Safety Training

The Case for a More Logical Practice

By Jim Walters

Why do high incident rates persist in the electric power industry? Bureau of Labor Statistics (2014) ranks power line installer as one of the 10 most hazardous occupations in the U.S. as measured by fatalities.

Consider the rhetorical question, "Why do we keep doing foolish things?" followed by, "We just had training on this last week." It is illogical to expect a positive change in incident rates while continuing to train as the industry has for decades.

Could it be that the electric power industry has optimized the process of doing the wrong thing by training workers on a deep-seated unspoken biased logic that the industry is simply hazardous and they should therefore expect incidents? If so, the problem is largely self-imposed due to the industry's continued reliance on traditional training efforts that are mostly devoid of thinking skills and other human factor components.

Accordingly, this article presents critical thinking as a crucial skill that should be incorporated into training curricula to establish a new safety era founded on development of thinking skills.

The electric power industry has a long history of being among the most dangerous industries to workers (BLS, 2014). Personnel continue to be maimed and killed despite the industry's (utilities and power contractors) training efforts. For this reason and because the author found no research on electric line installers safety, this article focuses on the notion of a new logic to reverse this safety trend. The concepts and remedies cited apply to the workplace in general.

Perhaps the industry is stuck in a homeostasis, wherein it trains workers on a deep-seated unspoken biased logic (i.e., "It is a dangerous industry and there will always be incidents"). This bias could be fueled by the frustration of not knowing what to do, other than what has always been done. It engenders private conversations such as, "As long as we keep incident rates at or below OSHA averages, we are in a good position."

As a former electric line installer, the author considered that safe work was defined as having a truck with orange cones, rubber goods for covering hot conductors, safety attire, monthly safety meetings and so on. Yet electric line workers are continually injured and killed. How can this be? After all, equipment was readily available, safety rules were known and safety rulebooks were stored in every vehicle.

IN BRIEF

- **Power line installer is among the most hazardous occupations in the U.S. as measured by fatalities.**
- **Expecting positive change in incident rates while conducting training in the same way for decades is illogical.**
- **Cognitive overload is an important emerging phenomenon with direct negative impacts on the electric power industry.**
- **To effect change, training curricula must incorporate critical thinking.**

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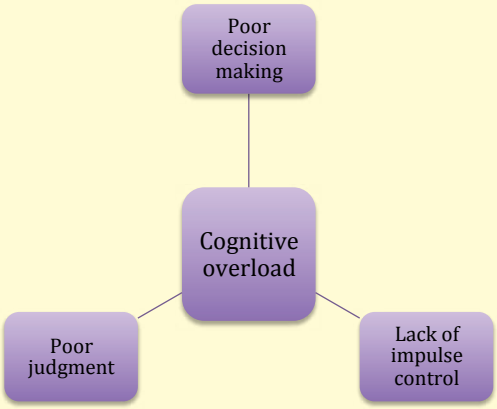
Figure 1
Effects of Cognitive Overload



The problem is not just about having accessible knowledge about how to work safely and having the tools to carry it out. The industry could improve the situation by expanding its current training tactics that generally consist of reviewing how to work safely (e.g., follow this rule about working on energized conductors), and showing videos of incidents that elucidate the consequences of not following the rules. This orientation seeks to impart knowledge to participants, often via a trainer, in hopes that new knowledge will be learned and behavior change achieved. However, behavior change requires a personal decision, which depends on training approaches that evoke change rather than trying to impart it. To evoke change is to embrace a new safety logic that embraces the dynamics of the human factor approach that centers on workers' interactions with the goal of minimizing errors (Wickens & Hollands, 2000).

