

In-Vehicle Cell Phones: Fatal Distraction?

Real or potential problem?

By David G. Curry

DEBATE IN THE POPULAR PRESS regarding the issue of cell phone use on American roadways is extremely prevalent, highly vituperative and often devoid of hard data. Editorials are rife with emotional personal accounts of tragedies or near-tragedies, but suspiciously empty of facts regarding the issues involved or experimental evidence supporting the positions espoused.

The resulting public consensus is that in-vehicle use of these products presents a danger that must be addressed. The rash of legislation proposing various types of quick fixes is proof that lawmakers are being crowded into a position that "something must be done about this problem," even though real data surrounding the issue are mixed at best. In an attempt to support an alternative solution, this article cites publicly available facts and figures in order to place the problem in perspective.

Driver Distraction

Many experts agree that the manipulative or surprise effect a ringing phone may have on a driver is not the greatest potential source of problems. The critical issue is the mental load—or "driver distraction"—that conducting conversations may impose on vehicle operators (Millman).

Some would argue that cell phone users may become so engrossed in their conversations that they fail to pay proper attention to the roadway and any potentially hazardous situations that may be present.

A recent study published in the *Journal of Experimental Psychology* lends credence to this position. It showed that a subject engaged simultaneously in driving and a verbal

task (repeating the words of the experimenter) visually scanned a much smaller area outside of the vehicle than when not engaged in such a secondary task (Recarte and Nunes 31+). Performing simple spatial-imagery tasks while driving (e.g., mental rotation of letters) caused the scanned area to shrink even more. Critics cite this study (among many others) to buttress the position that any task which significantly occupies a driver's mental resources (such as talking on a cell phone) may have a negative impact on safety (by making the driver less likely to notice unexpected events) and, thus, should be addressed by legislation.

Driver distraction is a definite problem in terms of its impact on safety. National Highway Traffic Safety Administration (NHTSA) estimates that 25 percent of traffic accidents involve at least some degree of distraction on the operator's part, although only a small fraction of these involve the use of cell phones (Hurd).

Driver distraction is a long-standing concern, one that has been debated for more than 90 years. It initially appeared around 1905 regarding the potentially "hypnotic effect" of windshield wipers on drivers. The issue resurfaced in the 1930s with the advent of car radios; some experts predicted that a multitude of accidents could be expected as drivers became so involved with the program content that they would stop paying attention to the roadway.

Few of these predicted problems materialized; windshield wipers and radios are now standard equipment on all cars, and debate regarding their potential negative impact on drivers has largely disappeared during the intervening years. Most people now regard these items as part of the normal driving environment.

In recent years, the distraction issue has reappeared regarding the degree to which use of cellular telecommunications in vehicles may cause or contribute to driver distraction. The question is, is this a real problem or (again) only a potential one?

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The Impact of Cell Phones

From 1983 to 1992, the number of cell phone users in the U.S. grew from a few thousand to more than 10 million; by 2000, that total had eclipsed 100 million (and is now reportedly some 129 million) (CTIA "General Wireless FAQ"). Current estimates suggest that 54 percent of all drivers have access to cell phones in their vehicles, 73 percent of whom use them at least occasionally while on the road, and that up to 70 percent of all cellular calls are made from automobiles (Shelton; Orski). According to NHTSA, at any given time, nearly three percent of drivers use handheld cell phones (Utter).

If in-vehicle cell phone use were as dangerous as has been portrayed, one would expect that the number of traffic accidents and fatalities during this period

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of massive growth would have skyrocketed. In fact, however, the reverse is true. In 1983, the fatality rate per 100 million miles traveled on U.S. roadways was 2.6; in 1999, the rate was 1.5, a decrease of more than 40 percent (NHTSA "Traffic Safety Facts"). When looking only at injury-related accidents, in 1988, the figure was 169 per 100 million vehicle miles; in 1999, it was 120, a 30-percent drop. In short, no meteoric rise in the number of accidents or fatalities has accompanied the increase in cell phone use in vehicles; the trend has been quite the reverse (Figure 1).

