

# James Reason: Patient Safety, Human Error, and Swiss Cheese

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**P**rofessor James Reason's achievements have been acknowledged with multiple awards both nationally and internationally. His publications starting from 1961 cover a wide range of subjects: motion sickness, absent-mindedness, human error, human factors, safety culture and managing the risks of organizational accidents in different industries.

James Reason was born in 1938 and lived his childhood in Watford, near London, Great Britain. He started his professional career as a medical student, but eventually changed his major to psychology. Encouragement to the decision came on a warm sunny day when he was sitting in a cafeteria near a big mental hospital in London, where he was as a medical student. He noticed a group of very charming looking young ladies passing by and heard that they were students from applied psychology. He graduated in 1962 with honors from the Department of Psychology, University of Manchester. The decision to change his major was a success also from a more personal point of view. Among the other students

he met his wife to whom he has been married since 1964.

James Reason's earlier interests were related to aviation, cockpit ergonomics, and motion sickness, and he worked at Royal Air Force Institute of Aviation Medicine in Farnborough for some years after graduation. He also had a private pilot license. Eventually he returned to the academic world and defended his thesis at the University of Leicester in 1967, where he worked until 1976. At the same time he was also doing research on motion sickness and disorientation in space at US Naval Aerospace Medical Institute in Florida. In the University of Leicester, he worked as a lecturer and a reader. Reason held the position of professor of psychology from 1977 to 2001 at the University of Manchester. Now as professor emeritus, he has actively participated in multiple safety-related events and research projects among different industries. During his tenure, he studied on topics such as error and absent-mindedness, safety and error management in various industries, as well as during the last decades, cultural and organizational issues, including patient safety.

*QMHC: How was Swiss cheese model developed?*

J.R.: It all started with cat food in a teapot, which seems utterly bizarre and random, but if you think about it, there are many common elements in this and all actually absent-minded slips, where you have

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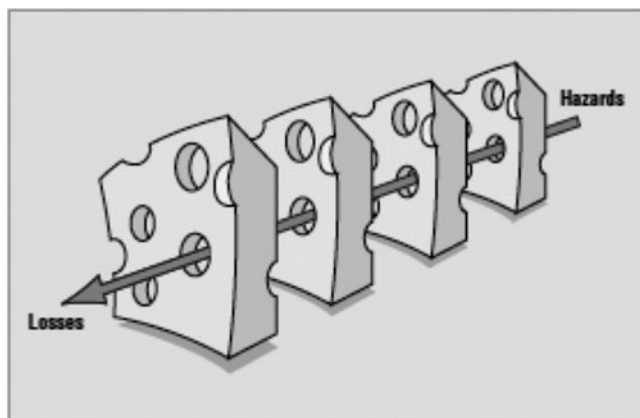
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these routine tasks: making tea and feeding the cat. Then, you have two tasks going on in parallel which compete for your attention, and elements of one migrate in to the other. (Figure 1)

This is the system model. It is assumed that people who are at the sharp end, doctors and nurses and pilots, don't make many errors, but when they do, they tend to cause accidents, which is actually not the case, because they make lots of errors and most of them are inconsequential. Errors arise from universal conditions in the system, which has to do with undermanning, inadequate tools and equipment, underresourcing, poor scheduling. So, the people in the sharp end, such as you, are much more likely to be the inheritors than the instigators of adverse events. There are all kinds of potential accidents brewing away in the system, and once in a while in the front-line, people cause those to happen. The main questions are, which defences failed, how did they fail, and why did they fail, defences, barriers, and safeguards. The most important thing about error is recurrence, the fact that the same situation shapes the same kinds of errors in different people. We are talking about error-prone situations rather than error-prone people. You can't change the human condition; we are who we are, but you can change the conditions under which people work.



**Figure 1.** Swiss cheese model. The Swiss cheese model of how defences, barriers, and safeguards may be penetrated by an accident trajectory.

In the top hierarchy of the organization, managers have to allocate the resources. They usually don't do that on an equitable basis, they usually find some departments who seem to deserve more. So, they give a bigger slice of the cake to those departments and that means that other departments get less, which translates into bad working conditions. According to the law of unintended consequences, these are the kinds of error traps that can be found in health care.