Problem

Cognitive Overload

The stakes are high if the industry continues on its current path. As the world becomes more complex, the demands for the ability to manage thinking will increase (Alleyne, 2011). Have you noticed forgetting more in the past few years than you have in the past? Maybe it was car keys, why you walked upstairs or someone's birthday. In all probability, these are not indicators of early onset Alzheimer's disease but manifestations of an overloaded mind, referred to as *cognitive overload* (Restak, 2011). Today, people must attend to far more details than ever before. Gone are the days of having others' help to purchase clothes, select insurance policies, retrieve bank statements or make airline reservations. The Internet empowers people to do much of this.

With empowerment comes the expectation that individuals fend for themselves in their personal and work lives. Answering text messages, posting on social media, using apps and keeping track of passwords are just a few of the demands on our attention and memory system (attentional system). The growth of the Internet, 24-hour television and mobile devices means that we now receive five times as much information every day as we did in 1986 (Hilbert & Lopez, 2011). Ratey (2001) relates cognitive overload to mental noise that makes it difficult to attend and hinders memory, learning, cognition, emotionality and other brain functions. Oakley (2009) provides a useful concept for understanding the ill effects of cognitive noise: *attentional budget*. "As cognitive overload increases one must reduce attention on other things since we cannot take it all in at one time" (p. 3).

All of this information requires the brain to devote attentional capacity to process it. The process consists of analyzing the material for understanding and determining whether it should be stored in working or long-term memory, and what should be dismissed. This only happens if the mind detects that it is new or important information. If the information is already known, which means it is stored in long-term memory, the mind does not detect a need to pay attention. The mind does this for efficiency reasons because it has only so much attentional capacity. If attentional capacity is depleted, the mind is in an overload situation and primed for an incident.

An effective method for improving this situation might be to create newness by thinking something exists, even if it likely does not. For example, an outage occurred at an electric substation during a stormy night. As the line installer travels to the substation, his thinking manifested in self-talk goes something like: "I am sure it is the breaker on the south bay again." The result of this thinking is a mind that sees only what it was primed to see by the self-talk and was further fueled by what it already has stored in long-term memory. The tactic is to change the thinking by creating new information. Change the self-talk to include, "There is a fallen guy wire across the gate." Creating newness elevates the attentional system for the fallen guy wire and most anything else because newness and importance was inserted in the thinking process.

Several studies have quantified cognitive overload or attentional capacity in terms of bits-per-second. Research has demonstrated that the average person processes information at a rate of about 110 bits per second (Alleyne, 2011). At 60 bits per second, a conversation between two people requires about half of that capacity alone. Add to that a three-way conversation along with the expectations of the information age, and the magnitude of cognitive overload becomes easier to understand (Alleyne, 2011).

When the mind is overloaded, thinking changes in ways that negatively influence the attention and memory system (Figure 1). When this happens, the ability to pay attention is hindered because what is not attended to is not remembered, and vice versa. An overloaded mind prompts many to take shortcuts, which is a natural way for humans to lighten their cognitive load. Nobel prize winner Herbert

Simon refers to this as *satisficing*: working for the best solution is replaced with solutions that are just good enough (Simon, 1957). In other words, a compromised attention and memory system promotes satisficing with often disastrous effects manifested in poor decision making, which is to not consider all consequences, decide impulsively, be quick to find fault in others, lead dictatorially and rely primarily on personal thoughts only.

Multitasking is perhaps a more obvious demonstration of the negative effects of cognitive overload. Multitasking is not merely juggling several tasks. Juggling tasks is no more than switching one's full attention according to the need. Multitasking is to do two or more things that require one's attention simultaneously. Texting while driving, and writing a quality report while keeping up with e-mails are two examples of attempts to do more than one thing that requires attention.

In both examples, a conscious decision is made to divvy up one's limited attentional capacity. Using the first example, the thinking is, "texting is fine in this stretch of road because the traffic volume low." In a sense, the mind tricks one into believing attention can be parsed because the information associated with the routine of driving is already known and stored in the subconscious. The problem is that when new information is introduced, such as a curve in the road or an erratic move by the driver ahead, the information never makes it to the conscious mind, which can have tragic results.

