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Temperature Variation In Parked Vehicle During Summer And Its Threats And Prevention.

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Abstract - *This paper demonstrates that when a vehicle is parked in the sun, temperature levels in the cabin of the vehicle can be more than 20°C above the ambient temperature. On a hot day in full sun, vehicle can reach dangerously high temperature exceeding 70^{0}C in response to a greenhouse effect. Parked cars and vans may create life-threatening environments for children left unattended. Maximum cabin temperatures, ranging from 41-76 degrees C, varied considerably depending on the weather conditions and the time of year. Clear days had the highest cabin temperatures, with average values of 68 degrees C in the summer and 61 degrees C in the spring. Cloudy days in both the spring and summer were on average approximately 10 degrees C cooler. Our findings indicate that even on cloudy days with lower ambient air temperatures, vehicle cabin temperatures may reach deadly levels. This paper may be used to for forecasting hazardous conditions, promoting public awareness, and to estimate past cabin temperature for use in forensic analysis, and also for its prevention[1][2][3].*

Key Words: Automobile, Temperature, Hot weather, Hyperthermia,

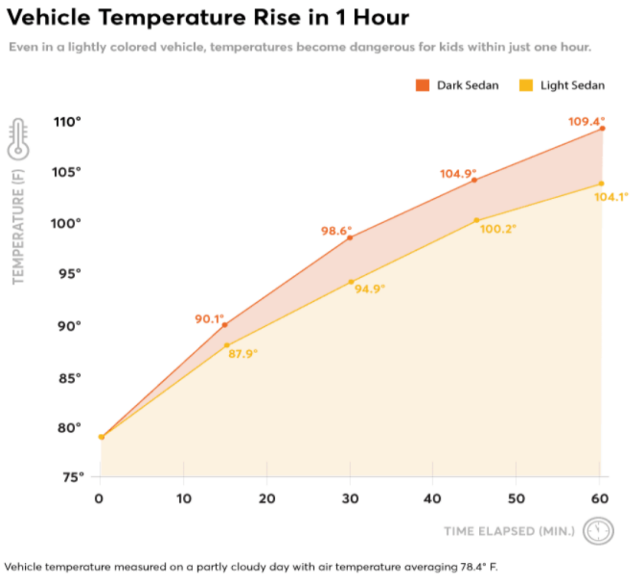
1. INTRODUCTION

Every year pets and young children die from hyperthermia after being trapped within cars. The temperature increase in the car is caused by a greenhouse effect associated with a radiation imbalance and reduced ventilation. A net radiation imbalance occurs as solar radiation can pass into the vehicle through the window but long wave radiation emitted by the car is trapped and prevented from escaping . In addition, a car without ventilation(e.g. open windows) blocks the loss of energy via. convection. Studies comparing vehicles in direct sunlight and shade reveal that cabin temperatures reached values that were 8°C–19°C greater in the sun. In this paper we suggest some prevention techniques to prevent rise in temperature in parked vehicles.[2]

1.1 Threats

Even on mild weather days, the temperature inside a closed vehicle can reach dangerous levels within an hour, posing major health risks to small children or pets left inside. Summer has officially ended, but parents and others still must be vigilant about the ongoing danger of hot cars. In some parts of the country, it can be a four-season threat, and there are tragic examples every year.[3]

"Temperatures that might seem comfortable for adults can quickly become dangerous for children," says Orly Avitzur, M.D., medical director for Consumer Reports. "And elderly passengers who can't care for themselves, or those with cognitive problems, can also be at risk if they're left in a car on even a mild day." Heat stroke is the leading cause of deaths in vehicles (excluding crashes) for children 14 years old and younger. The danger from high temperatures is particularly acute for young children because their bodies heat up three to five times faster than adults. Young children, especially babies, lack the ability to efficiently regulate their body temperature. Children dehydrate more quickly than adults. The threshold for heat stroke in children is when the internal body temperature reaches about 104° F. And a child is at serious risk of death if his or her internal body temperature reaches 107° F, according to medical experts.