Currently, 12 states track the incidence of cell phone use in relation to accident propensity. Of these, only Tennessee, Oklahoma and Minnesota have been doing so long enough to prepare reports based on the findings. In 1999, Tennessee investigated 30,994 accidents and found cell phones or two-way radios to be a factor in 48. In Oklahoma, 80,376 accidents were evaluated in 1998, with 98 found to be related to cell phone use. In Minnesota, 96,813 accidents occurred, with cell phone or CB use cited as a factor in 50. Across the three states that have been actively monitoring this "problem" for the longest period of time, cell phone use appears to have been involved in less than one-tenth of one percent of all accidents investigated (CTIA "Wireless Phones and Driving Safety").

If this same percentage rate were applied to the total automotive fatality rate for 1999, this would result in a total of 42 fatalities annually nationwide (NHTSA "Traffic Safety Facts"). To those interested in restricting cell phone use, such a loss of life is a call to action. However, to objectively evaluate any such statistic, it must be placed in proper perspective. According to National Safety Council's most-recent figures (1996), this represents roughly two-thirds of the number of people who die from being struck by lightning or approximately one-eighth of the number who drown in bathtubs in the same time frame. In short, the magnitude of the cell phone "problem" may be being drastically "oversold" to the public.

This is not to suggest that driver distraction *per se* is not a problem with regard to the number of accidents that occur each year; in fact, it is. NHTSA estimates that 1.6 million crashes per year are related to distraction—nearly 25 percent of the total (Stutts). In the author's opinion, what has been largely ignored in many public forums is that virtually any additional task performed by drivers while their vehicles are in motion (e.g., searching for street signs or highway markers, talking with passengers or mentally reviewing that day's schedule) can contribute (at least to some degree) to distraction.

According to NHTSA, more than 150,000 crashes per year are related to drivers interacting with in-vehicle entertainment systems (Kobe 30+). The absence of any large-scale effort to remove such systems from motor vehicles suggests that the driving public believes these systems are acceptably safe for use on the road and has assumed responsibility for deciding when and where it is appropriate to perform tasks involving them. Drivers recognize that



they must take their eyes off the road to operate these systems and, therefore, that some minor degree of risk is imposed by their use. Most people simply adjust behavior accordingly (e.g., do not search for a new CD while in heavy traffic or while traveling at high speed). This same approach should be taken with respect to cell phones and any other tasks commonly performed while driving.

Therefore, the issue that must be addressed before the cellular “problem” is targeted by legislation is not whether cell phone use in a vehicle distracts the driver. The real issue is whether such use is significantly more distracting than other tasks that the public as a whole currently regard as “acceptable” behavior behind the wheel.

Level of Distraction

Perhaps not all people would agree on what is and is not acceptable; recent surveys of activities commonly performed behind the wheel included such activities as putting on makeup, shaving, reading and inserting contact lens. However, some reasonable baseline should be identifiable (Response Insurance; “Traffic Safety Facts”). In the author’s opinion, singling out cell phones for special legislative and law enforcement attention, should they be determined to be as or less distracting than other normal driver behaviors, would be unreasonable as well as of limited value in increasing driver safety.