It is vital for line installers to understand the difference between juggling multiple tasks and multitasking as a first step to managing their thinking and the resulting decisions. To be sure, multitasking is at the other end of the attention continuum.

Human Factors

Addressing the adverse effects of cognitive overload requires a focus beyond telling workers how and what not to do. It requires efforts to improve workers' ability to manage their thinking. As Gonzales (2005) says, human factors such as personality, emotion, styles of thinking and ways of viewing the world "have more to do with coping with adversity than any type of equipment or training." Training programs typically are dominated with topics centering on proper use of equipment, company safety rules, CPR training and OSHA procedures. Training in this regard is important, but it is not enough.

It was not enough on a bright summer day in 1978 in a small town in Iowa. The line installer was connecting a service to a live transformer and burned up a compression tool in the process. He was in an aerial lift truck and had all of necessary insulating equipment. All of the nonhuman factors were more than adequate, but an incident still occurred.

The next day the safety director and the line installer went to the site and reviewed what happened. The safety director asked the line installer several questions relating to the job but never asked about his thinking nor did he offer any help to improve the line installer's thinking. How could he, as little was known about the machinations of the mind in 1978.

Enough is known about the mind today to make a positive and significant impact on the safety practice of electric line installers. Consider recently completed research by Turku University Hospital in Finland. Researchers under the direction of Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology (SINTEF, 2015) found that risky behavior was more strongly related to acting without thinking than sensation seeking. A behavioral analyst on the team emphasized that "the point here is that if you're going to take risks, you have to have the required skills. Moreover, they have to be learned and sadly, many fail during this learning process."

Research concerning the safety of electric line installers is scarce, particularly regarding human factors, with no research found regarding attentiveness as a causal factor of incidents. Instead, the author examined studies from other industries concerning human error, attentiveness and measurement of attentiveness. A review of this literature shows that the problematic rate of incidents in the electric power industry is not solely due to worker inattentiveness. Incidents are, in part, due to nonhuman factors such as organizational climate and decisions made upstream of the work site (Behm, 2005; Garrett & Teizer, 2009; Mitropoulos, Abdelhamid & Howell, 2005).

However, this literature established human error as a significant cause of incidents (Krokos & Baker, 2007; Schmid, 2011; Wiegmann & Shappell, 1999). Jerome Singer, who founded and chaired the Medical and Clinical Psychology Department at the Uniformed Services University in 1976, was perhaps the first researcher to associate human error to one's inability to attend to the present (Singer, 1966). Subsequent studies have linked inattention to accidents (Bailey & Konstan, 2006; Baysari, Mcintosh & Wilson, 2008; Blackmon & Gramopadhye, 1995; Edkins & Pollock, 1997; Klauer, Dingus, Neale, et al., 2006; Marcotte, Lazzaretto, Scott, et al., 2006; Owsley, Ball, Sloane, et al., 1991).

