Obituary

The passing of Professor James Reason

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Professor James Tootle Reason, CBE, passed away on 5 February 2025 at the age of 86. Born on 1 May 1938, Reason was a distinguished British psychologist renowned for his groundbreaking work in human error and safety. His research led to innovative ideas that have profoundly influenced safety practices across various high-hazard industries.

Reason graduated from the University of Manchester in 1962 and after that dedicated his career to the study of psychology, eventually becoming a tenured professor at his alma mater from 1977 until his retirement in 2001.

Reason was appointed Commander of the Order of the British Empire (CBE) in 2003 in recognition of his contributions to safety and risk management. He was also a Fellow of the British Academy, the British Psychological Society, the Royal Aeronautical Society, and the Royal College of General Practitioners.

Academic with a twist

Most people reading this article will be familiar with the work of the late Professor James Reason, a towering figure in safety science. While many recognise his name, fewer have explored his books or academic papers. Yet, his contributions have profoundly shaped how industries understand and manage risk.

A distinguished academic psychologist, Reason had an extraordinary ability to translate complex theoretical insights into practical, user-friendly models. His Swiss Cheese Model is perhaps his most famous contribution. It is an elegantly simple yet powerful way to illustrate how layers of defence have weaknesses, and accidents occur when these align. It has been used widely in process safety, nuclear energy, aviation, road and rail transport, cybersecurity, and healthcare, and wherever safety is a priority.

For those unfamiliar with the Swiss Cheese Model, a simple internet search will reveal its far-reaching impact. This article will reflect on his broader contributions and the lasting legacy he leaves behind in the field of safety.

A life in error

There is currently no dedicated biography of James Reason, but his book *A Life in Error – From Little Slips to Big Disasters*[1] provides a valuable overview of his 40-year career. As the title suggests, one of his primary interests was human error. His 1990 book, *Human Error*[2], marked a turning point in our understanding of the subject and how we can better manage human factor risks.

Reason often compared everyday examples of his own behaviour with the actions of people involved in major accidents to illustrate that the types of errors and their underlying causes were essentially the same. For example making a pot of tea while simultaneously feeding his cat, leading to him absentmindedly scooping cat food into the teapot.

He pointed out that this error was neither random nor inexplicable. Because he was highly familiar with both tasks (tea-making and cat-feeding) he performed them almost automatically, without conscious thought but the distraction of the cat disrupted his focus. Both tasks involved a similar action – using a spoon to transfer a substance from one container to another. This insight led him to a key realisation – people who are highly skilled at a task can make errors precisely because their expertise allows them to operate on autopilot. Conversely, those less experienced in a task are prone to different types of errors.

Reason demonstrated his academic credentials through detailed explanations of human behaviour and error classification – concepts that may hold limited interest for many safety practitioners. It seems that his books and papers were intended to capture his thought processes and ideas. However, the final results were practical insights that could be applied without requiring deep engagement with the underlying theory. He was keenly aware of the potential for overcomplicating explanations with what he called "psychobabble."

Reason acknowledged that while most people intuitively understand the concept of "error", there was no universally accepted scientific definition. Some argued for abandoning the term altogether; a debate that seems to have gained traction in recent years. However, Reason strongly disagreed, believing that the term was both useful and necessary, even if it did not always withstand strict academic scrutiny. He was generally dismissive of theories that sounded sophisticated but lacked real-world applicability, reinforcing his commitment to clarity and practical impact.

Organisational accidents

One of the key features of the Swiss Cheese model is the inclusion of 'latent conditions' as contributing factors to accidents. Originally described as 'latent failures,' Reason later recognised that most major accidents stem from organisational factors that are not immediately perceived as failures. His first book on organisational accidents[3], published in 1997, explored this concept, which he revisited in a subsequent book in 2016[4].

Reason analysed multiple accidents across different industries and found that, despite variations in location, technology, and costs, they shared common characteristics. Many contributing factors existed within the system long before the catastrophe occurred. These systems had multiple layers of defence, barriers

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and safeguards designed to prevent known hazards from causing harm. However, an unforeseen alignment of latent conditions led to these defences being defeated[1].

This is where the Swiss Cheese metaphor comes in – layers of defense have holes, much like Emmental cheese. Unlike cheese, however, these gaps are in constant flux. As a result, systems with 'defenses in depth' fail infrequently, but when they do the consequences can be catastrophic. This distinguishes organisational accidents from individual accidents, which occur more frequently but with less severe consequences.

Psychology meets engineering

Reason (and co-author Hobbs) acknowledged[5] that many individuals with an engineering background perceive psychology as a "soft, fuzzy 'people' business quite remote from their own tough-minded and rigorous technical concerns." However, many cognitive psychologists approach the human mind similarly to control engineers or systems analysts. They view it as an information-processing system with resources such as attention, memory, reasoning, problem-solving, and action control.

Figure 1 shows a simplified system representation illustrating how the human mind functions.

This model helps us understand both human capabilities and limitations. Humans receive information from multiple senses, with vision being dominant. However, we can process only a limited amount of information at a time, which we use to select and execute output functions. Other incoming information is filtered and stored in long-term memory, which can support our conscious workspace and enable automated responses, allowing us to react to stimuli without deliberate thought.