The Swiss cheese model, I didn't call it Swiss cheese at the time—no, it was someone in Australia who called it the Swiss cheese for the first time. But the Swiss cheese model went through various versions. The big change was that there are the barriers, defences and safeguards of one kind or another. So, sometimes the holes occur because of errors and violations, the people, the sharp end. These are often very short lived, they open and shut, open and shut. But the latent ones, they are more long lasting and they're present all the time because the designers, the builders, the maintainers, and the managers of the system can't foresee all the scenarios of failures. So, they unwittingly leave gaps and holes, and out here Murphy's law is looking through the hole, which only rarely occurs to produce a trajectory for an opportunity for a hazard to come into contact with victims. Professionals at the sharp end have little opportunity to change the system, so we need to make them more risk or error wise in order to recognize potential error-making systems in situations, and improve their ability to detect and recover errors.

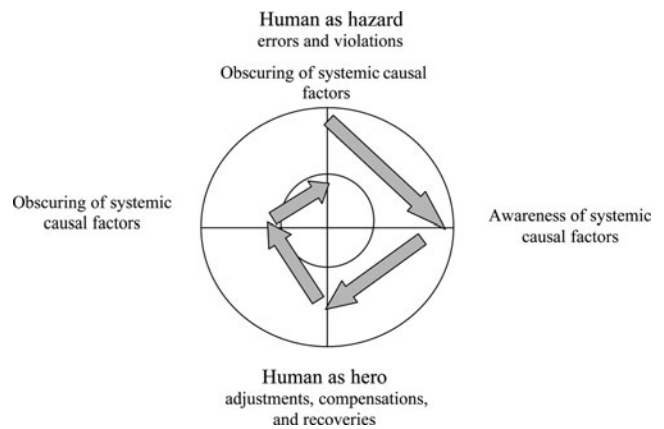
*QMHC: Is the Swiss cheese model ready?*

J.R.: Oh no, this is where the future comes in. We have two dimensions, where in one extreme, you are acutely aware of the systemic and causal factors, and on the other extreme, they are obscured. Then, you have the human as a hazard and the human as a hero. We could say that people in health care recognized in mid-1990s that blaming and naming and shaming is not much use, and they also recognized that system models have been successfully applied in other domains, particularly in aviation. They've become aware of error traps. If you separate the person from the context, you never really understand the error

trap situation. And then, we get to the point of capitalizing and exploiting the heroic features of the willingness “to go the extra mile.” So, we get to the adjustments, compensations, and improvisations. The thing about this is that people in an imperfect system are doing these adjustment compensations all the time, but the people who run the system don’t know that. And so, they assume without knowing what’s going on, that if you do today what you did yesterday and got away with it, there was no bad outcome—which is not necessarily the case. And then you came to the problem of autonomy. Nurses in particular love to work around, and in that process of working around, they get a lot of professional satisfaction and their supervisors approve. But what they’re doing is concealing system problems from the people whose problem it is to fix them, the managers. So, by trying to be the benevolent, they bypass the system and barriers, they forget to be afraid, and they do too much. So it could be at 2015, an accident happens which people will know about, and in which actions are implicated. Then, there is a backlash when the layers and the patients and the managers say, that right, let’s get rid of all this autonomy, will have to forget ourselves, and get more automation and more rules—and so by increasing reliance on administrative controls, the human is now back to be regarded as a hazard. However, as you go on around the cycle, the variability gets less. You know, nothing is wholly black or white, or good or bad. What I think is that as you go round the cycle, the variability reduces, and more and more the notion of person and system comes into increasing harmony, gradually, I think, I hope. As the organization learns and matures, the variability will diminish, tensions and transitions implicit in the cycle, but the perturbations are less disruptive (Figure 2).

*QMHC: When did you realize that you had achieved something remarkable?*

J.R.: That’s a good question actually. Swiss cheese was growing like a fungus through the 1990s, so there was the time when the patient safety movement came along. I went to Vancouver once. I was shown around the air control tower looking over the harbor, and



**Figure 2.** Reduction in the variability as the development cycle progresses.

there I was introduced to a young controller in his early 20s. When I said, Jim Reason, he said: “Ah, you’re the Swiss Cheese man!” Then I thought, well wow, the Swiss Cheese man.

Why has it been so popular? I think that the name Swiss cheese means a lot, because as a word you encapsulate the nature of Swiss cheese and the slices of Swiss cheese. But also, it’s a metaphor that people can take away. If you give them a long and complicated story, they can’t easily pass it on, but Swiss cheese is so easy. It just captures the idea.

