

## 1. INTRODUCTION

### Eye movements are a window into the reading process

- Recording eye movements has led to a wealth of findings about the cognitive processes involved in reading
- However, if we examine the eye-movement literature, we find that most results come from a small number of countries and involve reading in a limited number of languages

### Illustrating the eye-movement gap

- Data from Scopus: Searching for “eye” and “track(er/ing)” or “movement(s)” and “reading” in the title, abstract, and keywords
- Publications from 1974 to 2024
- Counting country affiliations by author (publications can have multiple authors and author affiliations)
- Excluding affiliations with missing country names
- Details: Angele & Duñabeitia (2024)

### Publications over time: 1974 – 2000

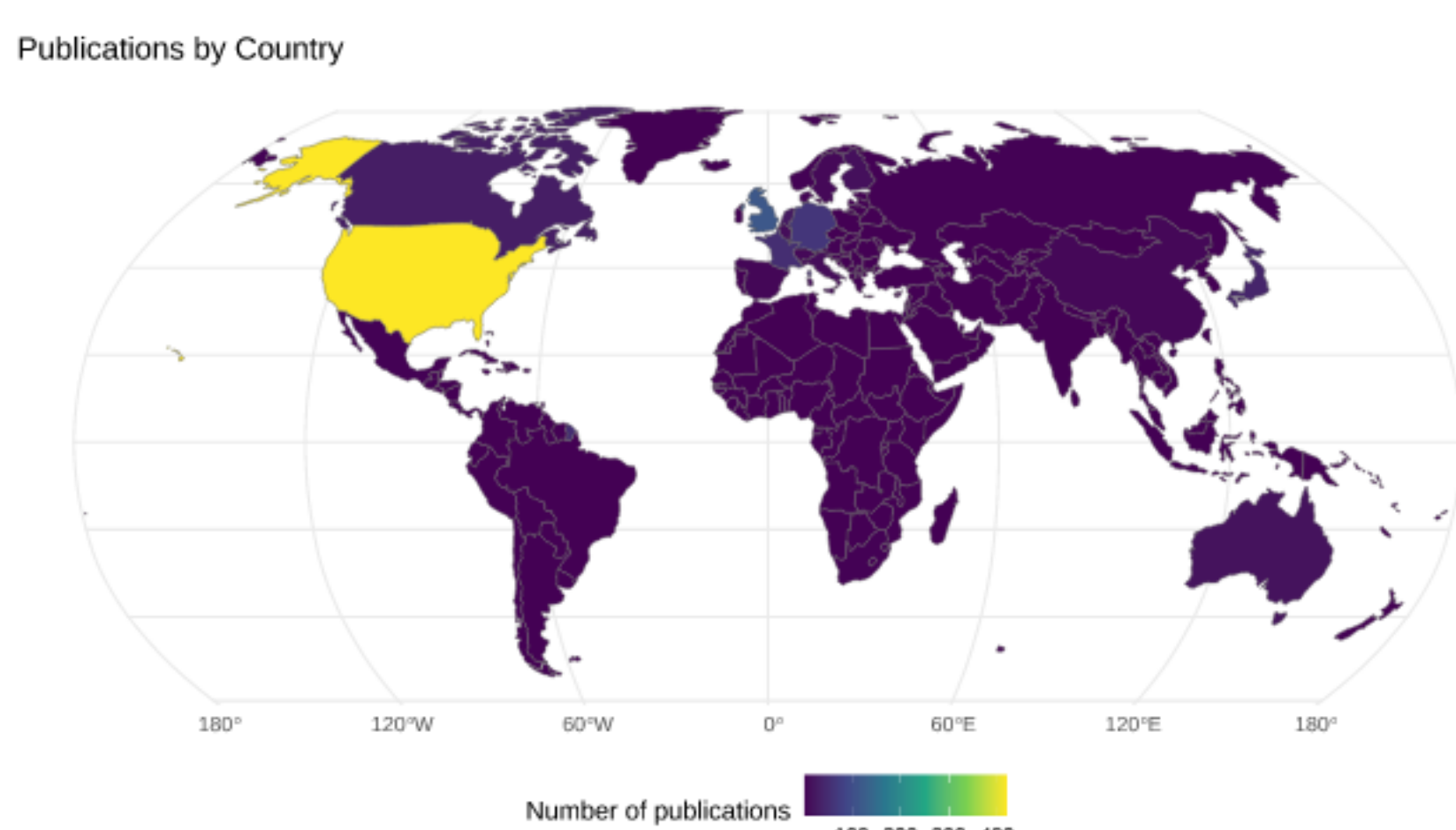


Figure 1: Cartogram of publications from 1974 to 2000

