



February 1st, 2023

RTAG General Meeting Wings Program

RTAG member Joe Rajacic presented a WINGS Credit Program entitled “Unintentional and Intentional IMC / Spatial Disorientation”. These are the second and third most common causes of fatal GA accidents. This seminar is part of the Advanced Qualification Program (AQP) that Joe is developing.

How Pilots get Spatial Disorientation

The **Coriolis illusion** occurs when a pilot has been in a turn long enough for the fluid in the ear canal to stop moving, causing the pilot to think the plane is straight-and-level. When the turn is followed by an abrupt head movement, spatial disorientation can be severe enough to cause the pilot to lose control of the aircraft. Trusting the instruments is crucial in this scenario.

The **Somatogravic illusion** occurs when rapid forward acceleration causes a pilot to feel as though he is pitching up, compelling him to lower the aircraft’s nose. This is most likely to occur with no visible horizon.

The **Leans illusion** occurs when a pilot enters a banked turn too slowly. The fluid in his ears doesn’t start moving and his brain thinks he is straight-and-level.

Moving your head around while flying in IMC can also induce spatial disorientation. Mount your iPad on the yoke and practice being able to manipulate all flaps, knobs, etc. without moving your head.

How to Prevent VFR into IMC

Weather Briefings: Look at the forecast along your entire route and take it seriously. Call Flight Services and request a weather briefing. Look at the temperature / dew point spread. 12 / 03 is good, but 06 / 03 is soup. Personal minimums vary according to familiarity with the area. Trygve added that, if you are IFR rated and plan to fly in IMC, know the ceilings along your route. If your engine quits, you don’t want a 300-foot ceiling. A 1000-foot ceiling gives you more options.

Aeronautical Decision Making: Poor ADM got you into the situation, but good ADM can get you out. Be physiologically ready: the right mindset, no fatigue, and no problems at home. When the little voice in your head says, “This is not looking good,” do a 180-degree turn (at a standard rate or less) and get out of there. If you are talking with ATC, ask them whether a different turn or a different altitude on the same heading would be better than a 180-degree turn. The key is to get back into VMC as quickly as possible.

Oxygen: If you are flying at night, your need for oxygen is greater. The FAA recommends using oxygen when flying at or above 5000 feet density altitude at night.

Tools: Use Foreflight in Attitude & Map mode as a backup.



Ninety percent of VFR into IMC crashes are fatal. In that situation, you will need to pay extreme attention to the instruments, with no distractions. **Potential Distractions** include the **startle effect**, in which it takes the pilot a few seconds to realize what has happened and then react appropriately, as well as looking outside, ATC calls, passengers, and system failures. There are two things to do if you fly VFR into IMC:

1. Fly using the instruments only. Do NOT look out the windows.
2. Call ATC and confess. They want to save your life and they will guide you to VMC.

If the controller tells you to “maintain VFR”, don’t look outside. Say that you’re in the clouds, you’re a VFR pilot, and you need help. When you declare your emergency as “VFR into IMC”, you have an instant instrument rating under 14 CFR 91.36. Ideally, you are already on Flight Following, but if you have no radio contact, use 121.5.

Putting on foggles will force you to look at the instruments. Confirm that your airplane’s systems (such as vacuum, electrical, etc.) are working.

Joe asked whether anyone knew the difference between a Turn Coordinator and a Turn & Slip Indicator. Trygve replied that a Turn Coordinator works on two axes and provides both a bank rate and a turn rate, while a Turn & Slip Indicator works on one axis and only provides a turn rate. Knowing whether your plane has a Turn Coordinator or a Turn & Slip Indicator, and how to read them, can save your life.

Why Pilots Fly VFR into IMC

According to Rod Machado, the most common reason is the “Mission Mindset”. Attempting to reach your destination to avoid disappointing others is a recipe for disaster. Be aware of what you value more. Say to yourself, for example, “I want my wife to continue having a husband,” and let that be your goal.

Involve your passengers in the safety of flight. Ask them ahead of time if they will be willing to turn back or divert if necessary. If they say no, then don’t take them. Never go flying if you don’t have a Plan B.

How to Train for Spatial Disorientation with a CFI

With the autopilot off, put on foggles, close your eyes, and fly straight-and-level.

VFR pilots: Get more instrument training.

IFR pilots: One-third of all pilots caught in VFR into IMC have instruments ratings, but they are either not proficient or have little or no actual IMC. To stay proficient, file instruments on nearly every flight and get actual some IMC with a CFI.

Most problems occur right after take-off in high workload environments in IMC. Some solutions:

1. Reduce your workload by having an autopilot and/or co-pilot, and a pre-flight briefing. Say what you’re going to do aloud before every flight, even if you are talking to yourself.



2. Announce "Single Pilot IFR" to Ground controllers and ask for a simpler departure, no turns below 1000 feet, and more time before a handoff or any new instructions.
3. Don't be in a rush to talk to ATC. If you told ATC not to call you until you get to 1000 feet, then don't answer any calls until you get to 1000 feet.

Trygve mentioned that it's very important to be on instruments at least five seconds before entering clouds. The light changes in clouds and it's hard to transition if you don't plan for it. Joe said that IFR rated pilots should go on instruments as soon as they have no usable runway left.

Final Notes

Think of ATC as "Air Traffic Coordinators" instead of "Controllers". They want you to get where you're going safely. Remember that they are sitting in an office; you are flying the airplane. Don't be afraid to ask ATC for what you need. If they say no, tell them you're declaring an emergency.

Under pressure, you don't rise to the occasion; you sink to the level of your training. The longer you wait, the fewer options you have. Fly the airplane.