Understanding this model can inform better system design. It highlights the risk of overloading individuals due to the constraints of conscious processing, which is a significant limitation. However, human sensory abilities and the way long-term memory functions allow us to outperform machines and computers in many areas, even with recent technological advancements. It is not the full story because human performance is influenced by many factors such as fatigue, stress, and natural and learnt bias.

Violations

One area of debate that interested Reason was violation, which are deliberate deviations from safety procedures, rules, and regulations. Although the instinct may be to hold individuals accountable for their behaviour, when committing a violation most are non-malevolent and the negative outcomes that sometimes occur were not intended[6].

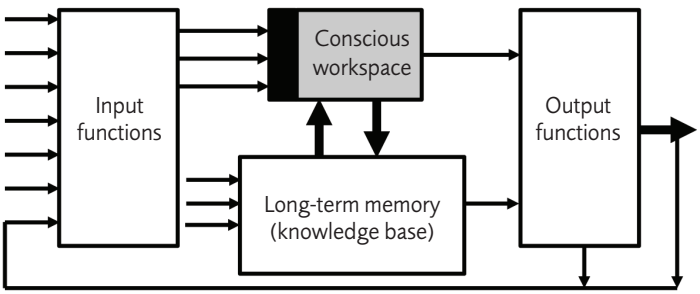

Figure 1: A simplified 'blueprint' of mental functioning[5]

Perceived benefits	Perceived costs
Easier way of working	Causes accident
Saves time	Injury to self or others
More exciting	Damage to assets
Gets the job done	Costly to repair
Shows skills	Sanctions / punishment
Meets a deadline	Loss of job / promotion
Looks macho	Disapproval of friends

Table 1 – Violation 'balance sheet'[6]

People often violate after assessing the perceived costs and benefits, as summarised in the table above. While it may seem logical to deter violations by increasing penalties, it is far more effective to enhance the perceived benefits of compliance. Individuals typically make cost-benefit evaluations quickly or instinctively, opting for the most convenient way to complete a task, especially if past violations did not result in negative consequences. One of the most effective ways to prevent violations is to provide well-designed procedures that enable people to work safely and efficiently.

Safety culture

Reason certainly discussed safety culture, but it was not a dominant theme in his writing. He viewed efforts to define it precisely as futile, instead emphasising its key attributes: learning, reporting, and justice.

He believed that conventional approaches to changing culture, focusing on beliefs, attitudes, and values, were challenging. However, he argued that modifying an organisation's practices, policies, and controls could effectively align people's values with them.

The concept of Just Culture is another example of where Reason took a complex idea and created something with practical use. He recognised that a culture of blame discourages individuals from reporting errors, ultimately hindering safety improvements[3]. Instead, Just Culture distinguishes between honest mistakes, system failures, and reckless behaviour. Reason used this to create the Culpability Decision Tree, which encourages organisations to focus on learning from errors by addressing systemic issues rather than punishing individuals for unintended mistakes. However, it also holds individuals accountable for deliberate violations or negligence.

Learning from past events

Reason pointed out that we can never fully recover the "whole truth" about any past event, including accidents[6]. The past is never entirely knowable, and hard facts must be pieced together with best guesses and theoretical assumptions. Even the most thorough analysis is merely a "highly selective version of actuality."

He emphasised that focusing on individual factors provides only limited insight compared to examining workplace and organisational influences. However, looking even further, to broader economic and societal factors, yields "rapidly diminishing returns," as these elements are largely beyond the control of system managers. Reason also expressed concerns about a growing trend in accident investigations to attribute causes to

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systemic shortcomings. He argued that while these shortcomings represent latent conditions present in all organisations, they do not, in themselves, explain how an accident occurred or how it could have been prevented.

Models, images and metaphors

Reason was aware that safety is a poorly defined concept and cannot be understood in the same way as a natural science[6]. This can make it difficult to communicate with people engaged in the day-to-day business of managing the safety of hazardous operations. This is where models, images and metaphors that can convey complex ideas in a concise and digestible fashion can be of great help. These representations do not have to be 'true' in the literal sense or even consistent with each other. They should instead be judged by their usefulness. In other words, does it improve safety?

Summing up

Professor James Reason's legacy is built upon several significant contributions:

1. *Understanding Human Error* – He explained that human error arises from systemic weaknesses within an organisation. While the human condition cannot be changed, the conditions in which people work can be improved to reduce errors.
2. *The Swiss Cheese Model* – His Swiss Cheese model has likely done more to advance the understanding of safety and risk management than any other approach. Though a simplification with inherent limitations, it has proven highly effective in communicating critical safety concepts to a wide and diverse audience.
3. *Distinguishing Accident Types* – He differentiated between individual accidents, which occur frequently with lesser consequences, and organisational accidents, which happen infrequently but can have catastrophic outcomes due to latent conditions within the system.
4. *Just Culture Framework* – He developed the concept of Just Culture, where organisations learn from mistakes rather than scapegoating individuals. He emphasised that people cannot easily avoid actions they did not intend to commit, making a blame-free approach essential for improving safety.

Reason was an academic with an uncanny ability to develop rigorous theoretical foundations while also creating simple, practical methods. A true pioneer in safety, he transformed our understanding of human error and its role in accidents, and his influence remains deeply embedded in modern safety and risk management practices.

Albert Einstein once said, "The definition of genius is taking the complex and making it simple." This perfectly encapsulates Reason's rare ability — one for which we should all be profoundly grateful.

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