

**Universität Stuttgart**

Acquisition and analysis of eye-tracking data

Does a picture in CVs influence  
the reader's attention?

## Milestone 4: Team Brownie

Hello, I am  
Brownie!

Hello, I am  
Toast!





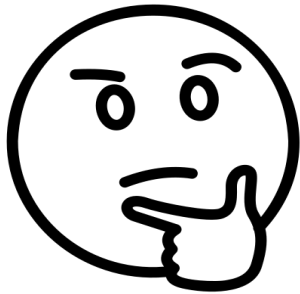
# Background & Motivation

# Motivation

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Job recruiters get a large number of CVs presented to them

Their goal: filter out qualified applicants as fast as possible



→ Recruiters spend less than ~5 seconds to read the resume during filtering stage



**Does a picture in CVs influence the reader's attention?**



# Background

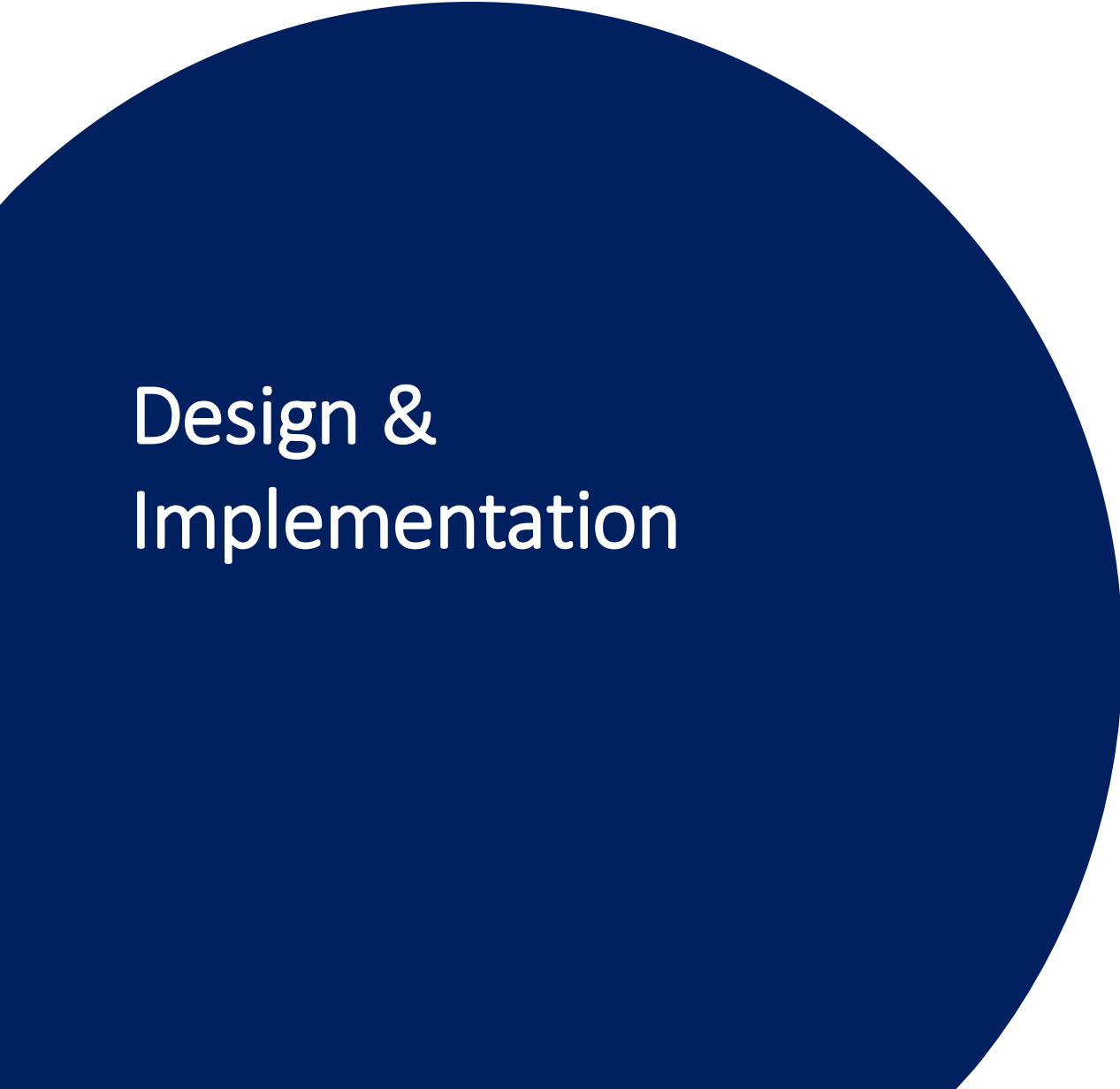
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Research suggests that **visual elements** on a page **can affect the reading patter** [1]