Solution

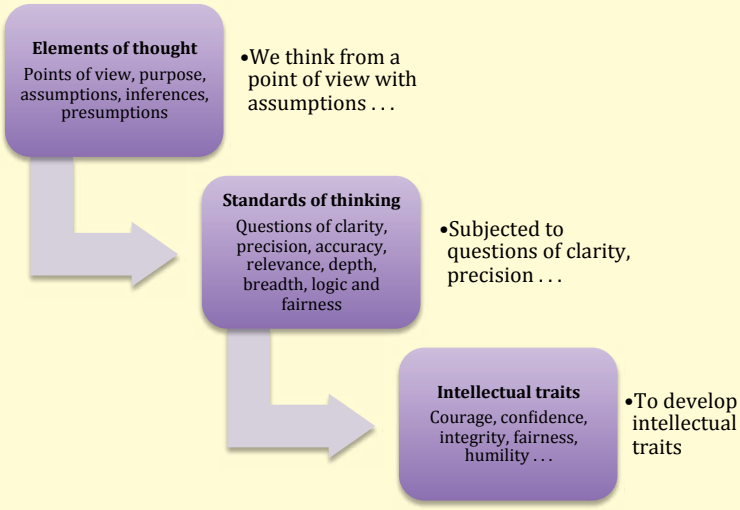
Critical Thinking Skills

Thinking is not the same as critical thinking. Thinking takes place anytime something is processed in the mind, but used here, *thinking* is the verb form that is to take action or responsibility. Active thinkers take initiative to manage their thinking, while passive thinkers rely on others to think for them. This is an important distinction because reducing incidents requires better decisions that can only result from those who actively think.

Thinking can be based on valid information or invalid information depending on the state of a person's ability to manage his/her thinking. Critical thinkers continually question their thinking and that of others in a quest to find valid information, the truth. Noncritical thinkers allow and even expect others to think for them. Their passive character allows the mind to have its way by stubbornly

Figure 2

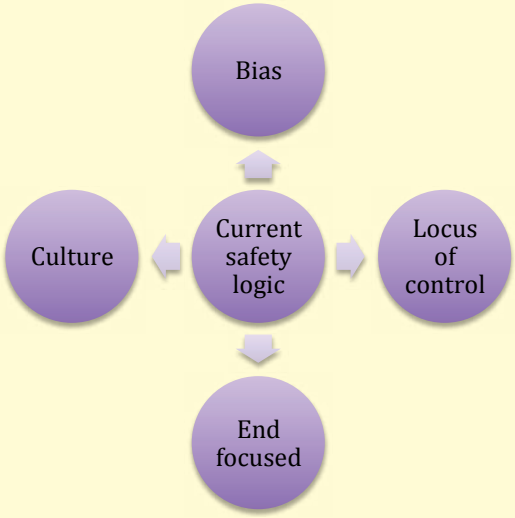
Process of Critical Thinking



Note. *Adapted from The Essential Dimensions of Critical Thinking, by Foundation for Critical Thinking, 2016.*

Figure 3

Key Questions to Address Current Safety Logic



holding to poor thinking habits such as biases, fallacious arguments and prejudices.

Examples of noncritical thinking include quick, knee-jerk decisions (impulsivity), me-first behavior, unconscious automatic responses (poor judgment), submissiveness in order to win one's way, absolutist or myopic thinking (poor decision making) and blindness to facts that do not support one's position. Poor critical thinking skills abound in the workplace whether it is two foreman arguing about how to place grounds, participants in a company meeting who do not speak up or journeymen lineman verbally degrading apprentices.

To think critically is to apply one's thinking in a way that guards against the natural human tendency to rationalize what is desired over what is needed. It is a purposeful effort to find the truth by becoming less self-interested (egocentric) and more fair-minded.

Put another way, critical thinking is not event-based decision making that serves selfish motives, wherein one practices skillful manipulation of ideas to serve one's own or one's group's vested interest. To think critically is to effectively identify, analyze and evaluate arguments (better judgment); become aware of and overcome personal prejudices and biases (reduced impulsiveness); develop and present convincing reasons to support conclusions; and make intelligent choices (better decisions) about what to believe and what to do.

Engaging in critical thinking by nature requires a deliberateness that slows thinking and makes room for reflection. The calming effect of slower thinking is perhaps the most important attribute of critical thinking as a guard against becoming cognitively overloaded.

Critical thinking skills can be developed and strengthened by providing workshops in which participants learn how to establish the habit of questioning personal thinking and that of others. The process of critical thinking consists of making known the points of view, presumptions and the other categories of thought referred to as the elements of thought (Figure 2). In other words, all thinking is based on a point of view, a purpose and so on that leads to implications and consequences that good thinkers (those who update existing knowledge through questioning) are ready to change based on valid information.

