

**Corvex
Connected
Safety**
August 2018

Leveraging Behavioral Economics and Technology to *Reduce* Workplace Incidents

Nine people will die today due to texting and driving¹. Everyone knows the law and severity of the potential consequences. Evidence shows that people understand the dangers of distracted driving, but over half still reported talking on their phones while driving and a third reported they text while driving². Moreover, a decade's worth of data has shown that informational warning labels on the dangers of smoking increase **comprehension** of the risks, but are ineffective in reducing actual smoking **behavior**³. These are examples of the sometimes fatal gap between what we know we ought to do, our perceptions of risk, and our actual behavior.

This discrepancy, sometimes called the **knowledge-action gap**, has a huge impact on work-site safety as well. Personal protective equipment (PPE), like ventilation masks or hardhats, can substantially reduce the risk on a work-site, but data indicate that only 64% of workers on average wear the correct PPE protection, and not wearing a proper pair of gloves costs as much as \$48 million dollars each year⁴.

Can understanding why the **knowledge-action gap** exists help in reducing work-site incidents?

In response to this and rising workplace injuries, the demand for Occupational Safety and Health Administration (OSHA) worker education safety training courses have grown dramatically... but this approach ignores the reasons *why* people don't engage in safety behaviors^{5,6}. Taking an educational approach to safety assumes that if people know what the proper safety procedures are, they will act

rationally in accordance with their knowledge. In contrast, the scientific field of Behavioral Economics teaches us that human decision-making is often irrational and that we are influenced by a variety of heuristics and biases that can explain why educational safety interventions are limited in their ability to drive safe behaviors⁷. Given this fundamental gap between knowledge and action, new approaches that take into account human psychology are needed to drive target safety-related behaviors that educational approaches alone have been unable to sufficiently address.

“...the actions of those around us are strong predictors of our own behaviors⁸.”

People often rely on mental shortcuts known as heuristics - like a rule of thumb or an educated guess - to assess the probability of uncertain events, such as workplace incidents. The use of heuristics reduces the complexity of a decision and allows us to perform complex thought processes in short periods of time⁷; however, in some cases, these heuristics can cause us to make systematic errors in decision-making. Workplace safety is the result of successive safety-related decisions that workers make each and every day. If our judgment and decision-making abilities are systematically biased, then safety officers ought to study these biases to understand how we can leverage them in order to drive workplace safety.

Common Heuristics Influence the Safety Knowledge–Action Gap

Often, rather than following through on what we think is right, we observe and follow what others are doing. Research has shown that people are strongly influenced by **social norms**, meaning that the actions of those around us are strong predictors of our own behaviors⁸. For example, in the U.S., one of the best predictors of adoption of roof top Solar Panels is whether or not the neighbors have installed a Solar Panel first. Moreover, people also adopt negative behaviors from their peers; psychology experiments have demonstrated that people knowingly make repeated mistakes if these mistakes are first made by their peers⁹. The influence of social norms strongly impact people’s behavior, so if the norms around safety on a given work-site involve slacking, taking shortcuts, or showing off, this can explain why workers, despite their knowledge of the risks on their job-site, may choose to continually engage in unsafe behaviors.

“...people tend to perceive themselves as much less likely to experience a negative event in the future compared to others.”

Psychological research has also shown that people tend to perceive themselves as much less likely to experience a negative event in the future compared to others. This is known as the **Above Average Bias**, or more colloquially as the, “*it won’t happen*

to me” effect¹⁰. One study demonstrated that people rated their chances of future life events to be significantly above average for positive life events and significantly below average for negative life events¹⁰. Evidence suggests that the **Above Average Bias** is even harder to correct when there is perceived control over a negative event, as there is with safe work behaviors¹¹. To make matters worse, people tend to overestimate their skills and ability to problem-solve, and consequently discount the risk of an accident¹².

“...larger the number of people present, the less likely each individual is to take action^{14,15}.”