Some research elaborates that *«reviewers were clearly distracted by common visual features such as pictures, ads, etc. These distractions wasted time and detracted from more pertinent and useful candidate information such as experience and skills. »* [1].

Therefore, a question arises: "**Do we still the resume the same way if it has a picture?**"

1. Evans, W. (2012). Eye-tracking online metacognition: cognitive complexity and recruiter decisionmaking. *The Ladders*, 1(1), 5.



Design &  
Implementation

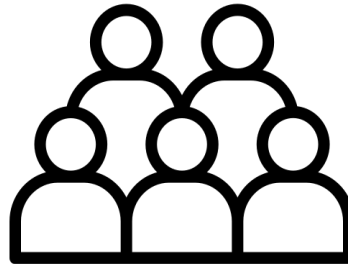
# Experiment Design

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## 1) Job Description:



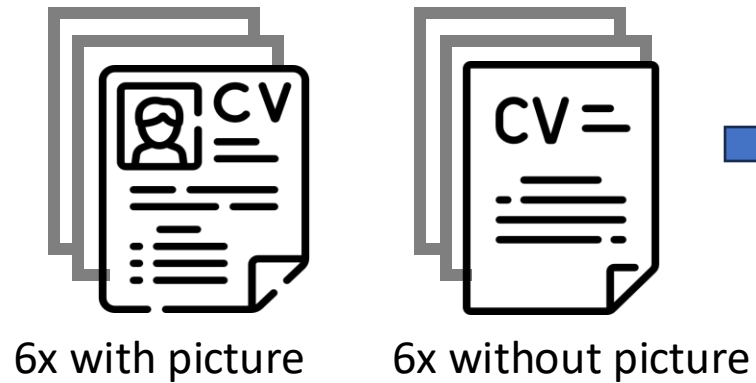
Participants



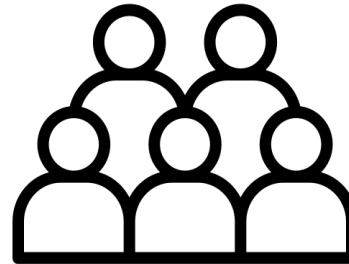
# Experiment Design

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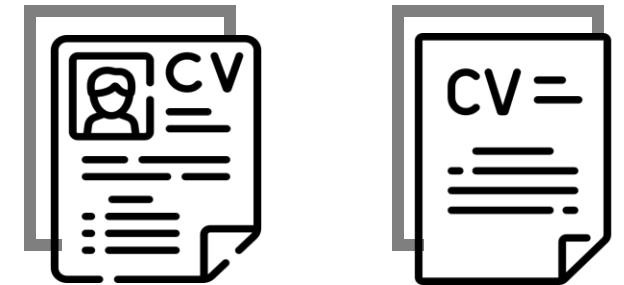
## 2) 12 different CVs:



Participants



## 3) Pick qualified CVs



# Implementation: CVs

- 12 different applicants
- 2 Different CVs for each applicant:



= total of 24 CVs

→ Each participant gets only 1 of the 2 CVs of each applicant

## Without picture

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EXPERIENCE

Senior Software Developer  
Deutsche Bank, Frankfurt, Germany  
March 2010 – 2024

- Lead the development and maintenance of critical banking applications, ensuring high performance and reliability.
- Collaborate with cross-functional teams to define and implement software solutions that meet business needs.
- Write, review, and maintain clean, efficient, and maintainable code.
- Conduct comprehensive testing and debugging to ensure software quality.

Software Developer  
Siemens AG, Munich, Germany  
June 2003 – February 2010

- Developed and optimized Java-based applications for various industrial projects.
- Involved in all stages of the software development lifecycle, from requirement analysis to deployment.
- Implemented new features and improved existing functionalities to enhance system performance.
- Actively participated in Agile development practices, including sprint planning and retrospectives.

