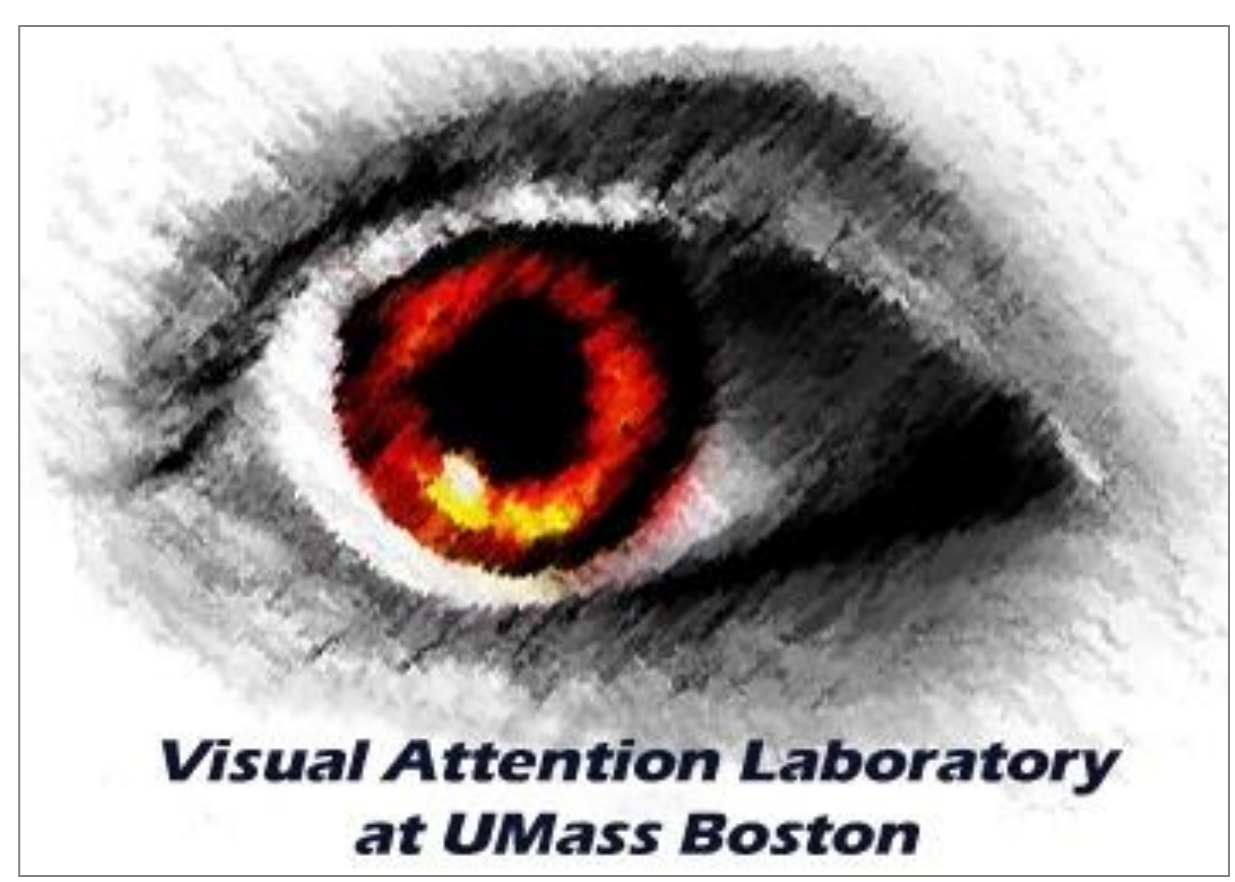


# How Does Text in Real-World Scenes Attract Attention?

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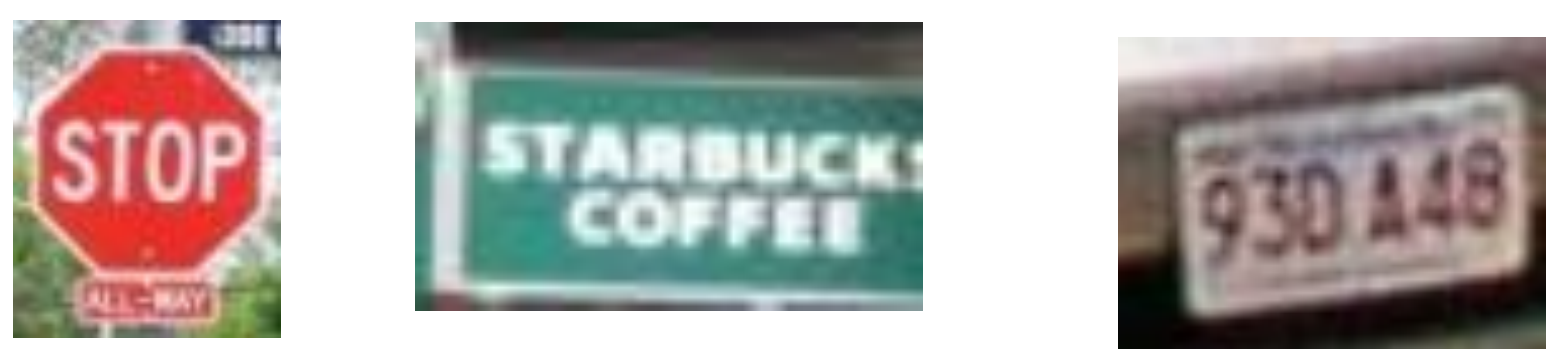
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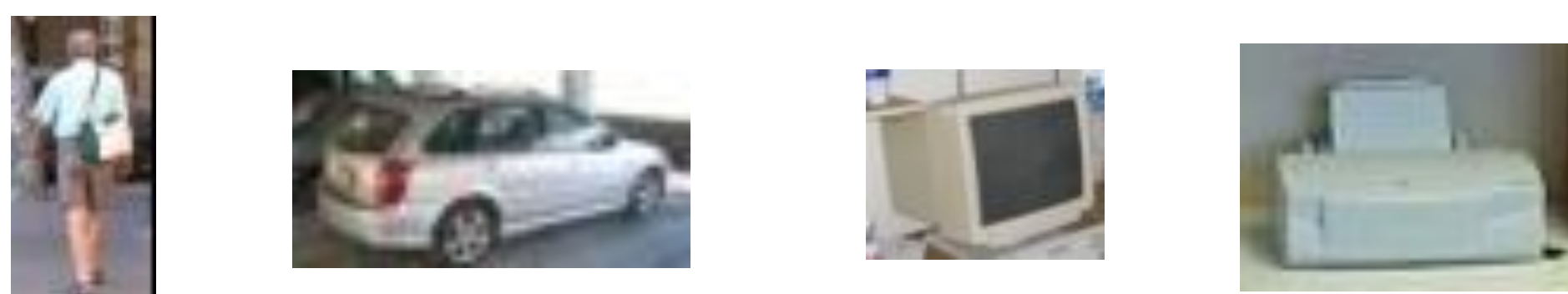
## Introduction

- Are **texts** more attractive than **non-text objects** or **control regions**?

-Texts: signs, banners, license plates, ...



-Non-text objects: people, cars, monitors, printers, ...



-Control Regions: Regions of similar features paired with texts.

- What **factors** affect the allocation of attention?

