RISK AVOIDANCE: Calling the Right Plays

By Ronald R. Knipling, Safety Researcher & Consultant

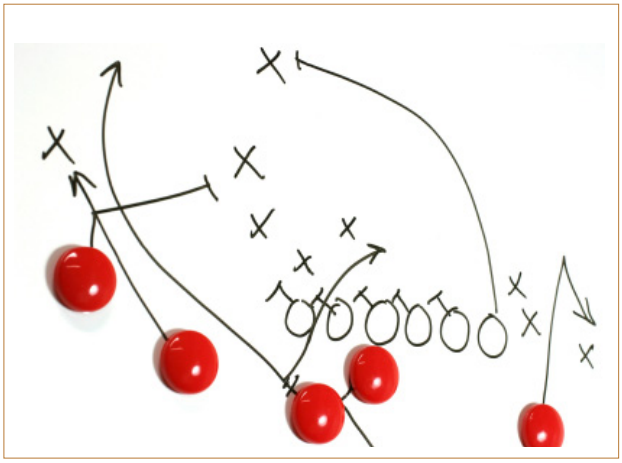
Conceptually, there are two broad ways that football coaches improve their teams' performance and win games. The first is to field the best possible team. A team's most important assets are its players. Much of team management and coaching involves selecting and recruiting the best players, keeping them healthy and fit, and training them in the techniques of their positions and specific plays. Putting the best team on the field is the primary key to winning. But there is also a second skill in coaching success: making the best decisions during the game. This includes making the best player substitution decisions and calling the right plays. If two teams are equally talented and prepared, the coach making the smartest "deployment" decisions on game day is likely to win the game.

The same two conceptual strategies apply in other spheres of operational management. The history of warfare, for example, is full of military campaigns where one side had stronger "assets," but the other side won the day because its leaders deployed their forces better and executed the best operational strategy ("called the right plays").

In motor carrier safety management, unlike football and warfare, every team can win. Yet the same two strategies apply: (1) fielding the best assets and (2) deploying them in the most enlightened ways. A motor carrier's greatest assets are its drivers, though vehicles and facilities are important as well.

Safety Management Strategies:

1. Field the best drivers & Vehicles.
2. Deploy them in ways which minimize risk.



Driver selection, training, evaluation, vehicle/equipment maintenance, and general supervision are all fundamental to operational success. These activities cost time and money, but they are proven ways to enhance safety and a company's bottom line.

In truck safety, enlightened deployment means avoiding risk. We'll use the term *risk avoidance* to refer to any safety management policy, practice or decision which deploys drivers and trucks in ways which minimize exposure to risk factors. Multiple risk factors operate continuously and simultaneously to raise or lower the probability of a crash. Almost every crash has a proximal cause or trigger, usually a specific driver error. But errors triggering crashes occur most frequently when the situation is already risky. A truck's road and traffic environment at any given time influences relative risk profoundly. You and your drivers may not appreciate how relative crash risk changes throughout the day along with road and traffic conditions.

A Speed Paradox: Slow Travel vs. Fast Travel

We can illustrate relative risk by comparing the risks associated with different vehicle speeds. Which carries more crash risk for trucks: driving slow or driving fast? You'd probably say driving fast, since excessive speed is one of the biggest causes of traffic crashes. But this is a trick question. Let's re-phrase it. Which is riskier for trucks: slow travel or fast, efficient travel? The answer is found by comparing the likelihood of crashes and

other incidents for trucks traveling at different speeds. Naturalistic driving (instrumented vehicle) studies are a perfect method because you can compare exposure (based on a random sample of normal driving) to crash-relevant driving incidents captured in onboard recorders. After the recorder data is downloaded, crash-relevant incidents are identified from hard-braking or other abrupt vehicle maneuvers. Videos are then reviewed to confirm the crash relevance of the incidents, which may include crashes, near-crashes, and other driving mishaps.

Figure 1, from an FMCSA-sponsored Virginia Tech Transportation Institute study, compares the vehicle speed profile of a random sample of driving (representing exposure) to vehicle speeds when incidents occurred. The first bar is the profile for exposure, the second the profile for incidents. Comparing the two bars, we see that slow travel is *riskier* than fast travel! Trucks in the study were traveling at 50mph or less only 16% of the time, but 63% of their incidents occurred at these slow speeds. We can even quantify the relative risk of slow travel versus fast travel. The *risk odds ratio* is a statistical measure of the relative risk of two situations. In this data, slow travel was 8.9 times riskier than fast travel!

