READIBILITY OF FONTS

Team Jaguar:

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OBJECTIVE AND RESEARCH QUESTION

Objective of this experiment was to investigates the impact of one (or more) properties that fonts have on readability.

The aspect that we decided to investigate is the CASE TYPE (lowercase and uppercase)

RESEARCH QUESTION

Are there any differences in eye-moving patterns between uppercase and lowercase text?

LITERATURE REVIEW

Some of the closest studies to our purpose (eye movements in the reading of sentences presented in lower compared to upper case text) in design and goal are as follows:

1. **Tinker and Paterson (1939) -->** Tinker and Paterson used a photographic technique to record eye movements whilst participants read paragraphs of text in either lower or upper case

2. **White, S. J., & Liversedge, S. P. (2006) -->** The very first study that provides a first unconfounded test of whether the visual distinctiveness or familiarity of upper, compared to lower, case text influences eye movement control in reading.

LITERARY REVIEW

Tinker and Paterson (1939)

- Total reading times were 7% longer for upper, than lower case text
- Upper case text produced 12% more fixations than lower case text
- Average fixation durations were 20ms shorter for upper than lower case text

RESULTS: The case type has a definitive impact on the reading behaviour, with UPPERCASE text being more complicated to read than LOWERCASE

White & Liversedge (2006)

- Sentence reading times were just 2% longer for upper case text than lower case
- There was no difference in the number of fixations between uppercase and lowercase text
- No differences in fixation durations
- LANDING SPOT: first fixation positions were closer to the beginning of the uppercase words than lowercase words

RESULTS: There was LITTLE DIFFERENCE in eye movement behaviour when participants read text in upper compared to lower case

HYPOTHESIS

The purpose of our reaserch is to either confirm the results reported in White & Liversedge (2006) ot those reported by Tinker and Paterson (1939)

Following the above mentioned studies we form this hypothesis: we will confirm White & Liversedge (2006) and see that no relevant differences are found in the two case types

DESIGN OF THE EXPERIMENT

CONDITIONS

- **Condition --> Case type**
- **Levels --> uppercase / lowercase**
- **Analysed between subjects**

PARTICIPANTS

- **10 partecipants were recruited**
- **Age between 20 -30**

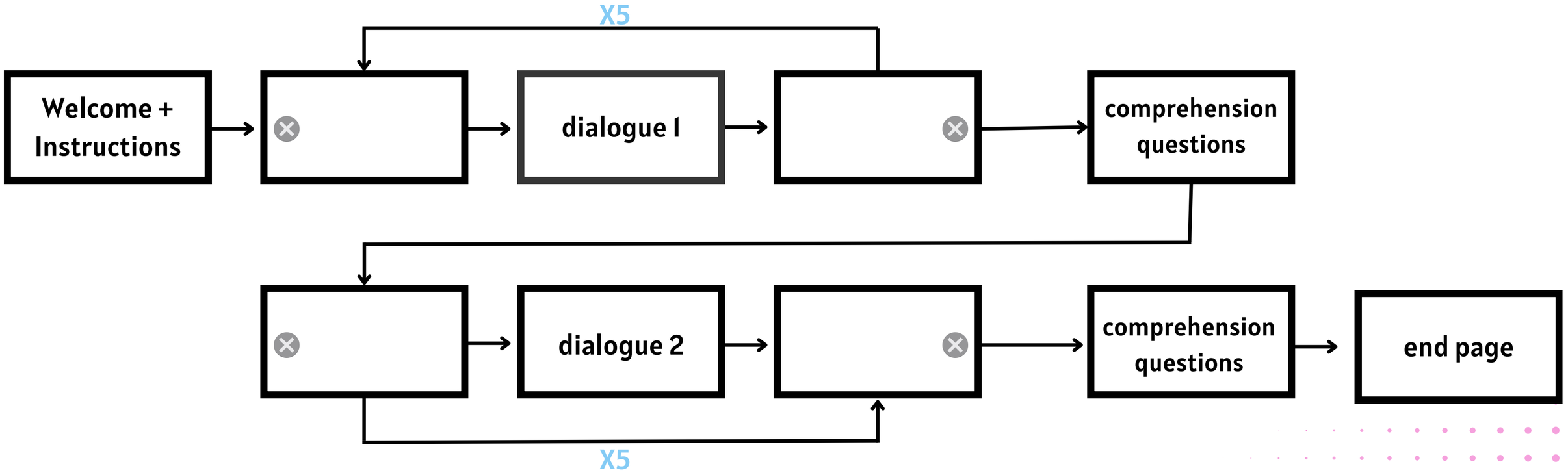
Our experiment involved 2 **dialogues** that were:

