



# THE TRUTH ABOUT TURBULENCE!

LAWRENCE LEYTON

# The Truth About Turbulence!

1 in 3 people have a fear of turbulence. Even people who are not scared of flying are unsettled by strong and heavy turbulence. Statistically speaking, every row of three seats on a commercial aeroplane contains at least one passenger who'd really rather not be there!

For a nervous flyer, even the slightest movement of the aircraft can be very unsettling. But for pilots, turbulence is no different from going down a bumpy road in their car – a small, but totally safe, inconvenience.

All airlines use the same 3 classifications for turbulence. **Light**, **Moderate** and **Severe**. The classifications help pilots to make a clear assessment of the situation, so they can choose the best course of action during the flight.

Pilots will use their sophisticated weather radar to avoid any large clouds and if necessary, will slow down the aircraft if it gets too bumpy to help achieve a smoother ride.



The image above is an example of the pilot's radar display and at the bottom is a cross which represents the pilot's aircraft.

As you can see, there is quite a bit of **green**. This is cloud and within the green you will also see some **amber** and some **red**. This represents moisture in the clouds with red having a denser moisture content than amber. This is how pilots are able to navigate their way through bad weather.

For instance, in this example, the current flight path of this aircraft, which is represented by the solid straight line, is heading directly towards cloud with more dense moisture content (i.e. the cloud with the **amber** colours). So the pilot will have been in discussion with Air Traffic Control (ATC) to change course to avoid this weather system and the dotted line you see represents the adjusted flight path (or direction) that the aircraft will now take to avoid the amber areas.

## What about Clear Air Turbulence? (CAT)

The truth is that you cannot see clear air turbulence or CAT, as you can't detect it on the weather radar, and therefore you can't accurately forecast it, but there are other ways of avoiding it.

Firstly, it's worth noting that there are an average of **9,728** planes carrying **1,270,406** people in the sky at any given moment of time. So that is a lot of planes, so pilots also have the benefit of ongoing reports from other pilots on the same route as them. Sometimes these are passed on directly to each other, but if not, they will be passed on by ATC.

This allows the pilots to adjust their flight path accordingly, just in the same way as if they had seen the heavy weather on the weather radar.

## Is turbulence more likely on certain routes?

Any airport is at the mercy of strong winds on any given day and some are naturally worse than others. The same applies to **jet streams** on any given route, although there is generally more chance of turbulence crossing the ITCZ (Intertropical Convergence Zone) when flying south across Africa, for example.



Those huge cumulus clouds are always pretty bumpy. Flights over mountain ranges and through certain frontal boundaries will also feel more bumpy than usual, as it will transiting a jet stream boundary. But the truth is that turbulence is notoriously unpredictable!

If you want to lower your chances of encountering turbulence, the National Weather Service suggests you try to book flights for the early morning or close to sunset when the sun isn't heating the Earth's surface and creating a less stable atmosphere.

## Jet Streams

A jet stream can sometimes be thousands of miles long but is usually only a few miles wide and deep. Depending on the direction of travel, the flight planners will either avoid or use these jet streams to cut fuel costs, as they can flow up to 250 mph.

Just like a fast-flowing river swirling against the riverbank, where the edge of the jet stream interacts with slower moving air, there may be some **mixing of the air** which causes turbulence.

Even moderate turbulence, which could cause a drink to spill as opposed to just slosh about, is nothing to worry about, and pilots will try find a different altitude if it persists for a long period.

The bottom line is; that pilots will do everything they can to avoid turbulence, but sometimes they can't avoid it, like driving down a bumpy road.

## Is Turbulence Dangerous?

Everything about turbulence seems dangerous. However, in all but the rarest circumstances, it's not.

The real truth about turbulence is that a plane **cannot** be flipped upside-down, thrown into a tailspin, or otherwise flung from the sky by even the mightiest turbulence.

Planes are built to take a remarkable amount of punishment, and they have to meet stress limits for both positive and negative G-loads. The level of turbulence required to dislodge an engine or bend a wing is something even the most frequent flier won't experience in a lifetime of travelling.

