Imagine you are now the pilot during a competition aerobatic flight. The airplane is preflighted and everything seems in order. The engine start is normal and you taxi out. Pre-takeoff checks are normal. You add power and here we go! Wow, it is now really loud inside. The airplane is very light on the controls; little movements are more than enough for normal flight.

You dive in gaining airspeed and signaling by dipping your wings. Straight and level and then back on the stick, pull-up, strain, contract thigh and trunk muscles; keep the blood from draining into your feet, you need it in your brain! The noise of the air and engine cover grunts you do to keep breathing while your abdominal and trunk muscles are contracting. Right now, stop, level again, pick a point to do the roll and stop exactly wings horizontal. The horizon goes around fast; your neck whips side to side trying to keep your eyes focused on it. Another pull, strain, grunt, contract those leg muscles and abdominals. Now you are flying inverted. The world is upside down. Everything looks different. You need to turn. Which way? If we go left, wouldn’t that be right from the judges’ perspective? Come on, it wasn’t that complicated on the ground! Blood rushes to your head. The turn wants to push you out through the roof of the canopy it seems. Aren’t you glad your belts are really tight? Did you turn the correct way? Well, it’s over with that, better to concentrate on the next maneuver. Now you have to go vertically straight to the ground. Speed increases rapidly. Again pull, now a very hard strain is essential. You know after being inverted one is more susceptible to the forces of the pull: the positive “Gs” (+Gz in technical terms). You had a little loss of peripheral vision on this one. You have to be careful on the next. Fatigue may be affecting you, or the heat, or maybe not as hydrated as you thought? You are only in the middle of the program, and already sweating. Careful, if another hard and long pull is needed the chances of
passing out are now higher. You already have felt some of the initial symptoms of lack of proper circulation (what pilots call “gray-out”). You know loss of consciousness can occur abruptly, without any warning symptom. Watch where you are! You don’t want to fly out of the box! Has the wind changed? It does not seem you should be so close to the edge at this point. May be it was the wrong direction turn after all? Forget about it. There is a half-loop down (split S), and that is a longer, more sustained +Gz. And immediately ending that there is a roll, where you want your coordination and visual performance to be really good. You do not want to risk having compromised blood flow to your brain at that point. OK, let’s not be lazy and let’s work, increase the effort, strain, contract those abdominal and you legs, squeeze the blood up into the head, save that reserve of oxygen in the tissues. At the beginning of the half-loop down where you were hanging from the seatbelts and assuming your resting blood pressure was normal, the blood pressure in your arteries to the head was about 145 and in your feet it was well below zero. Yeah, that means there was no blood flow to your feet. Your are doing a nice tight loop, and if you let go of the strain and relax your muscles at the bottom of this loop where your “G-meter” (instrument that reads the Gz acceleration) says +6 the pressure in your feet would be about 350, and in your head will be below zero: you could not stay there more than a few seconds (using that oxygen tissue reserve we all have) unless you do something to increase the pressure of blood going to the brain, like straining and grunting really hard. G-suits can do that too, but in competition they would move the resting platform you have for your hand since they work by inflating a cuff around the thighs, where your hand is resting. Your hands are doing all the fine work: all the fast and small movements to guide the airplane through these precise maneuvers. And your feet need to work too, and in perfect synchrony with your hand to make the maneuvers look right. You knew this was not going to be easy, but after competing a few times you realize you were wrong: it is extremely difficult to do this very well.

Well, you have completed your program, are exhausted, drenched in sweat, but still need to land safely. So calm down, pay attention, don’t let the exhilaration of this kind of flying take you out of your established patterns and routines for a safe landing. You are tired. Later, as the excitement fades away you notice some sore muscles. That night you discover some bruises in your hips and arms. Well, small price to pay for such enjoyment. It really does not matter what the standings in the competition are. You just think how lucky you are to have experienced one of the most liberating forms of flight.