LANGUAGES

- Spanish: Fluent
- English: Level C1
- German: Level C1

EDUCATION

Master of Science in Computer Science  
ETH Zurich, Zurich, Switzerland  
Graduated: May 2003

Bachelor of Science in Computer Science  
ETH Zurich, Zurich, Switzerland  
Graduated: June 2000

SKILLS

- Java, Python, C++
- Spring, Hibernate, Struts
- Git, Jenkins, Docker, Kubernetes
- MySQL, PostgreSQL, Oracle
- JUnit, Selenium, TestNG

SOFT SKILLS

- Leadership
- Emotional Intelligence

HOBBIES

- Cooking
- Hiking
- Swimming

## With picture

**Emilia Fernández**  
Frankfurt, Germany  
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# Implementation: Experiment

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## Important Features to implement:

- **Sorting of CVs for each participant**  Pre-sort CVs for each participant with additional algorithm to make sure :
  - No duplicate applicants
  - 6 CVs with picture 6 CVs without picture

# Implementation

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## Important Features to implement:

- **Sorting of CVs for each participant**
- **Same gaze starting point for each participant**  Show fixation cross before each CV

# Implementation

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## Important Features to implement:

- **Sorting of CVs for each participant**
- **Same gaze starting point for each participant**
- **Letting participants read job description between resumes**
  - ➡ Add breaks inbetween each CV where participant can look at job description again

# Implementation

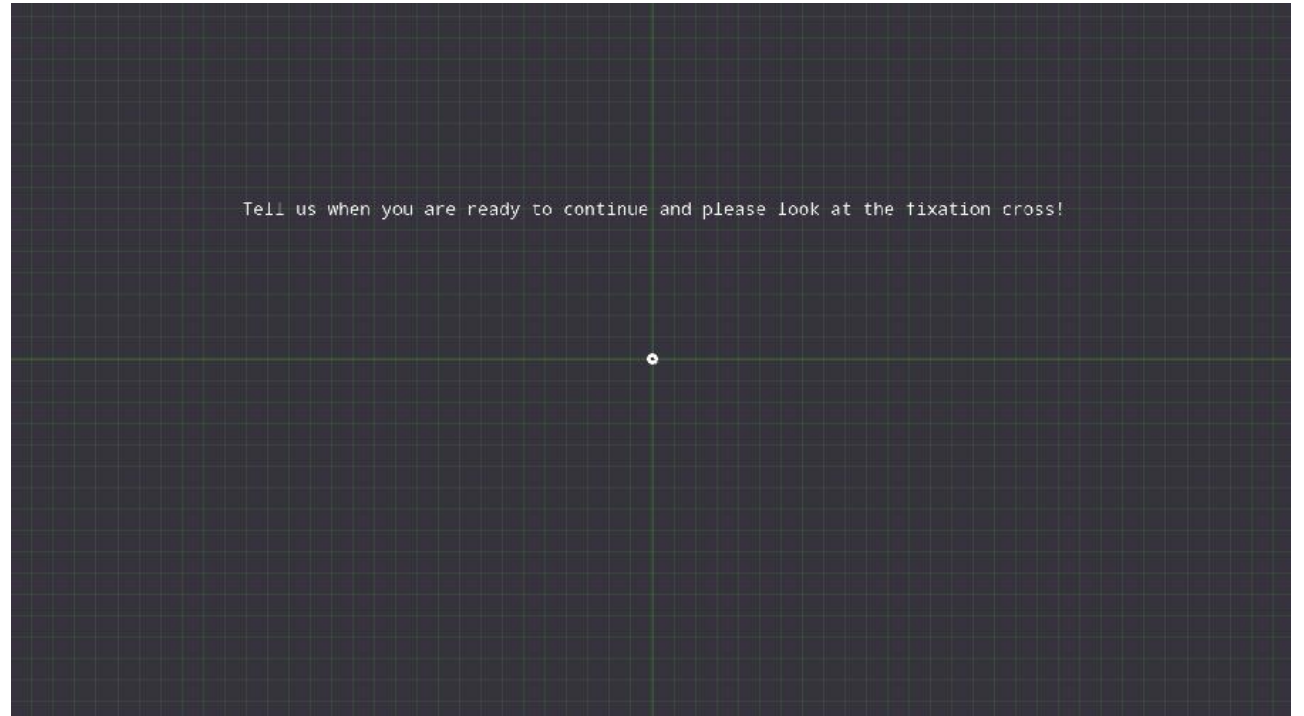
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## Problems:

Text on screen with fixation cross can lead to distraction

## Changes:

- 1) show text
- 2) then show fixation cross





Quality Control

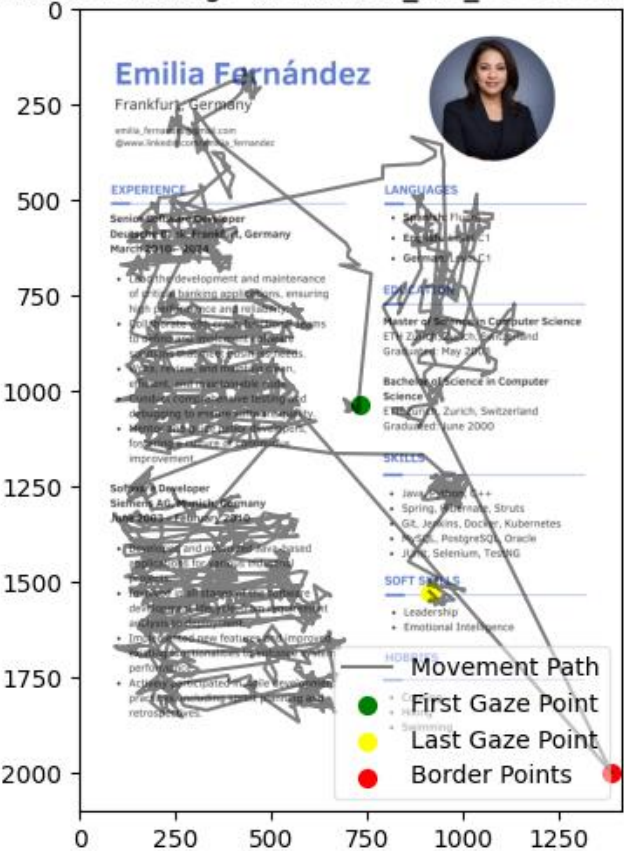
# Quality Control

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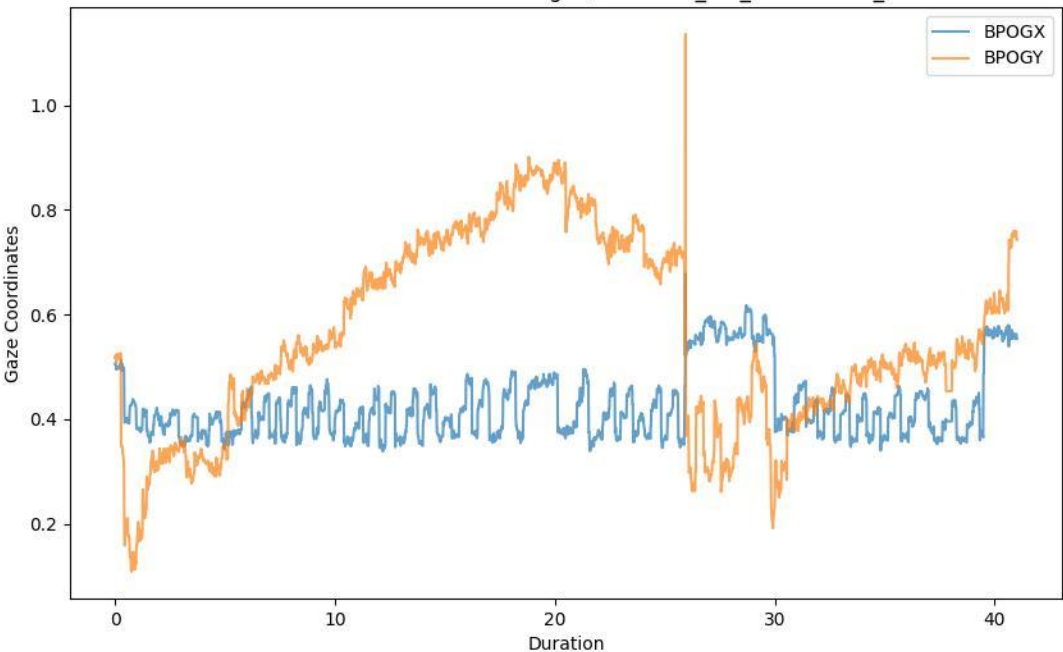
- **Are there missing resumes?**
  - Eyemovement pipeline to plot all resumes at once given tsv file
- **Resume duration reasonable?**
  - Min. 0.5s for unqualified and 1s for qualified (checked via plot)
- **Is eyetracker still well-calibrated?**
  - Visualize starting gaze point for each resume
  - Gaze point should be at center due to fixation cross
- **How often did eyemovement hit border?**
  - Plotting eyemovement