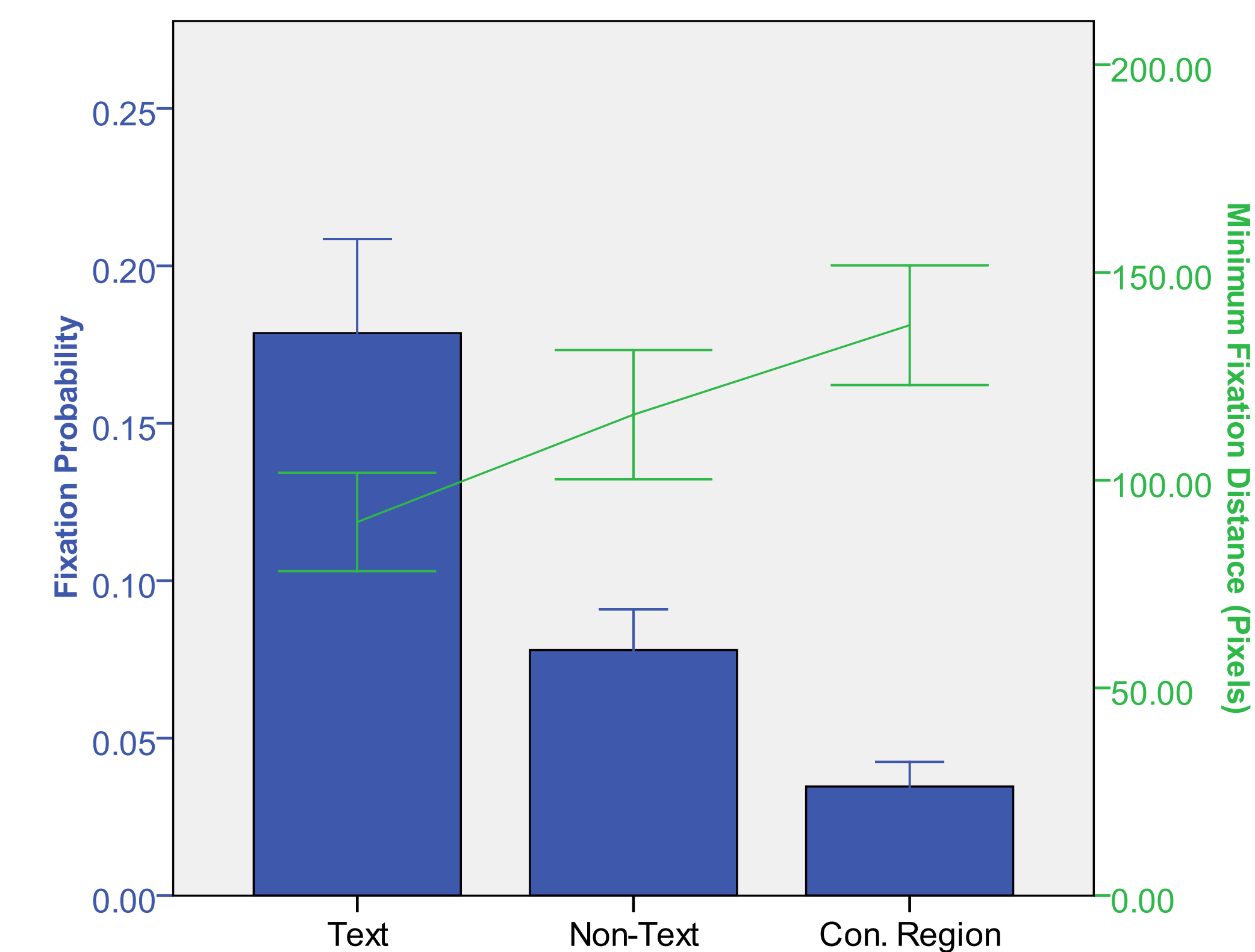
-Size? Eccentricity (Ecc.)?  
-Saliency (Sal.; Itti & Koch, 1998)?  
-Luminance Contrast (LumC.)?  
-Contextual Guidance (i. e., expected location; Torralba et al., 2006)?

- Eye movement **measures** of attraction

-Fixation Probability  
-Minimum Fixation Distance: minimum distance between an object and any fixation during a trial.