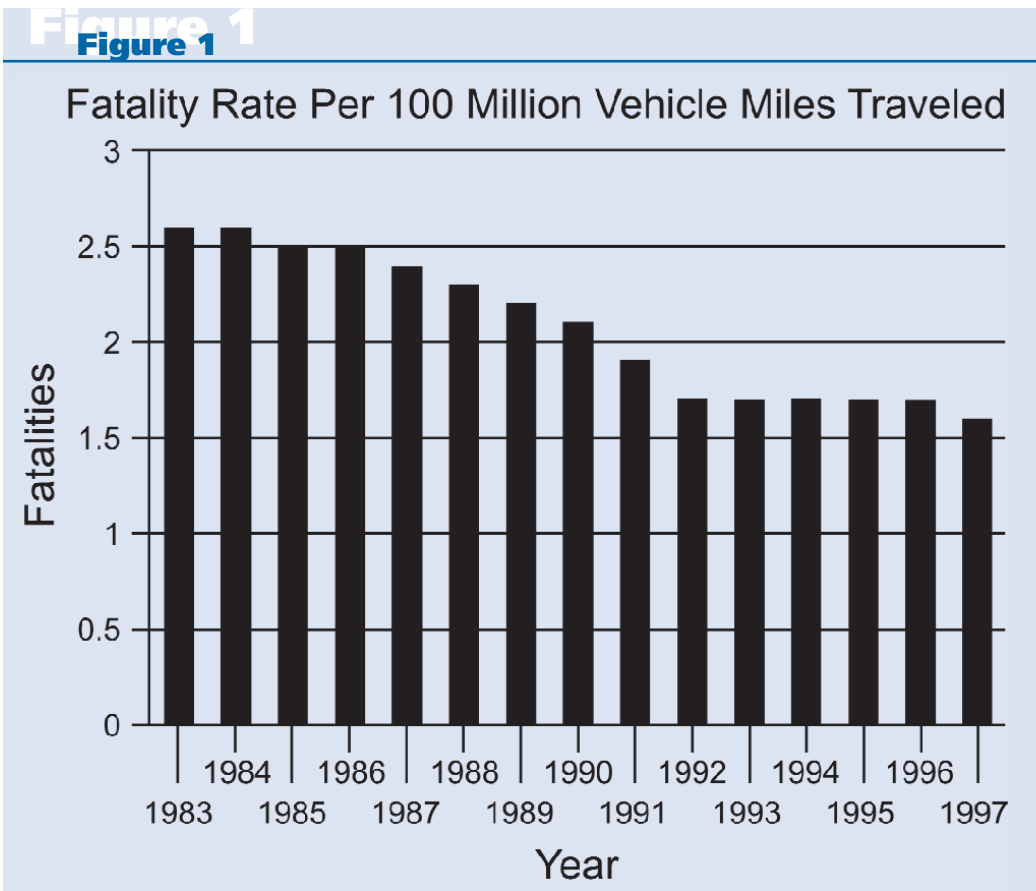
To illustrate this point, a 1993 study conducted at the University of Michigan’s Transportation Research Institute ranked, on a 10-point scale, the relative distraction of several tasks commonly performed by drivers. Changing tapes in an in-dash audio unit was found to impose more distraction than talking on a cell phone, and reading a map (the most-distracting task) was found to be nearly twice as distracting. In a 1995 survey of Honolulu law enforcement officials, taken at the request of the Hawaii state legislature, cell phones were seen as less hazardous than such common distractions as noisy children, unrestrained pets and smoking behind the wheel (CTIA “Wireless Phones and Driving Safety”).

Another study conducted by the National Public Services Research Institute compared the impact of placing cellular calls, conducting simple and complex cell phone conversations, and tuning a radio (searching for a particular program) on a task similar to driving a car. Results indicated that all four tasks affected operator performance, with simple conversations being significantly less distracting than either complex ones or radio tuning (which were roughly equivalent) (McKnight). From a legal standpoint, the radio-tuning task has long been the benchmark for an acceptable level of in-vehicle distraction, and it appears many phone conversations do not exceed this in terms of their impact on driver

performance. These results must be placed in perspective, however. The Cellular Telecommunications and Internet (formerly Industry) Assn. reports that the average cellular conversation lasts slightly longer than two minutes, while few radio-tuning events last that long.

An often-cited study, published in the *New England Journal of Medicine (NEJM)* in 1997, examined traffic accidents experienced by cell phone users in Toronto. It suggested that driving while using a cell phone resulted in a risk of having an accident four times as high as that of driving by itself; according to the researchers, this was roughly the same level of impairment as driving with a blood alcohol level high enough for one to be arrested in most states (Redelmeier and Tibshirani).

Interestingly, however, no significant difference was found in impact between calls that were made less than one minute prior to the accident



ASSE Recommendations on Driver Distraction

In addition to drivers following the rules of the road, ASSE recommends that the private sector take more responsibility for promoting safe driving techniques and offers five suggestions to achieve that goal.

1) Increase public outreach to reinforce the fact that a driver's first responsibility is the safe operation of a vehicle—this includes school-based driver education, which has been drastically reduced in recent years.