- Easy to comprehend
- Had the same number of words in each sentence

(To ensure balancing each dialougue had an uppercase and a lowercase version)

For each dialogue two CQs were made to ensure the full attention of partecipants

EXPERIMENTAL LOGIC



IMPLEMENTATION

(on OpenSesame)

Phase 1

We used a sketchpad to write the intro and the instruction

Phase 2

We create a sequence with 4 loops (one for each version of the 2 dialogues) where we added the fixation dots, the dialogues and the eyetracker logs

Phase 3

We then wrote the script for:

- Gaze detection
- Randomization of the 4 dialogues

Phase 4

In the same sequence we added 4 loops for the comprehension questions

PROBLEMS

PROMBLEM #1

The dialogues

1. Were too difficult to understand
2. Were not the same length

SOLUTION #1

We came up with dialogues that were way easier to understand and we also managed to rewrite the longer sentences so that all have the same number of words

PROBLEM #2

Storing data

1. Some loggers wouldn't work correctly

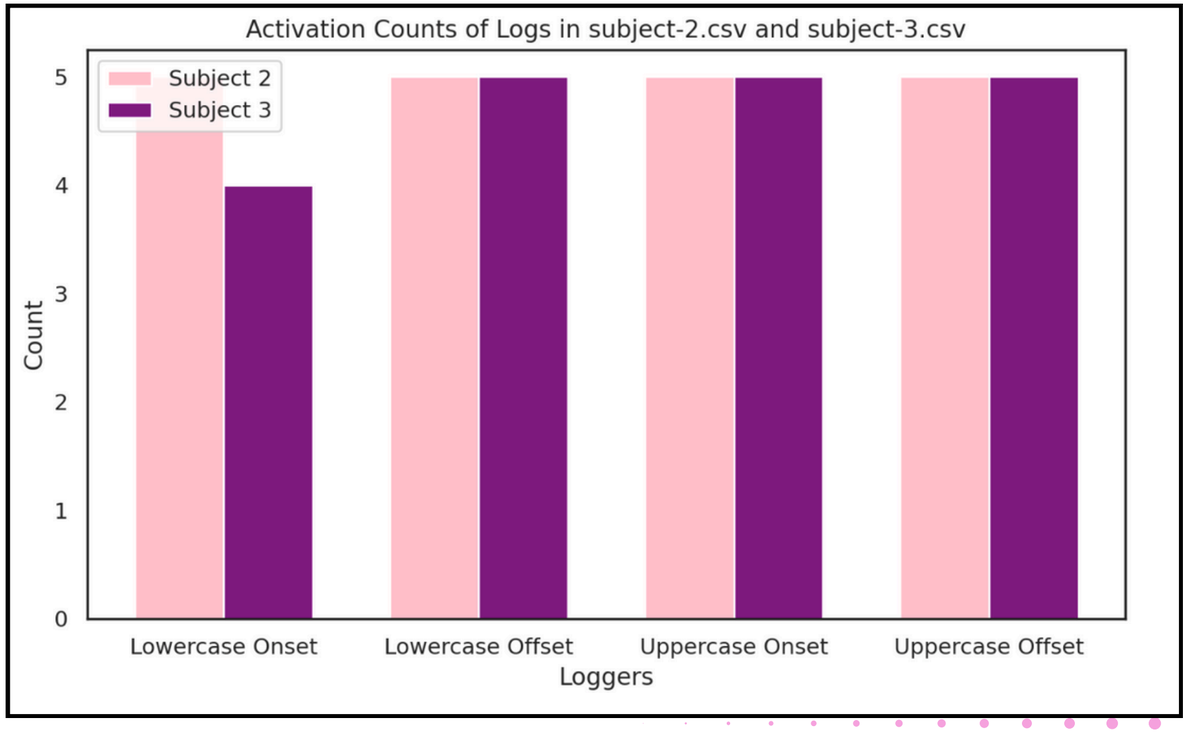
SOLUTION #2

We added a small script and changed the logs names to make sure we were getting the right data

