 Fitts' Law describes the time taken to hit a screen target with a mouse cursor:

$$Mt = a + b \log_2(D/S + 1)$$

where: a and b are empirically determined constants
(intercept & slope)

Mt is Movement time

D is Distance

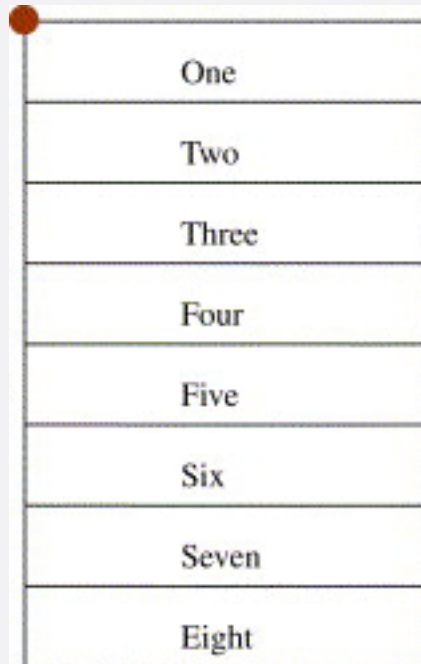
S is Size of target

⇒ **targets as large as possible**

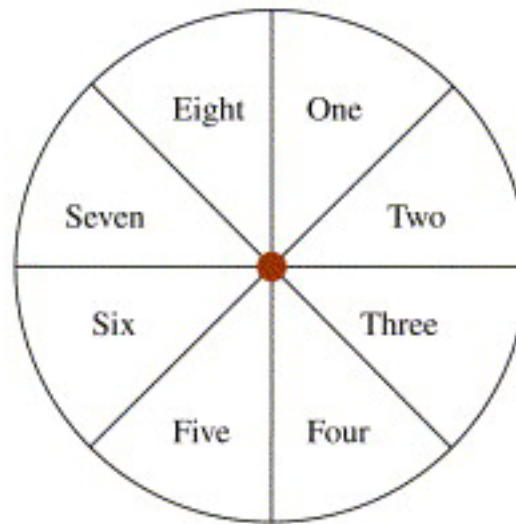
⇒ **distances as small as possible**

Fitts' Law example

Pop-up
Linear Menu



Pop-up Pie Menu



- Which will be faster on average from red starting point?
 - pie menu (bigger targets & smaller distances)

GOMS

🌀 **GOMS** is an abbreviation from:

- **G** → Goals
- **O** → Operators
- **M** → Methods
- **S** → Selection

🌀 For the detailed description, we define:

- **Goals (G)** as a **task to do** e.g. “Send e-mail”
- **Operators (O)** as all **actions** needed **to achieve the goal** e.g. “amount of mouse clicks to send e-mail”
- **Methods (M)** as a **group of operators** e.g. “move mouse to send button, click on the button”
- **Selection (S)** as a **user decision approach** e.g. “move mouse to send button, click on the button” or “move mouse to send button, click ENTER”

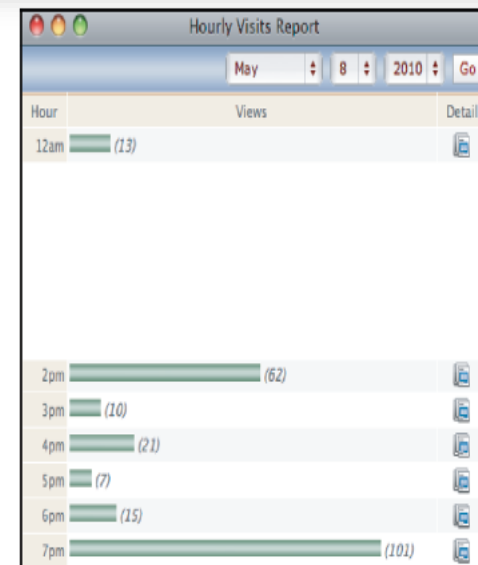
evaluation using analytics

- ⊗ a method for evaluating user traffic through a system or part of a system
- ⊗ many examples: Google Analytics, VisiStat, Learning Analytics
- ⊗ e.g. analyse times of day & visitor IP addresses



Display By: Geographic Location

	Unique Visitor	Views	Detail
1.	Los Angeles, California	6	[Detail]
2.	Sharpsburg, Maryland	1	[Detail]
3.	Phoenix, Arizona	3	[Detail]
4.	Lemesos, Limassol	2	[Detail]
5.	Targu-mures, Mures	1	[Detail]



what about user experience?

- ⊕ these methods may work for evaluating whether a tool is easy to learn to use, is effective, or has good utility, but what about evaluating against user experience goals?
- ⊕ can these methods be used to tell us whether a game is **fun**, whether a piece of software **supports creativity**, whether a phone is **fulfilling**?

key points

- ④ inspections can be used to evaluate requirements, mockups, functional prototypes, or systems
- ④ design guidelines can be used to develop heuristics
- ④ **user testing and heuristic evaluation may reveal different usability problems (but not user experience issue)**

Reminders

 **Drop-in Sessions**

 **Office Hour**

Please check the “Module Contacts” page on Canvas for details!

week 9 reading

- Read the “**Evaluation: Inspections, Analytics, and Models**” chapter of the Interaction Design book

