Analyzing Traffic Scenarios for Visual Attention Habits and Distractions

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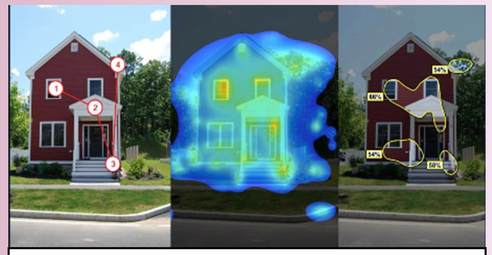
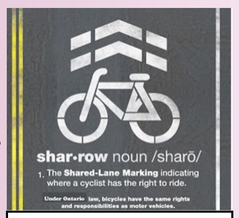
Introduction

- Visual attention can be defined as "... the mechanism by which one selects or orients towards objects, features or locations for further processing action."(Belyusar et al. 2015)
- **Visual attention uses in traffic scenarios:**
- Outside distractions reduce pedestrian visibility (Habibovic 2012)
- Frequent exposure reduces visibility (Arexis 2017)
- Advertisements (billboards) cause high distraction (Belyusar 2015)
- Previous visual analysis of bicycle lanes has indicated sharrows as the preferred design, but in Cambridge this design is rare
- **Research Goals**
- Using more universally applicable methods for visual attention (eliminating driver bias)
- Expanding the knowledge and uses of VAS
- Improving traffic structures and driver and pedestrian safety in Cambridge
- Eliminate the sample size issue



Visual sequence Heat map Regions of Interest (ROI)



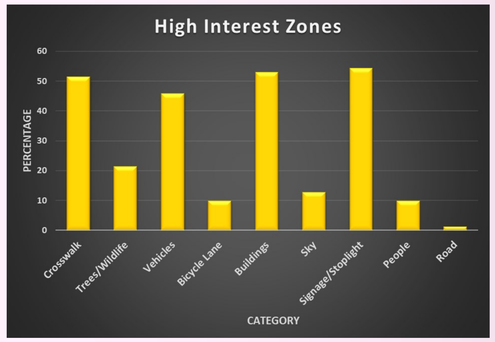
Sample of a sharrow bike lane design from a blog for bicyclists in Burlington, Ontario

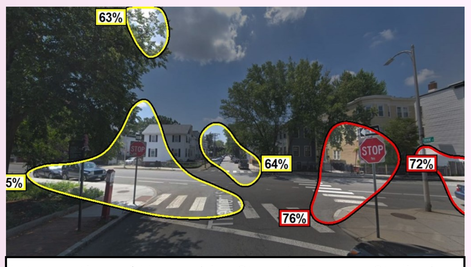
Methodology

- **Cambridge Police Department Crash data:**
- Originally contained 6,527 data entries spanning 1/1/2015 – 3/30/2019
- removed irrelevant fields and controlled for externalities
- refined to 19 high risk intersections
- 70 Images collected from Google maps and analyzed in VAS

Results

- **High Interest Zones (HIZs):**
- §ROI >50%
- Most frequent categories:
  - Signage/stoplight (54.29%)
  - Buildings (52.86%)
  - Crosswalks (51.43%)



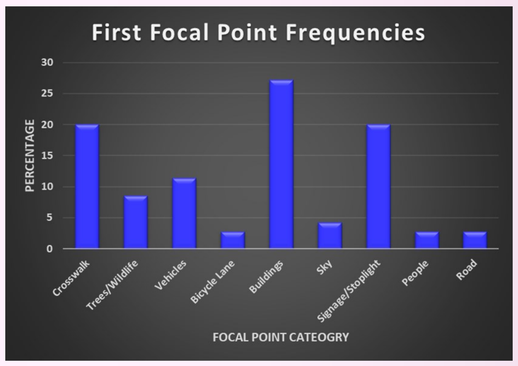


Intersection of Hampshire St and Tremont St displaying the typical features captured by VAS at traffic intersections

- **Bicycle Lanes:**
- Very low visibility was observed, with first fixation frequency of only 2.86%
- Bicycle lanes appeared in 18 images but were only fixations of any degree in 4, meaning 77.78% of bicycle lanes were not capturing any focus
- Solid green and white dashed lanes were common with low visibility in agreement with previous research

Intersection of Cambridge St and Cardinal Madieras Ave displaying an uncaptured bike lane

- **Visual Sequence Fixations:**
- Most frequent categories for first fixation:
  - Buildings (27.14%)
  - Crosswalks (20%)
  - Signage/stoplights (20%)
- Consistency across all four fixations



Discussion & Conclusion

- Signage and stoplights were the most frequently occurring HIZs
- Aligns with VAS's known preference for advertisements, flags, and other types of stand alone lights and signs
- Signage and stoplights hovered around only 20% first fixations
- It is possible that the signs may capture broad and brief visual attention while the information they present may not be fully absorbed (Arexis et al)
- Crosswalks had good visibility
- Ongoing plans for bike lane projects should be reconsidered for increased visibility and safety, potentially add signage for turns (Warner et al. 2017)
- Buildings captured attention in the same way previously seen in architectural study, thus data supports existing theories on architectural uses

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