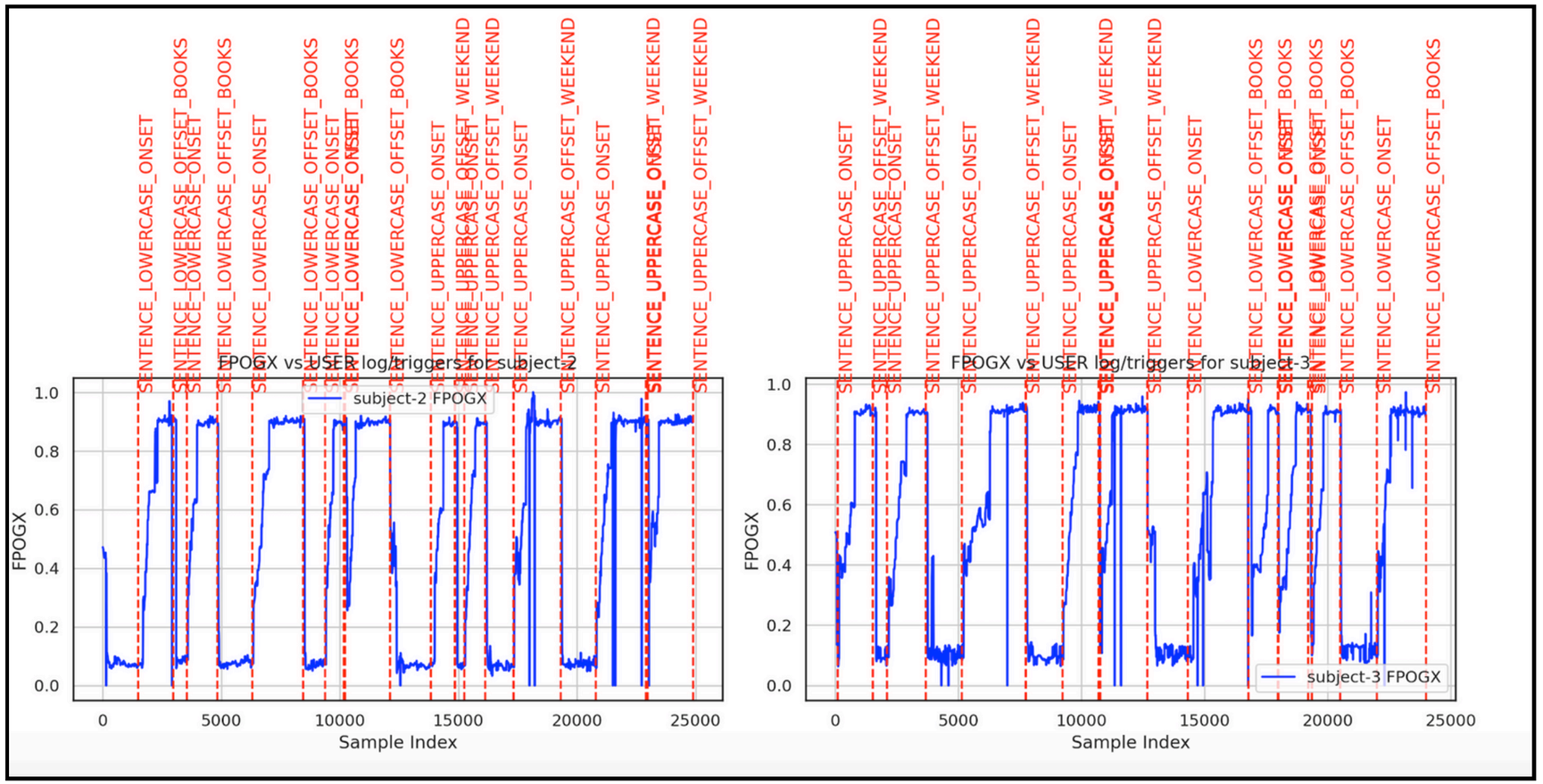
QUALITY CONTROL

To make sure the data we were collecting were good, we did some sanity checks with our first participants:

- Checked all the logs were there
- Plotted FPOGX and FPOGY (of the last row in each fixation ID)
- Gaze direction



