

# Development of a device to support people affected by Dyslexia

**Marco De Luca**

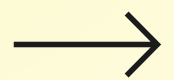
IT-IDX1Y Interaction Design

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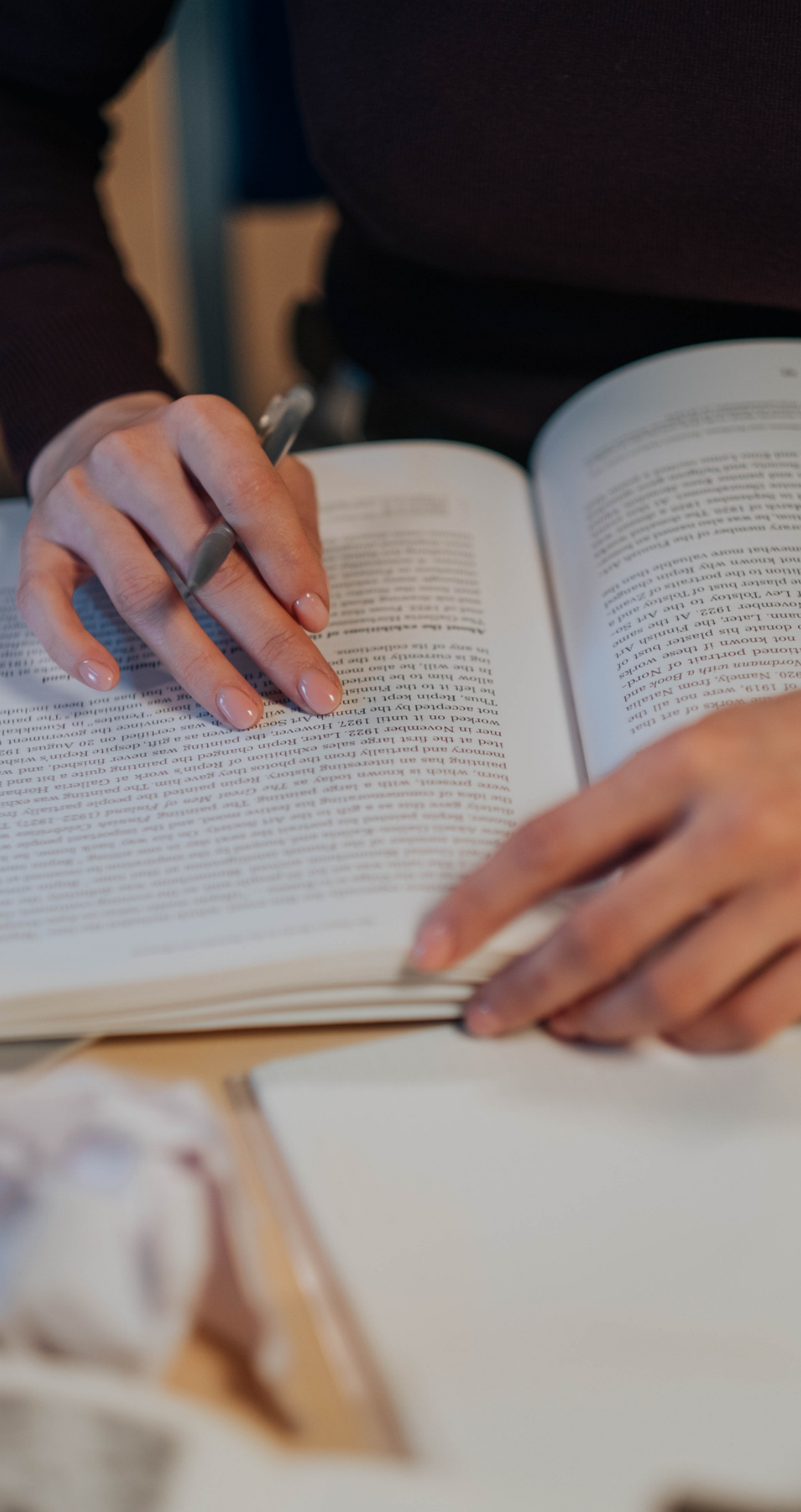


# Introduction

- 20% people have reading/writing problems
- **Dyslexia**







# Solution

- Reading device
- **Word pronunciation**
- Hearing aid

# Approach

- Double Diamond
- **Interaction Design** principles

# Step 1: Requirements analysis

- Persona
- Questionnaire

# Questionnaire

Methodology	Results
<ul style="list-style-type: none"><li>• Closed-ended questions (open are possible)</li><li>• Collect answers from a lot of people</li><li>• Background information</li><li>• Specific questions</li></ul>	<ul style="list-style-type: none"><li>• People mainly read in the afternoon and evening</li><li>• They read at desk</li><li>• Hearing aid is interesting</li><li>• A few have dyslexia</li></ul>

