Spatial Disorientation and Illusions

The Leans

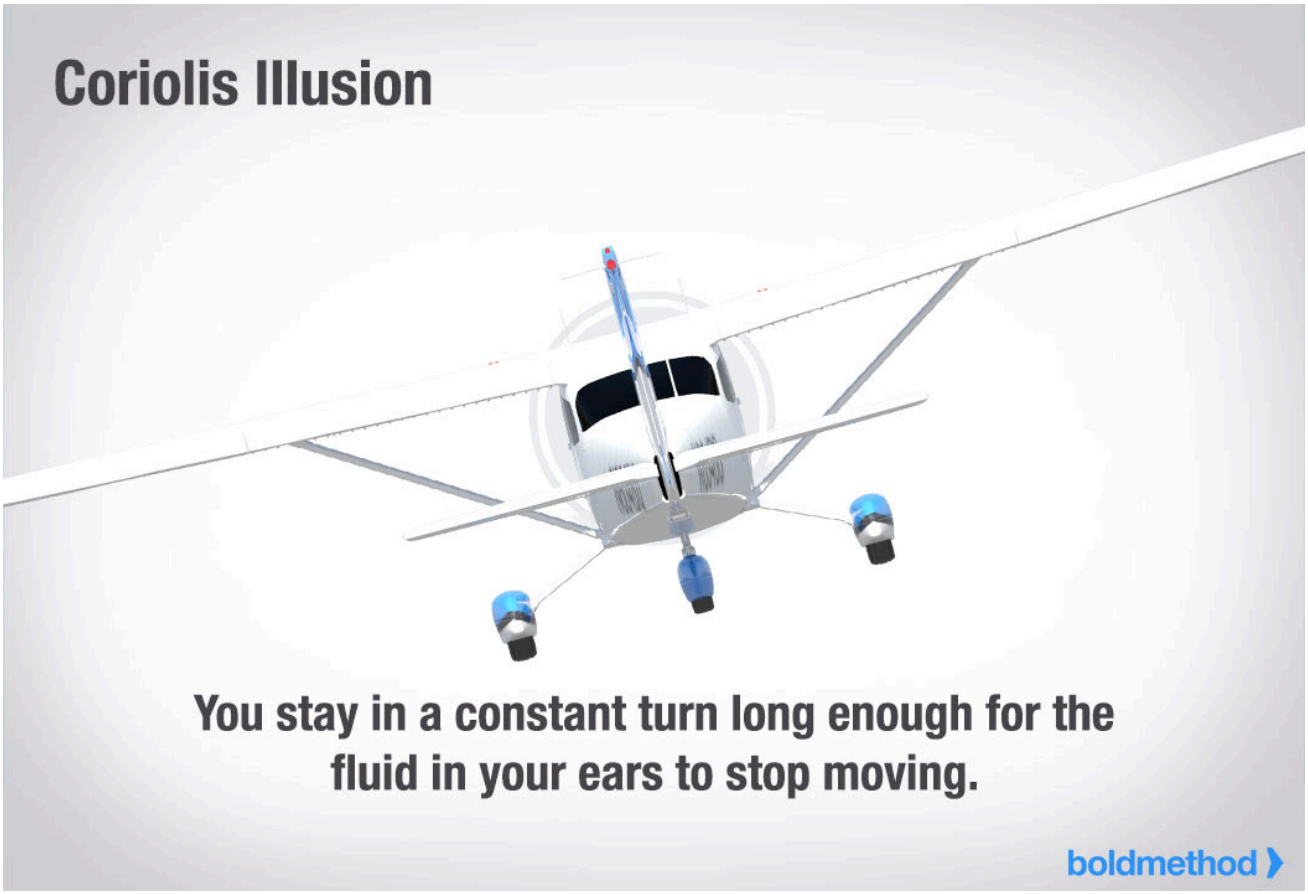
- The leans happen when you enter a banked turn to slowly
- If you don't roll quickly enough into a turn the fluid in your ears wont start moving and your brain thinks your still straight and level
- IF you correct too abruptly your ears and brain think they're banking in the opposite direction, this makes you feel like you need to roll the airplane back to the left, or leann your body to be upright.
- The best way to prevent the leans is to avoid super slow turns in the clouds you should never over control your plane but make sure you authoritative with your control inputs

Coriolis Illusion

- The Coriolis illusion happens when your in a constant turn long enough for the fluid in your ears to stop moving
- When this fluid stops moving your brain thinks you are straight and level
- If you were too move your head to quickly the movement of the fluid in your ears is perceived on an entirely different axis, this make you feel like the airplane is maneuvering in