Discovering valid information requires asking questions in order to move closer to the truth. Asking questions based on the intellectual standards of thinking such as clarity and accuracy is often where conversations break down. Recall that humans have biases that are deep seated; challenging them cues the threat response. The resulting egocentric behavior is to hold fast to one's opinion—to be a right fighter and not a truth finder.

The intent of questioning should be to unearth what often goes unsaid. In good critical thinking form, how often do you attend a meeting and not speak up? As a crewmember, how often do you witness highly fueled egos arguing about how a job should be done? Most of us have kept quiet at some point, whether at a meeting, on a crew, with a spouse or friend, or in other situations. To not speak up is to deny entry of one's thinking to the thought pool and is symptomatic of a nonlearning organization. Learning organizations correct errors at every level by engaging in critical thinking, analyzing their elements of thought, questioning them for accuracy and holding workers accountable (e.g., near-hit reports).

A habit of questioning is developed with serious attention to the process of examining the elements of thought, questioning using the elements and the standards of thought, repeated practice and maintaining a curious mind. This habit becomes part of who you are because habits become part of the default subconscious/automatic mind. A calmer mind fosters personal reflection, which develops intellectual traits such as courage and humility. A person can also develop intellectual traits by consciously working on the traits in which one is deficient.

As important as critical thinking skills are to strengthening attentional abilities, other tactics abound that are easy to practice on a daily basis. With the understanding that memories are created based on what is attended to, tactics to improve attentiveness include memory exercises. As James (1950) says, "the art of remembering is the art of thinking" (p. 87). According to Restak (2011), one such tactic is to memorize lists through the use of stories. For example, if a grocery list contains broccoli, milk, cheese, bread, hamburger, soap, cough medicine and spaghetti, a story might be, "I like cheese on broccoli with my hamburger, and am going to eat less bread and spaghetti. I'll drink water because the thought of drinking milk is like getting your mouth washed out with soap. I'd rather drink cough syrup!"

Attention-building tactics include taking time to purposely focus attention by finding one new detail (Sood, 2009). For example, while walking, stop to examine the intricacies of the veins on a tree leaf, or the tone and facial expressions of those with whom you converse, or the colors of the buttons on a shirt (Sood, 2009). According to Sood (2009), finding a new detail requires anchoring one's thinking toward the world as opposed to one's body, breath, mind or self. To do the latter is to slip into the mind that is predisposed to fixating on fear of the future or negative memories of the past. To focus on the present world is to train attention by managing the direction of what the mind is focused on, the depth (the veins on the leaf) and duration of attention (Sood, 2009).

Safety Logic

Perhaps the most important area of need for critical thinking is for addressing the current logic under which the industry may be operating. To understand a problem thoroughly, the most relevant place to start is the logic that fuels it. Asking questions relating to the problem reveals the underlying points of view, assumptions and implications that work to sustain the problem. Alternatively, raising questions reveals errors in thinking and opens the door to changing the situation. As depicted in Figure 3, key questions for the electric power industry concern bias, locus of control, end-focused training programs and organizational cultures that inhibit learning.

Bias

Is the industry steeped in biased thinking that hinders change? To have a bias is to convey a tendency or preference toward a particular perspective, ideology or result, particularly when the tendency interferes with the ability to be impartial, unprejudiced or objective. Humans are prone to having many biases that are egocentrically motivated, sociocentrically motivated based on the interest of a group of which one is a member, or faulty judgment (judgment biases).

Table 1
Understanding Bias

Thinking	Egocentric bias	Judgment biases
Line installer: "I am not afraid of risk, which is why I became a lineman."	It is true because I believe it to be true.	
Management: "It is the line workers who do stupid things despite all the training we provide."	It is true because we believe it.	
Line installer: "It is a dangerous job. There will always be incidents."	It is true because I have always believed it.	
Management: "Our incident rates are right there with other utilities (contractors). So, why should we increase the safety budget?"	It is true because it is in my own interest to believe it.	
Line foreman: "We never had an incident grounding this way."		**Confirmation**. Ignore or find fault with data or opinions that do not fit yours; seek only information to verify one's view.
Management: "Keeping incident rates below OSHA averages is what all contractors work toward."		**Conformity**. Allow others to do one's thinking out of fear of confrontation or embarrassment.