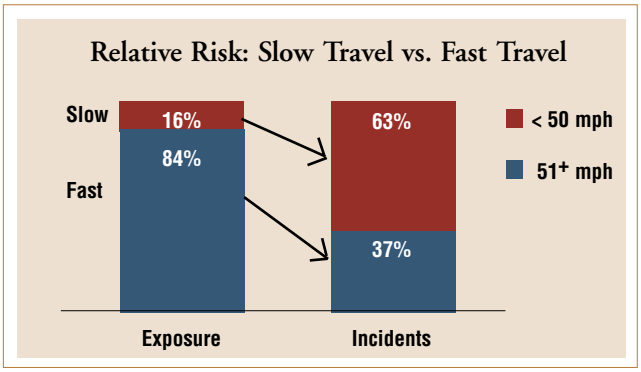


Figure 1. Relative risk: comparison of exposure and incident profiles for slow truck travel (< 50mph) and fast truck travel (51+ mph). Data source: Hickman, J.S., Knipling, R.R., Olson, R.L., Fumero, M., Hanowski, R.J., & Blanco, M. Phase 1 - Preliminary Analysis of Data Collected In The Drowsy Driver Warning System Field Operational Test: Task 5, Phase I Data Analysis, for the FMCSA under NHTSA Contract DTNH22-00-C-07007, TO #21, September 30, 2005.

[1] The risk odds ratio was derived as follows: (63%/16%)/(37%/84%) = 3.94/0.44 = 8.9.

I call this the speed paradox. Even though excessive speed is a major cause of serious crashes, most safety incidents occur when large trucks are traveling relatively slow. To understand this, think about all the situations where trucks must drive slow compared to when they can drive at regular highway speeds. Slow travel is associated with heavier traffic, undivided roads, closer proximity to other vehicles, traffic signals, crossing traffic, and geometric constrictions like narrow lanes, curves and ramps. All of these road situations increase risk. In contrast, fast travel usually means smooth flow. An ideal highway safety situation is when all vehicles are traveling at reasonably fast, uniform and legal speeds.

Efficiency ≈ Safety

The speed paradox illustrates a more general safety principle, which may also seem paradoxical: Efficient travel usually means safe travel. Inefficient driving conditions elevating risk include dense traffic, undivided roadways, frequent intersections, construction zones, curves, hills and adverse weather. Whenever your drivers can avoid such situations, they are avoiding crash risk.

What about operational inefficiencies? Excessive loading/unloading wait times, inefficient scheduling, empty back-hauls, unused trailer capacity, drivers getting lost, vehicle break-downs – all of these are operational sources of inefficiency and safety risk. They all increase risk exposure without increasing production.

Putting Risk Avoidance into Practice

It's one thing to identify risk factors in research studies; another to avoid risk in real operations. Trucks have to go just about everywhere at just about any hour. But you do have choices. In dispatching and routing, look for every way possible to avoid traffic, congestion, bottlenecks, and construction zones. Whenever possible, choose the route with the smoothest sailing, even if it may take a little longer. Identify your risk factors and make risk avoidance an operational practice.

SOME CRASH CAUSE & RISK VARIABLES

Crash Characteristics; e.g.,

- Crash type (e.g., rear-end, lane change, etc.)
- Single- vs. multi-vehicle
- Severity (e.g., DOT-reportable?)
- Preventability
- Principal driver error/other proximal cause
- Violation(s) charged

Conditions of Occurrence; e.g.,

- Month, day-of-week, time-of-day
- Weather, road surface condition
- Light condition (dark vs. light)
- Urban vs. rural
- Divided (with median) vs. undivided roads
- Work zone?
- Terminal yard, service area?
- Curve?
- Steep grade?

You can start by learning more about the characteristics and causes of large truck crashes. Crash statistics and research reports are available on U.S. Department of Transportation (e.g., FMCSA, NHTSA) and state DOT websites. Medium-to-large companies can also analyze crash risk within their own operations. Maintain a database or spreadsheet with standardized data on all your crashes, not just those that are DOT- or police-reportable. More data means more reliable statistics and better understanding. The textbox lists some key causal and risk-related crash variables. A detailed crash and risk analysis system for motor carriers is available for free download on my website (www.safetyforthelonghaul.com).

To truly understand your operational risk, you need exposure data. Comparing your crash statistics to your exposure statistics for any factor tells you the relative risk associated with that factor. For any factor, you can assess relative risk by simply dividing its crash percentage by its corresponding exposure percentage. You may have more fleet exposure data at your disposal than you realize. For example, you can analyze a sample of your driver logs to generate time-of-day and an Hours of Service-related profile of your fleet's driving.

NOTE: It would be even more helpful to the reader to take this example one step further by providing the actual relative risk 'formula' here…in other words, give the numerator and denominator in the example. If you have the same data for crashes, you can assess relative risk for those factors.

Similarly, if your company operates a number of terminals or operational units, you can assess their relative safety performance by comparing their crash, violation and incident counts to their exposure statistics. Exposure can be measured many ways, including miles, hours of driving, driver payrolls, revenue, or number of loads. Different metrics may yield different insights into your company's key risk factors. Putting all this information together will give you the knowledge and insight to call the right plays.

Dr. Ron Knipling is the author of *Safety for the Long Haul; Large Truck Crash Risk, Causation, & Prevention.* He is a researcher and consultant with 30 years experience in truck safety.