

VFR INTO IMC

Part One



With VFR-IMC being consistently one of the top 10 causes of aviation accidents worldwide, new research is taking a fresh look at pilot decision-making.



“The gravest mistake made by the pilot was his persistent attempt to continue visual flight in impossible conditions... [he] showed a serious lack of responsibility for the safety of the aircraft and of the passengers on board.”

This comment, in *Vector*, then named *Flight Safety*, appeared in its very first issue, 50 years ago.

Despite a half century of increasingly sophisticated sources of weather information, dazzling cockpit tech, advances in training, and a general maturing of the sector, VFR pilots continue to get entangled in instrument meteorological conditions (IMC), often with devastating consequences.

The stats across the world are stubbornly high and indicate how lethal such occurrences are.

In New Zealand, in the 15 years from January 2000, 31 people died in CFIT¹ accidents – about one accident a year – caused by continued flight into deteriorating weather².

And, according to the online aviation library, SKYbrary³, 75 percent of weather-related GA fatalities are in VFR-IMC accidents.

A personal account⁴

“The day before, weather had stopped me completing a job, so I was feeling pressure from the client to get the job done, and efficiently. So I was looking for any way I could, to take the most efficient route. And as a result I was pushing the weather.

“[I’d] got away with a close-ish call. So I thought to myself, ‘I’ve got this nailed. I’m a good pilot and, as long as I’ve got a tree as a reference, there’s no way I can go inadvertent IMC.’”

In the thickening murk, the pilot lost his tree and over the next ten or so minutes, flew blind in cloud, repeatedly climbing and descending, the airspeed careening between 40 and 140 knots.

“I remember looking down through the bubble between my feet, just seeing grey, and waiting for the trees to smash through.”

The machine finally popped out at 14,000 feet.

// I remember looking down through the bubble between my feet, just seeing grey, and waiting for the trees to smash through. //

“I was at a point in my career where I was cocky and complacent and operating right on the line. I’d had that close call a few days earlier but I’d got away with it. And that reinforced to me that I was awesome.”

Fast thinking

Matt Harris, former CAA Chief Advisor, Human Factors, says the VFR into IMC statistics indicate the complex nature of the factors behind the phenomena, and “they demonstrate that more needs to be done to understand why pilots continue”.

Now, a Griffith University doctoral thesis⁵ is providing some of that understanding.

The thesis says VFR pilots who enter IMC are unconsciously influenced by what’s known as ‘fast thinking’ – thinking shortcuts we all use before making a decision.

Actively engaging the brain and processing lots of information takes effort and can be pretty inefficient when we need to make quick decisions.

On the ground, therefore, a thinking shortcut can be useful. If we’re in a hurry and need a packet of crackers from the supermarket, we might just grab a familiar pack, or the cheapest. We don’t stand for hours staring at the choices on the shelves, trying to weigh up the advantages and disadvantages of each option.

“But fast thinking in aviation,” says Matt Harris, “can lead us to make incorrect – and fatal – judgements.” »

1 Controlled flight into terrain.

2 Source: CAA.

3 SKYbrary – *Inadvertent VFR Flight Into IMC*.

4 *Vector*, Winter 2019, “Rotary visibility issues”.

5 Stanton, A. A. (2022) ‘Gathering Clouds’ *A study of plan continuation, risk, rules and pilot behaviour*, [Unpublished doctoral dissertation]. Griffith University.

» Deciding to fly. Deciding to continue flying.

The Griffith University research indicates VFR into IMC is likely the result of the pilot being influenced by a clutch of these thinking shortcuts.

The shortcuts – or ‘biases’ – are active right from the initial decision to fly.

The ‘confirmation bias’ of a pilot who very much wants to fly has them paying attention mainly to information confirming the opinions they already have – and ignoring, or minimising, the information which doesn’t.

“In the setting of VFR flight into IMC, confirmation bias might result in a pilot subconsciously searching for environmental cues that the weather conditions are slightly above the minimum required, steady, or improving, when the opposite is true,” says Anthony Stanton⁶, the lead author of the Griffith research.

A second thinking shortcut, ‘anchoring bias’, has that pilot relying on the first piece of information (the anchor) they received, and then making estimates or judgements based on that anchor. This first piece of information becomes an arbitrary benchmark for all other information.

“An anchoring bias might result in pilots placing too much emphasis on earlier (good) weather forecasts,” says Anthony, “and then evaluating – through the lens of the original forecast – the actual weather being experienced as better than it actually is.”

These biases, combined with a lack of training or experience is often the cause of pilots going inadvertent IMC (IIMC).

The decision to *deliberately* enter IMC is influenced, the Griffith researchers say, by three more unhelpful biases.

‘Framing bias’ is how a pilot values the option of turning back from bad weather.

“If they frame the decision as a gain – lives and aircraft saved – they’re more likely to turn back. If they frame that decision as a loss – time wasted, clients let down – they’ll tend to keep going,” says Anthony.

‘Sunk cost bias’ has us continuing with a decision and a path, because we’ve already put so much into it. In the VFR pilot’s mind, that might be time and fuel, and maybe promises to clients.

The most worrying bias reported by the researchers, however, is ‘self-evaluation bias’, also known as the Dunning-Kruger effect⁷.