Understanding bias is an important first step to correcting errors in decisions and improving the effectiveness of how work is performed. Important areas the electric power industry must investigate to optimize safety practice include those shown in Table 1.

With regard to industry bias, would safety improve if annual discussions were held by industry representatives whose sole mission was to uncover systemic industry bias?

Locus of Control

Who is responsible for line workers' safety? *Locus of control* refers to the degree to which one feels s/he can control events. A person with an external locus of control feels s/he has little influence over events in his/her life. Alternatively, an internal locus of control is associated with those who feel they control the events in their life.

Understanding this difference is important because improving safety behavior is a personal endeavor. It follows that training efforts should be geared to strengthening individuals' internal locus of control by including human factors, particularly critical thinking, that nudges responsibility for one's safety practice to the individual.

The use of *accident* instead of *incident* by the electric and other industries is an example of the detrimental

Reducing incidents requires better decisions that can only result from those who take responsibility for their thinking.

effects an external locus of control orientation. As a former line installer, the author experienced several incidents that had a common personal root cause: poor decisions or cognitive deficiencies. Yet the mishaps did not jeopardize the author's job because the underlying bias of the industry was and continues to refer to mishaps as *accidents*.

The term *accident* conveys a personal helplessness, such as a sinkhole that swallows a house. For the most part, electric line workers do not experience accidents, which are unintended events; they have incidents, which are unplanned events.

Although subtle, the difference is important to understand. The term *accident* conveys the tacit message "mishaps just happen" and thereby promotes nonaccountability; the locus of control is external. Most mishaps are not accidents, but are incidents that happen because of personal actions. The locus of control is internal to the individual.

Shifting from an external to a more internally based locus of control requires a change in how the industry refers to mishaps and inclusion of thinking skills in safety training programs. Accomplishing the former is a formidable task because it requires organizations such as OSHA and Edison Electric Institute to change how they refer to mishaps.

End Focused

Does the current method of measuring training results with tests and quizzes effectively gauge safety learning? Conducting a training session and testing at the end of the session is a widely practiced model for determining whether new information was learned. However, this practice only measures a person's ability to recall information from memory; it does not adequately measure learning. Learning results when a person has internalized information in a way that changes behavior.

The ineffectiveness of testing as the primary means of determining whether one has learned was pointed out by Nosich (2012), who noted that getting healthcare practitioners to wash their hands between patients is not easy. Student nurses were asked to circle *true* or *false* with regard to the statement, "It is important to wash hands between patients." All of the nurses answered the question correctly by answering *true* on the test, but as evidenced at an infectious disease conference in New Orleans, they did not learn.

The audience for the conference was made up of doctors who presumably received the same training as the nurses. Graduate students were stationed in the restrooms to document how many doctors washed their hands after using the restroom. The researchers found 13% of the women and 44% of the men did not wash their hands. As Nosich (2012) points out, this was a conference on infectious disease where every doctor would agree that the hands are the primary means of passing along disease. Knowledge was provided and tests were administered but there was no learning, no behavioral change.

The need to focus on the process over just the end (test) is the missing link. Focusing on the process entails taking time for the conversations, debates, disagreements, pushbacks and questions that stimulate internalizing new information and trust building. Attention to the process over the end enables workers to make the needed neural connections between the words and the content they are directing to. Additionally, attention to process coupled with management's understanding and participation creates a high probability for learning and behavioral change. The process works by making the needed connections for unblocking the mind's deep-seated ways of doing work.

Culture

Culture refers to how work is performed in an organization. The electric power industry has experienced two paradigm shifts in safety. The first was the emergence of technology and standards followed by improved management systems that provided the means to proactively manage safety. The current shift is establishment of a safety culture. Safety cultures continually pursue self-corrective action at all levels of the organization by changing individual behavior (e.g., improving cognitive and leadership abilities).