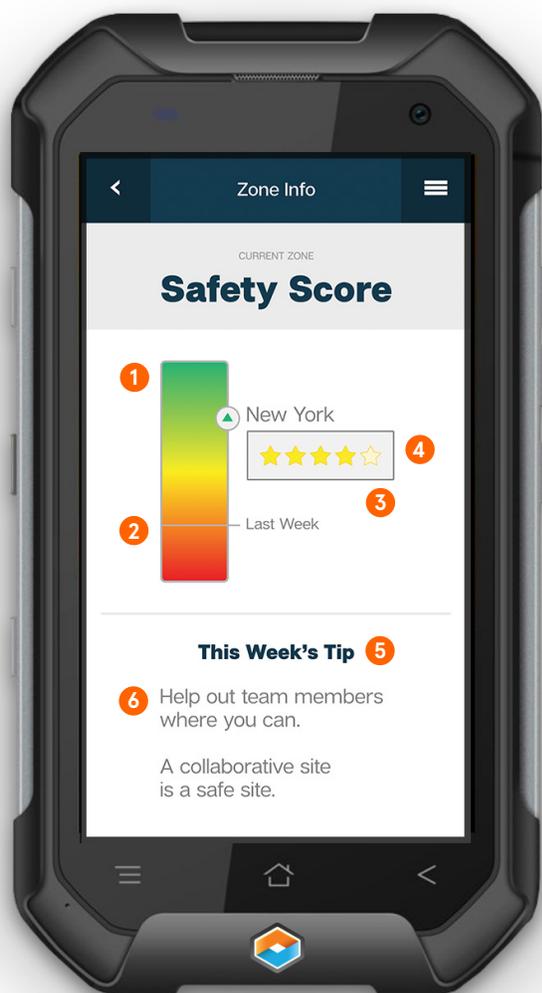
Even when people are aware of imminent risks, the inherent biases and heuristics of the human brain sometimes prevent people from taking appropriate action. For example, research shows that people are less likely to take responsibility for actions if others are present. This effect is known as the **Diffusion of Responsibility**¹³. For example, in the event of an emergency, researchers have found that the larger the number of people present, the less likely each individual is to take action^{14,15}. Take the simple example of a wet floor due to a leakage: a worker may feel compelled to solve the issue if they are the only person present to see the danger. However, in a busy work environment, we can imagine a situation where each worker passes on the responsibility to another, assuming *someone else* will take care of it and the hazard remains unfixed for days.

Unfortunately, the realization that our decision-making is biased is often insufficient to overcome and prevent ourselves from engaging in irrational and unsafe behaviors. Understanding the psychological and behavioral forces behind people's decisions provides a rich opportunity to make changes to the work environment (e.g. how we present safety information) to help people make safer decisions.

Our Solution

Corvex Connected Safety is partnering with BEworks, a leading Behavioral Economics consulting firm, to help workers overcome the cognitive limitations that lead to unsafe

behavior by changing the environment and the way feedback is given. Corvex technology connects to environmental sensor data in addition to the smart PPE worn by the workers, which allows for behaviorally-triggered interventions (e.g. alerting an employee when they fail to adhere to safety guidelines). Behavioral interventions such as reminders and notifications, when used properly, have been empirically shown to increase safety compliance by 11%-20%¹⁶. Where education methods are insufficient, Corvex and BEworks work to apply the current literature in behavioral science to bridge the knowledge-action gap by providing real-time feedback to workers on-site.



- 1 Use of Heuristics**
People use mental shortcuts, or heuristics, to save time and energy. **Leverage the heuristics of green and high= good, and red and low= bad, to quickly communicate feedback**
- 2 Historical Benchmarks**
Providing historical trends helps people to interpret their performance. **Visually showing workers how they are doing compared to last week gives high-resolution feedback about performances without lowering actual score and triggering loss aversion**
- 3 Loss Aversion**
People hate losing roughly twice as much as they like gaining. **Avoid triggering loss aversion and demotivation by converting safety score to a 5-point scale for workers**
- 4 Whole Unit Bias**
People are motivated to complete images. **Increase motivation to improve score by showing their score as a fraction of a complete image**
- 5 Feedback Schedule**
The frequency with when you provide feedback affects people's mental goal timelines. **Encourage workers to think about safety as a longer-term goal by giving them feedback on a weekly - not daily - basis**
- 6 Actionable Information**
People are more likely to act upon feedback when they are given specific actionable recommendations. **Help workers improve their site score by giving specific tips based on the lowest component scores for that site**

Corvex and BEworks are currently developing a Safety Index Score, which is designed to provide actionable feedback to workers about their work-site safety, and give them a less biased view of their own risk exposure. The Corvex platform digitizes behavioral data and facilitates new quantitative inputs, which are used to predict the likelihood of incidents. Using this platform, new forms of experimentation can be conducted to optimize behavioral interventions, work environments, and new application features that reduce worker injury.

BEworks hypothesizes that by presenting the right amount of feedback to workers (e.g., a Safety Index Score on a 5-point scale, *see below*), workers can see how their on-the-job behavior affects an objective measurement of risk¹⁷. Using information from a work-site's Safety Index Score, Corvex will use both positive and negative reinforcement in the form of behavioral interventions – like a notification or an actionable tip – to encourage proactive safety behaviors. Based on evidence from psychology research showing that people hate losing anything roughly twice as much as they like gaining, BEworks hypothesizes that by presenting feedback on a coarse 5-point scale, we can reduce the demotivating effect of seeing the score drop too often¹⁸. Furthermore, it is hypothesized that by presenting workers with their historical score and comparing it to those of their peers, it will signal to workers through social norms that unsafe behaviors are not as common as they may perceive.