# Persona

Methodology	Results
<ul style="list-style-type: none"><li>• Typical user of the product</li><li>• Not a specific person, but still real!</li><li>• Background</li><li>• Behavior</li></ul>	<ul style="list-style-type: none"><li>• Child</li><li>• Dyslexic</li><li>• Difficulty</li><li>• Frustrated</li><li>• Sense of inferiority</li></ul>

# Step 2: Designing alternatives

- Conceptual design
- Concrete design



# Designing alternatives

Methodology	Results
<ul style="list-style-type: none"><li>• Conceptual design</li><li>• Concrete design</li></ul>	<ul style="list-style-type: none"><li>• 2 different designs<ul style="list-style-type: none"><li>◦ Headband</li><li>◦ Smart pen</li></ul></li><li>• Need<ul style="list-style-type: none"><li>◦ Camera</li><li>◦ Speakers</li></ul></li></ul>

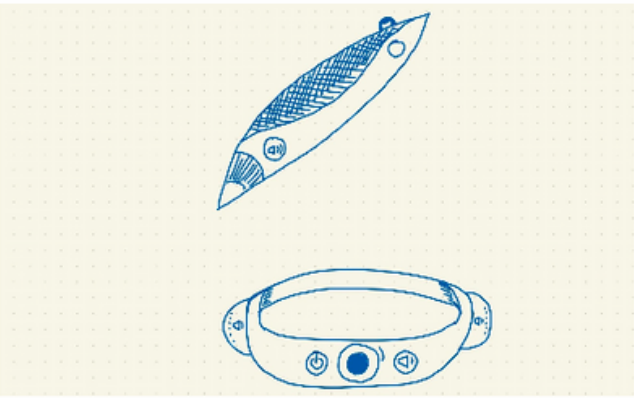
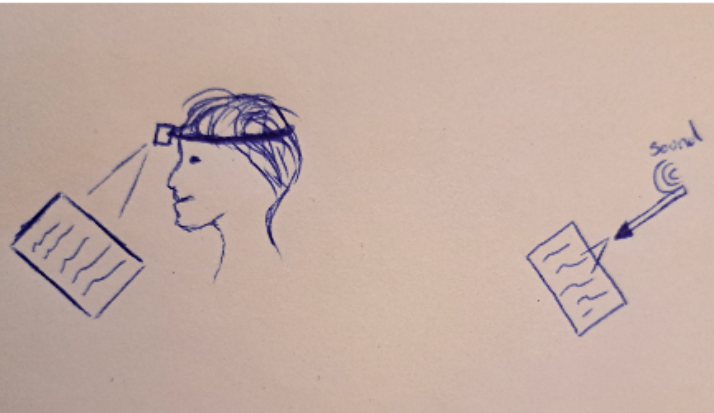
# Step 3: Low-fidelity Prototyping

- 2 cycles
- Sketches
- Physical realization
- Wizard of Oz


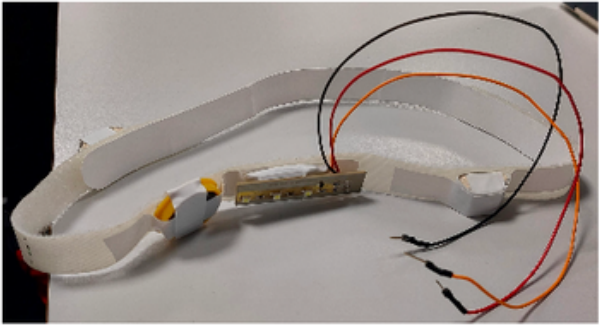
# 2 cycles

Methodology	Results
<ul style="list-style-type: none"><li>• Building more prototypes</li><li>• Improve the initial idea</li></ul>	<ol style="list-style-type: none"><li>1. Prototypes are realized</li><li>2. Feedback is gathered through testing</li><li>3. Prototypes are modified</li></ol>

# Sketches

Methodology	Results
<ul style="list-style-type: none"><li>• Simple drawings for concepts</li><li>• Show the idea</li></ul>	<div>A blue line drawing on a yellow dotted background. It shows two objects: a small, elongated, fish-like device with a circular sensor on its side, and a wristband with three circular buttons.</div> <p>Fig. 7: First sketch of the prototypes.</p> <div>A blue line drawing on a brown background. It shows a person's head wearing a head-mounted display (HMD) with a screen. To the right, there is a small rectangular device with a screen and a button, with a curved arrow labeled 'sound' pointing towards it.</div> <p>Fig. 8: Second sketch of the prototypes.</p>