The recipe for engineering a nonlearning culture is to react to problems instead of proactively working toward productive outcomes. In such a culture, leaders hold information to themselves and blame individuals, instead of the greater system, for incidents. These traits are the opposite of a safety culture. According to Reason (2005), safety culture:

1) works at all levels to continually and proactively correct errors;

2) is characteristic of employees who unreservedly share near-hit and error information;

3) is flat as opposed to top driven because a flatter structure passes control to the task experts along with appropriate accountability;

4) represents a shift from linear to systems thinking. Systems thinking recognizes the interconnectedness of everything that is performed by an organization; hence, correction of error requires blame beyond only the individual.

These four characteristics define a learning organization/culture where the organization corrects errors at every level. Correction of error might entail two nonmanagement workers deciding to change how a job is performed because they suspect that a piece of equipment malfunctions, reporting near-hits and discussing personal deficiencies with one's boss.

(Note: Safety culture is sometimes defined as one that encompasses a learning culture, as well as a reporting culture (free flow of incidents and near-hit information), flexible culture (management is open to change) and just culture (recognizes workers make three types of behavioral choices that need managing: human error, at risk behavior and reckless behavior). This article uses learning culture synonymously with safety culture because reporting, flexible and just cultures are inherent in a learning culture.)

Conclusion

Today OSH professionals can use what is known about the mind to improve the electric power industry's ranking as a dangerous occupation. Critical thinking is the means for becoming a more fair-minded thinker whose focus is less on satisfying egocentric needs and more on finding the truth. By expanding training efforts to include critical thinking as the most important human factor, electric utilities and contractors will empower line installers to make better safety decisions. Ultimately, a new era of safety training will emerge in the electric power industry. **PS**

References

Alleyne, R. (2011, Feb. 11). Welcome to the Information Age—174 newspapers a day. *The Telegraph*. Retrieved from www.telegraph.co.uk/news/science/science-news/8316534/Welcome-to-the-information-age-174-newspapers-a-day.html

Bailey, B.P. & Konstan, J.A. (2006). On the need for attention-aware systems: Measuring effects of interruption on task performance, error rate and affective state. *Computers in Human Behavior*, *22*(4), 685-708. doi:10.1016/j.chb.2005.12.009

Baysari, M.T., Mcintosh, A.S. & Wilson, J.R. (2008). Understanding the human factors contribution to railway accidents and incidents in Australia. *Accident Analysis and Prevention*, *40*(5), 1750-1757. doi:10.1016/j.aap.2008.06.013

Behm, M. (2005). Linking construction fatalities to the design for construction safety concept. *Safety Science*, *43*(8), 589-611. doi:10.1016/j.ssci.2005.04.002

Blackmon, R.B. & Gramopadhye, A.K. (1995). Improving construction safety by providing positive feedback on backup alarms. *Journal of Construction Engineering and Management*, *121*(2), 166-171. doi:10.1061/(asce)0733-9364(1995)121:2(166)

Bureau of Labor Statistics (BLS). (2014). National census of fatal occupational injuries in 2014 (Preliminary results) (Press release). Retrieved from www.bls.gov/news.release/pdf/cfoi.pdf

Edkins, G.D. & Pollock, C.M. (1997). The influence of sustained attention on railway accidents. *Accident Analysis and Prevention*, *29*(4), 533-539. doi:10.1016/s0001-4575(97)00033-x

Foundation for Critical Thinking. (2016). The essential dimensions of critical thinking. Tomales, CA: Author. Retrieved from www.criticalthinking.org/pages/critical-thinking-where-to-begin/796

Garrett, J.W. & Teizer, J. (2009). Human factors analysis classification system relating to human error awareness taxonomy in construction safety. *Journal of Construction Engineering and Management*, *135*(8), 754-763. doi:10.1061/(asce)co.1943-7862.0000034

Gonzales, L. (2005). *Deep survival: Who lives, who dies and why*. New York, NY: W.W. Norton.

