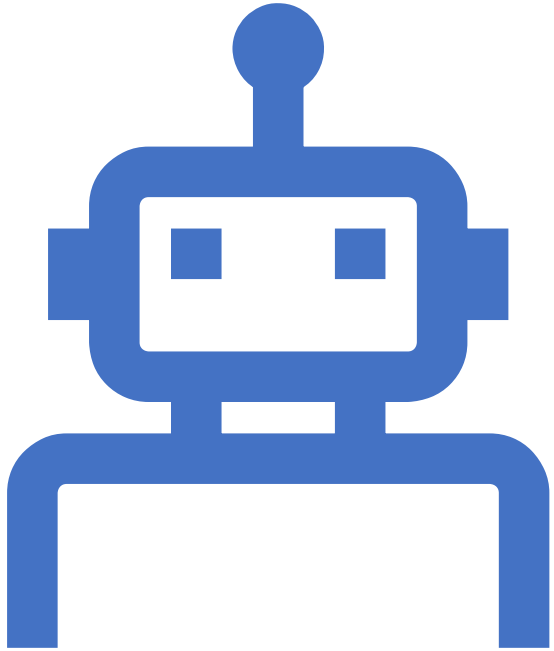
Challenges in Usability Engineering



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Background | Usability Engineering

Figure 01

Figure 02

Introduction | Challenges for Usability Engineers

- User Diversity
- Rapid technology advancement
- Vague Requirement Specifications

- **In usability perspective**
  - ❑ **Maintaining cognitive abilities of users**
  - ❑ **Contributing to sustainability (Sustainable Human-Computer Interaction)**
    - Social sustainability
    - Environment sustainability

Maintaining cognitive abilities of users

Maintaining cognitive abilities of users

- While technology has improved the speed, accuracy, and efficiency of work, its prolonged use also weakens users' cognitive abilities over time.
  - Cognitive psychology focuses on the way in which people acquire, process, and store information within their brains.
  - In UX designing, **cognitive load is the power of mental processing required to use a feature**.

Maintaining cognitive abilities of users

- **In usability engineering, minimize cognitive load to maximize the usability**

  However, by automating our cognitive tasks such as problem-solving and decision-making, we reduce our ability to “translate information into knowledge and knowledge into know-how”

- Because,

  Creating usable, efficient, emotive, and engaging experiences inadvertently leads users to offload their innate capabilities onto their devices.

Maintaining cognitive abilities of users

Why do we need Redesigning?

- Traditionally human-computer interaction (HCI) has emphasized on:
  - Usability
  - Efficiency
  - Optimization

- This approach increases the overall productivity of users, but it also makes them offload their innate capabilities onto the plethora of ‘smart’ devices

How should technology
be (re)designed so as to reduce the negative effects
on users' cognitive
abilities when used over time?

Digital calculator application?

Maintaining cognitive abilities of users

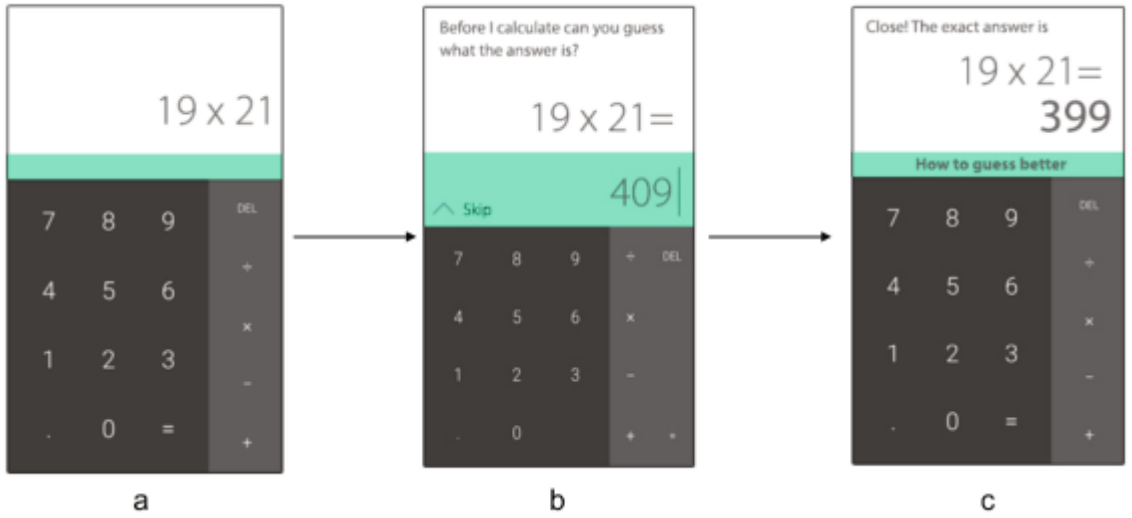
- **Approaches to reduce the negative impact on user's cognition**

