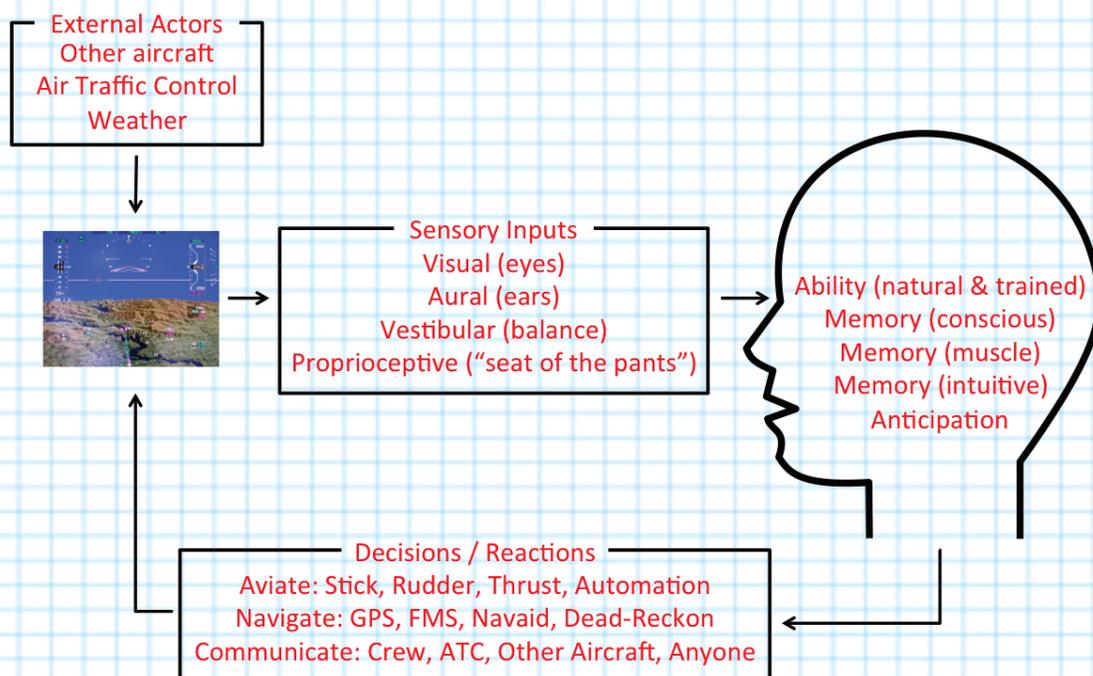


## Situational Awareness (SA)



**Sensory Inputs.** A pilot's situational awareness requires an accurate perception of the environment and the aircraft. If you want to improve your SA, you need to ensure the channels of communications from your sensory inputs are unimpeded:

**Visual.** You visually acquire aircraft attitude, performance, navigation, and spatial information. You can improve all of these using technology, such as enhanced vision systems, heads up displays, radar, synthetic vision, and flight management systems.

**Aural.** You use your ears for the radio and the noise level of the cockpit can tell you volumes about airspeed, altitude, thrust settings, and aircraft health.

**Vestibular.** Your ears' semicircular canals derive attitude and rate of turn information, but this system is easily fooled.

**Proprioceptive.** The proprioceptive system reacts to the sensations resulting from pressures on joints, muscles, and skin and from slight changes in the position of internal organs. Forces act upon the seated pilot in flight. With training and experience, the pilot can easily distinguish the most distinct movements of the aircraft by the pressures of the aircraft seat against the body. The recognition of these movements has led to the term "seat-of-the-pants" flying. This system is also easily fooled.

## Flight Lessons 2: Advanced Flight

**Physiology.** Not all of your inputs will be valid, it is up to the gray matter in your head to sort the wheat from the chaff:

**Ability.** You have ability, natural and trained, to process all those sensory inputs and to make that information useful.

**Memory.** There are three types of memory and all three can be trained. Your conscious memory controls most of your actions. Your muscle memory reacts to your will to perform basic tasks without taking too much conscious effort. Your subconscious memory is continually learning and producing the “feeling” you get which can be called intuition.

**Anticipation.** Your subconscious brain uses all sensory inputs and memory to anticipate the future. This anticipation is your situational awareness. You need to pay attention to the world around you and keep your mind alert to take advantage of the memory’s internal database to maintain good SA.

**Decisions / Reactions.** Your conscious and subconscious team together to produce reactions based on your sensory inputs.

**Aviate.** You must always devote at least one pilot to flying the airplane and when SA begins to break down, it is usually wise to dedicate that pilot exclusively to the task of keeping the airspeed, altitude, and heading where they need to be. Automation can be a hinderance or a help, and where it is a hinderance the pilot must take over.

**Navigate.** The first priority in navigation is keeping the airplane from hitting anything and then comes getting the airplane to the destination if possible, any airport if necessary, and on the ground in one piece as a last resort. If the GPS is healthy that should be the “go to” source, followed by operative flight management systems, ground-based navigation aids, and back to basic dead reckoning.

**Communicate.** Keep the lines of communication in the cockpit open, the best ideas may be someone else’s and discussion can produce solutions any single individual would have missed. Air traffic control, the home base, or the aircraft manufacturer are only a phone call away.

**Action / Reaction Loop.** Once the pilot has made a decision and acted, the result may be completely unexpected because the environment itself (weather, ATC, other aircraft, etc.) has a vote. The sensory inputs must again be assessed and the pilot must restart the action/reaction loop.

## James Albright

**Clues of degraded situational awareness.** If the airplane gets to some point in space and time before your brain does, you have lost situational awareness.

“What’s it doing now?” — If the aircraft automation commands a change in aircraft horizontal or vertical navigation that surprises you, you either have an automation problem or you have lost SA.

“Why’s it doing that?” — If an aircraft system starts to act up, it might be a systems-related problem. But it could also be a programming or other user input error due to the user’s confusion caused by a loss of SA.

“I guess we are there” — If the airplane gets to an event sooner than you expected, for example if you get a vertical alert announcing the top of descent, you may have lost SA.

“It’s awfully quiet on the radio” — If you are preoccupied in the cockpit and realize you haven’t heard anything on the radio for a while, you or ATC may have missed a handoff. You have lost SA.

### **Situational Awareness Restoration Plan**

Fly the airplane. Make sure one pilot is devoted to keeping the airplane right-side-up, the airspeed indicator above the stall and below the red line, the altimeter where it should be (usually that means level flight).

Make the automation make sense. Once you’ve evaluated the aircraft’s attitude and speed trend, decide what part of automation is helping and what part is hurting. Take over the chores that aren’t working.

Evaluate the big picture. It may be helpful to verbalize the situation from the very big picture to the smaller details as a way of getting your brain back into the game.

Buy time. If things are not going well, if you have enough fuel, and if there isn’t a dire reason to get the airplane on the ground, look for a way to buy time. Ask for a holding pattern or delay vectors.

Communicate. It never hurts to ask for some help.

Step back and reassess. If your current view isn’t helping, step back and take a look from another perspective. “What would Wilbur and Orville have done?”

Calm down. Take a breath and take stock of what you have going for you and what is working against you.