Moving the Needle

in Safety Performance —It's All in Your Brain

White Paper

The oil and gas industry involves some of the most dynamic, complex, and high-hazard working environments in the world. When workers and equipment interface, exposures run high. As a result, the industry is on the leading edge of safety practices, systems, and processes—working toward a reduction of injuries and incidents, thereby, lessening its impact on the environment.

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But being at the forefront came at a significant cost. The best practices leading the industry in reducing injuries, exposures, and environmental impact were sparked by the 1988 Piper Alpha incident that took 167 lives. Crucial lessons were learned, and the industry gained a greater understanding of how culture, leadership, and behavior all impact safety performance.

Since that turning point, operators, contractors, and service providers have been placing a greater emphasis on having initiatives that develop culture and leaders. In addition, implementing near-miss and behavior-based programs focusing on observation and feedback has been just as important. And there have been more resources invested to help reduce—and eliminate—exposure that leaves people vulnerable to workplace incidents. All these efforts have helped reduce injuries and undesired safety events.

But is all that enough? Even with the great strides made across the industry, there continues to be imperfections in health, safety, and environmental performance that harm workers who complete similar tasks without injury time and time again.

Injuries don't just affect poor performers and those with limited experience. With the recent downturn in the industry operators and contractors are doing more with less. High performers—typically those with more experience —currently represent the largest portion of the workforce. So why are incidents still occurring? Many argue that attaining zero is not achievable, because people are error prone. They say that some people are just prone to making errors because of how we are wired.

Well, those who make these arguments might be onto something.

It's Not the Worker's Fault

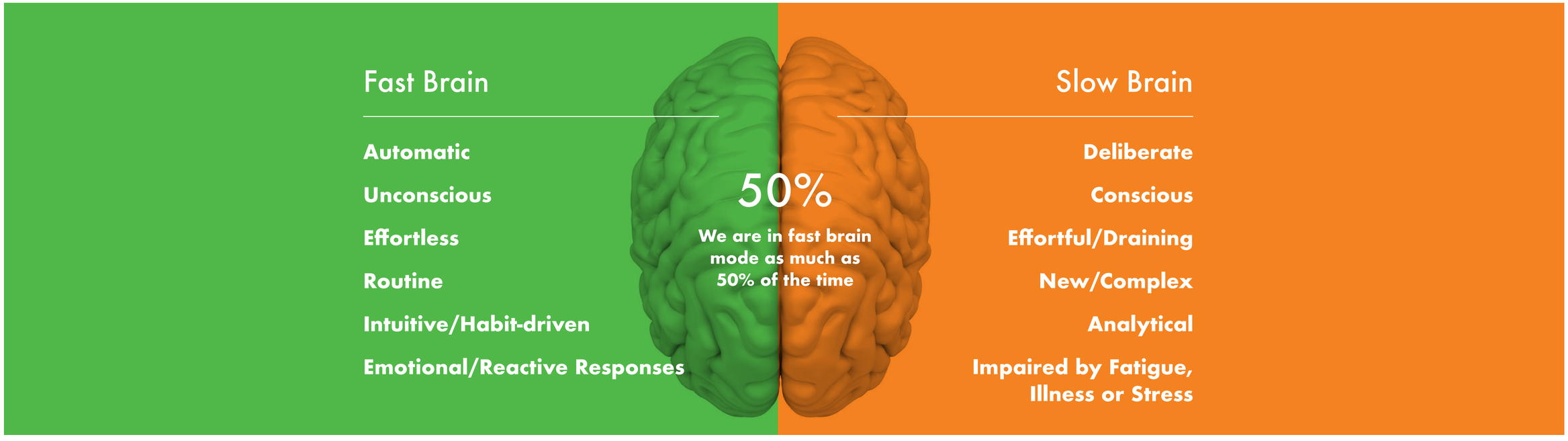
When incidents occur, the common reaction is to blame the worker and to say that the worker didn't know enough, didn't have the capabilities, or simply just didn't care. Placing blame on the worker can be a dangerous road to go down. It can erode trust and destroy the culture. And more important, it does not get to the root of the human error that contributed to the incident.

Blaming the worker leads to easy fixes, like retraining or disciplinary action. While these corrective actions may be necessary in some cases, most incidents involved good, knowledgeable, and capable workers. Therefore, fixing the person is not an acceptable solution.

Why? Because we are all similarly wired, and that sets us up to be imperfect and to make errors. Remember, simply understanding that we, humans, make mistakes is not enough." The answer can be found in what Oscar Wilde said: "It is not the prisoners who need reformation, it is the prisons." This is true for our industry as well.

Instead of trying to *fix a person*, organizations must change how they design work and work-related activities to *fit that person*. Consistently accomplishing job tasks accurately, completely, efficiently, and based on agreed-upon procedures and

Fast Brain / Slow Brain



standards of excellence is best done through applying knowledge of how we are wired. We need to create a human-work interface that maximizes *Right First Time*: ensuring that job tasks are performed right the first (and every) time

Fixing the work environment requires an understanding of how the brain works and of how visualization plays a role in the decisions we make.

How the Human Brain Operates

The human brain is actually several brains housed in one.

Two key components of the brain include the cerebrum and the paleomammalian cortex. The cerebrum, or the "slow brain," is the part of the brain that consciously processes information. It analyzes, solves problems, and makes decisions.

