Brain-centred performance: understanding how the brain works, so we can work more safely

Sebastian Blair

DEKRA Safety Consulting, UK

Introduction

Through improved education, technology and data analysis, safety leaders have become increasingly adept at recognising and controlling external hazards and exposures related to people, processes, and materials. What we are beginning to understand, however, is that this is not sufficient for driving operational excellence or sustained reductions in significant injuries and fatalities. The missing key to unlocking sustained performance reliability and safety comes from within the human brain. The overarching "human error" hazard can only be effectively controlled by aligning existing organisational culture, structures and procedures with the functional realities and limitations of the human brain - that is, by making our organisational systems brain-aligned.

Studies underpinning the Brain-Centric Reliability™ (BCR™) System have uncovered important insights into human performance. The good news is, everything from organisational culture and leadership messaging, to work schedules, procedures, human machine interfaces and incident investigations can be revamped to align with brain science, to reduce exposure. Taking a data-driven, brain-centred approach, uncovers weaknesses in operational and safety systems, forces a re-examination of how accidents and exposures originate, are classified and addressed and has begun to fundamentally influence the way we design, lead and work.

Neuroscience brings new understanding

Neuroscientists have confirmed that different systems in the human brain compete to control human behaviour. Nobel prize-winning research by Kahneman and Tversky (amongst others) introduced us to the dual-process system of the fast brain and slow brain, which operate independently and at times cooperate to direct all human action.

The fast brain is housed in the limbic system of the brain, also known as the paleo-mammalian complex. The following types of actions are controlled by the fast brain:

- Pre-conscious
- Rote
- Reactive
- Habitual

The slow brain is housed in the pre-frontal cortex, the brain's executive centre. The slow brain controls the following types of actions:

- Conscious
- Analytical
- Reasoned

- Reflective
- Intentional

So who is running the show? Fast brain or slow brain? It may not be what you think (or want). As a leader, which type of organisation would you like to build? One based on automatic, reactive and habitual actions (as housed in the fast brain), or one based on conscious, analytical and well-reasoned actions (as housed in the slow brain)?

Surprisingly, and unfortunately, research has shown that the slow brain is not the one in charge much of the time. In fact, an average of 45%-50% of all actions adults performed across a day, and particularly repetitive, routine ones, are controlled and executed in the fast brain without thinking or conscious decision making. Analysis and decision-making take energy – and the brain leaps at the chance to conserve valuable energy by defaulting to reactive, reflexive actions based on habit. The slow brain actually has to be intentionally activated to spur conscious cognition – the brain state that enables analysis, accurate problem identification, reasoning, planning and decision making.

What does this actually mean to us in terms of operational reliability and safety?

The fast brain reacts without thinking. When adults engage in routine actions – driving a car, navigating a crowded pavement, mowing a lawn – we tend to rely increasingly on habit and muscle memory to accomplish such tasks. In the workplace, this habitual, fast brain response to routine tasks can lead to missed steps, incomplete work and a dangerous reliance on past experiences to predict and direct current actions. That means, if the circumstances are not identical, incorrect actions will be taken.

The fast brain operates in sketch mode

The goal of the fast brain is to process visual information and deliver feedback as quickly as possible. The result is a quick, generalised sketch of a situation based on colour, shape and movement, and an ensuing response based on habit, experience and limited memory recall. The risk is that these generalised visual perceptions miss important changes in the work situation, including weak signals that might otherwise spur preventative action in a high-consequence or safety-critical work environment.

True performance reliability demands the conscious cognition that only the slow brain can provide. However, research has shown that the slow brain takes a full half-second to activate. The fast brain, by comparison, processes visual cues and reacts in four-tenths of a second – initiating responses or actions before the slow brain has even had a chance to weigh in.

So what can be done?

With our new, deeper understanding of the workings of the brain, it has become clear that the way our work systems operate and the way the human brain works are not always in sync. The time has come to re-examine our systems, processes and procedures, to isolate the newly identified brain-centred hazards, and to put in place solutions that encourage intentional actions, eliminate reflexive risk, and enable employees to respond to all operating conditions with right-first-time performance. While we cannot change the way our brains work, we can change the way that our organisations work with our brains.