And just to add some more comfort if you are a nervous flyer, I can tell you that wings will never snap off a plane. Engine failure will never result in a plane "plummeting" from the sky. All planes can fly with one engine, and if both engines cut out, an aircraft at cruising altitude can glide for 100 miles before it needs to land.

By example, **Air Transat Flight 236** lost all power over the Atlantic Ocean and was able to glide to a safe landing at a nearby runway 75 miles away. There were only 2 major injuries, both ironically as a result of the subsequent evacuation! The pilot even had to circle the runway and then carry out some "S" shaped turns to dissipate excess altitude because it was still too high to land by the time it reached the airfield.

But this was an extremely rare incident. In fact the chances of both engines failing on a twinjet aircraft (which is most commercial aircraft) is less than **one in a billion** flight hours. Those engines are very reliable. And even when it does happen, the plane can continue to glide for a considerable distance and can even safely land on water (just think about the Hudson River landing not so many years ago).

Car companies make their vehicles seem safer by showing crash tests in their commercials, but you never get to see the rigorous testing done on planes unless you look for it. Perhaps if you did, you'd feel safer.



Aircraft go through a massive amount of testing before they even get off the ground, and there's still plenty more after that for example:

**Wing flexibility testing:**

The plane's wings are bent to varying degrees, sometimes up to 90 degrees and eventually bent until they snap. This is to find their breaking point, which always requires far more force than any plane has ever experienced in actual flight. Wings are very strong and designed to bend and bounce to an extreme.

**Ingestion testing:**

This involves two separate tests. The first is the bird strike test, where dead chickens are shot into the engines to simulate hitting a bird mid-flight. The windshield is also tested. The second test is the water intake test, where the plane lands in a water covered runway as if there was heavy rainfall. This is to ensure that excessive water doesn't get into the engines.

**Temperature and altitude testing:**

Planes are operated and flown in extremely hot and cold temperatures to make sure their engines, materials, and systems work properly in all conditions.

**Velocity minimum unstick testing:**

A test pilot will drag the plane's tail along the runway to determine the absolute minimum speed needed for take-off.

**Brake testing:**

Planes are loaded to their maximum weight and equipped with worn brake pads. The plane is then brought to take-off speed before it hits the brakes to come to a complete stop.

Planes are tested for other emergencies too, like lightning strikes and low fuel scenarios. All of this should give you an idea of how important safety is to aircraft manufacturers. If there's something that could happen to a plane, they've probably tested for it.



## The Media Doesn't Help!

The media doesn't help. Most car accidents need to cause multiple fatalities just to make the local news, but plane crashes fill the rolling news for days or even weeks even if everyone makes it out safely. Even a plane taxiing to their stand and accidentally clipping the wing of another plane will be big news!

When it comes to aircraft incidents everything always seems to be exaggerated and blown out of all proportion. In fact the media even invented the term 'air pocket', but science will confirm that there is no such thing as an air pocket!

The point is that the media does not help if you are a nervous flyer!

## Things have changed since the 1920's

In the 1920's air accident rates were high, even the chances of witnessing an air crash were high, however, aviation has moved on exponentially since then and it really has become the safest way to travel.

Over the years, whenever there is an aviation incident, airlines across the globe will immediately share information so that new procedures can be put in place as soon as possible to avoid any repetition.





## Airline Safety Stats

No other form of transportation is as scrutinised, investigated and monitored as much as the aviation industry. The statistics below are from one of the largest possible single sources i.e.; The USA. Take a look. It shows the chance of fatalities on a commercial flight compared to other causes of death. Notice that you are more likely to die from a bee sting than from a commercial flight.

The number one killer in the United States is cardiovascular disease, with about 885,000 deaths per year. Each of us has about a fifty percent (50%) chance of dying of cardiovascular disease. Whenever we fly, we have a one one-hundred-thousandth of one percent (.000014%) chance of dying!