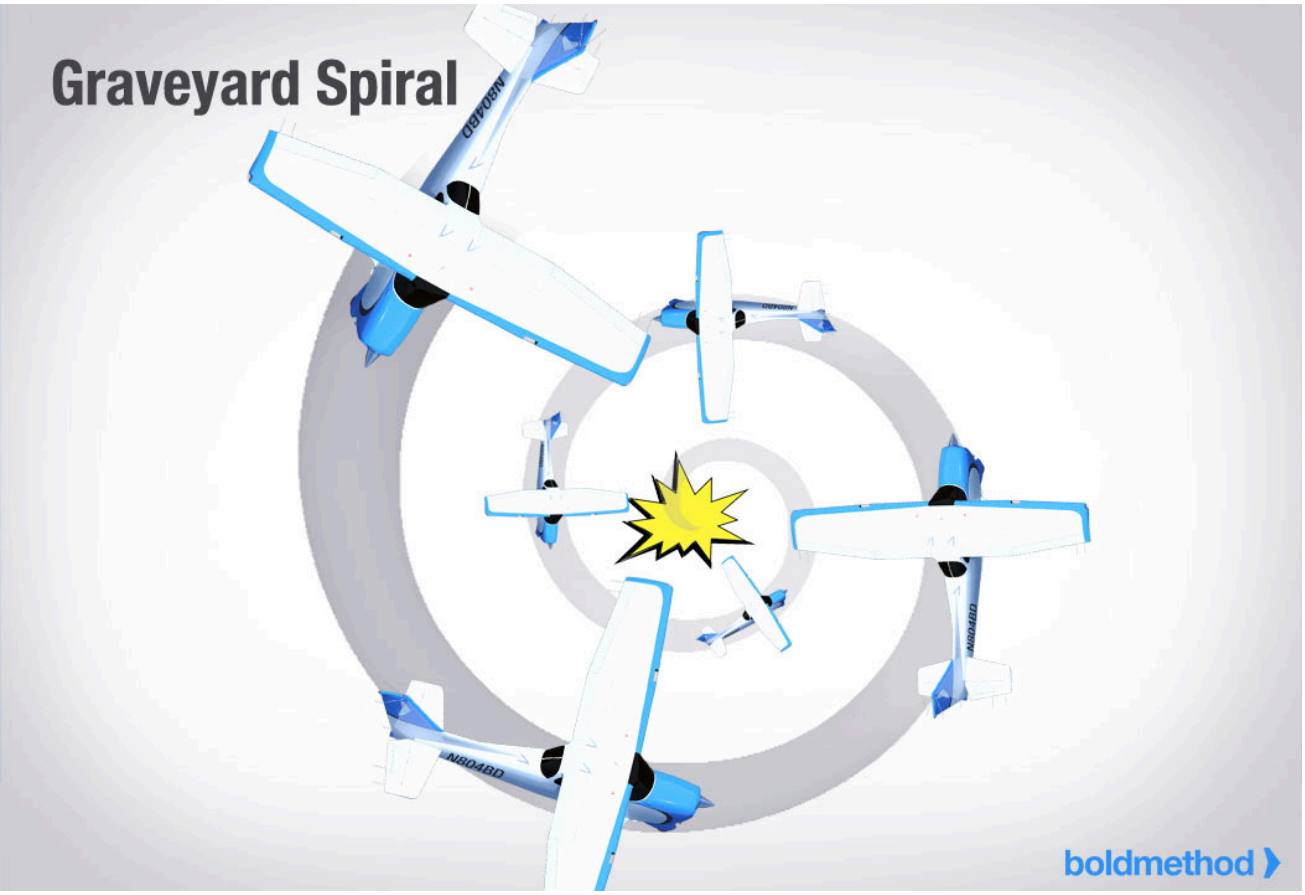
a way that it isn't.