### Publications over time: 2001 – 2010

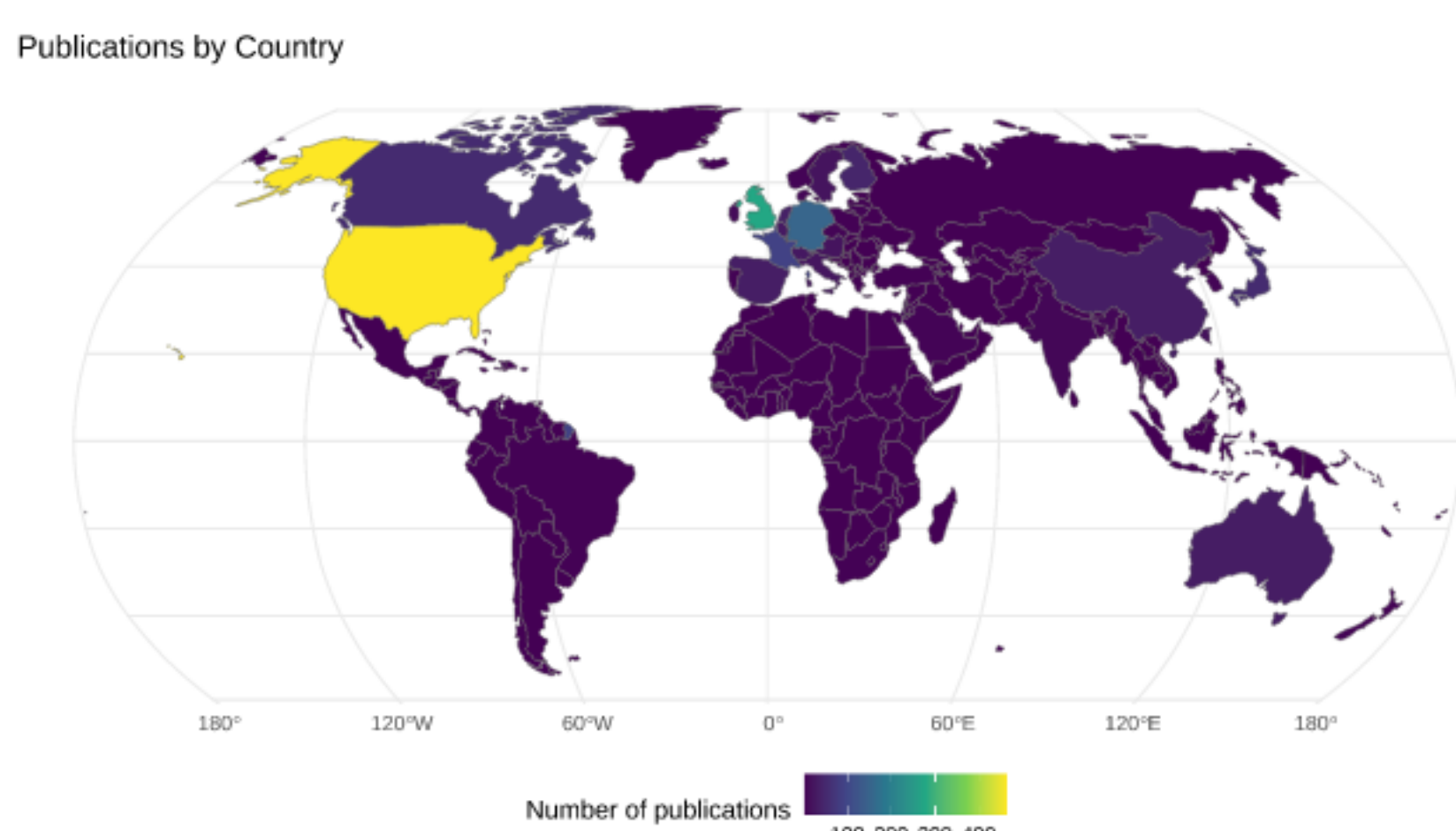


Figure 2: Cartogram of publications from 2001 to 2010

### Publications over time: 2011 – 2020

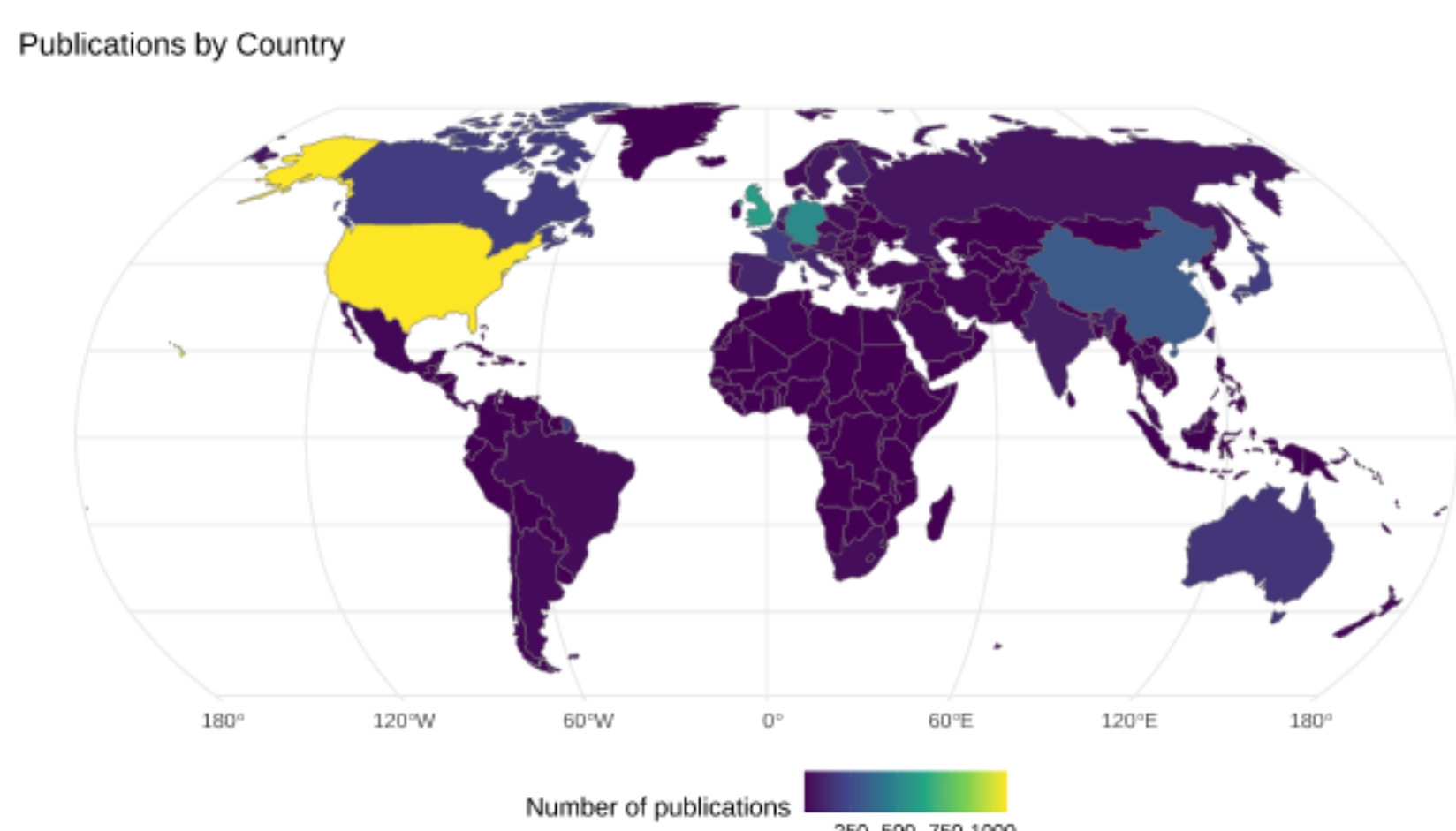


Figure 3: Cartogram of publications from 2011 to 2020

### Publications over time: 2021 – 2024

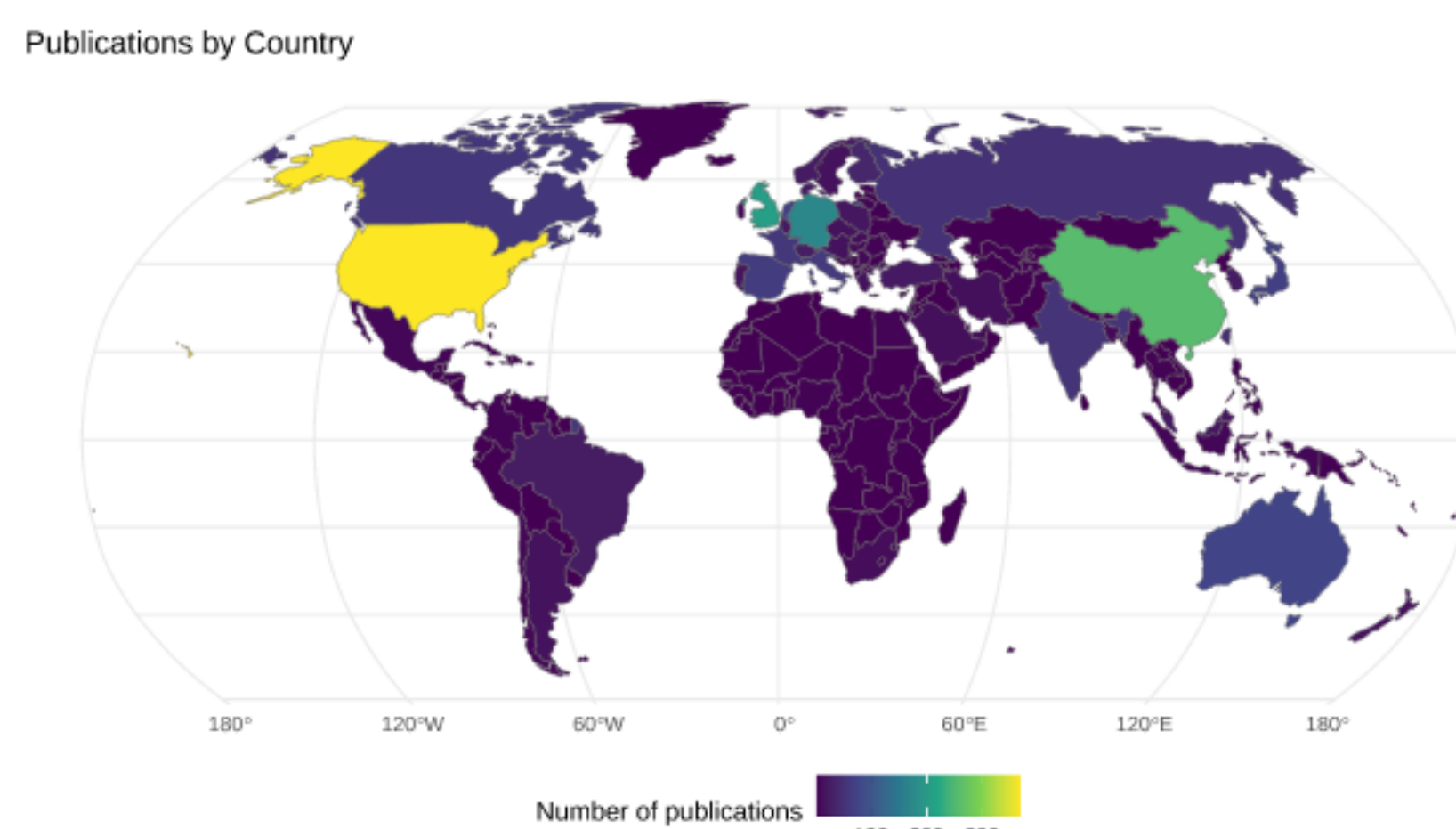


Figure 4: Cartogram of publications from 2021 to 2024

### What are we missing?

- General issue of WEIRD research (Henrich et al., 2010): Western participants may not be representative of all readers or even the majority of readers
- English, German, French, Spanish, Italian etc. are similar languages in many respects and all share the same writing system
- Studying Chinese reading has forced us to think about new issues such as word segmentation, processing of character components and many more.