# Physical realization

Methodology	Results
<ul style="list-style-type: none"><li>• Paper</li><li>• Velcro</li><li>• Cardboard</li><li>• Weight</li></ul>	<div>A photograph of the first version of the headband prototype. It features a yellow fabric headband with a small, rectangular electronic module attached to the front. The module has a red and black face, possibly a sensor or camera lens. A green connector is visible at the end of the headband.</div> <div><p>Fig. 5: First version of the headband prototype.</p></div> <div>A photograph of the second version of the headband prototype. It is a white fabric headband with a more complex electronic module attached. The module is white and rectangular, with several colored wires (red, yellow, black) extending from it. A yellow connector is visible at the end of the headband.</div> <div><p>Fig. 6: Second version of the headband prototype.</p></div>



# Wizard of Oz

Methodology	Results
<ul style="list-style-type: none"><li>• Show functionality</li><li>• Simulate software's response</li></ul>	<ul style="list-style-type: none"><li>• User reads a text</li><li>• Team member acts as hearing aid</li></ul>


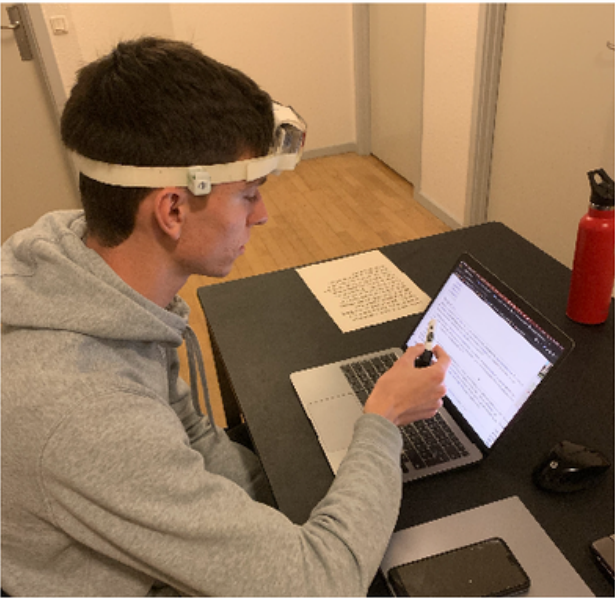
# Step 4: Evaluation

- Methodological triangulation
- Observations
- Interviews
- Improving the prototype

# Methodological triangulation

Methodology	Results
<ul style="list-style-type: none"><li>• More data gathering techniques combined</li></ul>	<ul style="list-style-type: none"><li>• Semi-structured interviews</li><li>• Direct observations</li></ul>

# Observations

Methodology	Results
<ul style="list-style-type: none"><li>• Direct</li><li>• Usability testing</li><li>• Think aloud</li><li>• 2 categories of people with different texts</li></ul>	<div></div> <div><p>Fig. 9: Picture of the testing process.</p></div> <div></div> <div><p>Fig. 10: Picture of the testing process.</p></div>

# Interviews

Methodology	Results
<ul style="list-style-type: none"><li>• Semi-structured</li><li>• Questions:<ul style="list-style-type: none"><li>◦ Warm-up</li><li>◦ Yes/no</li><li>◦ Open</li><li>◦ Cooling-off</li><li>◦ Acknowledgements</li></ul></li><li>• Recorded</li></ul>	<ul style="list-style-type: none"><li>• Headband heavy</li><li>• Audio solution suitable</li><li>• Possibly a visual aid</li></ul>



1. How old are you?
2. What is your nationality?
3. Do you have diagnosed dyslexia? Any other problems in reading?
4. Which of the prototypes did you prefer? Why?
5. Were the prototypes comfortable? What about the size, weight, and location?
6. Did the audio solution help you? Were you disturbed by the sound?
7. How many times do you think you want to listen to the pronunciation?
8. Would you like to have a visual help as well? Why?
9. Do you have any other ideas on how to solve the problem?
10. What other features would you add?
11. Would you wear the device in public? Why?
12. Would you use the device in bed? Why?

# Improving the prototype

Methodology	Results
<ul style="list-style-type: none"><li>• Understanding feedback</li><li>• Redesign</li><li>• Adding features</li></ul>	<ul style="list-style-type: none"><li>• Hearing the pronunciation more than once</li><li>• Smaller camera</li><li>• Speaker more rounded</li></ul>



# Project future

- Data collected from the right people
- Emotional design – product aesthetics
- Focus on cognitive frameworks
- Production

# Thank you!

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