- The best way to prevent the leans is to never move your head to quickly, if you feel like your getting disoriented focus on your instrument scan pattern and bring the airplane to straight and level



Graveyard Spiral

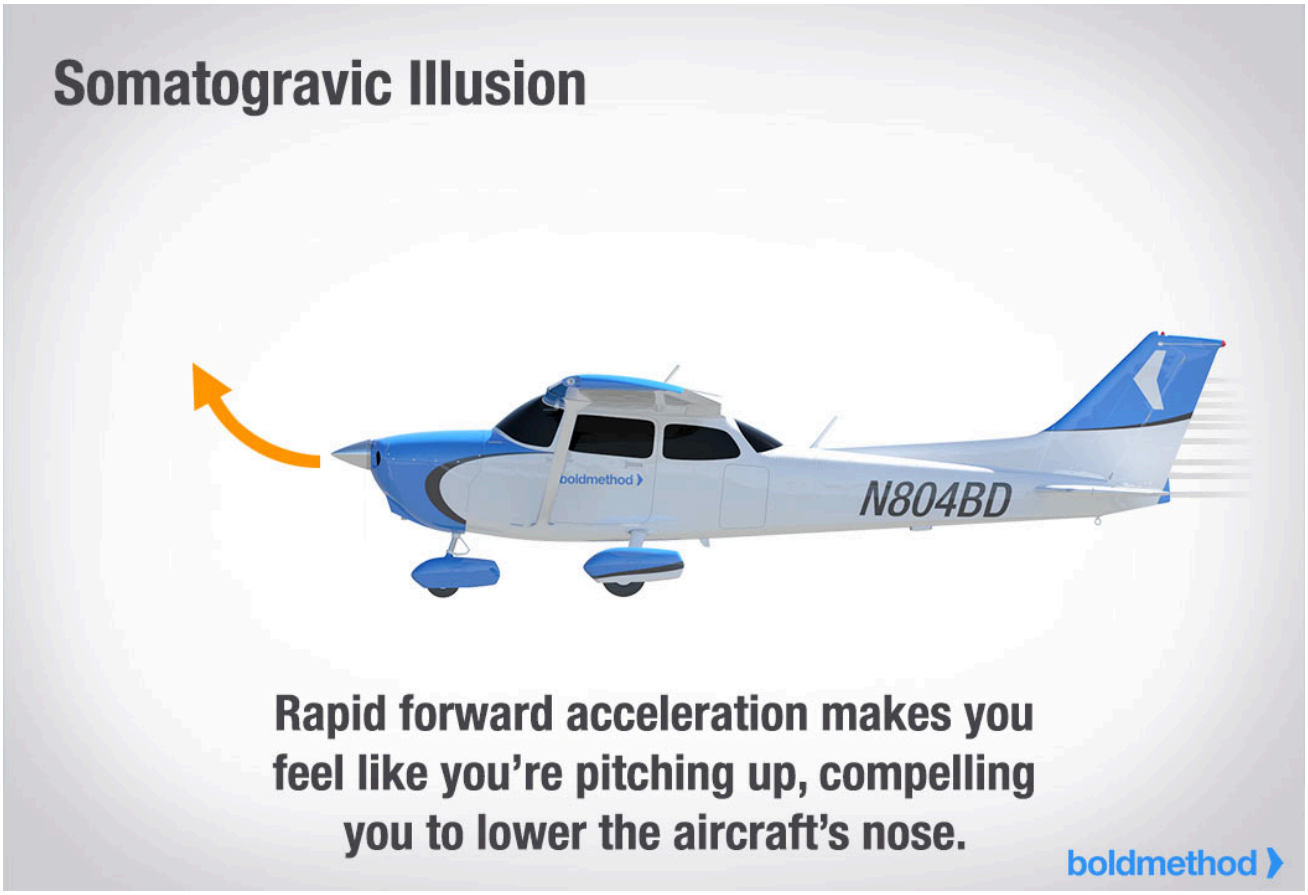
- If you stay in a turn long enough the fluid in your ears stops moving, as you return to level flight you feel like you've turned in the opposite direction and you return back to the original turn.
- Since aircraft generally lose altitude in a turn unless correcting with proper back pressure, the airplane will star to descend, because you think you are in a wing level descent you pull back on the yoke, this tightens the spiral and causes you to lose even more altitude
- The best way to prevent this is to maintain a strong scan pattern and not fixate on a single instrument



