

Car Color and Safety
White Paper
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Background

A frequently asked question of Foundation staff is "What is the safest car color?" Psychological studies show that color has an effect on behavior, and there are other studies about color and conspicuity, but there are very few studies examining the impact of car color on crash rates.

"Colors can create conditions that can cause fatigue, increase stress, decrease visual perception, damage eyesight, increase possible worker errors, and negatively affect orientation and safety" (www.colormatters.com). Studies examining traditional color psychology find blue is relaxing and red increases heart rate and blood pressure. Color affects mood and people make purchasing decisions based on color. However, it seems unlikely that a person who dislikes the color orange, for example, would purposely crash into an orange vehicle.

General studies have also been done to show the most visible colors for day and night; however, there are no studies directly addressing the relationship between car color (conspicuity) and crashes among passenger vehicles. The study below discusses colors for fire fighting equipment, and presumably it would have some relevance for passenger cars too:

It is noted that the color red, used for fire fighting equipment, is one of the least visible of vehicle colors. Optometrists note that, for its high visibility, lime yellow should be used by fire and rescue teams, as well as favored by trucks and car buyers. Lime yellow falls in the middle of the color spectrum (Schuman 1991).

Several Web sites focus on color and solicit opinions; as one might expect, the general public has many theories on color psychology. One Web site, *Color Matters* (www.colormatters.com), discusses the effect that color has on the mind and body. Visitors can pose questions and leave comments:

I once owned a 1980 "sand-beige" ford escort [*sic*]... In the 4 years that I owned the car, it was hit 11 times. Each time it was either completely stopped at a light, stop sign or parked. Apparently, this is a hard color to see, particularly on sunny days. Now, I drive a black VW and have not been in an accident in 5 years.

And:

My mother owned a silver-gray car. We noticed a significant number of near collisions on foggy morning and dusky evening hours. The silver seems to blend in with the road.

This type of speculation and frequent questions to Foundation staff underscore the timeliness of this topic. Car buyers often ask, "What color car is safest?" Unfortunately,

the relationship between car color and safety is not at all clear, because only two scientific investigations of the matter have been conducted to date, and the authors of both studies admitted that they were not able to draw clear or generalizable conclusions.

The relationship between car color and safety is complex. Background color (trees, desert, etc.), weather conditions (rain, fog, snow), and daylight have a profound effect on conspicuity.

At night, white is the most visible, but lime yellow stands out better against cloudy skies and snowy backdrops than does white. The color red is perceived as black at night. Also, people have particularly poor peripheral detection of red shades (Schuman 1991).

In addition, any study of the relationship between car color and crashes must consider the distribution of different colored cars on the road and whether certain colors are over or under-represented among certain types of drivers. For instance, any study that reports red cars are more prone to crashes needs to rule out higher number of red cars on the road and disproportionate numbers of bad drivers (e.g. young males) owning red cars. Potential confounding variables in such a study include age, sex, weather conditions, and the time of day that the crash occurred. One could envision a graph of car color and crashes, with a line for each car color juxtaposed against time of day. Are different car colors involved in crashes at different times of day? Further multivariate analyses could be done to investigate the relationship between car color and safety while controlling for potential confounding variables.

Scientific Studies

A literature search for studies analyzing the relationship between car color and crash occurrence was performed in June 2004, and two relevant papers were identified.

Lardelli-Claret and others analyzed data in Spanish crash databases, collected between 1993 and 1999. Selecting crashes in which only one driver was cited for an infraction, 57,472 crashes were identified. Using the drivers cited for infractions as the control group, and the drivers not cited for infractions as the case group, and adjusting for confounding variables, the authors found that light-colored (i.e. white or yellow) cars were slightly less likely to be “passively involved” in crashes. The effect was observed to be strongest during daylight on open roads under less-than-ideal weather conditions. Black cars had the worst record for passive involvement in crashes. The authors themselves identified several weaknesses of the study, including classification of a driver as “passively involved” solely based on his not having been cited for an infraction, and the possibility that certain driver-related variables associated with higher risk of crash involvement, besides those explicitly accounted for in the analysis, are actually correlated with certain vehicle colors (Lardelli-Claret 2002).

Furness *et al.* analyzed injury crashes in Auckland, New Zealand, between April 1998 and June 1999, in a study involving 571 cases of drivers involved in crashes in which one or more of the occupants of the car either required hospitalization or were killed, and 588 controls in the region, consisting of drivers identified by cluster sampling and selected at random. The authors found that silver cars were about half as likely to be involved in crashes resulting in serious injury as white cars, with brown, black, and green cars being roughly twice as likely as white cars to be involved in serious injury crashes (Furness 2003). In an online discussion of the paper on the *BMJ* Web site (bmj.bmjournals.com), the author noted that there is no snow in the winter in Auckland, New Zealand, and thus that the results might not be generalizable to regions differing in climate. In the discussion, several respondents wrote in with anecdotes similar to that above expressed on the *Color Matters* Web site about the visibility of silver cars, including:

I was driving my metallic silver Ford down towards Chessington Zoo in November 1978 with the setting sun behind me at about 4pm. As I slowed for the up-coming traffic lights, doing about 40 mph, a boy aged 11 yrs ran straight towards my car, dodgng [*sic*] across the road on his way from school...Driving a silver car out of the November sun meant that, for the boy, my car was invisible, camouflaged with the tarmac of the road.

Discussion

In preparing this white paper, very little information was found specifically on car color and safety. People assume that yellow is the safest color because it is used for school buses. However, when the National Conference on School Transportation chose the color at their meeting in 1939, nothing was mentioned about the expected effect on traffic safety. Similarly, many people think red is a safe and conspicuous vehicle color because fire trucks are red; again we found no research supporting this belief.

Of the two studies identified that actually sought to test the association between vehicle color and crash involvement, one found that silver cars were least likely to be involved in injury crashes (Furness 2003), and the other found that white or yellow cars were least likely to be struck by other drivers who committed infractions (Lardelli-Claret 2002). The finding that silver cars were safest was contradicted by many anecdotes of silver being seemingly invisible to other people and to animals, especially against the sunset.

When choosing a vehicle, the bottom line is that there is presently no scientific evidence supporting the selection of one particular vehicle color as the unambiguous best choice for safety.

References

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