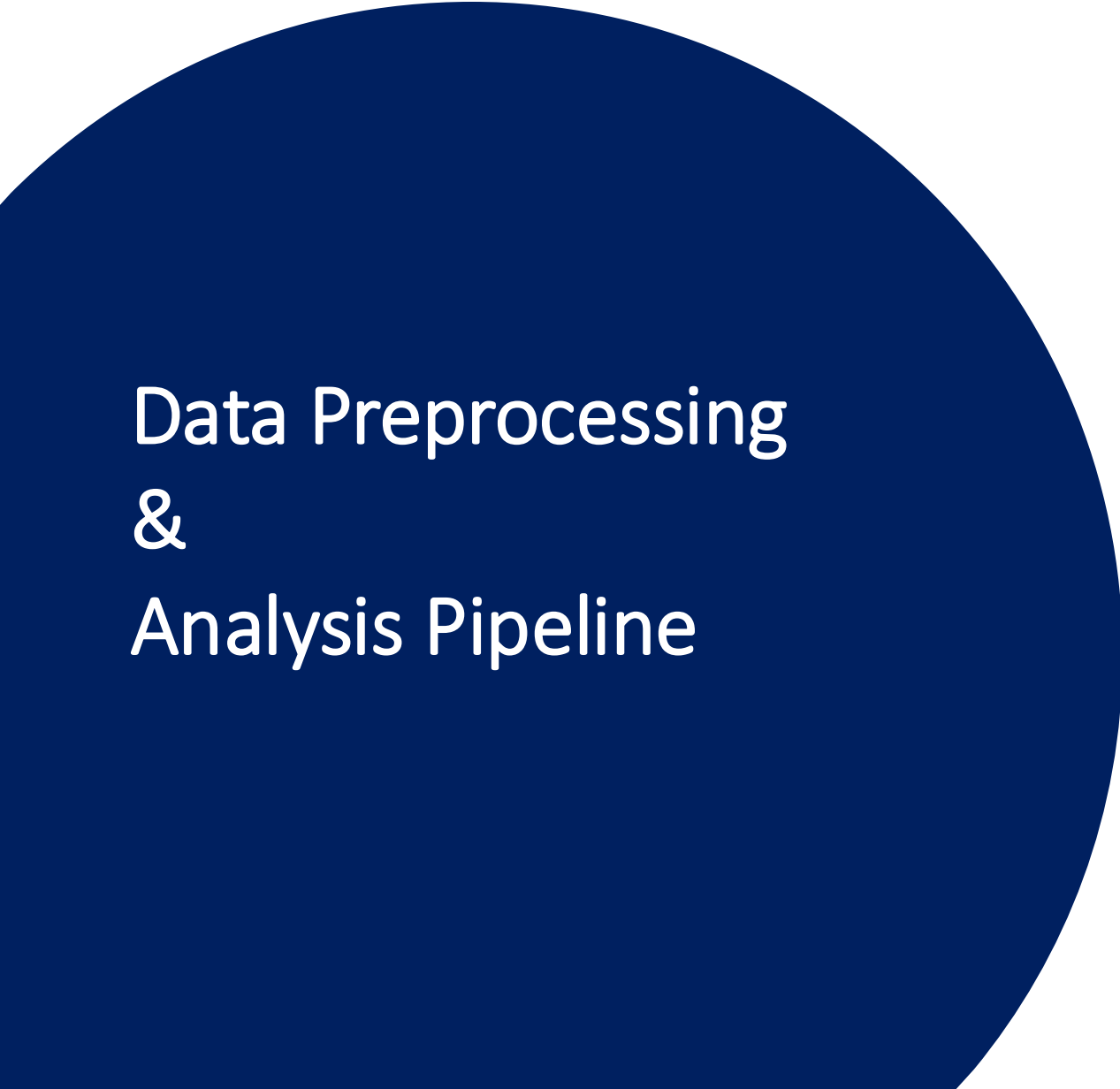
# Quality Control: Example Plots

Eye Movement for Image QUALIFIED\_PIC\_GOODSORT\_EMILIA.PNG



Gaze Coordinates over Duration for Image QUALIFIED\_PIC\_GOODSORT\_EMILIA.PNG





# Data Preprocessing & Analysis Pipeline



## Planned analysis

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- **Observe how the presence of a picture affects the way readers go through a resume**
- **Record time spent on text blocks vs picture.**