### Odds of Death

- Cardiovascular disease: 1 in 2
- Smoking (by/before age 35): 1 in 600
- Car trip, coast-to-coast: 1 in 14,000
- Bicycle accident: 1 in 88,000
- Tornado: 1 in 450,000
- Train, coast-to-coast: 1 in 1,000,000
- Lightning: 1 in 1.9 million
- Bee sting: 1 in 5.5 million
- **U.S. commercial jet airline:  
1 in 7 million**

*Sources: Natural History Museum of Los Angeles County, Massachusetts Institute of Technology, University of California at Berkeley*

## How about accidental deaths?

The figures below compare the average number of airline fatalities per year (not including commuter airlines) from 1981 to 1994 with the most recent figures for other forms of accidental death. Again, you can see that flying is relatively insignificant compared to other causes of death.

### Number of Accidental Deaths Per Year by Cause:

- **100 on commercial flight**
- 850 by electrical current
- 1000 on a bicycle
- 1452 by accidental gunfire
- 3000 by complications to medical procedures
- 3600 by inhaling or ingesting objects
- 5000 by fire
- 5000 by drowning
- 5300 by accidental poisoning
- 8000 as pedestrians
- 11,000 at work
- 12,000 by falls
- 22,500 at home
- 46,000 in car accidents

*SOURCES: Bureau of Safety Statistics, National Transportation Safety Board*

If we are talking about turbulence statistics specifically then here is the real truth.

Turbulence has, on **very** rare occasions resulted in some minor damage to an aircraft and there have been some injuries to passengers and crew.



These are normally always because people are walking around and not sitting with their seat belts on at the time of severe turbulence.



About 60 people annually are injured by turbulence in the US and two-thirds of them are flight crew. That works out to be only 20 actual passengers injured and if you put that in perspective that is **20** out of 800 million people, who fly each year!

It's also important to realise that most aviation incidents are not fatal. Planes lose altitude, slide off the runway, and hit extreme turbulence without any injuries. Even if your plane is involved in some type of accident, there's an incredibly high chance you'll survive. The National Transportation Safety Board estimates there's a 95% chance of survival based on their studies of past commercial aircraft accidents.

And if you're thinking "Yes, but what about terrorism?", that's highly unlikely as well. The Bureau of Transportation Statistics found there's roughly one terrorist incident per **16,553,385** departures. You're probably more likely to be killed by being kicked to death by a donkey!



In life there's always some kind of risk, but believe it or not the drive to the airport is much more dangerous than the actual flight itself!

In fact, on average, 1.25 million people are killed each year in traffic related incidents, so that's over 104,000 each month, or over 24,000 each week, or over 3400 each day, or over 143 per hour of each day. That's about a plane full of people every hour of every day, on average, dying in traffic related accidents. Conversely, in 2017 for instance, there wasn't a single accidental fatality in commercial aviation. The statistics speak for themselves!

### Which is the smoothest part of a plane to sit?

Although it doesn't make a huge difference, the smoothest place to sit is over the wings, nearest to the plane's centres of lift and gravity. The roughest spot is usually right at the back of the plane.

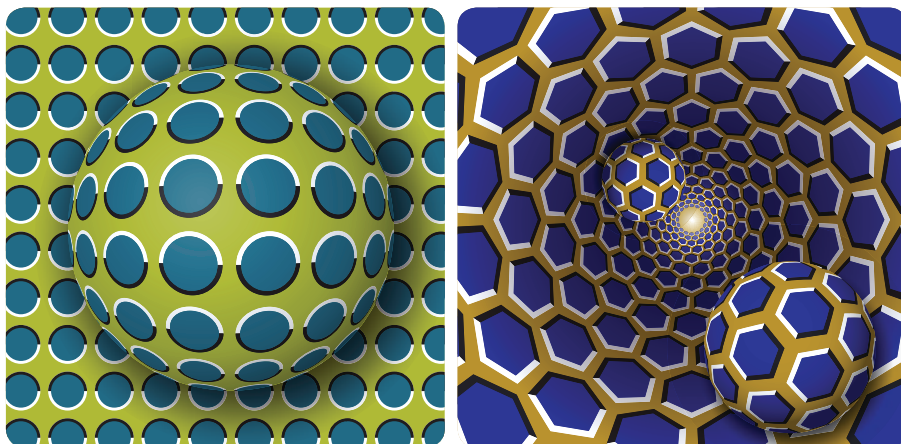


## Don't avoid flying

As humans we try to make ourselves feel safer by avoiding things, but that won't help you to deal with your problem. Avoiding flying can affect your career if your work involves travel. It can also affect relationships, as most people want to go on holiday somewhere abroad, with their family.