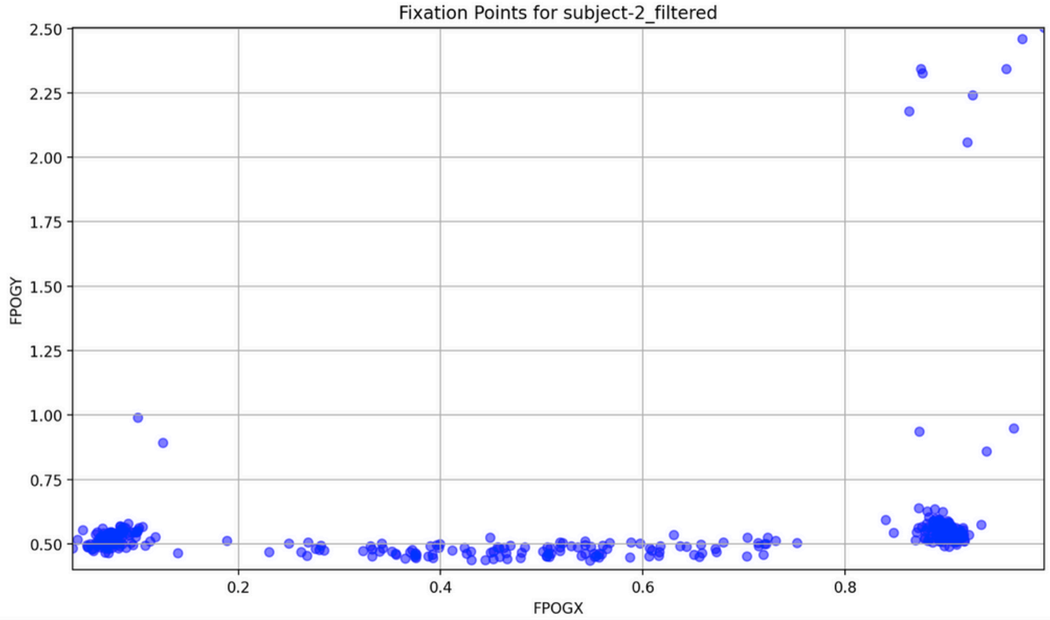
QUALITY CONTROL

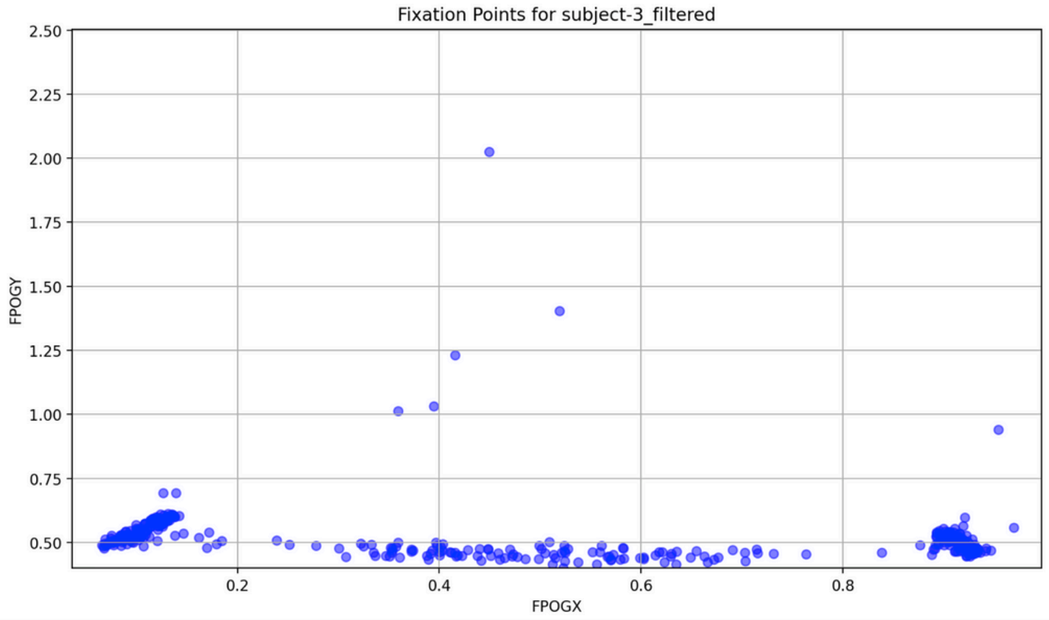


A different plot to show the logs

QUALITY CONTROL

FPOGX and FPOGY of 2 subjects





OUR ANALYSES

How precisely is the analysis going to answer the research question?

The analysis we're going to use for our project are similar to the ones in the two previous studies

Possible outcomes

1. We confirm the results in White & Liversedge (2006)
2. We prove that uppercase is in fact more difficult to read (Tinker and Paterson, 1939)
3. We find proof that lowercase is more difficult to read

REQUIRED ANALYSIS

(to answer our research question)

- **Number of fixations**

  If one type case has more fixations than the other, it indicates that it requires more eye movements to be read.

- **Fixation Duration**

  The lenght of the fixation might be potentially due to the distinct character shapes in both case types.