// State highway camera image of N72EX, carrying Kobe Bryant, pilot Ara Zobayan and seven others, as it disappeared into cloud, about two minutes before it impacted terrain.

Simply put, self-evaluation bias is the tendency for people – pilots included – with less ability and experience than others to think they’re actually pretty good.

“We found a large number of the more than 400 pilots we studied had a mistaken, elevated appreciation of their own skill levels,” says Anthony.

“And, consistent with the Dunning-Kruger effect, the pilots who substantially overestimated their ability were the less able pilots.

“Nevertheless, because they believed they were better than they were, they were also less risk-averse and more likely than others to be comfortable with the idea of entering IMC.”

Matt Harris says pilots might actually be quite good at accurately assessing the risks, “but we need to also understand these other factors can prejudice our decisions”.

Killer pressure

The helicopter pilot’s IIMC account on page 5 illustrates some of the pressure propelling VFR pilots into IMC.

CAA Aviation Safety Advisor Mark Houston, a 14,000-hours agricultural pilot, saw all types of pressure in his 40-year career. “For instance, to leave because others had or were about to, to start or finish a job, or to keep the customer or operator happy”.

Mark was not immune.

“It’s only a little bit of low scud that’ll burn off in an hour, so get out now and you’ll be right’ were words from a peer that I thought, nine minutes later, would be the last I would ever hear,” Mark says.

He says the ultimate decision to fly lies with the pilot.

“Responsibility for their own safety, and to their family to come home safely, should outweigh obligations to their employer, their colleagues, and especially to their own ego.”

6 GA pilot (8,000 hours), flight examiner, former flying school CFI. CASA branch manager of sport and recreational aviation. His research is separate from his CASA role.

7 “Flying near Mt Stupid” Vector Spring 2019.

// We have a culture of flying at low level in poor weather to get a job done. //

Jim Finlayson, A-category helicopter instructor and flight examiner⁸, agrees, and believes that New Zealand helicopter pilots are at particular risk of IIMC accidents.

“We have a culture of flying at low level in poor weather to get a job done. It’s up to experienced pilots and operators to be in the forefront of changing that culture.

“So, if a pilot says to their boss ‘I can probably push through that weather if you want me to’, the answer from the boss should be an unequivocal ‘no’. Without such leading by example, we’re going to continue to have IIMC and poor weather CFIT accidents.”

Pilot self-induced pressure appears to have been the main factor in the accident that killed the American basketball star Kobe Bryant and eight others, in January 2020, in California.

In its investigation, the US National Transportation Safety Board (NTSB) found there had been no pressure from his employer, Island Express Helicopters, nor from Bryant himself, on the pilot to fly.

But repeatedly during the accident flight, the 8600-hours pilot, Ara Zobayan, flew with less than regulation visibility, just under the clouds rather than 500 feet below them, at a lower altitude than his employer recommended, and at speeds far exceeding those recommended by the IIMC training he’d received seven months before.

He also shunned the recommendation in that training that a pilot should divert, land, or turn back rather than take a chance on poor conditions.

According to *Vanity Fair* magazine⁹, Kobe Bryant flew exclusively with Island Express Helicopters, giving it a sheen of celebrity, and Bryant often asked for Zobayan, the operator’s chief pilot, by name.

Getting Bryant to where he needed to be was number one for the VFR pilot.

On the day of the accident flight, the LA police grounded its helicopters due to the conditions. But Zobayan only partially completed a mandatory flight risk analysis checklist, failing to enter into it updated preflight weather information. This kept the flight risk score on the checklist low enough that he didn’t have to discuss the intended flight with his company’s operations director, nor develop an alternate plan.

With the determination to get his prestigious client to his destination overriding what the NTSB said was Zobayan’s “typical judgment and decision-making behavior”, it’s no surprise the NTSB found plan continuation bias, or “get-there-itis” also a factor in the accident.

Get-there-itis is thought to be one of the most common reasons a VFR pilot will plunge into deteriorating weather, pressing on with a plan, despite evidence it’s not working.

Research conducted by the Australian Transport Safety Bureau¹⁰ indicates that plan continuation bias increases as the flight progresses.

CAA safety investigations have often found that pilots dying due to VFR flight into IMC accidents were in the final 20 percent of their journey when their aircraft impacted terrain.

And Ara Zobayan had just on a third of his journey to go, when he entered cloud.

Matt Harris says self-induced pressure to get to a planned destination can be extremely powerful.

“It’s probably more effective to minimise the *external* influences that make the decision to continue seem like the only option.

“That’s by planning, and having a suitable alternative, and setting clear expectations to passengers that if the weather is bad, then it’s unsafe to continue.” ➔

Comments or queries? Email vector@caa.govt.nz

// PART TWO OF VFR INTO IMC

Part Two of *VFR into IMC*, in the Spring 2022 *Vector*, will look at further reasons pilots become ensnared by instrument conditions, and will offer some expert advice about how to avoid them.

⁸ And also CAA’s Senior Advisor, Dangerous Goods.
⁹ “Kobe Bryant’s Tragic Flight” *Vanity Fair*, 25 January 2021.

¹⁰ “General Aviation Pilot Behaviours in the Face of Adverse Weather”, atsb.gov.au, 2005.