

Where's Volvo?: Visual search for automobiles & why attention is prioritized to school buses

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School Bus Safety

- In a one day "snapshot", from a sample of 108,000 bus drivers, it was reported that over 85,000 drivers illegally passed by stopped school buses. (National Association of State Directors of Pupil Transportation Services; NASDPPTS; 2013)
- In the U.S. it is estimated that 15 million drivers illegally pass stopped school buses annually. (NASDPPTS; 2013)
- This is shocking, considering how important school buses are, and how distinct they are from other vehicles.
- It is important to understand how drivers pay attention to these important vehicles to gain a sense of why so many violations occur each year.

The Present Investigation

- Working with the *Child Safety Network*, we examined how and when attention is prioritized to school buses.
- We used a visual search paradigm to examine how well people are able to locate particular types of vehicles among distractors, or to discriminate specific instances of a vehicle from other members of the same category.
- We also examined how vehicle decals influenced eye movements and attention, and whether or not they would be distracting, in order to examine the potential influence of ad banners placed on vehicles.

Familiarity and Search

- Given the high exposure to the standard American yellow school bus, we expected that familiarity with the color and form of school buses would influence search performance.
- Familiar items are found faster than items that are not familiar (Flowers & Lohr, 1985; Qin, Koustaal, & Engel, 2014).
- We hypothesized that:
 - School buses would be located faster than any other type of vehicle.
 - The probability of fixating on a school bus (when it was the target) would be highest compared to other targets, and lowest when people were looking for other types of vehicles (i.e., when other buses were distractors).
 - The presence of a decal on a school bus would not be disruptive to the searcher's visual attention.

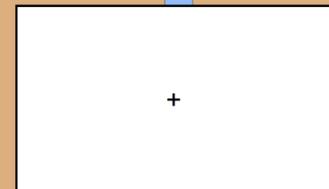
In both experiments, participants searched for a target vehicle among distractor vehicles. In Experiment 1 (N=30), people looked for targets defined by vehicle type and viewpoint (e.g., a school bus shown from the side) among other vehicles and viewpoints (e.g., a bus shown from the front, a sedan shown from behind). In Experiment 2 (N=30), targets were searched for among distractors from the same category (e.g., a particular SUV shown among other SUVs).

Method

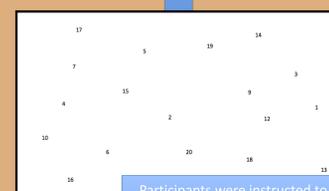
Procedure

PLEASE FIND THIS VEHICLE
An: **AMBULANCE**
shown from the: **FRONT**
PRESS SPACE BAR TO CONTINUE

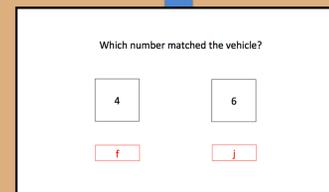
Target cues were pictures in Exp2



Distractors were all drawn from the same category in Exp2



Participants were instructed to remember the number that appeared at the location of the target.

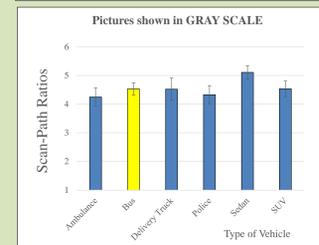
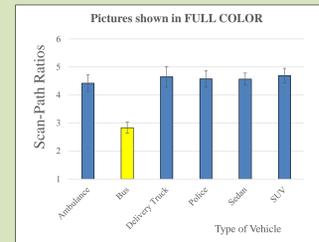