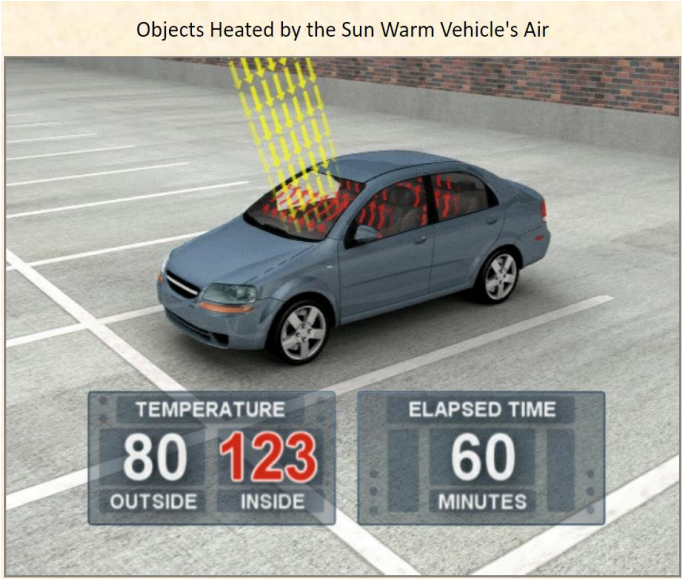
1.2 Why cars heat up?

Closed cars can get super hot quickly because sunlight heats up elements inside, such as the dash, upholstery, steering wheel and more. Those elements radiate their heat into the air, increasing the ambient temperature inside the car. This phenomenon -whereby the inside of a car gets really very hot, much hotter than the outside -is known as the GREENHOUSE effect.

This is what happens. Sun light travels from the sun in the visible part of the spectrum (i.e. we can see it!) and strikes the inside surface of the car. The sunlight is absorbed by the

surface of the car (say the dashboard and the carpet) and since radiation is energy, the absorption of the visible radiation causes the surface that is struck to heat up. Now---- and this is the key part---- EVERY OBJECT emits energy at a wave length that is a function of the temperature of the object. Human beings around 100 deg F emit radiation in the INFRARED part of the spectrum. The human EYE cannot see this emitted radiation unless one uses special Goggles that enable this radiation to be converted to a range that the eye CAN see. In fact, this principle is the basis for NIGHT VISION goggles. Also SNAKES that catch rodents in the desert at night have such IR heat sensors!!!...

At any rate, sunlight falls on the carpet of your car and then the carpet RE RADIATES that, the absorbed visible (short wave length) energy in the IR (long wave length) part of the spectrum. BUT water vapor and CO_2 in the air in your car will ABSORB this re-radiated IR energy (the water and CO_2 is transparent to the incoming visible radiation) and so the heat gets trapped in your car. This is because the incoming visible light gets absorbed and re-radiated at longer wave lengths and these long wave lengths are TRAPPED by the small amount of water vapor and co2 present in the car



1.3 Physics

In simple terms this is a greenhouse problem in which the solar radiation entering through the windows of the vehicle is partially trapped inside the cabin of the vehicle. What actually happens is much more complex. Incident or indirect radiation from the Sun is partly reflected and partially transmitted from all external surfaces of the vehicle. Radiation (of all wavelengths) hitting the external metal surfaces is either reflected or absorbed (being opaque to all wavelengths). Glass is however transparent to light (short wavelength) radiation, but opaque to thermal (long wave length) radiation, so that the primary heat input into the cabin during daytime is sunlight transmitted directly through the windows; there is little sunlight absorption in the glass. This light radiation is subsequently absorbed (and thus converted into heat) by the dashboard, the seats and the floor of the vehicle. Furthermore, since almost all of the (short wavelength) light radiation entering the vehicle is absorbed and the windows as well as the vehicle interior are opaque to the (long wavelength) heat radiation thus generated, we have radiation trapping; the heat loss from the cabin occurs through other mechanisms. Convection currents generated within the vehicle by differential surface heating redistribute the heat to the air within the cabin. It is of course this air cabin temperature that is our primary focus. Heat losses from the vehicle occur by conduction (primarily through the roof and windows of the vehicle) combined with convective exchanges with the environment from all external surfaces. Also, and importantly, heat exchanges can occur because of the leakage of hot air from the vehicle cabin into the environment especially through any open windows. All the above heat exchanges are strongly effected by prevailing climatic and local weather conditions.[2]

2. PREVENTION

Temperatures harmful to the body with prolonged exposure, but they can provide unnecessary wear and tear on a vehicle. Fortunately, with the proper precautions there are many ways to keep a car cool in the summer sun.