2) Evaluate employers' current practices, and create and enforce written guidelines addressing employee use of electronic devices while driving.

3) Proactively train employees about appropriate operation of electronic devices.

4) Encourage research by the automotive industry and manufacturers of electronic and other devices that are routinely used in vehicles to improve designs and functions to eliminate driver distractions.

5) Improve driver education—a significant component in securing safety on the roadways and in addressing the hazards of using cell phones while driving. Driver education should include training about eliminating or minimizing driver distractions and should show the horrendous effect even a slight distraction can have—such as a death or sustaining a lifelong injury, including brain damage—when an accident occurs.

and those made from one to five minutes before the accident. Since the average cell phone call lasts only slightly more than two minutes, many (if not most) calls made during this earlier period would have been completed before the accident occurred. This strongly suggests that the source of any distraction involved in the accident was not a function of the use of the phone itself, but rather the diversion of the driver's attention from the roadway to the subject of the conversation—a distraction that likely continued after the call was completed. Such distraction is present regardless of whether the driver is actively engaged in a phone call or not; simply focusing attention on some topic while driving could produce this effect. Since most drivers do not devote their entire attention to the driving task, such a condition may unfortunately be more or less the normal state of affairs.

At this point, one must consider what effect a total ban on in-vehicle cell phones could possibly have on whether a driver is more involved with the roadway than with some unrelated event about which s/he is thinking. As one of Redelmeier and Tibshirani's colleagues said, "Society has long been prepared to say, 'Don't drink and drive.' I do not believe that we are ready to impose the requirement, 'Don't think and drive'" (Cohen). Furthermore, this raises the question of which activity produces the greater degree of distraction: placing a call from a moving vehicle and quickly resolving an issue, or spending an extended period of time thinking about it while driving. No studies to date have attempted to examine this aspect of the problem.

Another critique of the *NEJM* report regards the timing of the accidents. The authors' used three sources for accident time of occurrence: subject statements, police reports and calls to emergency services. When sources differed, the earliest time was used. Since at least two of these sources are highly related (police reports normally rely on subject statements since officers are rarely at the scene when an accident occurs), and all stem from estimates made by individuals in a less-than-ideal frame of mind (due to the accident), the actual time of occurrence may have varied more than the study's authors would have liked. Therefore, a significant portion of the calls placed around the time of the accident may have actually occurred as a result of the accident, rather than being an underlying cause of them.

Furthermore, a study recently released by the Harvard School of Public Health has called into question the levels of risk reported by Redelmeier and Tibshirani (Lissy, et al). According to the Harvard report, the risk associated with having a fatal accident while driving and using a cell phone is on the order of 6.4 in a million per year (roughly one-fifth that of driving for half an hour 12 times per year with a blood alcohol level of 0.10). This is only four times the risk associated with driving once per year for 60 miles on a noninterstate rural roadway, or less than one-fourth of the risk associated with driving a smaller car rather than a larger

one. The risk of being struck and killed in one's own car by another driver using a cell phone is 1.5 in a million per year—less than 10 percent of the level of risk associated with either being killed by a driver with a blood alcohol level above 0.00, or of being killed in a crash with a large truck (Lissy, et al).

Another study, conducted at the University of North Carolina under AAA sponsorship, lends credence to the Harvard research. In the UNC study, some 32,000 accidents were analyzed to investigate the causes and effects of driver distraction. One of the most-telling pieces of evidence to emerge from the study were the percentages of accidents associated with specific sources of driver distraction: outside person, object or event, 29.4 percent; adjusting the radio, 11.4 percent; other occupants, 10.9 percent; moving objects in the vehicle, 4.3 percent; climate controls, 2.8 percent; eating/drinking, 1.7 percent; *cell phones*, 1.5 percent; smoking, 0.9 percent; and other or unknown distractions, 34.2 percent (Stutts, et al 4).

The researchers acknowledge that these percentages are preliminary and may rise, but one has no reason to suspect that the relative positions associated with the different sources of distraction will change. Assuming that they remain constant, this reinforces the conclusion that cell phone use is far less "dangerous" than many other more mundane tasks routinely performed behind the wheel. If one assumes the stance that in-vehicle cell phones are inordinately dangerous due to the degree of load they impose on the driver, then logically any task with greater impact must be commensurately more dangerous and should also be forbidden. Judging from the data presented, this would lead to the elimination of multi-passenger vehicles as well as those equipped with radios, side windows or air conditioning/heating.

