

It's Late Night with Ned!

In the dark during a sandstorm, an F-16 pilot struggles with spatial disorientation while flying a combat mission over Iraq.

by Retired Lieutenant Colonel Ned Linch, United States Air Force

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The mission was intense. I had to fly my F-16 Fighting Falcon over Iraq at night in a sandstorm to conduct emergency close air support for troops surrounded by the enemy. Sound like a perfect setting for an in-flight catastrophe? ... It was.

While attempting to fly visually in the dark with night vision goggles and no illumination, I experienced spatial disorientation like

I've never had before in the F-16. Spatial disorientation is a dangerous condition pilots face when they don't have sufficient references to maintain proper control of the airplane. And the F-16 is an aircraft with a design that increases a pilot's susceptibility to this hazard.

Of course, the weather conditions compounded the problem. A major sandstorm had already shut down the area of responsibility for a few days. The conditions certainly weren't suitable for a tactical flight, nor for locating the troops hysterically calling for help on the radio. Because of the reduced visibility and zero illumination, it was not only hard to tactically manoeuvre, but difficult to locate the troops who could only be identified by a small, handheld imaging infrared strobe.

I had to turn off all cockpit lights except for keeping my attitude indicator dimly lit. I had my heads up display turned down to a barely readable glow of green. My wingman, in a sensor trail position became my talking altimeter.

In pilot training, nose high/low unusual attitude recoveries were beat into us for a good reason -- to mitigate a mishap from human factors and spatial disorientation. My undergraduate pilot training instructors ingrained these recovery manoeuvres in my mind to become second nature for such situations. That night over Iraq, I had to knockoff my F-16 attack and rewind back to T-37s in the middle of a combat manoeuvre ... several times.



Photo: Pete Vaughan Lightowler



The last place you want to be is at 200 knots, 70 degrees nose high in an F-16 fully loaded with bombs, fuel tanks and a targeting pod. But there I was, and the same procedures ingrained into me at pilot training work just fine in combat, despite the hair-raising circumstances.

Unusual attitudes and spatial disorientation are never planned or anticipated. But, perhaps, when we step out the door to fly, we should plan on and anticipate experiencing a date with this monster to avoid a serious cockpit error. Believe it or not, spatial disorientation is actually pilot error (perception error -- that is, you failing to react properly to the situation). It's preventable and you, the pilot, must maintain the focus and discipline to properly recover from the error.

In my case, I had to accept the risk for pilot error to help others in need, but I was prepared with options to mitigate the risk to avoid error.

There are three types of spatial disorientation. During that harrowing night over Iraq, I experienced both Type I and II spatial D, and lucked out on not experiencing Type III only because I remained focused and disciplined.

Type I is unrecognized spatial disorientation in which the pilot has no idea anything is wrong. The key to preventing a mishap in this case is an effective crosscheck as well as previous training, flight preparation and an organized cockpit. During my date with Type I spatial D, I'd look outside and try to locate the imaging infrared strobe, manoeuvre the jet, and then look back in at my instruments to verify what I had just done. I kept getting spatially disoriented and had to constantly look inside the cockpit and strain to see the dimly lit attitude indicator to stay orientated. Because of the weather, I was unable to scan quickly enough; thus, I found myself in an unusual attitude on more than one occasion.

Type II spatial D is recognized disorientation. In most cases, the pilot believes there's an instrument malfunction. The key to recovering from this type is to backup your aircraft data interface with your standby aircraft data interface or the heads up display and then believe and trust your instruments. In my case, I knew before I made an aggressive manoeuvre that I was going to experience spatial D. I anticipated it after every turn.

I had to trust my instruments and my wingman.

Type III spatial D is the worst. Many times the pilot is unable to recover from this type of spatial D because he knows something is not quite right, but he is unable to mentally and physically respond. It's like the pilot's brain is "locked up" just like your desktop computer often does. The only way to recover is either to eject in a single pilot aircraft or transfer the control to the other pilot/crewmember in a crew aircraft.

There is usually very little time to react in a Type III situation, so immediate action could save your life.

Psychologically speaking, sensory inputs to the brain arrive via two paths -- the shortest path is the emotional side that reacts prior to the reasoning side inquiring, evaluating and then making a sound decision. This is where flight discipline comes into play to block the "short circuit" to help keep the focus to prevent Type III.

What prepared me most for combating spatial D and having a successful mission were all those undergraduate pilot training T-38 backseat instrument sorties with the hood and the many night formation approaches on the wing in the weather ... especially in "pop-eye" conditions (in and out of thick weather).

Don't forget to take advantage of training opportunities because you never know when you might need those critical skills. You might be the next flight lead experiencing spatial D over hostile territory at night in bad weather with others desperately needing your help. *

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Proven Tips to Prevent Spatial Disorientation

Plan: You need to have a basic game plan to recover the aircraft. This should have been hammered into your brain in pilot training. Effective and thorough flight planning, plus an organized cockpit, will reduce the chances of task saturation, situational awareness issues, channelized attention and mis-prioritization -- all areas that contribute to spatial disorientation. A backup plan with several options will give you the capability to always have an "out". Realize it can happen to anyone, especially if you are fatigued, regardless of your experience or proficiency. So be ready!

Anticipate: You need to plan on experiencing spatial D on every flight and be ready for it, especially if you're stepping out into marginal weather or you know you'll be flying close formation in weather or at night. For a night ocean crossing mission in a fighter, you'll most likely experience spatial D so be ready to be trapped over the North Atlantic with no options but to focus and recover. The more proficient you are in your aircraft with recent experience, the less likely you'll experience spatial D (if you've been out of the cockpit for more than three weeks,

your chance of spatial D increases). Take-off and landing, air refuelling and tactical operations (low altitude in hazy weather, for example) are critical areas where you will have a higher chance of experiencing spatial D, so anticipate it. Also be ready for it during dynamic and demanding phases of flight and/or when there are other preconditions. Weather, night, formation, night vision goggles, fatigue, hypoxia, G stress, emotional compartmentalization issues, to name a few, are potential areas for distractions which increase your chances for a breakdown in your crosscheck. They can all lead to spatial disorientation.

Recognize: If you do experience spatial D, the first step is to recognize the situation. The faster you're able to do this, the greater the survival rate for you and your aircraft.

Confirm: Next, you need to confirm the spatial D. Crosscheck all instruments to confirm your attitude. If you hear a lot of wind noise, you're probably headed toward dirt. If in close formation, you might be straight and level, so take a quick peek at the heads up display. It's very difficult to suppress information from unreliable sources (your vestibular system) when in formation. You just have to hang tight and concentrate on flying.

Recover: Execute a nose low or high unusual attitude as you were taught in pilot training. If you're in close formation, recovering might just be simply getting into the correct position. Many times you're straight and level and it just seemed you were in a turn because you were riding high or low on your flight lead.

Photo: Cpl Andrew Saunders