Thoughts on the Cross Control Stall (Tim Brill, MCFI-A)

This data is taken from my flying the 8KCAB "Super Decathlon." Ok, we all know that an airplane will stall when it exceeds the Critical Angle of Attack. We also know that when the airplane exceeds the critical angle of attack, the ailerons aerodynamically have the opposite effect of what most pilots think. In other words, although the aileron deflection in "Normal" flight and "Stalled" flight is the same, the effect will be the opposite. Consider in "Normal" flight, if say the left wing drops, pilots use right aileron to "lift" the left wing. Why, because the downward deflected aileron on the left wing means the left wing is now at a higher angle of attack, meaning more lift plus more drag (adverse yaw). Now move into stalled flight where the lift / drag trends diverge, meaning the wing generates less lift + more drag, and that same left wing now generates less lift, meaning, the left wing "drops" more + way more yaw to the left. This roll coupled with yaw + spin!

Lets move on. So, the big problem when students stall and airplane is YAW. Remember, from the pilots perspective, yaw is always an ear to ear movement of the nose of the airplane. Inclinometer ball be damned! Students don't often consider the effect of the ailerons (adverse yaw) and the typically do not know how to effectively use the rudder. Remember, the rudder input is always 2 part, Applied THEN Neutral. In other words, wiggle your feet.

Next, aside from something being broken, fundamentally there are only two pilot induced pro yaw flight conditions. The first is when roll and yaw are in the SAME direction: The SKID. The other is when roll and yaw are in OPPOSITE directions: the SLIP.

Skids are stall and spin prone. Do NOT SKID. Slips are spin resistant (otherwise the FAA would not show pilots how to slip to a landing) and are pretty much stall resistant (at the fuselage begins to generate more and more of the lift). Now, you can transition from a slip into a skid if you get sloppy in moving the aircraft controls.

OK, in the Decathlon, if we are in a slip, bring the power to idle, then increase the elevator back pressure until we stall, what you will notice is the aerodynamic buffeting caused by the stall. Specifically, the back end of the airplane flying through the lumpy air spilling off the wings. But there is no directional control loss.

Now in a typical high wing Cessna, the effect of stalling in a slip (cross controlled) will result in the air flow over the rudder being reduced. So, the airplane will go off heading towards the down wing. It will also transition from the slip (cross controlled) into the skid, then into the spin. In this case the spin will be, if I am correct, towards the down wing.

In a typical low wing airplane, like a Piper, the effect of stalling in a slip (cross controlled) will result in the air flow over the high wing aileron being reduced. So, the airplane will

will first go to a “wings level” attitude. It will then transition from the slip (cross controlled) into the skid, then into the spin. In this case the spin will be, if I am correct, towards the applied rudder. In other words, the pilot will normally “stop” doing anything when the wings are “level,” typically not noticing that the control inputs are (say if we begin from a slip to the right), full left rudder and full elevator aft, total pro spin inputs.

So, a few things. First, the student HAS to take notice of where he / she has positioned the control inputs. Hold the elevator aft (assuming upright flight) and hold the rudder, you have a spin. Next, the skid is always more dangerous than a slip. Yet it is the slip that is technically, cross-controlled. So, which is worse? The cross control and the cross controlled stall is not necessarily bad provided you do not let it transition into a skid, which can then transition into a spin.