## 2. OUR STUDY

### Our approach

- We take a practical approach: Which is the lowest sampling rate that allows us to find evidence of cognitive processing?
- We need a benchmark effect – a phenomenon that is well-studied and whose existence (and effect size) is clear
- The word frequency effect on fixation duration is ideal for this

### Method

- 32 participants read 400 sentences in Spanish
- Eye movements are recorded by an SR Research Eyelink Portable Duo
- Four sampling rates 250 Hz, 500 Hz, 1000 Hz, and 2000 Hz (100 sentences each)
- Frequency manipulation: each sentence has a target word that was manipulated to be either
  - high frequency (mean frequency 47/million)
  - low frequency (mean frequency 2/million)
- The context up to the target word was identical for both versions of the sentence.
  - Context after the target word was allowed to vary.

## 3. RESULTS

Reducing sampling rate from 1000 Hz to 1000 Hz by dropping 0 out of every 1 samples.

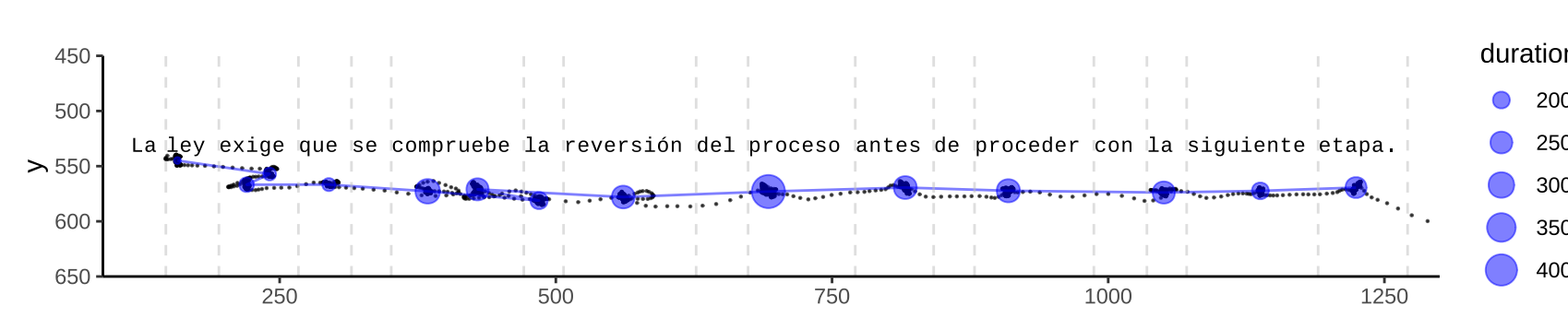


Figure 5: Example trial at 1000 Hz

### Example trial 250 Hz

- With Eyelink fixations

Reducing sampling rate from 250 Hz to 250 Hz by dropping 0 out of every 1 samples.

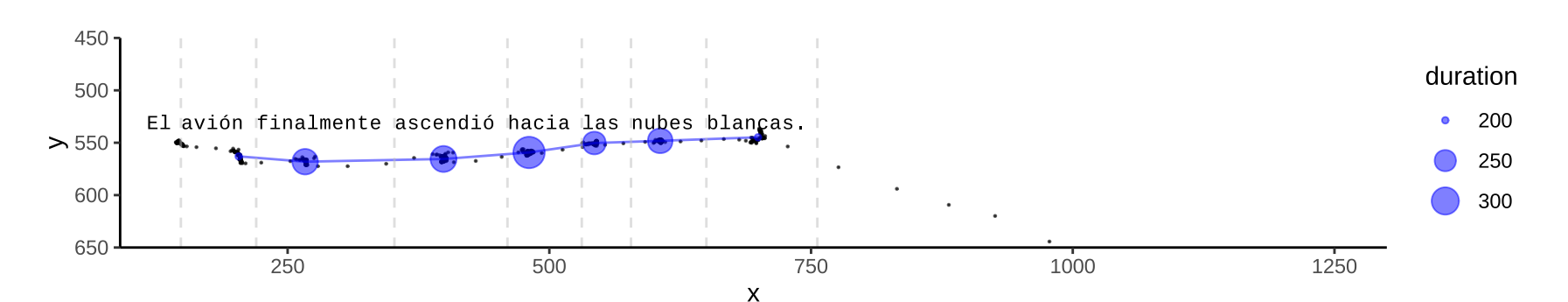


Figure 6: Example trial at 250 Hz

Reducing sampling rate from 1000 Hz to 50 Hz by dropping 19 out of every 20 samples.

