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Loyal readers of this column will know that I am a fervent admirer of John von Neumann (**25 January 2023**

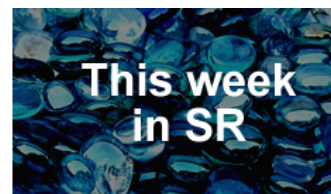
(<https://www.scottishreview.net/ManfredilaManna644a.html>) whose many brilliant insights are not appreciated widely enough. Like many a true genius, von Neumann worked at a very high level of abstraction, leaving to us mere mortals the task of working out the implications of his abstract findings for the deeper understanding of reality.

In my earlier piece, I suggested how one of von Neumann's theorems has important consequences on the organisation of production. Now I will try to show how the very same findings can be deployed to gain a better understanding of how 'mavericks' can provide unexpected benefits. In order to do so, I will resort to a real and, alas, very sad real case which shows dramatically the dire consequences of 'group thinking' – Elaine's story.

Elaine had been anaesthetised but for reasons still unknown it wasn't possible to get air to her lungs, and she started to turn blue and became 'hypoxic'. Within a few minutes, her anaesthetist and his assistant had started to attempt to 'intubate', in other words, get a tube down her airway, but their attempts met with failure.

After six minutes, in response to a call for help, others arrived in the theatre, including another anaesthetist and the surgeon waiting to perform the op. The three consultants continued attempts to intubate but soon this had degenerated to a situation known as 'can't intubate, can't ventilate', a recognised emergency in anaesthetics for which guidelines exist. These guidelines would suggest by this point (ideally sooner) that the best course of action would be surgical access to the airway, such as a tracheotomy.

Coincidentally, the senior anaesthetist in the theatre was one of the authors of



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the guidelines. Despite the nursing staff around them trying to hint that this was the best course of action, the consultants appear to have become fixated on intubation. Despite the ideal skill mix and equipment in the theatre, Elaine died a few days later because they failed to bring the skills and knowledge available to the fore.

The reason why this is a well-known case study in emergency medicine is that Elaine's husband was an airline pilot. When he read the report of the subsequent investigations undertaken by the hospital, he was astounded at the different approach taken by the medical establishment compared to his own industry, where incidents and near-misses are analysed not only in much greater detail, but also and more importantly from an altogether different perspective. The hospital was pushing the line that all staff involved acted in good faith and to the best of their knowledge and abilities, almost certainly with an eye on possible legal action and hence very concerned about denying responsibility.

In the airline industry, instead, the emphasis, apart from a much more forensic search for evidence, is not on avoiding court proceedings, but rather on finding any fault points and remedying them. A critical aspect of this process is the role played by non-senior staff. In Elaine's case, the nursing staff had indeed suggested the correct course of action that would have saved Elaine's life, but the ethos of the surgical theatre is that consultants' decisions are final and undisputed by less senior doctors, let alone mere nurses.

Movie buffs and especially fans of *Rainman* will recall the answer to the question 'which is the safest airline', as in the movie Dustin Hoffman (the savant) correctly identifies Qantas. What the film does not explain, is why Qantas. An important reason for Qantas' safety record is the role assigned to junior pilots and their relationship to senior staff. In the Qantas organisation junior pilots are supposed to, encouraged and rewarded for reporting any mistakes by senior staff and are expected to act on their evaluation of possible errors. This has a feedback effect on the actions of senior pilots whose judgement is not considered final, but subject to criticism and possible revision.

The key point here is that whenever critical decisions are taken, potentially large benefits can be gained by criticisms from people with different viewpoints, i.e., 'mavericks'.

Another, and admittedly less dramatic, application of the von Neumann's principle of using the contributions of resources that, on average, are less successful than the norm is the case of research grants. Billions of pounds, euros, and dollars are spent each year on research grants. The typical procedure is that each application is judged 'on its own merit', normally against a checklist of desirable outcomes/features. Seen from a von Neumann perspective, this process is highly inefficient. Indeed, it is very simple to produce examples where two projects, one from a mainstream research institution, the other more speculative and uncertain, will be rejected when examined individually, but will produce a net expected benefit when combined together.

As an aside, I should like to point out that this plea for a greater role to be given to off-mainstream approaches and ideas is totally different from the current emphasis given to DEI (Diversity, Equality and Inclusion) by universities on both sides of the Atlantic, where the diversity does not pertain to researchers' ideas, but to their physical and sociological features.



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