1. **The concept of "Slow Technology" / Experience centered design**
2. **Hard to use interfaces**
3. **Gamification**
   - Applications of lessons from the gaming domain to change behaviors in non-gaming situations

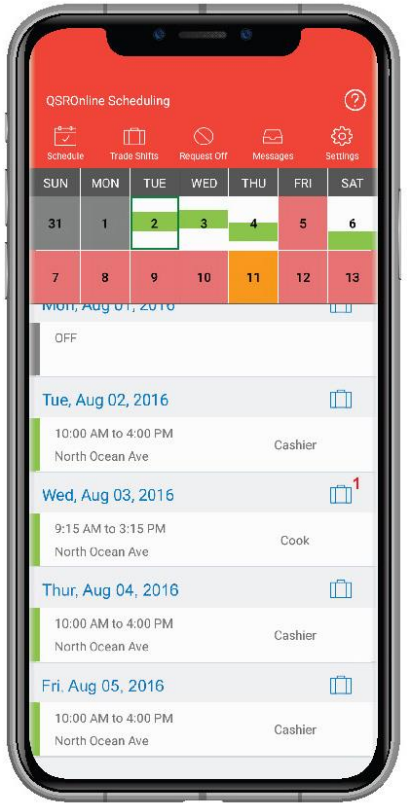
Maintaining cognitive abilities of users

Example applications that need to be re-design to reduce the negative effects on users' cognitive abilities

- **Re-designed calculator**



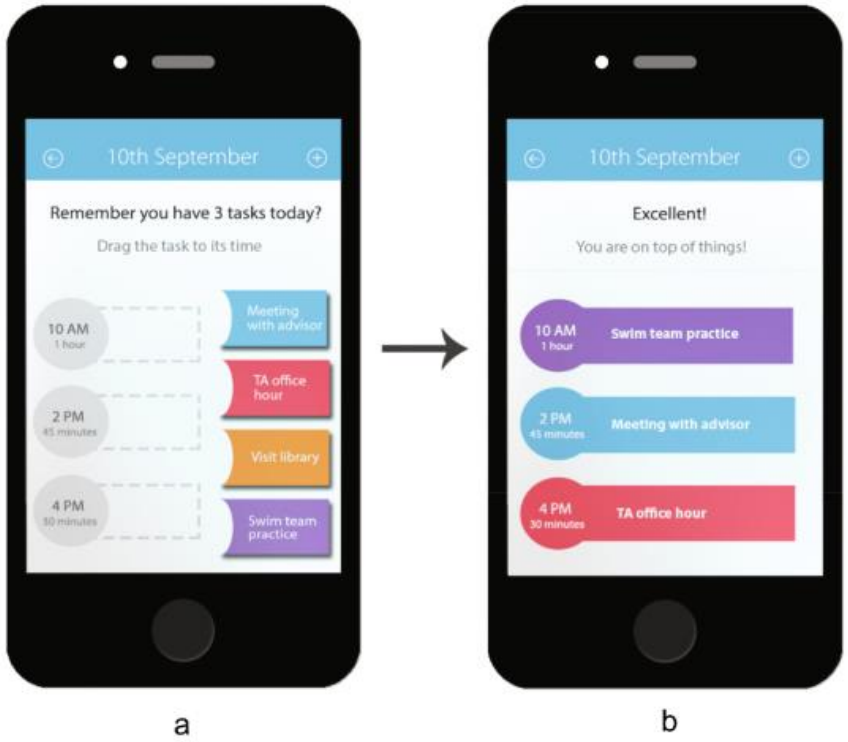
Scheduling application?



Maintaining cognitive abilities of users

Example applications that need to be re-design to reduce the negative effects on users' cognitive abilities

- **Re-designed To-do App/ Scheduling App**



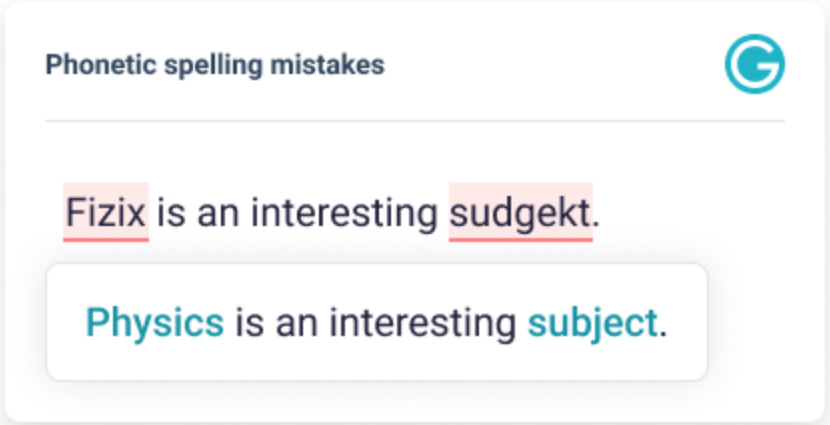
a b

Help users in recollecting meetings and agendas, instead of reminding them.

