# A Scientific Perspective on Why Parents Forget Children in Cars

I am Dr. David Diamond, a professor in the Departments of Psychology, Molecular Pharmacology and Physiology at the University of South Florida. I have been studying the brain and memory for almost 40 years. The challenge I am faced with as a scientist is to explain how loving and attentive parents can forget a child in their car, rendering the child vulnerable to develop brain damage or to die from hyperthermia when the car later becomes dangerously hot. In addition to leaving the child in the car, what is baffling to people is how a parent can go about their routine activities for an entire day, unaware their child remained unattended in their car. The public, the authorities, and even the parents themselves, are all bewildered as to why anyone would unknowingly leave a child in a car.

I have studied fatal memory errors involving children in cars for the past 12 years. With the aid of data collection from www.KidsAndCars.org, I have learned that hundreds of children in the US and around the world have died or suffered brain damage as a result of being forgotten in hot cars. With this substantial database, as well as my own interviews with parents that have forgotten children in cars, I have identified common features of the fatal day's events. The one aspect which is not a factor is that these children were not forgotten by parents that were reckless with regard to care for their children. This phenomenon must be explained from a brain science perspective, not one that blames parents for being negligent.

The first thing to point out is that the brain is composed of many different structures, and each structure has a different function. Two brain structures, called the hippocampus and prefrontal cortex (PFC), work together to enable us to plan to do something in the future. For example, they enable us to make the following plan when we leave home: Today, unlike most days, I'm planning on leaving home with my child, I'll drop off my child at daycare and then I'll go to work. Another brain structure, called the basal ganglia, also helps us to get to work, but it relies entirely on well-established habits. The basal ganglia has the capacity to function at a subconscious level to take us from one place to another, almost without thinking about it. When the basal ganglia is activated we function in an "auto-pilot" mode, as we follow well-established routes with minimal thought. The basal ganglia, therefore, can become engaged during a drive to generate a "habit memory" which automatically and subconsciously takes a parent on a commonly driven route.

We know from experimental studies that brain structures engage in a form of competition, in which the hippocampus/PFC system attempts to remind us what is different about today (go to daycare) but this system can be outcompeted by the basal ganglia, which attempts to take us on a route that has been followed many times before, but one that does not include going to the daycare. This type of phenomenon is actually very common, usually with little consequence. For example, we may have the plan to stop at the store on the way home from work (using our hippocampus/PFC), but somewhere en route, the basal ganglia takes charge, directing us to go

directly home, and in the process, produces a complete loss of awareness of the person's original plan to stop at the store along the way.

In the dozens of cases I have studied in which children are left in cars it appears that the basal ganglia of these parents outcompeted the hippocampus/PFC system to suppress their awareness of the presence of their children in the cars. Two factors that bias the basal ganglia to outcompete the hippocampus/PFC system are stress and sleep deprivation. It is commonly reported that on the day a child is forgotten, a stressed and sleep-deprived parent intended to follow a route to daycare, but somewhere along the drive the basal ganglia redirected the parent to drive a commonly driven route that did not include the stop at daycare. Therefore, the neurobiological basis for why parents forget children in cars is the dominance of the basal ganglia, which suppresses the hippocampus/PFC system, causing the parent to lose awareness of the child in the car as it directed the parent to drive straight to work, instead of to daycare.

It is also important to point out that these parents commonly report events of the day, including talking about their child with co-workers, and that they had to leave work on time to pick up their child from daycare. All the while, they were completely unaware their child had remained in the hot car all day. This occurs because the brain created the false memory that their plan to take the child to daycare had been accomplished. Therefore, they went about their normal daily activities because they believed their child was at daycare.

There is no doubt that competition between brain memory systems in normal, attentive parents is the basis of why children have been forgotten in cars. When the basal ganglia outcompetes the hippocampus/PFC system we subconsciously make fatal memory errors. This is a phenomenon that occurs without awareness in the best of parents. Therefore, we must have a system that provides a reminder to parents of the presence of a child in the backseat for that rare occasion when a child's life is in danger because parents, through no fault of their own, lose awareness of the presence of their child in the car.