



## Cell Phones in Public Transportation: Why Rules Aren't Enough

DEKRA

On a clear September afternoon in 2008, a commuter train made its way north from downtown Los Angeles toward Ventura County. The commuter train carried 222 passengers, many of them on their way home from work. About 40 minutes into its journey, the train departed the Chatsworth station. Little over a mile later, the commuter train failed to stop at a red signal. Proceeding onto a single track at over 40 mph, the commuter train collided head-on with an eastbound freight train. The resulting crash and derailment killed 25 people, including the commuter train's engineer, and injured 135 others.

While the official investigation into the accident is ongoing, phone records show that the engineer of the commuter train had been sending and receiving text messages in the moments leading up to the accident. The last text was sent just 22 seconds before impact. Investigators now believe that text messaging played a significant role in the worst U.S. train disaster in more than a decade.

Unfortunately, the Chatsworth disaster is by no means an isolated event. Cell phone use has played an increasing role in public transportation incidents since cell phones have come into use. For instance:

- In May 2002, a coal train engineer who was talking on his cell phone failed to stop his train before it ran onto another track, resulting in a head-on collision with an intermodal train. The engineer of the intermodal train was killed.
- In November 2004, a bus driver talking on a hands-free cell phone ran his 12-foot high bus into a 10-foot high bridge. The driver saw neither the warning signs nor the bridge itself before the impact, and he did not apply any brakes. Eleven students were injured, one of them seriously.
- In May 2009, a 24-year-old trolley operator in Boston ran a red light while he was text messaging and crashed into another trolley, injuring 49 people.

What's most puzzling to safety and public transportation officials is that the use of personal cell phone devices continues despite rules prohibiting their use. Each new event prompts calls for additional laws and policies, yet the behaviors continue. The answer to this troubling trend lies in understanding the complexities of human — and organizational — behavior. Seasoned safety professionals know that immediate demands or consequences (good and bad) are a stronger influence on employees than rules or policies. When organizational consequences are poorly aligned with standards and law, deviation from their use is not far behind.

Understanding this gap, and why it happens, is essential to creating compliance with cell phone law and preventing disastrous incidents. This article explores why transportation employees continue to use cell phones, despite their known dangers and prohibitions against their use on the job, and offers transit leaders practical suggestions for addressing it in a more proactive way.

## Cell Phones in Transportation

Concerns about the safety of cell phone use during the operation of vehicles have increased in proportion to the explosion of cell phones as ubiquitous personal devices. The United States has seen cell phone subscriptions increase from 5 million in 1990 to 263 million in 2009. Worldwide, cell phone subscribers totaled some 2.6 billion in 2007<sup>1</sup>.

With estimates of cell phone use in vehicles ranging from 5% to 8%<sup>2</sup> at any given time, one can reasonably surmise that over 13 million people in the U.S. and 10 times that number around the world are dialing, talking, or texting while driving a car right now<sup>3</sup>.

The evidence clearly shows that using a mobile phone while operating motor vehicles impairs performance. Drivers using cell phones have difficulty maintaining lane position, predictable speed, and following distance. Reaction times increase with cell phone use, and spatial judgment is impaired<sup>4</sup>.

This impaired performance translates into increased accident risk. In one study, researchers found that accident-involved drivers who were using a mobile phone at the time of the accident were nine times more likely to be involved in a fatal accident<sup>5</sup>. Another study reported that individuals using a mobile phone when driving are four times more likely to have a crash that will result in hospital attendance<sup>6</sup>. A 2006 study by the NHTSA<sup>7</sup> concluded that dialing a phone creates up to a five-fold increase in crash risk, while simply talking and listening creates up to a two-fold increase in crash risk.

This problem takes on unique characteristics in public transportation: Responsibility is greater, the risk exposure is greater, and the severity potential is greater. Engineers, operators, and conductors have a greater responsibility than operators of personal cars. They are acting as agents of public transportation and have ethical and legal responsibilities to protect the public that heightens the importance of minimizing exposure.

The job characteristics in public transportation alone create greater risk than someone driving a personal motor vehicle. Railroad engineers, train operators, and bus drivers work in isolation, doing routine work with a lack of mental stimulation over longer periods of time relative to automobile drivers.

The severity potential is greater. Trains are heavier than personal motor vehicles. They carry more people than passenger cars. Train accidents can kill, and have killed, dozens of people at a time.

## The Problem with Rules

As concerns about the safety of cell phone use has grown, along with evidence pointing to the validity of those concerns, so too have the regulations. Today, 18 states plus Washington, D.C. ban school bus drivers from using cell

phones while driving. Two more states allow phone calls, but prohibit school bus drivers from texting while driving<sup>8</sup>. No US federal law bans railroad employees from using electronic devices while working, however, California banned train operators from using cell phones while on duty shortly after the Chatsworth accident in 2008.

