

LOW-SPEED, LOW-ALTITUDE TURNS

What happens when a pilot applies aileron to turn left? The left aileron is deflected upward, lowering that wing, while the right one deflects downward, raising its wing. As a result, the airplane banks, and the generated horizontal lift component helps turn the airplane.

But that horizontal lift component? It didn't exist a moment ago, when flying straight and level. Where did it come from? Since there's no free lunch in aerodynamics, it was taken from the vertical lift component and essentially re-directed to the left.

Meanwhile, drag increases. The left wing's deflected aileron creates parasitic drag where it didn't exist before while the right wing's induced drag increases, thanks to the greater lift it's generating.

In other words, turning requires us to change the vector for some of the lift being generated while increasing drag. That's not such a good idea when close to the ground, at close to gross weight, at high density altitude and after just taking off.