- **Landing Spot**

  This suggests variations in initial fixation behavior, with different starting points for reading uppercase and lowercase text and could potentially affect readability

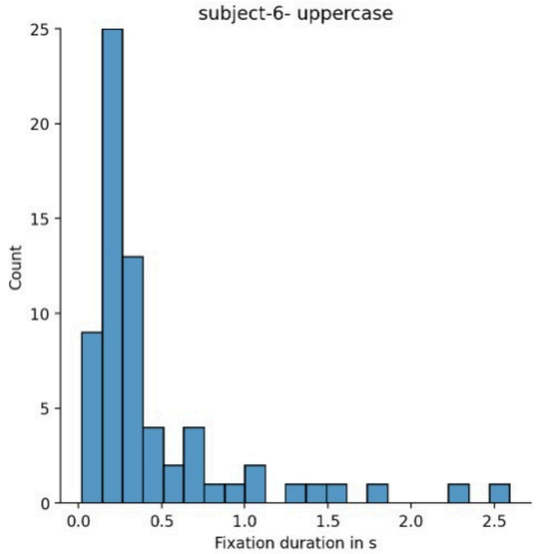
PILOT RESULTS

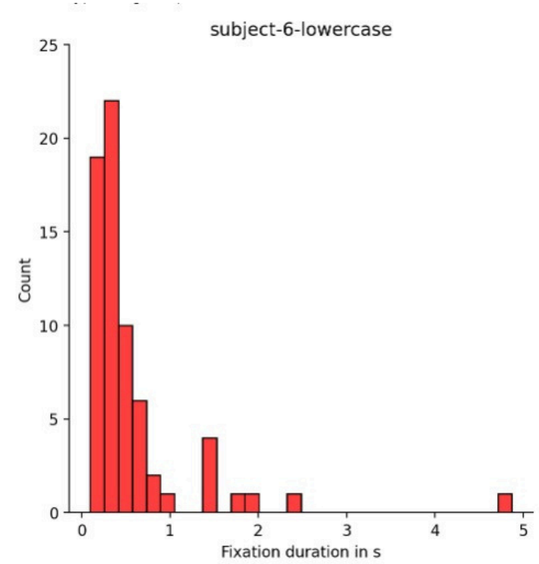
Fixation duration:

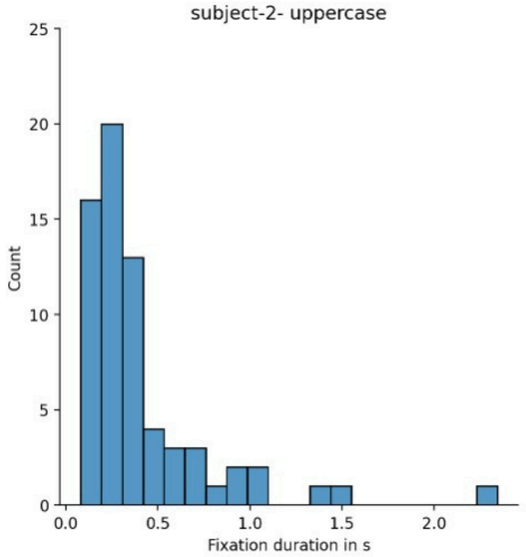
- White & Liversedge (2006) = no difference in fixation duration
- Tinker and Paterson (1939) = Average fixation durations were 20ms shorter for uppercase
- **Present experiment = no significant difference in fixation duration**

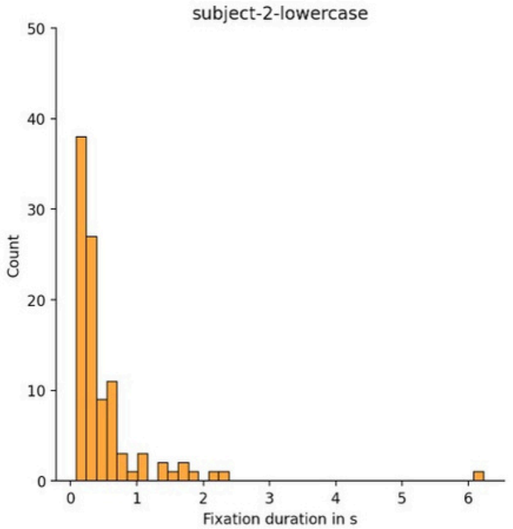
Number of fixations:

- White & Liversedge (2006) = no difference in number of fixations
- Tinker and Paterson (1939) = 12% more fixations on UPPERCASE
- **Present experiment = no significant difference in number of fixations**