Companies are starting to implement their own policies banning cell phone use. In May 2008, the Massachusetts Bay Transportation Authority banned employees from using cell phones while operating motor vehicles. Following an accident a year later, they banned train operators and bus drivers from carrying cell phones while on duty. Similarly, Veolia Transportation prohibits its engineers from using cell phones while working, requiring that devices be turned off and out of reach<sup>9</sup>.

These rules and regulations play an important role in setting expectations and standards and raising awareness. Without them, we are asking people who haven't seen all the research and who don't have access to all the information they need to use their discretion to determine what is safe. Rules and regulations also sanction protective behavior that might otherwise be difficult. Unfortunately, rules and regulations are not sufficient. People don't always follow rules, and accidents still happen. In order to prevent cell phone-related accidents in public transportation, we need to understand the reasons people break the rules, so that we can address the problem holistically. This requires an understanding of human behavior.

## Understanding the Rule-Behavior Disconnect

It is relatively easy to determine how things should be done; the hard part is leading in a way that ensures things are actually done that way. Most of us are all too familiar with the gap between the ways we would like to behave and how we actually do behave. We know we would like to lose weight, devote more time to our families, be more patient, and get our important errands done. Nevertheless we often fall short of doing what we intend. The same gap appears in organizations. The way we intend things to be done often differs from how they actually get done. This gap is so much a fact of organizational life that most of us have adapted to it and accept it as inevitable. Yet, in cases where the intention is to prevent exposure to accidents and injury, closing this gap is an imperative.

Why do people persist in using cell phones on the job despite it being against all the rules? It's tempting to blame workers; their individual behaviors are within their direct control. But analysis of the circumstances in which people use cell phones reveals surprising systems influences. In this case, the systems include family and social systems, in addition to organizational systems.

Applied behavior analysis (also known as ABC analysis) sheds light on the difficulty of behavior change and provides tools for making behavior-change efforts successful. Derived from psychology, it provides a powerful methodology for understanding, measuring, and influencing behaviors of all kinds. Research in education, clinical psychology, and organizational improvement all demonstrate the effectiveness of applied behavior analysis as a tool for improving behavior.

Applied behavior analysis dissects a behavioral event, such as the use of cell phone while driving a train, into three elements:

- Behavior: An observable act.
- Its antecedents: The events or circumstances that precede and trigger a behavior.
- Its consequences: The results following the behavior, including any event or change.

Using ABC analysis to understand behavior starts by pinpointing a behavior that we are interested in: a specific behavior, performed by a specific person, in a specific situation. Next, we list the antecedents and consequences associated with that behavior. Finally, we evaluate each consequence on three characteristics:

- Positive or Negative: Positive consequences make the behavior more likely to recur.
- Sooner or Later: The closer they are connected to the behavior, the more powerful they are.
- Certain or Uncertain: The reliability of the consequence influences how quickly the behavior develops and how quickly it fades after the consequences change.

The biggest, most powerful consequence controlling the texting behavior described in Table 1 is the immediate, positive, social reinforcement of connecting with someone. The engineer feels excited, energized, even loved. The engineer has someone to think about, making him feel less isolated. These positive social consequences far outweigh the very weak negative consequences – getting caught, being

injured or killed in an accident, and/or injuring or killing others in an accident. These negative consequences are weak because they are rare outcomes relative to the number of times someone can use a cell phone without suffering any negative consequences.

Besides the personal factors related to this engineer, this analysis also points to several barriers that complicate the issue: the lack of understanding of the unique risk associated with texting while operating the train (as distinguished from the radio, for example); lack of agreement that the risks apply to this particular engineer; cultural norms; the design of the cell phone; and the working conditions in the cab of a locomotive. These are all very significant barriers that could be addressed as part of the solution.

## Changing Behaviors

The solution is to change the Antecedents and Consequences to reduce the chance of an undesired behavior and increase the chance of a desired behavior. In this case, the desired behavior is undivided attention to the driving/operating task. If we want to impact this problem, we need to improve the antecedents, align the consequences, and remove barriers to performing desired behaviors.

**Improving antecedents** • If an organization does not have a policy prohibiting cell phone use while operating motor vehicles, this can be one of the most helpful antecedents to put in place. This should be accompanied by an awareness campaign that educates people about the risks, and reinforces their moral responsibility for the safety of their passengers. Organizations should be prepared to explain why using cell phones while driving is riskier than using a 2-way radio to communicate with crew members in brief stints about the job. Improving the antecedents is not enough to change persistent behavior, but it sets the stage for it.