Hands-Free Operation

Beyond mental distraction, the potential impact of the task of manipulating the phone while driving is also cited as a concern. Several U.S. cities and states (notably New York), as well as some foreign

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countries, have either passed or are actively considering legislation banning the use of handheld cell units in vehicles, while still permitting so-called “hands-free” operation.

The logic behind this position is difficult to understand. NHTSA’s stance is that the critical issue regarding cell phones is driver distraction rather than occupation of a driver’s hands; the agency estimates that only eight to 15 percent of cell-phone-related crashes occur while manipulating the phone (NHTSA “Safety Implications”). Why is it that no other manually intensive task (such as eating, drinking, lighting a cigarette or tuning a radio) is under similar scrutiny by lawmakers? These tasks impose similar or even greater manipulatory burdens on the driver. Even the *NEJM* study observed no significant difference in the accident rates of hands-free versus handheld phones, although hands-free units were associated with slightly more accidents (Redelmeier and Tibshirani).

In fact, the use of some hands-free units may result in even more “eyes off road” time than traditional handheld units. Typical kits provide an in-vehicle mount for the phone with a speaker and a remote microphone, usually concealed in the windshield’s headliner. Users often operate in a “head down” mode when speaking or listening to the phone, following the natural propensity to speak and look toward the source of sound during conversation.

In addition, legislative mandates for hands-free operation may backfire on supporters, should users assume that such systems eliminate any problems with their operation and, consequently, increase call frequency or length. Further research assessing the benefits of hands-free systems should be conducted

before mandating their incorporation into vehicles in a well-meaning attempt to address what may well be more of a theoretical than an actual problem.

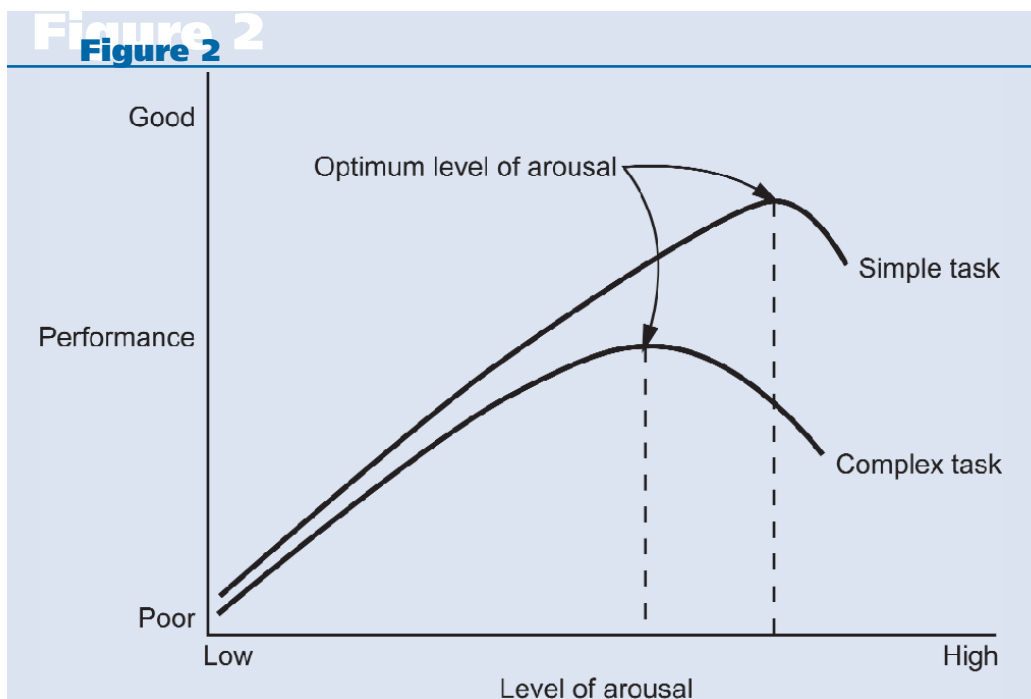
A related problem stems from legislative efforts to ban cell phone use in vehicles; such efforts largely ignore the beneficial aspects of in-vehicle communications. The most-often-cited benefit involves the ability to request emergency services or report accidents or crimes (almost 118,000 calls a day are made to 911 or other emergency numbers from wireless phones) (CTIA “General Wireless FAQ”). Many less-obvious benefits must be recognized as well.