*QMHC: Does health care have any chance of reaching the same level of safety as aviation?*

J.R.: Well, first of all, the real difference is that patients are already vulnerable, passengers are not. You don’t have to do much to injure or to do harm to a patient. It’s close and contact work, it’s personal, it’s always rushed, it’s always pressured, there are always more patients coming in. So, these are the things that are so different about health care, diversity of activism and of equipment. In aviation, two pieces of kit—there’s Airbus and Boeing and that’s it. In health care, it’s all hands-on work and the more you touch, the more opportunities there are for error, there’s uncertainty and incomplete knowledge, in spite of that the patients are vulnerable and needy, and you respond. We’re not going to have an

error-free performance—there will always be errors because of the nature of the business. But we can hope to increase the resilience so that the system can withstand more and more without harm necessarily being delivered. In order to do this, the system has to be geared up to give the individuals on the frontline the necessary skills and autonomy, and local risk awareness. The most defining feature of a high-reliability organization is a constant concern and awareness that things can go wrong.

*QMHC: In your opinion, is just culture achievable in health care?*

J.R.: If you go to the NPSA's Web site, they have something called the decision tree, which I think is very good. I tried in that to sort out, what were the culpable and what were the nonculpable actions. And it is really about to kindly advise the managers on the question of suspension, because a suspension is a terrible thing to happen to a professional. They really never come back from it in some cases. It doesn't sound like sacking, but it's bad. Of course, the health care professional is the third victim.

In order for an organization to learn, it has to have a memory. It has to recognize what has been going on in the past. In order to have a memory, it has to have a recording system, an incident reporting or learning system. People are not very keen on telling you about their own errors and near misses, because they're afraid to be punished, as they still are on certain circumstances. So, in order to become a reporting culture, you first have to be a just culture. And after becoming a reporting culture, you can become a learning culture. And once you are a learning culture, you can start to become a flexible culture, you can reconfigure yourself to suit to circumstances you find yourself in.

Blame-free culture is silly because there are some acts that are bad, culpable. So, just culture is not blame free, but open and fair. What we are trying to say is that where do we draw the line between those whose actions are unacceptable and those actions which are honest errors. And when you do this in some other domains, it turns out that

90% of errors are honest errors where as 10% are really bad and blameworthy and where things go wrong.

You have to recognize that the psychological forces that cause us to blame are so powerful that we love it—blame is such a delicious thing. You point out your finger, and what you are doing is detaching the guilty part from yourself. I've spent most of my time talking about uselessness of blame, as you know, because it's a very unproductive emotion.

*QMHC: What would be your message to managers and quality improvement activists?*

J.R.: You have to talk about the system and the person view. You have to recognize that fallibility is a part of the human condition. It is not entirely a bad thing either. We are fallible, but fallibility is trial and error learning, and when you are working on an area where you have no prior knowledge, you have to work it out on the floor, at the given time. Then, the errors you make represent the other side of the glide path. That's where you shouldn't go over. That indicates the areas where it's possible to progress. Error is not a bad thing per se, it is not a devil's gift, it's good. And most errors are inconsequential.

One of the most important things in the heart of the patient safety problem is, really, a real paradox. That is point 1: patient safety is immensely error provoking; point 2: doctors (not nurses) grew up in a culture where errors equate as incompetence; error is marginalized, stigmatized; and you don't talk about it. You know, there is no culture of sharing error, so doctors tend to write down their bad errors in their little black books if they are thoughtful. However, there are only two kinds of professionals in health care: those who have unwittingly harmed a patient and those who will unwittingly harm a patient. And that's the entire population. You don't, you can't escape.

*QMHC: What do you find inspiring?*

J.R.: People mostly, students and colleagues. A major figure for the last 10 years has been Sir Liam Donaldson, who has been a real leader of safety and a great influence. I would name also Lucian Leape,

he was very excited about the systemic approach, and a Canadian anesthetist named Jan Davis, whom I've known for many years. She's been an astonishing ally.

And I must say, I find the human as a hero. One of the salient moments of my career was actually in mid 1990s watching a pediatric cardiovascular surgeon. I was amazed. The surgeon in this case was a doer, so I said: "Come on, what does it feel like, to give life, and I mean literally give life to a kid?" I thought it was absolutely wonderful. Could you imagine doing that on a daily basis?

*QMHC: Yes, I could. Thank you for the inspiring words and discussions!*

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#### SUGGESTED READINGS

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