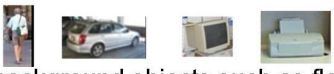
How Text Attracts Attention in Real-World Scenes

Hsueh-Cheng (Nick) Wang and Marc Pomplun
Department of Computer Science, University of Massachusetts at Boston, USA

Introduction

- Are **texts** more attractive than **non-text objects**?
  - -Texts: signs, banners, license plates, …

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

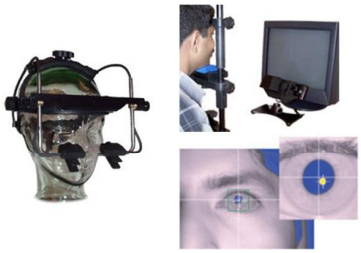


  - -Excluded: background objects such as floors, walls, sky, …

- What features of text affect the allocation of attention?
  - -Saliency (color, orientation, intensity, contrast, etc.)?
  - -Object size, location (eccentricity), or background?

Method

- Where Do People Look? **Eye Tracking**
  - -Free Viewing Task
  - -15 subjects for Exp.1 and 2, six subjects so far for Exp. 3.
- What/ where are the objects? **LabelMe** (Russell et al., 2008)



Exp. 1: Natural Scenes

- Reanalyze eye-movement database by Judd et al. (2009)
- **Objective**: Determine whether texts are more attractive than control objects. Fixation probability (on text or control) within subjects is used.

Exp. 2: Missing Text

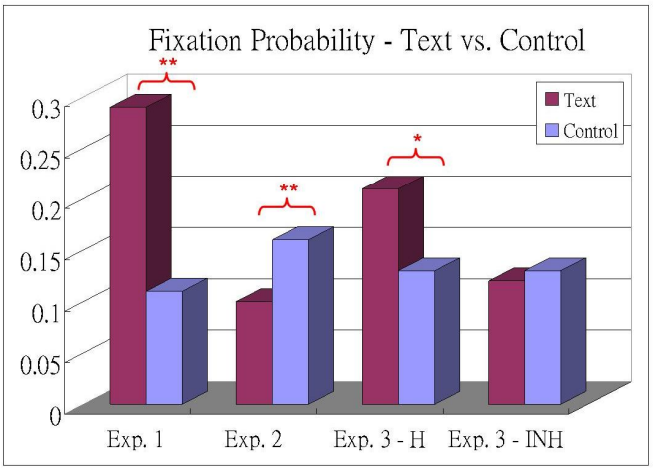
-Remove text from objects by filling surface with background color

-**Objective**: Study the influence of Scene syntax. Do the modified objects still attract more fixations than controls?

Exp. 3: Unconstrained Text

- Place text from other scene randomly (keep contrast, size and eccentricity)
- Place text on **h**omogeneous or **inh**omogeneous background.
- **Objective**: Exclude the confounds of scene syntax and contrast.

Results



** p<.01, * p<.05

Discussion & Conclusions

- Exp. 1 shows that **texts are more attractive** than controls.
- Exp. 2 indicates that:
  - -Regions with removed text have below-baseline attraction.
  - -Their reduced contrast may contribute to this effect.
  - -No scene syntax effects w/o text.
- Exp. 3 demonstrates that:
  - -Only unconstrained texts on **homogeneous background** attract above-baseline attention.
  - -Unconstrained text attraction (0.21) is smaller than real text attraction (Exp 1, 0.29).
- So why are texts more attractive?
  - -**Scene syntax** combined with **high contrast** (homogeneous background) seems to be important.
  - -Scene syntax (expected text location) itself does not draw attention.
  - -Unconstrained texts on inhomogeneous background do not attract attention, at least for brief (3 seconds) scene viewing.