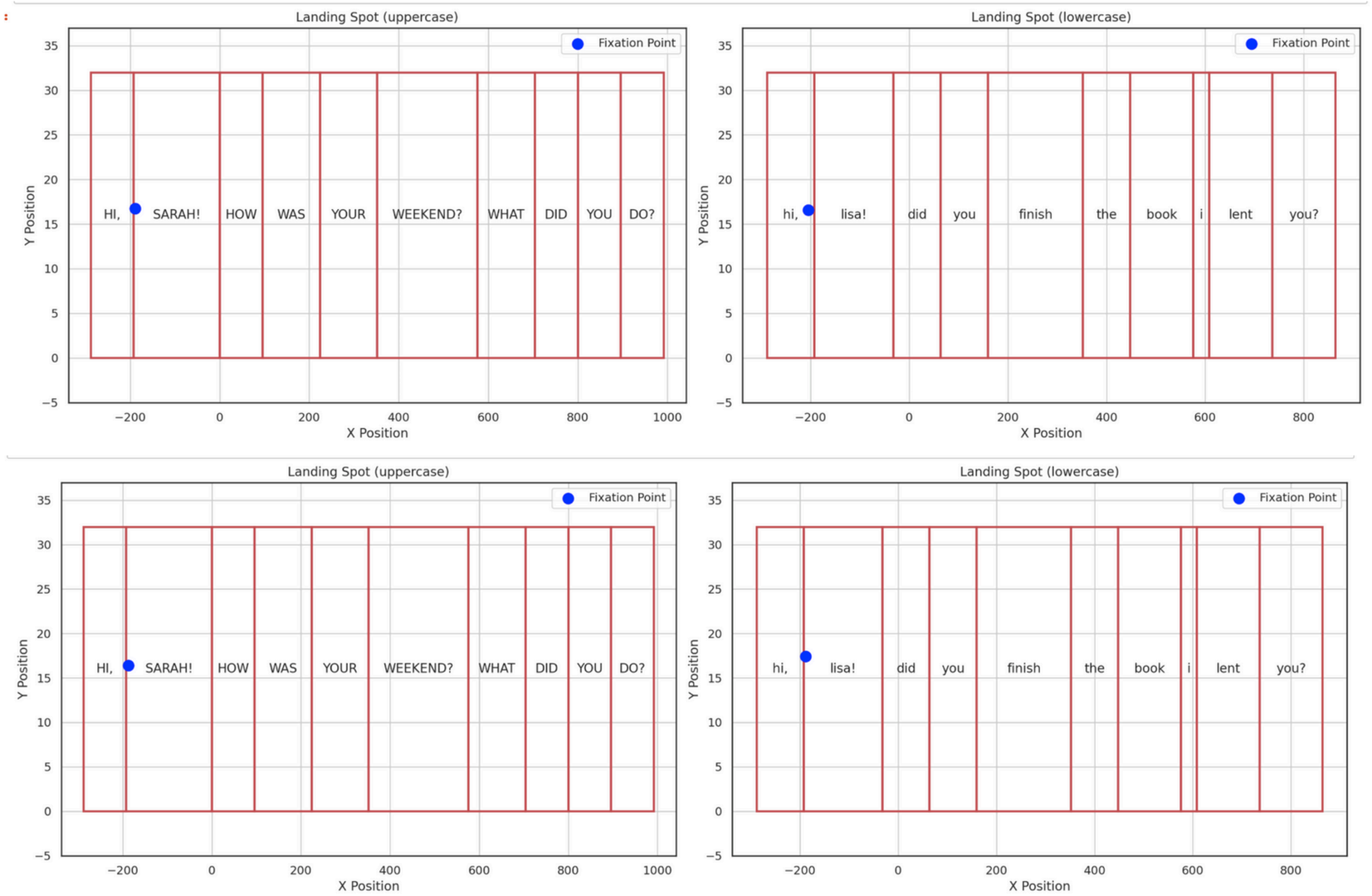




PILOT RESULTS

Landing spot:

- White & Liversedge (2006) = slighty closer to beginning of words for uppercase
- **US = no significant difference landing spot**



CONLCUSIONS

Our findings thus far align more closely with the outcomes reported in **White and Liversedge (2006)**.

- **Fixation duration** ✅
- **Landing spot** ✅
- **Number of fixations** ✅ -->One subject showed slightly more fixations for the lowercase but overall there are no signficant data

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THANK YOU

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