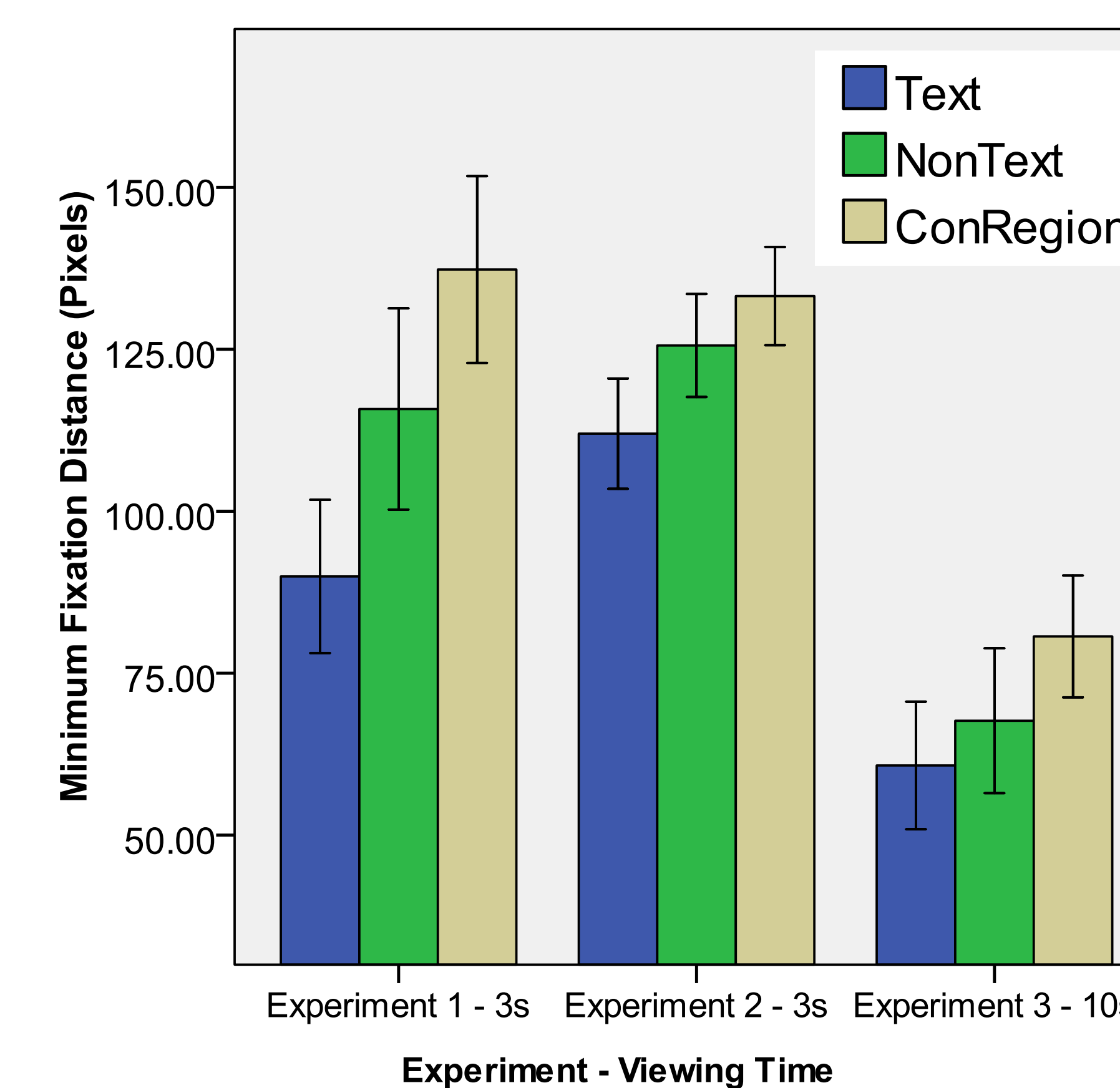
	Size	Ecc.	Sal.	LumC.
Experiment 1				
Text	2631	283	0.41	40
Non-Text	2828	292	0.41	40
Con. Region	2631	283	0.37	46
Experiment 2				
Erased Text	2631	283	0.43	21
Non-Text	2676	293	0.41	24
Con. Region	2631	283	0.37	36
Experiment 3				
UncText H B	2351	288	0.20	10
UncText INH B	2723	281	0.39	55
UncText H	2351	288	0.24	34
UncText INH	2723	281	0.40	57
Non-Text H	2670	301	0.27	34
Non-Text INH	2746	284	0.41	57
Con. Region H	2351	287	0.28	40
Con. Region INH	2723	281	0.41	55

