

## Optical illusions - perception is everything... or is it?

In the time that flies between seeing something on the ground and referring to your GPS or charts to record where you saw it, your location can change by several kilometres and your attention is distracted. Maintaining a constant cycle of observation (checking instruments, scanning the horizon, a restful look around then back to instruments) is the art of good attention, but flying involves multi-tasking so awareness of factors which affect the vision can improve both safety and confidence.

The first time I went solo, in a powered glider at an RAF base, I had not had many hours of instruction. I did a reasonable circuit until I had to land. The low wing Venture glider did not allow a downward view. I knew I was somewhere above the field and I needed to set down before I ran out of runway. Not being able to see below shook my confidence. Like so many inexperienced pilots, I decided to discover where the ground was by flying down towards it. The result was a big bounce and a dented ego. If I had throttled back a little, and let the glider find the ground for me, it would have been a good landing.

The problem was not caused by the gliders field of view but by my need to see something that I already knew was there. If I had been able to look down I would only have seen a blur. Perception is everything, we all have our blind spots and we all make assumptions. Witnesses to the same event rarely agree on the details. When looking for a landing strip in an unfamiliar landscape what we see changes as much with a change of light on the vegetation as it does when we study a map of the area. We are bound to this situation, so it is good to familiarise ourselves with its tricks so we can recognise what is illusion.

It took a century to refine cameras till they could obtain images at the range of light intensity that the human eye can. The ability to see in the low light conditions, as the sun goes down, is very limited. Anything with light behind it is almost invisible in the dark and much of what we see is filled in by our imagination.

The eye is not just a remarkable imaging mechanism, it is hooked up to the brain which can produce distortions as well as correct them. The moon appears smaller when high in the sky and larger when close to the horizon but if you stretch out your arm and compare the size of the moon to the width of your thumb, it will be the same no matter where it is in the sky. The mind naturally pays closer attention to things on the horizon.



Picture from a celebration of women  
[website](#) full moon July 2012

If you sit in a totally dark room with a small point of light some distance away, you will see it moving even if it is still, even when you know it is still. With two similar looking lights next to each-other in the sky, one could be ten times brighter but much further away. Satellite watchers know how easy it is to mistake a star or an aircraft for a satellite, despite the differences of size, distance and motion. It can take a few moments to convince yourself that something you thought was moving is in fact still, many a ghost is observed that way.

Scale creates illusions too. What looks like a mountain could be a low hill which is much closer than you think it is. Moonlight can throw shadows across a landscape and appear to be

good illumination but it is not enough to reveal the detail of fences, cables and powerlines which are possible, and easier, to see in daylight. The danger is that we fill in the details with prior knowledge and mistake that for clear vision.

There are some things about vision which defy common sense. If you have an internet connection, have a look at [www.msf-usa.org/motion.html](http://www.msf-usa.org/motion.html) where you will see another strange illusion. If you stare at anything for long enough it begins to blend into the background. This is a hunting adaption which allows the conscious mind to rest yet still be aware of something which moves through the field of view, something which could be dinner. Though this blending of the vision seems harmless it can cause us to miss things moving slowly in our peripheral vision.

There are different types of tunnel vision. Speed along the ground can narrow the vision to the direction of travel so peripheral vision is blurred. Sudden or dramatic events can focus not just the vision but the whole mind so only things directly in the line of sight can be seen. Last minute collision avoidance can also reduce the scope of vision while the mind is trying to resolve what happened. Difficult conditions of weather or stress can limit the concentration to a narrow focus as much as fatigue can.

Finding things in the sky is an acquired skill. Some people are naturally better at it than others, but we can all benefit from being aware of the focus of our eyes as we look for aircraft amongst the clouds. If we focus on the background sky our eye will not be focused on what we are looking for, so it helps to deliberately scan at different distances. Once you have seen what you are looking for its location seems obvious.

The eye corrects colour as well. Everything looks grey with the sun behind it but brightly coloured when directly lit. Location and motion are not specific; it is not unusual to think the train you are riding in is moving when in fact it is stationary or to sense a momentary descent during a climb. A useful tool of navigation is our instinctive knowledge of progression across a landscape, but it is prone to large errors. The magnetic compass, air speed indicator and wrist watch were the original tools of aerial navigation but reliance on them often led to larger errors than navigation by landmarks and the sun. Life is much easier with GPS as a backup.

Perceptions can be fleeting, our reality is composed of experience and it changes with closer investigation. Our actions are always a second or two behind the decisions of the rational mind. Fast reactions come with practise because our reactions are programmed by repetition. Truly unexpected events leave us all speechless and unsure of what to do. People who remain calm in extreme and unlikely circumstances have simply planned to do so no matter what happens. Hesitation is just the time we need to make a considered decision.

So we often see what our brain expects us to see but we must also see what we are actually looking at, so that action can be taken when it is necessary. Concentrating on the danger of illusion will not help, but being aware of illusion is a crucial aspect of confidence. Anyone with an instrument rating who has spent time looking into night skies, will have seen the occasional small flash or momentary point of light. Some of these will be meteors or rain reflecting outside lights, some will be tricks of the vision and some will be other aircraft. Knowing that you don't know, is nine tenths of the solution!