Somatogravic Illusion

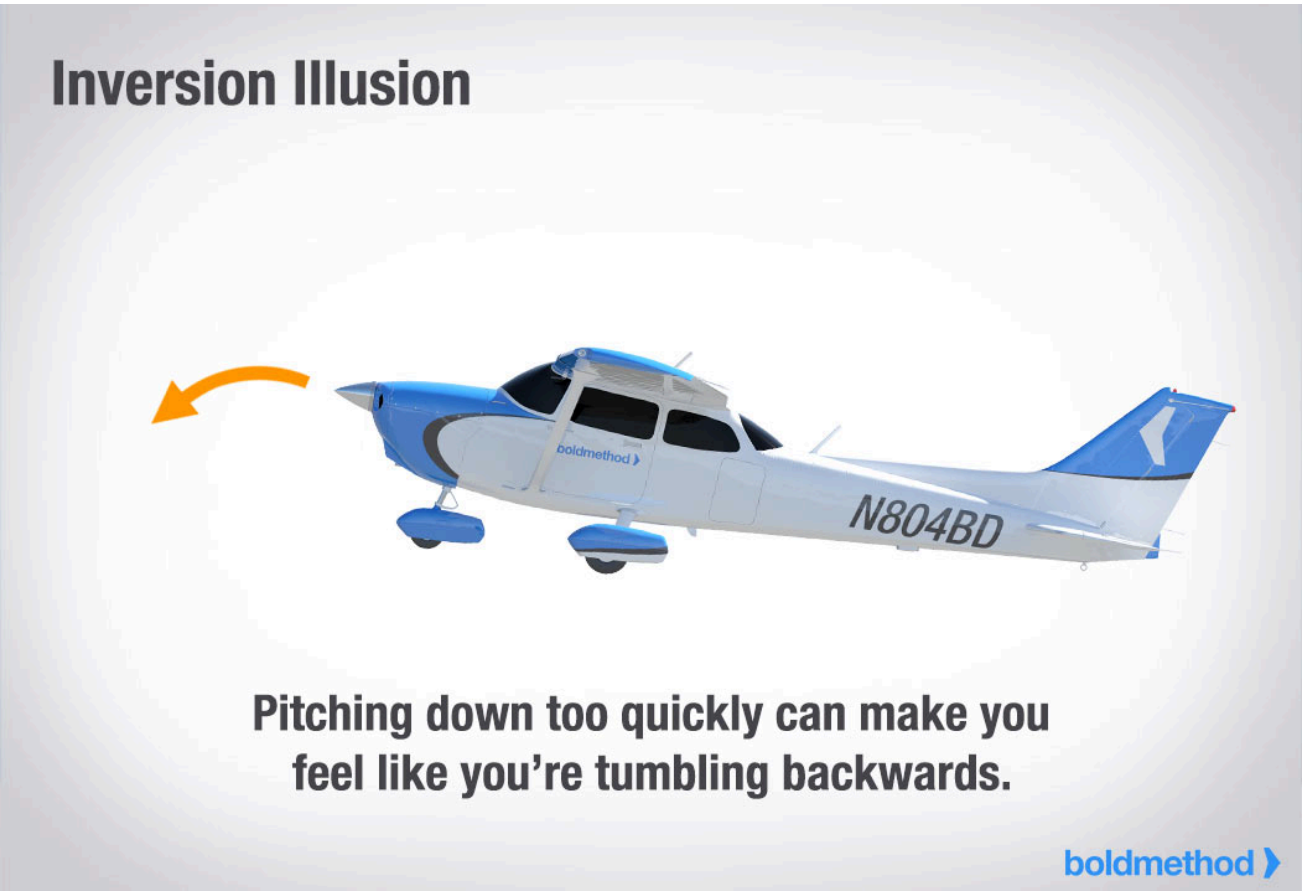
- When you accelerate quickly, the otolith organs in your ears think you are pitching nose up, this makes you want to push the nose of the aircraft down and you enter a nose low dive
- The opposite is true for deceleration, as the aircraft slows rapidly you feel like you are beginning to pitch down, you tend to pull back and enter a nose high stall attitude.

- The best way to prevent this is too avoid rapid acceleration and deceleration in the clouds.