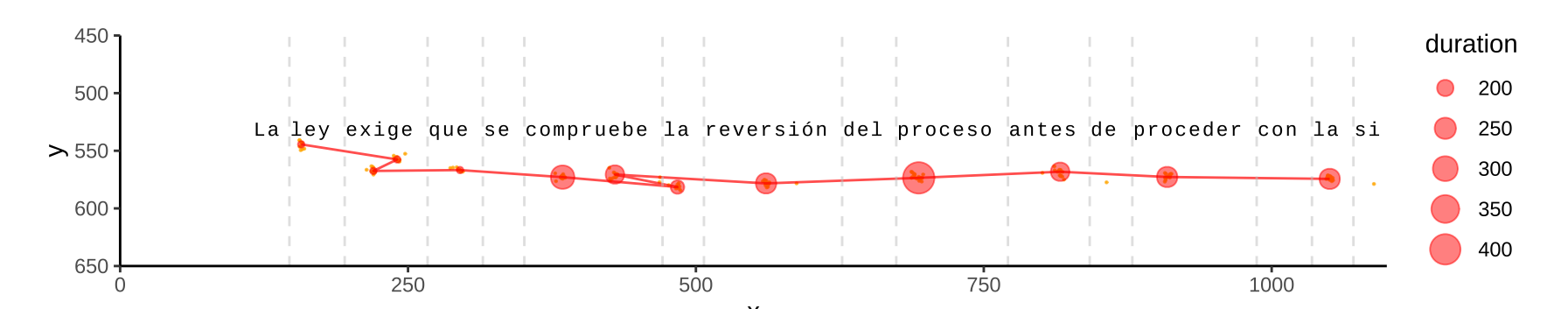


Figure 7: Example 1000 Hz trial downsampled to 50 Hz

## 4. DISCUSSION

We will start with a random math equation, just to show that quarto and typst can do *math*. Now some random text so that the yellow box spans two columns. Ut enim aequo doleamus animo, cum corpore dolemus, fieri tamen permagna accessio potest, si aliquod aeternum et infinitum impendere malum nobis opinemur. We will put this next part in a maize-colored box to make it stand out.

$$\sum_{k=1}^n k = \frac{n(n+1)}{2} = \frac{n^2 + n}{2} \quad (1)$$

- That was a math equation bracketed by \$ (which invokes the math translator), notice that the box extends across column breaks. Watch the indent when this extends across a whole line. Note that this box does not have a lot of inset padding, unlike the gray box below, where the text can ‘breathe’.
- Also notice how rounded the corners are (radius) in the two different boxes.
- Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do.

Implications in a Gray Box (0[black]–255[white]) with a Blue Border

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim aequo doleamus animo, cum corpore dolemus, fieri tamen permagna



accessio potest, si aliquod aeternum et infinitum impendere malum nobis opinemur.

Now inserting another plot and controlling the height and width in inches on this 72 in poster. Note the backslash (for a line break) is used on a line by itself to give us a bit of separation between the text and the plot.