Reflecting on the hierarchy of controls for addressing workplace hazards, it is clear that companies cannot eliminate brain-centred hazards altogether. Even substitutions are not always a viable

approach, especially in process industries or labour-intensive industries where automation cannot fully replace humans. Rather, what must be done in all companies where humans perform safety-critical job tasks, is the implementation of new systemic layers of defence that are designed to drive BCR™ practices and behaviours into our workplaces.

More specifically, leaders have to re-think and re-design their worksites, instituting organisational and team structures, systems, practices, and procedures that are brain-aligned. To illustrate how the BCR™ System can help us achieve these important safety goals, we have described below three sample steps for leaders to take on their path to performance reliability.

The power of words – change the cultural messaging

Culture starts at the top. Leaders create corporate cultures by sending messages to their organisations that define organisational success and set the tone for how people work. If these messages are messages of urgency, such as "Get it done…", "Finish quickly…", "What's next – move on…" or "Get more done, faster…", then leaders are inadvertently sending a signal to work from the fast brain only. Under time pressures, adrenalin is released and our slow brain is isolated, causing us to speed up and move faster, but also creating the risk that we will skip steps or miss weak signals in our hurry to complete the task at hand. A high-urgency environment is characterised by a bias for action, a focus on deadlines despite errors, a too-fast work pace and an emphasis on output above all else. While high urgency may be possible for a short time, it is unlikely to be a successful operational model for the long term. We need to re-examine our corporate cultures and leader messaging from a brain-centred perspective. Messages such as "Take your time…", "Think it through…" and "Focus on doing the right job, first time...", encourage measured, slow-brain responses. To build smarter, safer cultures of thoughtful, precise execution and right-first-time reliability, leaders need to consistently send the right verbal messages to the workforce.

Create brain-aligned SOP™ designs – get rid of procedural ambiguity

When the performance of crucial procedures relies on past experience or rote memory, the door is opened for human error. If we want error-free actions, then we have to provide the workforce with clear, concise procedures that reflect and align with the way our brains work. Now that we know our brains often fire quickly, based on immediate responses to visual stimuli, it is critical that we eliminate confusing instructions, poor design and other opportunities for mis-cueing and misinterpretation in our written SOPs – standard operating procedures. Clearly written, well-designed and approachable SOPs provide critical guidance and can make the difference between rock-solid performance reliability and devastating misinterpretations that result in high-consequence errors.

Manage fatigue risks

Most organisations would do well to take a long look at all of their management systems, to determine whether they are brain-aligned. For many organisations, there also is a management system they need to add – a fatigue risk management system. As we now know, fostering conscious cognition improves error-free performance. Conscious cognition is housed in the slow brain - and cognitive fatigue from sleep deprivation is, quite simply, the enemy of the slow brain. Now that we know definitively – from actual brain imagery – that sleep deprivation leads to cognitive impairment and severe gaps in performance capability, we can no longer turn a blind eye to the rampant levels of cognitive fatigue across all levels of the workforce. Overcoming the microsleep mishap hazard that results from sleep deprivation requires a robust, multifaceted fatigue risk

management system that ensures effective, in-depth fatigue training, sufficient unrestricted sleep opportunities, real-time and objective individual fatigue risk assessments, and much more.

Conclusion – we need to embrace the opportunity

As we have seen, recent neuroscience research has provided new insights into our brains, how they function and how they impact the way we work, safety and performance reliability. These insights present valuable new opportunities for leaders responsible for operational reliability as well as organisational and process safety. We now have the knowledge and tools to challenge existing misperceptions about human error and to mitigate or virtually eliminate those errors. We know how to better support and protect our employees in the performance of their duties, and to build safe, smart, high performance reliability organisations. The overarching "human error" hazard can only be effectively controlled by aligning existing organisational culture, with the functional realities and limitations of the human brain: that is, by making our organisational systems brain-aligned.