In both experiments, eye movements were recorded by an Eyelink 1000 tracker

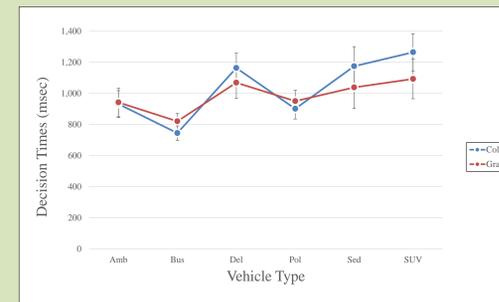
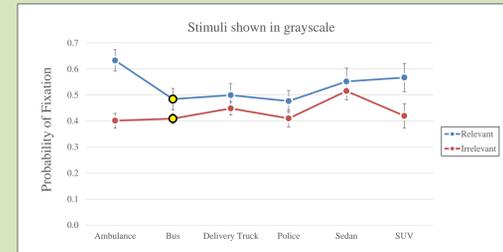
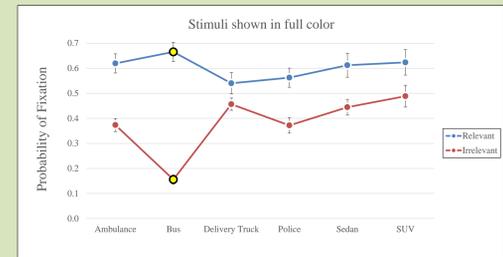
- In Exp1, school buses were located (and avoided!) most efficiently, as indexed by scan-path ratios and fixation probability. The decision time analyses, however, showed that buses were recognized more quickly, irrespective of color information.
- Taken together, this suggests that the attentional advantage afforded by buses is not due entirely to their predictable color, but that their ubiquitous shape is also a useful source of information.
- In Exp 2, when targets and distractors were of the same category, buses were more challenging to find, as evidenced by high scan-path ratios and decision times (compared to other vehicles). This is likely due to the homogeneity of appearance in school buses.
- The presence of a decal on vehicles had a small effect on performance (e.g., higher scan-path ratios when shown in gray). This suggests that when color information is absent, decals may be modestly deleterious insofar as they disrupt the expected form of the vehicle.

Results

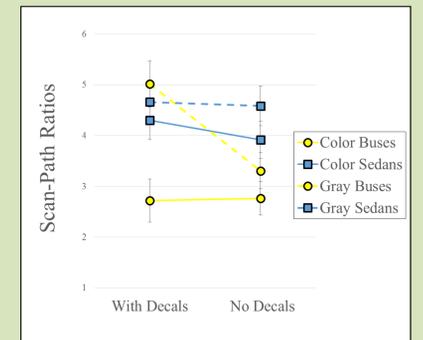
EXPERIMENT 1



• Main effect of Vehicle Type
• Vehicle Type x Color interaction

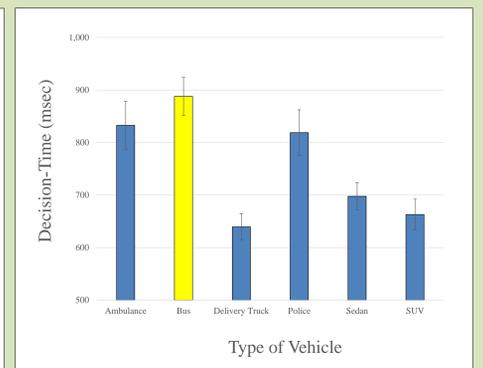
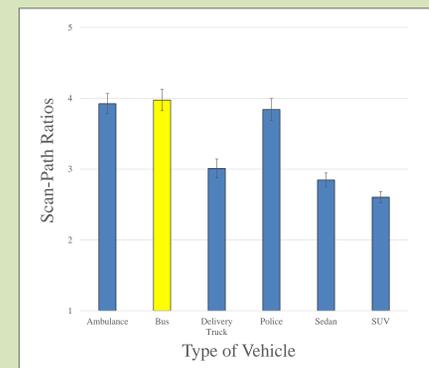


- Main effect of Vehicle Type
- No Vehicle Type x Color interaction



- Main effect of Vehicle Type
- Main effect of decal presence

EXPERIMENT 2



- Main effect of Vehicle Type

Conclusions &
Future
Considerations