## Your Perception is Key!

So that's the truth about turbulence but actually, it's also about how YOU deal with turbulence.



**Stare at these images. Even though they are still you will see them moving! This demonstrates how movement can easily be exaggerated by your mind.**

## There are 3 things that control state of mind

1. **Body language**
2. **The pictures going in inside our heads – i.e. Mind Movies**
3. **The language that we use to communicate with ourselves – our Internal Dialogue**

## Body Language

When it comes to body language, a large part of the mind-body connection relates to breathing. Some people don't breathe correctly and often take too many breaths per minute. This can be referred to as shallow breathing where air is drawn more into the upper lung area by using the intercostal muscles of the chest rather than throughout the lungs by using the diaphragm.

Furthermore, they are then breathing out too much carbon dioxide too quickly. Low levels of carbon dioxide in the blood causes many of the symptoms of hyperventilation (i.e. breathing too quickly). All of this can have an adverse reaction on the body. There may be medical reasons for this, however, it can also be a symptom of anxiety, stress or panic attacks. This can then become a vicious circle. Panic leads to rapid breathing and rapid breathing can make you feel panicky.

So, learning about our mind-body connection can change how we breathe and therefore how we feel.



## Mind Movies

The movies that we play inside our head have a direct impact on our emotions as well as our behaviour. If we imagine the worse-case scenario ahead of time, then we will react to this accordingly. If we learn techniques to change our submodalities (internal coding) then we can remove the fear.

## Internal Dialogue

What we say to ourselves (self-talk) also directly affects how we feel and our behaviour.

So, once you understand the mechanics of how the brain works in relation to fear and how to change your state of mind, then you can learn to let go of it forever.



## How your Mind Perceives Turbulence

When you are in turbulence it can sometimes feel as though you've fallen hundreds of feet but in reality, the plane will rise or fall only by a **couple** of feet during all forms of turbulence but for many they perceive it as hundreds or even thousands of feet.

So, perception plays a major role in the fear of turbulence.

When an aircraft starts to get bumpy in-flight due to turbulence, most people totally lose perspective and find that any small movements trigger a series of negative thoughts of the worst-case scenario and it's these negative thoughts that make people feel nervous and scared!

However, if your perspective is corrected allowing you to understand that the movement you are experiencing is nowhere near as bad as you are imagining, then those negative thoughts will completely dissipate.

Turbulence arises because of air currents, that's all. People get alarmed by the sensation of movement and then worry about the structural integrity of the aircraft, but technically speaking it really is a non-issue.

Turbulence becomes a massive 'trigger' that switches on people's fear and anxiety. No one enjoys turbulence, but fearful passengers translate that into extreme danger but there's a big difference between discomfort and danger. You might spill your drink, but the plane isn't going to fall apart.

Fear of turbulence can start from a lack of understanding, and the **Turbulence Cure** online course will give you that knowledge and understanding. Knowledge really is power! This is why the **Turbulence Cure course** was developed and it will be able to help you. It will change your perspective fast and when it matters the most, so instead of catastrophising throughout the flight, you can be reassured that what you are experiencing is **completely safe and normal**.

The **Turbulence Cure course** has been created by a team of industry experts, who work with thousands of phobics each year running one of the world's leading 'fear of flying' airline courses. The **Turbulence Cure course** is presented by our lead pilot, Captain Simon Lewis. The course is based around a tried and tested formula that we know works, so we are certain by the end of the course you will no longer be scared of turbulence again!



For more information about the **Turbulence Cure** online course go to:  
**[www.turbulencecure.com](http://www.turbulencecure.com)**