Inversion illusion

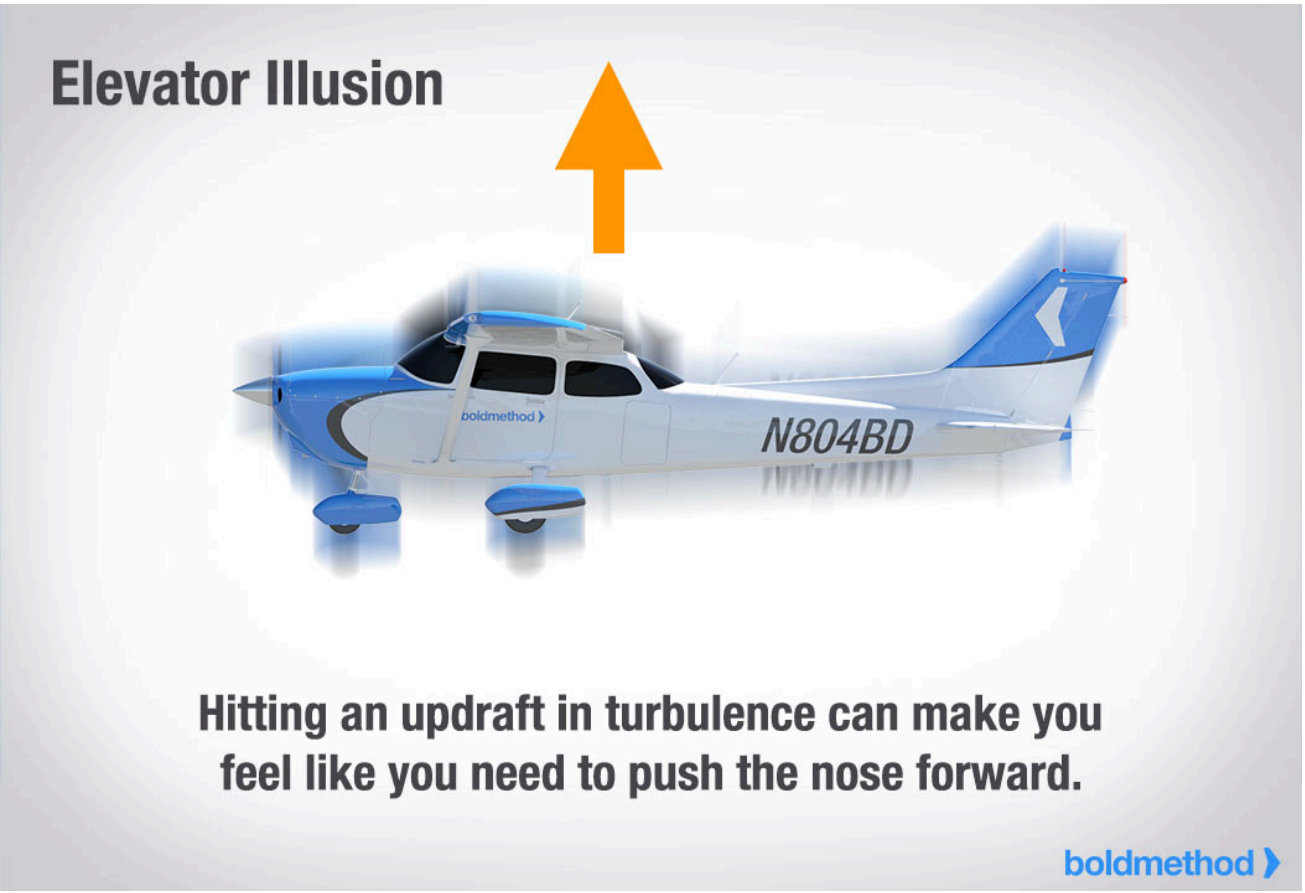
- If you pitch down too quickly from a climb to straight and level you can get the illusion of tumbling backwards
- The real danger is that it makes you want to push the nose even lower which puts you into a dive attitude
- The best way to prevent this is to ensure you are making slow and steady control inputs when your transition from a climb to straight and level flight.



Elevator Illusion

- The elevator illusion happens when you catch an updraft, and the aircraft is accelerated vertically
- The plane is most likely in straight and level flight, but this vertical acceleration can cause you to push the yoke forward
- The best way to prevent this is maintain a strong instrument scan pattern in turbulence and if the updrafts and downdrafts become so strong that you are unable to maintain altitude fly

the attitude indicator keeping your wings straight and level



Visual Illusions

False Horizons

A sloping cloud formation, an obscured horizon and aurora borealis, a dark scene spread with ground lights and stars and certain geometric patterns of ground lights can provide inaccurate visual information, or false horizon for aligning the aircraft correctly with the actual horizon. The

disoriented pilot may place the aircraft in a dangerous attitude.

Autokinesis

In the dark a stationary light will appear to move about when stared at for many seconds. The disoriented pilots could lose control of the aircraft in attempting to align it with the false

movements of this light called auto kinesis.

Optical Illusions (Instrument Flying Handbook 3-9)

Runway Width Illusion

Runway and Terrain Slopes Illusion

Featureless Terrain Illusion

Water Refraction

Haze

Fog

Ground Lighting Illusion