For example, according to cell phone critics, any increase in driver workload necessarily has a negative impact on performance. One of the earliest findings in the field of experimental psychology, the Yerkes-Dodson Law, suggests this is not always the case (Figure 2). A person’s performance on any type of task is highly dependent on his/her degree of mental arousal, usually a function of the level of workload currently being experienced. While extremely high levels of mental workload do lead to decreased levels of performance, it is also true that too low of a level can produce a substantial negative impact (Wickens, et al 383-84).

For any task, there is an optimal level of workload that maximizes performance. This is why many systems that require continuous monitoring for infrequent events (e.g., radar scopes) have built-in “false alarms” to help maintain operator vigilance. Driving, in and of itself, is not usually a highly taxing task for most people. If total workload (arousal) drops below a certain point, performance begins to degrade substantially; those who have taken long drives through boring terrain are intimately familiar with this phenomena. Thus, it is possible that the slight extra load imposed by conversing while driving may have a net positive effect on driving performance in such situations. Several research studies have shown indications of this effect, at least in the case of light conversations.

Conclusion

While some degree of risk is associated with in-vehicle cell phone use, the current state of knowledge regarding its level does not indicate that it is significantly greater than that experienced during the course of normal driving while performing other socially acceptable in-vehicle tasks. Before legislative or legal action is taken, research is needed to examine the impact of the entire spectrum of tasks performed while driving, as is



a common "yardstick" with which to measure them and a scale against which to compare them. If in-vehicle cell phone use is shown to impose significantly more of a load on a driver than the range of other acceptable behaviors, then additional action is likely warranted (although the nature of such action is unclear at this point).

Legislation designed to limit in-vehicle cellular communications that does not take into account current development programs underway at the major automakers is also ill-advised. Many manufacturers are developing revolutionary new products such as adaptive cruise control systems (in which a vehicle will maintain a preset following distance behind another car, applying the brakes as necessary); lane departure warning systems (where drivers are alerted when approaching or crossing lane boundaries); and forward collision warning systems (where drivers are alerted automatically of forward obstacles in the roadway). Such devices address the primary effects of driver distraction—lane position variability (weaving back and forth within the lane); speed variance (decreases of 5 to 8 mph); and failure to detect forward obstacles. Is it reasonable then to forbid drivers to operate cellular or other devices in vehicles that are equipped to compensate for driver distraction regardless of its cause? This point is particularly true should vehicles equipped with such systems prove to be safer regardless of the level of driver distraction than conventional vehicles driven by nondistracted drivers.

If in-vehicle phone use is not shown to have a greater impact than other tasks, perhaps the best approach for dealing with driver distraction as a whole is a program of education combined with vigorous enforcement of existing laws. Cellular service providers and others have developed campaigns to educate drivers about the potential impact of cell phone use on reaction time to unexpected events. These initiatives urge drivers to increase following distances; limit the duration and nature of calls; not take notes while driving; and place calls when current conditions do not demand full attention.

Such programs could be augmented by efforts of the state and federal departments of transportation, which could encompass all sources of in-vehicle distraction. Existing laws in most jurisdictions require operators to maintain full control of their vehicles at all times. Such laws already apply to cell phone users, should their distraction levels increase to the point where it negatively affects their driving; however, they should also be applied to anyone not maintaining proper vehicle control—regardless of cause. Such enforcement would serve to increase public awareness that any distraction can affect performance. Violations of such laws could and should be prosecuted in an expeditious manner and would serve to reinforce the educational programs. Ideally, the end result will be a heightening of driver situation awareness and overall roadway safety—something not likely to result from legislation targeted solely at cell phone use. ■

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