# Analysis Pipeline

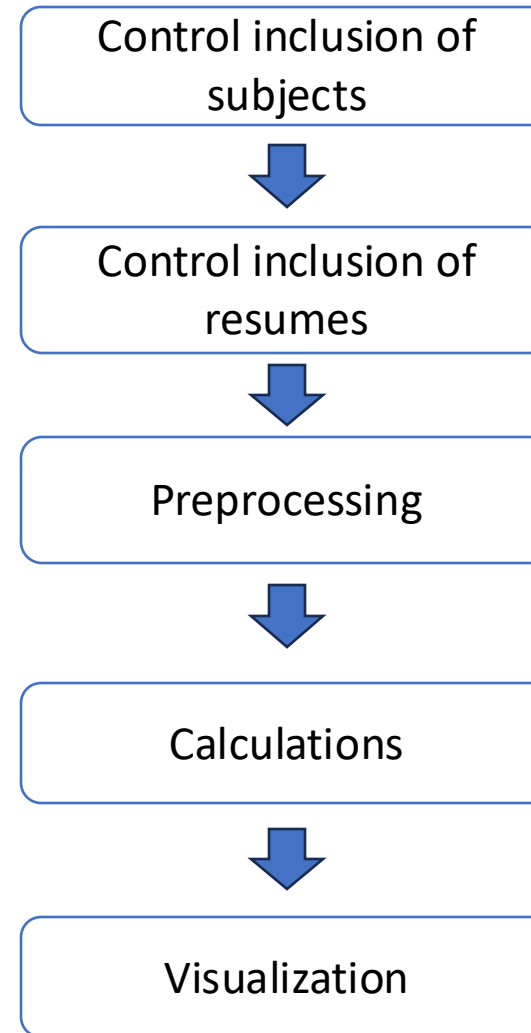
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Specifying participants to include in the analysis

```
1 data/subject-0.tsv
2 data/subject-1.tsv
3 data/subject-2.tsv
```

Specifying resumes to include in the analysis

```
1 QUALIFIED_NOPIC_GOODSORT_HANNAH.PNG
2 QUALIFIED_PIC_GOODSORT_AISHA.PNG
3 QUALIFIED_NOPIC_BADSORT_DAVID.PNG
4 QUALIFIED_NOPIC_BADSORT_DAVID.PNG
5 UNQUALIFIED_PIC_BADSORT_TIAN.PNG
6 QUALIFIED_NOPIC_BADSORT_VIKTOR.PNG
7 QUALIFIED_PIC_BADSORT_RAHUL.PNG
8 QUALIFIED_PIC_GOODSORT_EMILIA.PNG
9 UNQUALIFIED_NOPIC_GOODSORT_LEA.PNG
10 UNQUALIFIED_NOPIC_BADSORT_MARIA.PNG
11 UNQUALIFIED_PIC_BADSORT_LEILA.PNG
12 UNQUALIFIED_NOPIC_GOODSORT_KARE.PNG
```



# Preprocessing

1. Filtered out samples with  $FPOGV == 0$
2. Grouped raw samples into fixations. Last values of FPOGX, FPOGY, FPOGD
3. Mapping gaze coordinates to specific regions of interest on the CVs.
  - Picture Block
  - Text Blocks:
    - Name
    - Education
    - Experience
    - Skills
    - Soft Skills
    - Languages
    - Hobbies



# Calculations

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1. **Total time spent on a resume = sum of all fixation durations on that resume**
2. **Absolute time spent on a block = sum of all fixations in that block**
3. **Relative time spent on a block = absolute time on block / total time on resume (in case of normalizing over total resume time)**
4. **Average time spent on a block = Average over all resumes and all participants**
5. **Split data on presence of picture.**



# Analysis for Research Question

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## Question: Does a picture in CVs influence the reader's attention?