**Align the consequences** • The most important thing an organization can do to change cell phone behavior is to neutralize the powerful social consequences when someone makes a call and replace them with positive consequences for the desired behavior: undivided attention to the task. What if the people on the other end of the call refused to talk to someone who is driving? What if cell phones could be designed so that they work in emergencies but not otherwise?

Feedback is another very powerful social consequence that could be used to reinforce for operators and engineers the desired behavior, which is attention to the driving task. Technology exists to monitor driver attention, and family members, co-workers, managers, and even passengers

ANTECEDENTS	BEHAVIOR	CONSEQUENCES	EVALUATION*
In very familiar territory; conditions are good.	Engineer sends text message to friend while operating a train.	Receives message back right away.	S C +
Thinking about friend and wants to invite her to dinner; concerned he will forget if he waits until later.		Feels happy and excited, looking forward to his date.	S C +
Cell phone is nearby and available.		Can start thinking about and planning his date for the rest of the shift.	S C +
Works alone with little social interaction.			
Does not believe he will get caught.			
Believes that rules are for other people.			
Bored and would like to break up the monotony.		Escapes monotony and boredom.	S C +
Aware of train accidents related to texting, but doesn't believe texting carries any special risk that applies to him.		Gets caught.	S/L U -
Peers text at work too.		Gets injured or killed in an accident.	S U -
Has seen his supervisor look the other way with regard to cell phone use while operating a train.		Injures or kills others in an accident.	S U -
Doesn't believe that texting involves any different risks than operating the radio, and operating the radio is part of the job.			

could learn to deliver effective feedback for both attention and inattention. If we can get any of these things to happen reliably, we can prevent every accident caused by cell phone-induced driver inattention.

**Remove barriers to the desired behavior** • In some cases, safe execution may be difficult or impossible because of the limitation of training or knowledge, the configuration of work systems and schedules, or even lack of communication. Some organizations may need to establish alternate communication channels for relaying urgent messages that the driver receives at a time when he or she can give their attention to it safely. They can create contingency plans for drivers and engineers who need to manage personal emergencies. Other organizations may benefit from driving safety assessments and specialized training to help bus and railroad operators focus their attention.

## Conclusion

Managing the risks associated with personal communication devices takes more than implementing more rules and policies. Given the complexities of human and organizational behavior, such measures only function to the extent that they provide positive consequences for following them. Using a behavior-change model that seeks to understand the environment that rules are used within can help transit organizations better align intention with practice, not just in the area of personal devices, but in any “precursor” area that puts the public at-risk of serious harm.

1 These numbers were pieced together from a variety of sources: <http://www.wiareport.org/index.php/11/patterns-of-inequality-in-technology-access-1995-2005>; <http://www.theodora.com/wfb/>; [http://www.etforecasts.com/products/ES\\_cellular.htm](http://www.etforecasts.com/products/ES_cellular.htm); and <http://www.infoplease.com/ipa/A0933563.html>

2 Source: <http://www.edhat.com/site/tidbit.cfm?id=638>

3 Source: <http://www.nhtsa.gov/staticfiles/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/810977.pdf>

4 Royal Society for the Prevention of Accidents (2002). The Risk of Using a Mobile Phone While Driving. [www.rospa.com/roadsafety/info/mobile\\_phone\\_report.pdf](http://www.rospa.com/roadsafety/info/mobile_phone_report.pdf).

5 Violanti, J. M. (1998). Cellular phones and fatal traffic collisions. *Accident Analysis and Prevention*, 30(4).

6 McEvoy, S. P., Stevenson, M. R., McCartt, A. T., Woodward, M., Haworth, C., Palamara, P. and Cercarelli, R. (2005). Role of mobile phones in motor vehicle crashes resulting in hospital attendance: a case-crossover study. *British Medical Journal*, 331;428. Originally published online 12 Jul 2005; doi:10.1136/bmj.38537.397512.55.

7 Klauer, S.G., Dingus, T. A., Neale, V. L., Sudweeks, J.D., and Ramsey, D.J. (2006). The Impact of Driver Inattention On Near-Crash/Crash Risk: An Analysis Using the 100-Car Naturalistic Driving Study Data. NHTSA. Report No. DOT HS 810 594. Retrieved from: <http://www.nhtsa.dot.gov/staticfiles/DOT/NHTSA/NRD/Multimedia/PDFs/Crash%20Avoidance/2006/DriverInattention.pdf>

8 Source : [http://www.ghsa.org/html/stateinfo/laws/cellphone\\_laws.html](http://www.ghsa.org/html/stateinfo/laws/cellphone_laws.html)

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