In addition to predicting incidents and deploying behavioral interventions, Corvex and BEworks are working to increase safety **accountability** in the workplace. Research has suggested that safety can be improved by assigning responsibility directly to the individual and cueing them to take action, helping to mitigate diffusion of responsibility¹⁹. Corvex's technology allows workers to find and report unsafe working conditions while rating the severity of safety threats and perceived likelihood to cause harm. This process enables a fully digital and trackable way to measure how long it takes to fix and repair unsafe working conditions and in turn empowers people and their teams to solve problems quickly and correctly the first time.

The study of Behavioral Economics has yielded numerous insights on seemingly irrational behaviors, such as why most people know they should save money for retirement, but often do not, and why most people know they should eat healthy and exercise, yet fail to do so²⁰. We often don't follow through with our intentions because we don't set the proper goals, or because we simply forget. In most situations, these common errors of cognition are of little consequence, but in some instances, the consequences can be dire as in the case of work-site safety, where the simple act of remembering to strap on a helmet can save a life. Together, Corvex and BEworks are working to leverage the science of Behavioral Economics to close the gap between knowledge and action to improve safety compliance on work-sites across the globe.

References:

- 1 National Center for Statistics and Analysis (2017). Distracted Driving: 2015 in Traffic Safety Research Notes. *DOTHS 812381*. March 2017, National Highway Traffic Safety Administration: Washington, D.C.
- 2 Madden, M., & Lenhart, A. (2009). Teens and distracted driving: Texting, talking and other uses of the cell phone behind the wheel.
- 3 Ngo, A., Cheng, K. W., Shang, C., Huang, J., & Chaloupka, F. J. (2018). Global Evidence on the Association between Cigarette Graphic Warning Labels and Cigarette Smoking Prevalence and Consumption. *International journal of environmental research and public health*, 15(3), 421.
- 4 Ahmed, S.M. and Azhar, S. (2015). "Addressing the Issue of Compliance with Personal Protective Equipment on Construction Work-sites: A Workers' Perspective." <http://ascpro0.ascweb.org/archives/cd/2009/paper/CPRT176002009.pdf>, accessed March 15, 2015.
- 5 United States Department of Labor (2018). Commonly Used Statistics. Occupational Safety and Health Administration Washington D.C. Retrieved from <https://www.osha.gov/oshstats/commonstats.html> July 13th, 2018
- 6 Institute of Medicine (US) (2000). Committee to Assess Training Needs for Occupational Safety and Health Personnel in the United States. Safe Work in the 21st Century: Education and Training Needs for the Next Decade's Occupational Safety and Health Personnel. Washington (DC). *National Academies Press* (US). 2000. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK225534/doi:10.17226/9835>.
- 7 Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4157), 1124-1131.
- 8 Graziano, M., & Gillingham, K. (2014). Spatial patterns of solar photovoltaic system adoption: the influence of neighbors and the built environment. *Journal of Economic Geography*, 15(4), 815-839.
- 9 Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological Science*, 18(5), 429-434.

References:

- 10 Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology*, 39(5), 806.
- 11 Chorlton, K., Conner, M., & Jamson, S. (2012). Identifying the psychological determinants of risky riding: An application of an extended Theory of Planned Behaviour. *Accident Analysis & Prevention*, 49, 142-153.
- 12 Coston, C. T. M. (1995). Self other judgements about perceptions of vulnerability to crime among urban transient females. *International Review of Victimology*, 4(1), 33-46.
- 13 Higgins, E. T. (1997). Beyond pleasure and pain. *American psychologist*, 52(12), 1280.
- 14 Latané, B., & Darley, J. M. (1970). The Unresponsive Bystander: Why Doesn't He Help? *Century Psychology Series*. New York,: Appleton-Century Crofts.
- 15 Latané, B., & Nida, S. (1981). Ten years of reseach on group size and helping. *Psychological Bulletin*, 89 (2), 308.
- 16 Cox III, E. P., Wogalter, M. S., Stokes, S. L., & Tipton Murff, E. J. (1997). Do product warnings increase safe behavior? A meta-analysis. *Journal of Public Policy & Marketing*, 195-204.
- 17 Kreuter, M. W., & Strecher, V. J. (1995). Changing inaccurate perceptions of health risk: results from a randomized trial. *Health Psychology*, 14(1), 56.
- 18 Kahneman, D., & Tversky, A. (1979). Prospect Theory: An analysis of decision under risk. *Econometrica*, 47, 263-29.
- 19 Darley, J. M., & Latane, B. (1968). When will people help in a crisis? *Communications Research Machines*.
- 20 Choi, J.J., Laibson, D., Madrian, B.C. and Metrick, A. (2006). Saving for Retirement on the Path of Least Resistance. *Behavioral Public Finance*, pp.304-351.