Hilbert, M. & Lopez, P. (2011). The world's technological capacity to store, communicate and compute information. *Science*, *332*(6025), 60-65. doi:10.1126/science.1200970

James, W. (1950). *The principles of psychology*. New York, NY: Dover Publications.

Klauer, S.G., Dingus, T.A., Neale, V.L., et al. (2006). The impact of driver inattention on near-crash/crash risk: An analysis using the 100-car naturalistic driving study data (Report No. DOT HS 810 594). Washington, DC: National Highway Traffic Safety Administration.

Krokos, K.J. & Baker, D.P. (2007). Preface to the Special Section on Classifying and Understanding Human Error. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *49*(2), 175-176. doi:10.1518/001872007x312414

Marcotte, T.D., Lazzaretto, D., Scott, J.C., et al., (2006). Visual attention deficits are associated with driving accidents in cognitively impaired HIV-infected individuals. *Journal of Clinical and Experimental Neuropsychology*, *28*(1), 13-28. doi:10.1080/13803390490918048

Mitropoulos, P., Abdelhamid, T.S. & Howell, G.A. (2005). Systems model of construction accident causation. *Journal of Construction Engineering and Management*, *131*(7), 816-825. doi:10.1061/(asce)0733-9364(2005)131:7(816)

Nosich, G.M. (2012). *Learning to think things through: A guide to critical thinking across the curriculum*. Boston, MA: Pearson.

Novella, S. (2012). *Your deceptive mind: A scientific guide to critical thinking skills*. Chantilly, VA: Teaching Co.

Oakley, T. (2009). *From attention to meaning: Explorations in semiotics, linguistics and rhetoric*. New York, NY: Peter Lang.

Owsley, C., Ball, K., Sloane, M.E., et al. (1991). Visual/cognitive correlates of vehicle accidents in older drivers. *Psychology and Aging*, *6*(3), 403-415. doi:10.1037/0882-7974.6.3.403

Ratey, J.J. (2001). *A user's guide to the brain: Perception, attention and the four theaters of the brain*. New York, NY: Pantheon Books.

Reason, J.T. (1997). *Managing the risks of organizational accidents*. Aldershot, Hants, England: Ashgate.

Restak, R.M. (2011). *Optimizing brain fitness*. Chantilly, VA: Great Courses.

Salas, E., Burke, C.S., Bowers, C.A., et al. (2001). Team training in the skies: Does crew resource management (CRM) training work? *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *43*(4), 641-674. doi:10.1518/001872001775870386

Schmid, S.D. (2011). When safe enough is not good enough: Organizing safety at Chernobyl. *Bulletin of the Atomic Scientists*, *67*(2), 19-29. doi:10.1177/0096340211399404

Simon, H.A. (1957). *Models of man: Social and rational; Mathematical essays on rational human behavior in society setting*. New York, NY: Wiley.

Singer, J.L. (1966). *Daydreaming: An introduction to the experimental study of inner experience*. New York, NY: Random House.

SINTEF. (2015, Nov. 30). Risk-takers are smarter, according to a new study. *ScienceDaily*. Retrieved from www.sciencedaily.com/releases/2015/11/151130113545.htm

Sood, A. (2009). *Log on: Two steps to mindful awareness*. Lexington, KY: Morning Dew Publications.

Wickens, C.D. & Hollands, J.G. (2000). *Engineering psychology and human performance* (3rd ed). Upper Saddle River, NJ: Prentice Hall.

Wiegmann, D.A. & Shappell, S.A. (1999). Human error and crew resource management failures in Naval aviation mishaps: A review of U.S. Naval Safety Center data, 1990-96. *Aviation, Space and Environmental Medicine*, *70*(12), 1147-1151.