The paleomammalian cortex, or the "fast brain," also processes information, but it does so at a greater speed. And it moves us into action based upon reaction and habit without consciously thinking through the situation and the information available to us.

When it comes to most activities in which safety is paramount, ideally, we want slow-brain functioning, which is more analytical and gives us time to make safe decisions. After all, fast-brain functioning can lead to human error, because it relies more on habits—disastrous in a situation that requires stepping outside the lines to accomplish an unplanned task safely.

Fast-brain functioning is most prominent when involving repetitive tasks and among experienced workers who have fallen into the trap of accomplishing tasks the way they have always accomplished tasks.

Take the example of an incident that occurred during a milling operation on an offshore platform, where a solids control (swarf) unit was integrated with the drilling fluids system for removing solids. During such an operation, solids could plug the hoses. This could result in fluids backing up and in losing primary containment. In this instance, solids began to plug the hose to the unit. The solids control operator communicated to the drill floor to cut the pumps, believing that the driller would completely turn off the pumps.

Instead, the driller reduced the pumping rate, resulting in the backup of fluids and the loss of primary containment. As they had always done, the drill crew used the term "cut" synonymously with "reduce" ;whereas, the solids control operator understood "cut" to mean shut off.

In this situation, human error was a significant contributing factor to the serious adverse safety event. The human error, related to the brain-centered hazard, is known as fast-brain functioning. Here, the driller's actions aligned with how he and his crew had always interpreted "cut the pumps."

How to Prime Slow-Brain Functioning

The slow brain is not a light switch. People do not choose to turn it off and on. The brain finds opportune moments to conserve energy and uses the fast brain, which uses less energy than the slow brain. It does this during tasks that have been done before. Driving is a great example of when the brain functions using the fast brain.

Work activities must be designed with this in mind. They need to prime people to consciously think through activities that, while quite similar, are often different in a highly complex and dynamic work environment commonly found in the oil and gas industry.

Tips for Priming Slow-Brain Use

Create engagement in pre-work activities, such as pre-job safety briefs. Dig deeper by using follow-up questions that promote such specific responses as:

- What is different this time doing a familiar job?
- What could go wrong (that is, cause a process or personal safety event)?
- How will the team prevent those potential undesired events?
- Transform your work-site engagements by focusing on exposure due to brain-centered hazards and by asking workers how they are controlling specific exposures.
- Plan high-risk job tasks at more optimal times of the day, when energy is higher.
- Create effective SOPs and risk assessments that identify exposure to brain-centered hazards and appropriate techniques for managing them.

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Enhancing Visual Recognition

Workers are also wired in a way that misses information that is key to completing a job accurately and safely. We can miss information for a variety of reasons. But, quite often, we simply see what we expect to see. This is known as expectation bias. It is analogous to why motorcycles are involved in so many accidents on highways—people simply do not see them because they are looking for larger vehicles.

Take the example of an incident that occurred on the cargo deck of an offshore installation. Typically, the deck is filled with large equipment and cargo containers sitting on a series of raised beams. Roustabouts maneuver containers into tight spaces around other containers that are easily visible. When walking in the area, as many roustabouts must do, the obvious exposure is the other containers' being backloaded and landed in the area, as well as the exposure to the beams that could result in someone tripping. On this day, the deck was free of large containers. Roustabouts were laying out lifting gear across the beams to backload for testing and recertification onshore. As a crew member stepped over a deck beam, he stepped on a lifting sub that was in between the beams, rolling his ankle and resulting in a fracture.

While other factors contributed to this incident, visual recognition, a brain-centered hazard, is highly relevant. A general scan of the environment did not identify any additional exposures, because those that typically exist in the area were not present. Thus the brain did not identify anything else out of the ordinary or anything that required further, or different, actions, which might have been taken had the exposure been identified.

In the complex, dynamic, and high-hazard environment seen in the upstream oil and gas industry, visual recognition is paramount to reducing exposures. Expecting workers to have good situational awareness is not enough. Many undesired safety events have occurred because of poor visual recognition of exposures. In this complex landscape, it is extremely difficult for a worker to identify all the exposures simply by performing a general scan—even more so if the worker has no strategy.

How to Enhance Visual Recognition

Implement
Implement a strategy that looks broadly to identify hard-to-see exposures. Like a hunter, a worker can divide the field of vision into smaller chunks in order to search for exposures that are most likely to result in incidents.

Use
Use brain-aligned checklists for critical exposures that could result in serious injuries and fatalities.

Design
Design work-related activities that include a conversation on what has changed or on what is different.

Establish
Establish specific pause points to reassess the work site for changes that could create additional or different exposures.

Conclusion

Given the complex, dynamic nature of the work environment in the oil and gas industry, it is important to understand how we are wired. Simply hiring great people, retraining workers or disciplining workers will only continue to mask the underlying human-performance issues and not reduce the potential for human error, which could result in undesired events.

If the industry wants to transform the current safety performance, it is imperative that it understand how we are wired, that is, how our brains work and how brain-centered hazards play a role in human error.

No one is immune to making errors. And yet, whenever there is human error in such a high-hazard environment, the costs can be quite significant. Priming slow-brain functioning and developing a more strategic approach to the visual recognition of exposures are paramount to increasing safety consistency in human performance. As each control is imperfect, it is key to implement multiple layers of controls. Can we attach this orphan sentence to the paragraph above?

Ready to transform your organizational safety performance?

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