- RQ: Do participants spend less **time** looking at text when picture is present?
  - Reader's attention measured via time
  - Control: Comparing **same applicant** resume with and without picture
  - Comparing time spent on text blocks

# Time: relative vs absolute

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- **Relative time:**
  - ensures normalization for different reading speeds and strategies
  - Resumes without picture always have values 1 (relative time spent on text blocks)
  - Resumes with picture can have values below 1
  - Paired t-test to check for significance
  - Issue
    - Zero variance in the distribution for resumes without picture
    - Values for resumes without picture are not normally distributed due to zero variance!
  - Possible solution:
    - Use one-sample t-test instead with population mean of 1 (indicating the resumes without picture)
  - Also calculate the effect size via cohen's d
  - Remaining issue:
    - Does it really answer the research question?

# Time: relative vs absolute

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- **Absolute time**

- Comparison of two sample means possible, resumes with and resumes without picture
- both sample means normally distributed --> Paired t-test
- Drawback:
  - Different reading speeds and strategies from participants leads to high variability in reading time
- Solution:
  - Need of a lot of participants, but could not be practical
- Cohen's d for effect size: How strong is the influence of a picture in reader's attention?



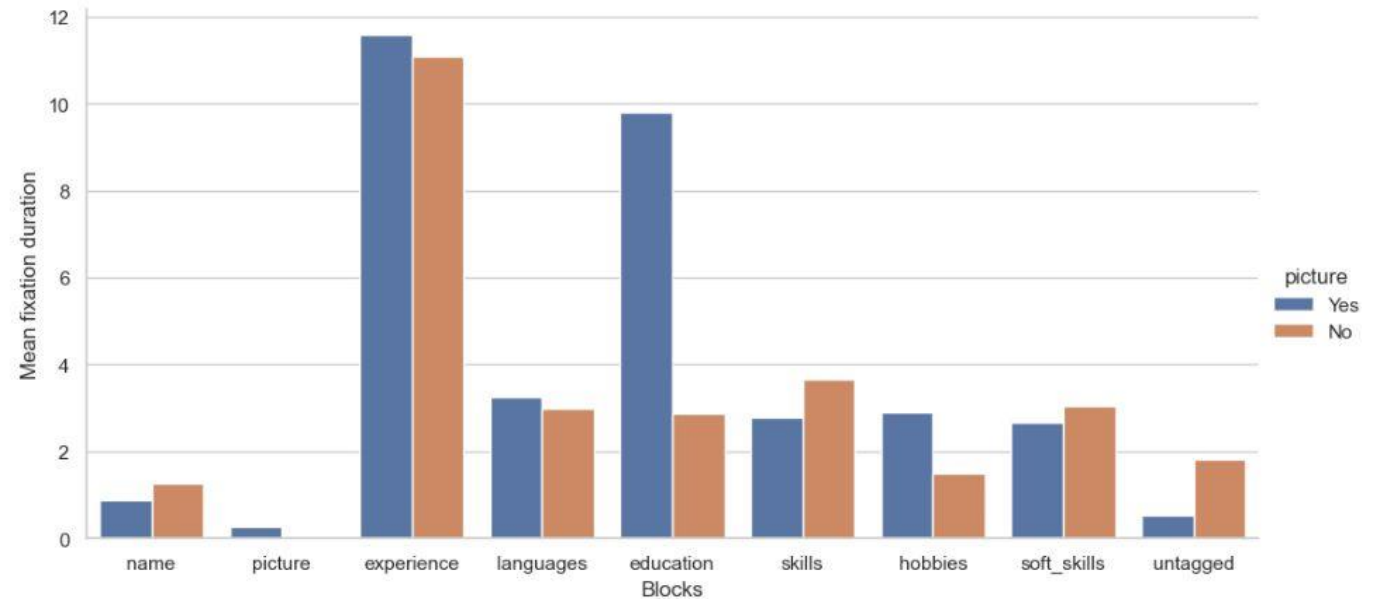
# Versions of sample mean

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1. Significance on applicant level:
  - for each applicant, compare absolute time spent on text blocks with and without picture averaged across participants
2. Significance on qualified and non-qualified level:
  - Step in 1. And additionally average into groups non-qualified and qualified applicants
3. Significance on no-pic vs pic level:
  - Do step in 1. and additionally average across applicants

# Preliminary Analysis of Pilot

- Pilot did not look much at pictures compared to text blocks
- --> indicates low influence of picture in reading attention
- Preliminary as multiple participants are needed for significance testing (same applicant with and without picture)





Thanks for your  
attention!  
Any Questions?