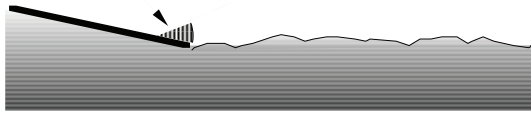
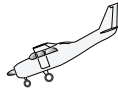
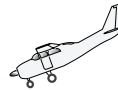


this angle looks too steep



this angle looks too shallow



Runway sloping up Even though the approach is normal, the perspective of the runway makes it appear that the aircraft is too high. The pilot compensates by making a flatter approach - dangerous at night!

Runway sloping down With the aircraft on a normal approach path with respect to the horizontal, the perspective of the runway makes it appear that the approach is too low. The pilot compensates by flying a higher approach, resulting in an overshoot or a high speed at the runway threshold.

Judging distance at night. Most pilots undergoing Night VFR training have a tendency to grossly underestimate the distance to illuminated areas such as small towns or aerodromes. This is because the illuminated area becomes clearly visible much sooner at night than it does in the daylight when the clutter of the background makes it less distinct. This effect can be exaggerated on very clear nights when the lights appear

even brighter and closer than normal. [How often have you heard someone describe a crystal clear night as one where you 'could reach out and touch the stars'?]

On final approach on a clear night, runway lights can appear brighter and closer than they really are, giving the pilot the impression that the runway is closer than it really is and the aircraft is too low. By the same argument, on a night with visibility reduced by haze or smoke, runway lights appear further away than they actually are, giving the impression that the approach is too high.

Black-hole effect. Of particular importance is the effect of an approach on a dark night when the only lights visible are the runway edge lighting. This is likely to be the case when the flight is on a night with a middle-level overcast obscuring the moon and stars and depriving the pilot of any natural horizon. On such occasions you can lose all perception of distance and depth and the runway lights can appear as though they are painted on the windscreen!

It is called the black-hole effect and the tendency is to get the false impression that you are too high causing an undershoot on the approach [the aircraft tends to 'sink' into the black-hole beneath it]. The effect can also be present when city lights are visible beyond the runway, but there are no lights in the vicinity of final. Black-hole-like effects can also occur in the daylight when the approach is over featureless terrain such as snow or calm water. On take-off the absence of lights other than the runway lights can give rise to the somatogravic illusion once the runway lights disappear after the nose is raised during the take-off run.

INCREASED SUSCEPTIBILITY TO DISORIENTATION The likelihood of a pilot experiencing disorientation and illusions depends to some extent on his/her physical and/or mental state.

Physical contributing factors include:

Head colds, flu or sinus infection
Physical exhaustion or discomfort

Mental contributing factors include:

Anxiety, stress or mental fatigue
Fear or panic
Preoccupation with other problems [worry]

SUMMARY OF VISUAL ILLUSIONS ON APPROACH:

A pilot may think that he/she is too HIGH on approach [and therefore tend to undershoot] when:

- The runway slopes down to [up from] the threshold.
- The terrain slopes up to [down from] the threshold.
- The runway is narrower than usual.
- The runway is longer than usual.
- The approach is over water or featureless terrain.
- The approach is in total darkness except for the runway lights.
- The runway lights are dimmer than they usually are

The air is unusually clear.

A pilot may think that he/she is too LOW on approach [and therefore tend to undershoot] when:

The runway slopes up to [down from] the threshold.

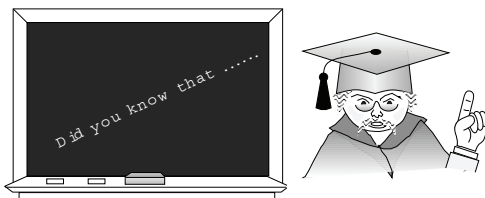
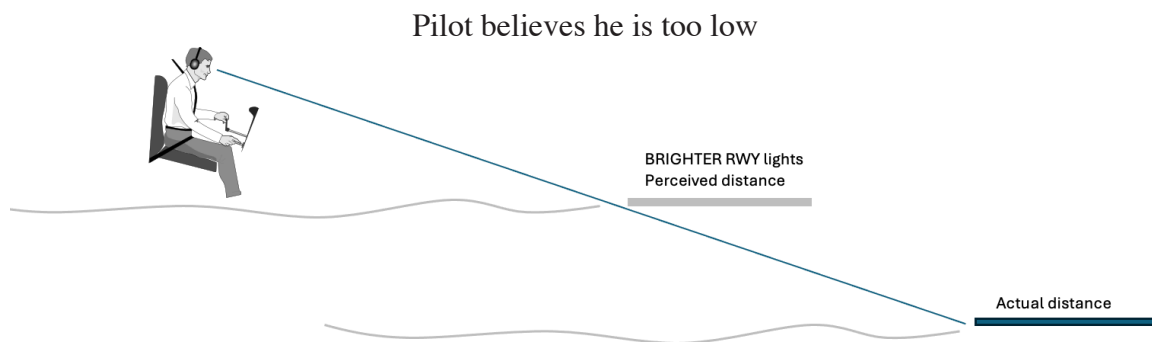
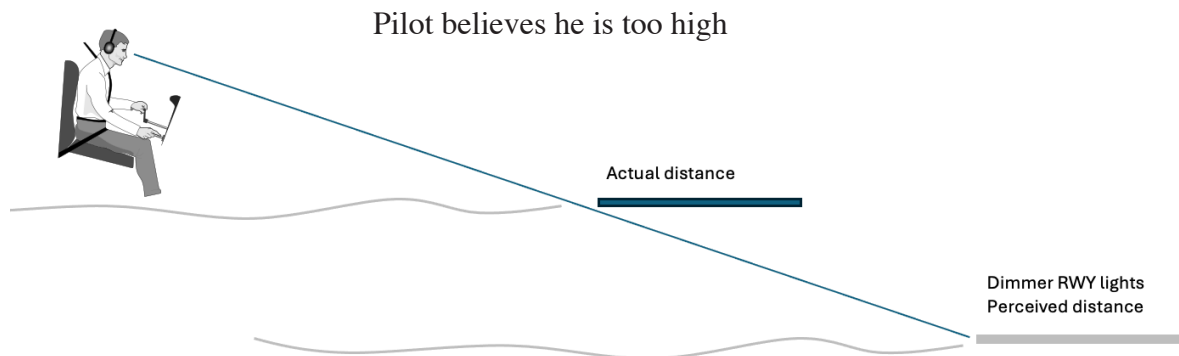
The terrain slopes down to [up from] the threshold.

The runway is wider than usual.

The runway is shorter than usual.

The visibility is poor.

The runway and approach lights are dimmer than usual.



The brain receives information from the eyes, the inner ear and skeletal muscles and joints. Of these three sources by far the most important is the visual information.



Vertigo is a confused state of disorientation which occurs when the messages from the three sources mentioned above are conflicting or ambiguous. The only sure way to counter its effects is to rely absolutely on the information provided by the aircraft's instruments and ignore all other sensory information.



In the absence of reliable visual information, proprioceptive [from the skeletal muscles and joints], and vestibular [from the inner ear] cues can misinterpret acceleration as a continuously steepening climb - *the somatogravic illusion*.



When the terrain over which an approach is made slopes up from the approach threshold, the pilot may falsely perceive that the approach angle is too shallow, while terrain that slopes down from the approach threshold can give the impression that the approach angle is too steep.



Susceptibility to disorientation can be increased by physical factors such as head colds, fatigue and discomfort, or by mental factors such as anxiety, fear or worry.