(a) When the app is opened, the user is asked to drag and drop the main events to the correct time slots.

(b) The correct schedule is then shown, thereby confirming the user's answers.

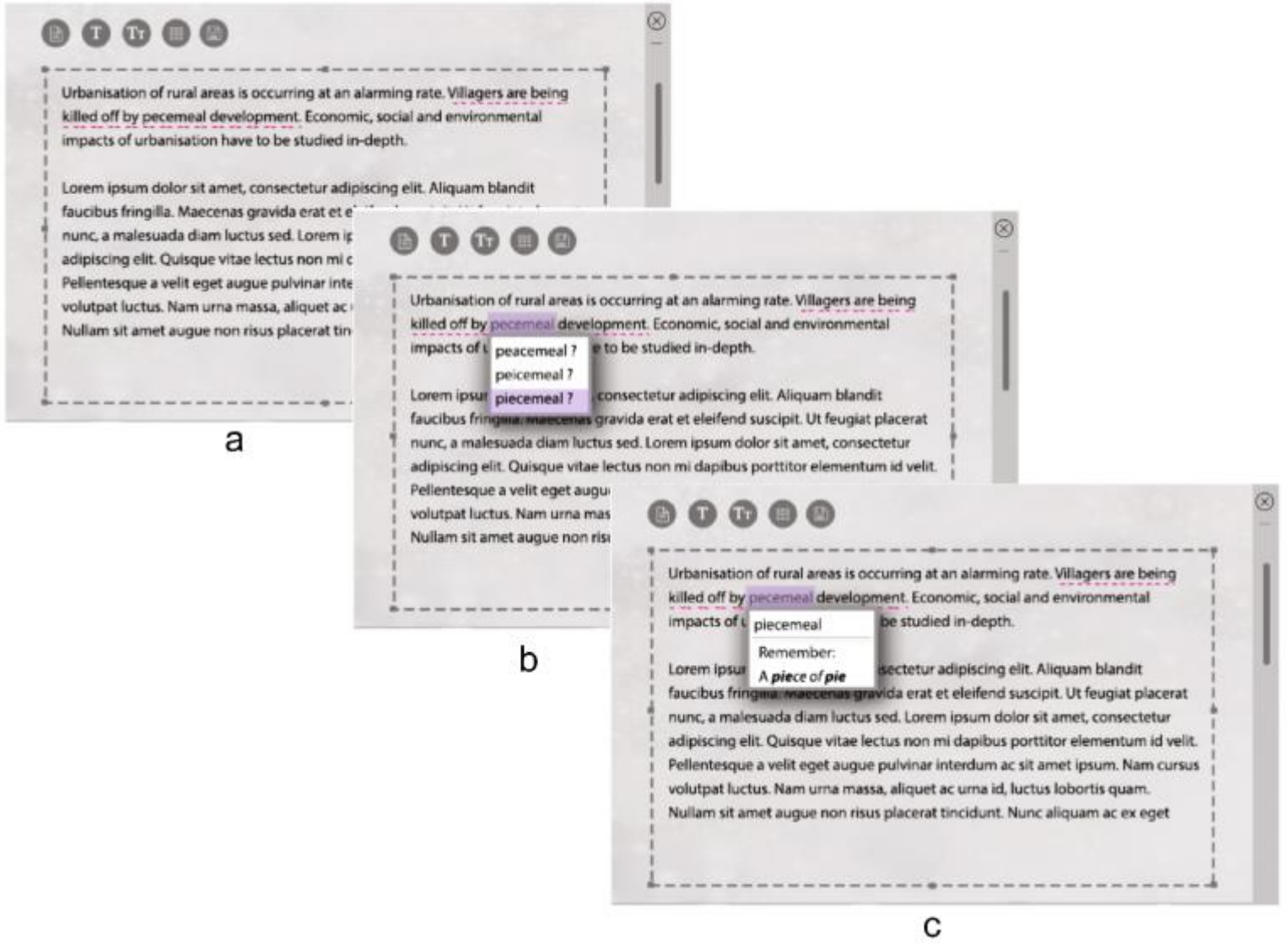
Spell checker application?



Redesigned Spell-checker

Informed of the presence of errors in the text, without being shown the exact error and the correct solution.