One method that is somewhat handy and completely free is leaving blankets on the seats while the car is not in use. The blanket will be exposed, but the seat will be shielded from direct sunlight. Of course, the blankets will be hot when the driver and passengers return, but they can simply be tossed on the floor or into the trunk. An alternative to the blanket method is using a sunshade. Sunshades are sometimes metallic and look almost like aluminum foil stretched across the inside of a windshield. Others, especially ones designed for back seat windows, have child-friendly designs such as Winnie the Pooh on them. Their use is obvious: they keep the sun from reaching the inside of the car and heating up the seats. For cars without a sunshade, the driver should attempt to park facing away from the sun. Parking in the shade or in a garage is also highly effective and recommended whenever possible.

When returning to a car on a hot summer day, the driver and his or her passengers may want to take the time to wipe down the steering wheel, gear shift and safety buckles with water. The water will evaporate quickly due to the heat and with it some of the heat will be carried away. Another simple way to lessen the intensity of the interior is by leaving the windows open. It is foolish to leave car windows completely down. However, leaving them open a small crack – less than the width of a person's arm – can help ventilate the inside of the vehicle. If rain is expected, you can still crack the windows as long as you have window vent visors. The visors are small tinted pieces of plastic that attach to the top of a car's window. Window vent visors are also useful for reducing wind noise when driving with the windows down. About five years ago a new device with a similar use

came into the public eye: a solar car vent. The small device houses a solar panel that when triggered, powers a fan that helps to exchange hot air from inside the car for cooler air outside. Here are some tips to reduce the temperature of car during summer.

1) Use of solar wall exhaust fan or blower to extract heated air from parked vehicle

This blower shown in figure are working on the solar power. We can use solar panel and battery arrangement for run the blower. When blower is running it capable to through out the heated air outside the parked vehicle, and help to reduce temperature upto atmospheric temperature.

2) Use a sunshade or window visor

This tried-and-true method of keeping your car cool should be your go-to option to counteract hot interior temps throughout the summer. Put up a sunshade or window visor every time you exit your car for more than a few minutes. Keep it even cooler for long periods by putting a sunshade in your rear window as well.

3) Use a dash cover

A fabric or upholstered dash cover can go a long way towards making your car's interior more comfortable. You won't feel as overwhelmed by the heat if you don't have to touch hot vinyl surfaces. Dash covers also protect sensitive vinyl from sun damage that can cause cracking and fading.

4) Cover your steering wheel with a hand towel

Even if you use a sunshade, it's a good idea to cover your steering wheel with a small towel. This will help to keep the contact temperature of your steering wheel down.

5) Park in a shady area

Whenever possible, park in a shady area. If you're going to be somewhere for an extended period of time, it's worth it to walk a bit farther in order to park in the shade. You'll be happy to enter a not-so-hot car when you return from your day out.

6) Keep your precious possessions out of the sun

Any tapes, CDs or delicate items that you keep in your car should be stored out of the path of direct sunlight. Try storing your tape and CD cases underneath the seat. You can also throw a blanket over your precious possessions. If you can't find a place in your car that will conceal heat-sensitive goods, consider placing them in the trunk.

7) Park in a garage when possible

Whenever possible, park in a garage. Your car will be out of direct sunlight and will have the benefit of near-constant shade. Even a warm garage beats being parked in the sun all day.

8) Keep windows slightly cracked

While it's not a good idea to leave your windows all the way open, it *is* a good idea to leave them slightly cracked. Check to be sure that you can't fit your arm through the crack in your window. Even a small crack will promote ventilation and help to keep your car cool.

9) Purchase a solar-powered fan

Paired with cracked windows, a solar-powered fan can make your car feel downright pleasant during even the hottest summer days. These simple fans work to expel hot air from your car. By creating constant air circulation, they lower your car's overall temperature.

10) Throw blankets over your seats

If your car features vinyl or leather seats, you know just how hot these materials can become when exposed to sunlight and high temperatures. To keep car seats cool, throw blankets over them. When you return to the car, you can place the blankets on the floorboards or toss them in the trunk. Keeping your seats cool will make your car more pleasant on hot summer days.

11) Do not lock your child or pet in car during summer.

The temperature inside a closed vehicle can reach dangerous levels within an hour, posing major health risks to small children or pets left inside. So make sure that neither your child or pet getting trapped in car every time.

3. CONCLUSION

This research paper conclude that, the temperature in a parked vehicle is above 65^0C which is not suitable for younger children and pets. Though it may cause hyperthermia which may cause a death. So use above prevention methods and save the life of your loved once. Also due to high temperature the quality of inner element of vehicle may be damaged. So we have to prevent this causes.

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