## Experiment 1: Reanalysis of Previous Data – **Attractiveness of Texts**



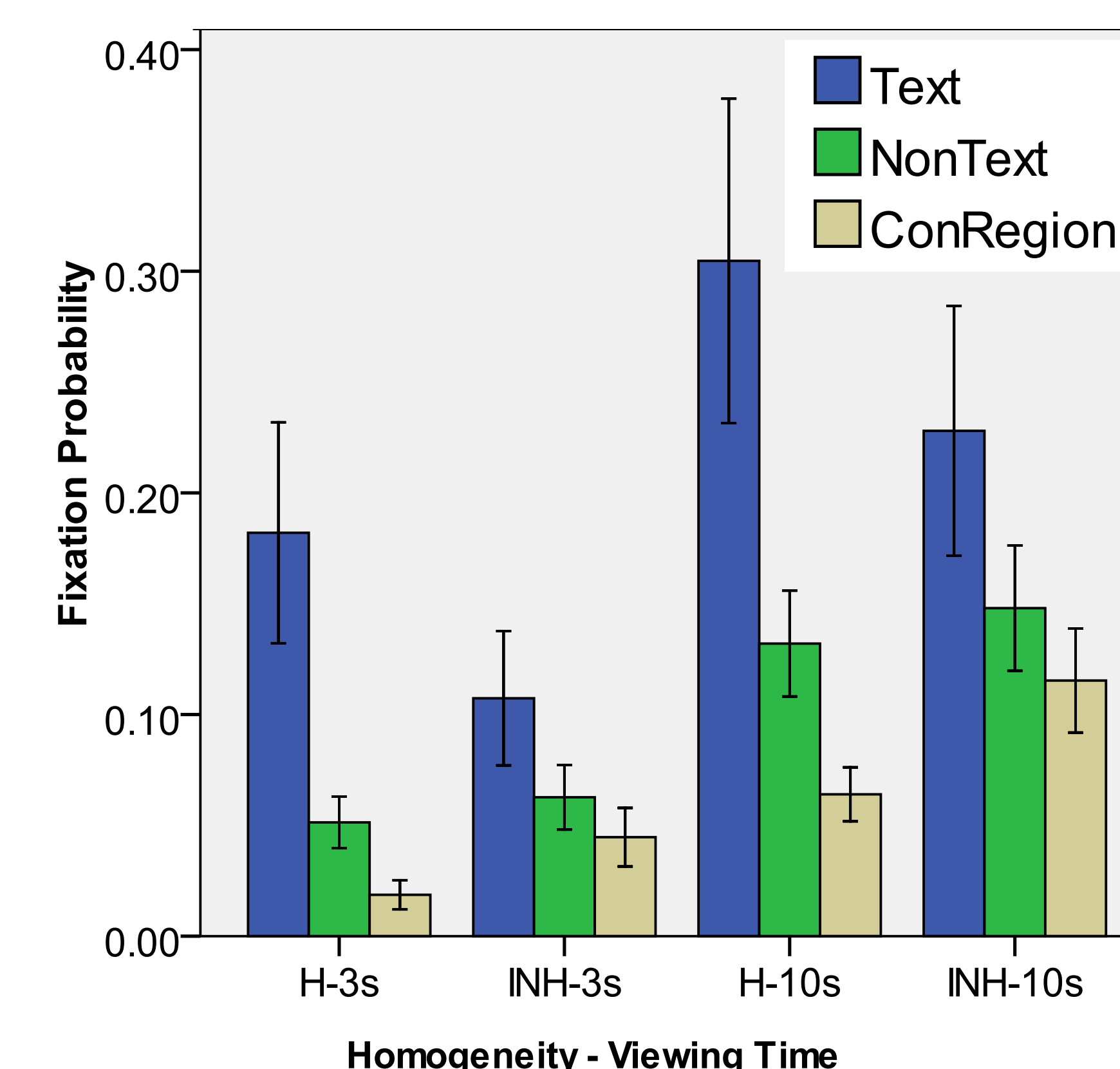
- Reanalyze eye-movement database by Judd et al. (2009)
- The effects might be caused by
  - 1) Typical saliency (Itti & Koch)
  - 2) high level features (e. g., expected locations), or
  - 3) unique visual features of texts
- The selected controls ruled out the first hypothesis.

## Experiment 2: Erased Text – Effect of **Expected Locations**



- Remove text from objects by filling surface with background color
- The typical locations of text still matter even when they do not contain any text.
- This result indicates that part of the attractiveness of texts derives from their expected locations.

## Experiment 3: Unconstrained Text – Effect of the **Unique Visual Features of Texts**



- Place text on **homogeneous** (UncText H, fully visible) or **inhomogeneous** (UncText INH, degraded variants) backgrounds.
- For UncText INH, the fixation probability was still significantly higher, but the difference was not as large as for UncText H.

## Results and Discussion

- In Experiment 1, text objects were found more attractive but the effects were **not caused by typical saliency**.
- Experiment 2 suggested that **expected locations matter** and supports the concept of “contextual guidance” found by Torralba et al. (2006) even during scene viewing.
- Experiment 3 indicated that **the unique visual features of texts dominated** the attention allocation over high-level features.

## Future Work

- To further investigate the unique visual features of texts, the next step could be an experiment using non-English texts, such as Chinese characters, for native English speakers as subjects.
- This study was supported by Grant R15EY017988 from the National Eye Institute to Marc Pomplun