(a) The sentence with incorrect spelling is highlighted, as a whole.
(b) When the user identifies the misspelt word, spelling variations are presented for the user to choose the correct spelling.
(c) Upon choosing a word, the system reveals the answer.



Pros & Cons of Redesigned Applications

Even though above designed support to enhance the cognitive ability of users in different ways, there are certain cons.

Example: In a redesigned calculator app, it takes more time to do the task. Sometimes users may have to choose accuracy over checking their cognitive ability.

FYI please refer:

Balasubramanian, G., Lee, H., Poon, K.W., Lim, WK., Yong, W.K. (2017). Towards Establishing Design Principles for Balancing Usability and Maintaining Cognitive Abilities. In: Marcus, A., Wang, W. (eds) Design, User Experience, and Usability: Theory, Methodology, and Management. DUXU 2017. Lecture Notes in Computer Science(), vol 10288. Springer, Cham. https://doi.org/10.1007/978-3-319-58634-2_1

Maintaining cognitive abilities of users

Design Recommendations for kids

Websites and apps should consider kids' cognitive-development stage in order to best support their goals, depending on the target age range.

Example:

1. Give kids clear and specific instructions by **stating the goal of a game** (or other online tasks) and how to achieve it.
2. Use existing mental models and knowledge about the world to help kids accomplish tasks.
3. Reduce cognitive load by designing **self-explanatory interfaces and preventing possible errors**.
4. Instructions should be clear and specific, but not too prescriptive.

- Nielsen Norman Group -

Contributing to the Sustainability

Sustainability:

Meeting our own needs without compromising the ability of future generations to meet their own needs

Sustainable Interaction Design (SID)

Sustainability?

I. Sustainability in design

- ❑ Find solutions to social, economic, and environmental issues in our own design, implementation, and/or evaluation practices
- ❑ Reduction of the energy consumption of the computerized machines which are used in our daily practices
    - i.e: Introducing lightweight mobile applications to reduce data demand

II. Sustainability through design (Design for sustainability)

- ❑ Set out several principles to guide Sustainable Interaction Design
- ❑ Computer/Mobile applications designed as a tool for awareness, mobilization, and the encouragement of behavioral changes in favor of sustainability
    - Games that teach the principles of sustainability (eg: My Life as a Refugee gaming app)

II. Sustainability through design (Design for sustainability)

- **Refugee:**

My Life as a Refugee is an app created by the Office of the United Nations High Commissioner for Refugees (UNHCR). The app uses simple graphics and real-life stories to raise awareness about the organization's project and the people in crisis they work to support. It is a decision-making game that entertains and educates players, compelling them to wrestle with dilemmas faced by millions of asylum seekers.

II. Sustainability through design (Design for sustainability)

- **Global hunger:**

ShareTheMeal is the United Nations' World Food Program app that gives people an opportunity to share users' meals with those in need from all over the world

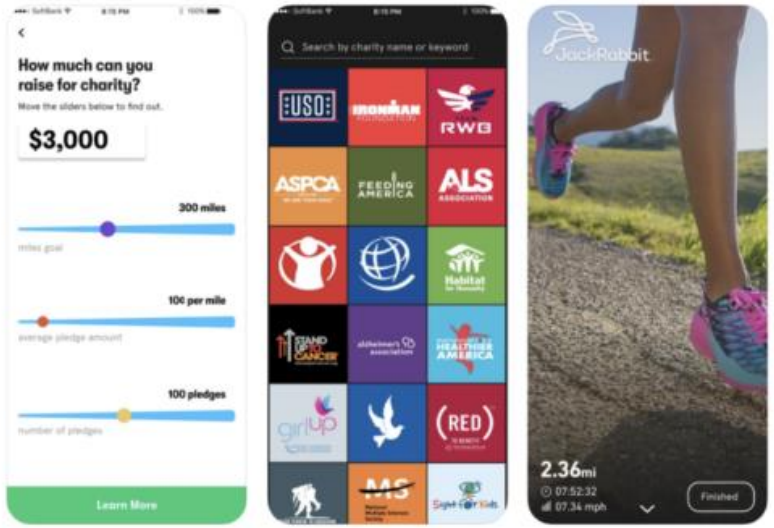
"securing food": ensuring supplies are stable and available and that the food is of an acceptable quality

"monitoring of food": interactive technologies can trace the origin of food, and provide information that can ensure that that the food is organic or has

"sensors for gardens": which can be linked to computer applications that provide advice on what can be planted and when, and other useful information.

II. Sustainability through design (Design for sustainability)

- **For charity:**



Charity Miles app is for a company that connects charities, individuals, and sponsors by earning money from being active. For every mile users move, they are helping earn money for the charities


Q&A

Thank You