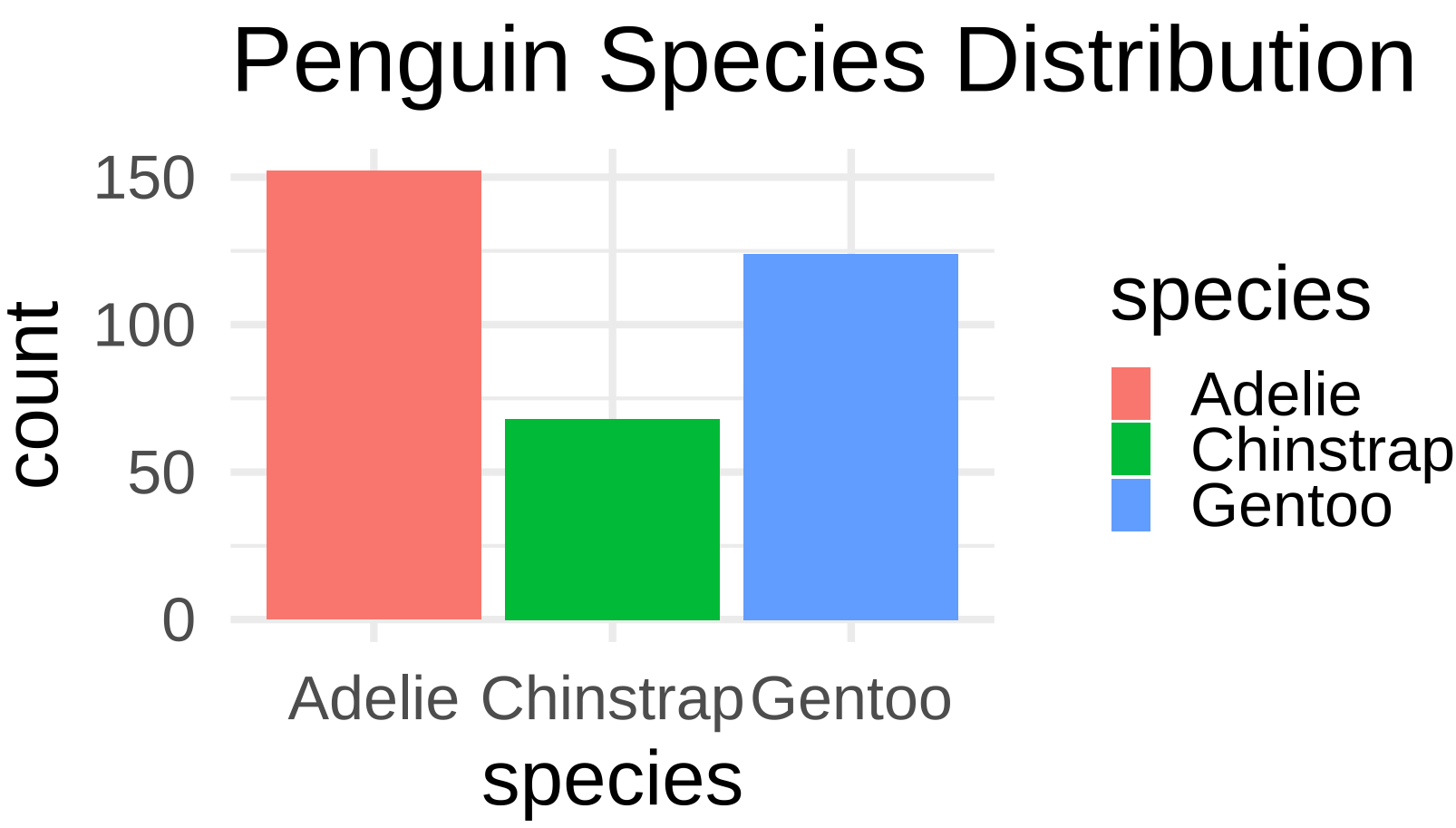


Figure 8: A fabulous plot made in R.

5. NEXT STEPS

- 1. We will do amazing research in vitro with cell lines in petri dishes
- 2. We will extend this with in vivo studies in mice and rats.
- 3. We will then extend this with pig studies
- 4. We will then move to human clinical trials.
- 5. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do.
- 6. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do.
- 7. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do.

6. TO INFINITY AND BEYOND

- 1. We will do amazing research in vitro with cell lines in petri dishes
- 2. We will extend this with in vivo studies in mice and rats.
- 3. We will then extend this with pig studies
- 4. We will then move to human clinical trials.
- 5. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do.
- 6. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do.
- 7. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do.

BIBLIOGRAPHY

Angele, B., & Duñabeitia, J. A. (2024). Closing the eye-tracking gap in reading research. *Frontiers in Psychology*, 15. <https://doi.org/10.3389/fpsyg.2024.1425219>

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature*, 466(7302), 29–30. <https://doi.org/10.1038/466029a>