Pilot Performance
A New Reality of Superior Performance and Adventure

by Henry K.

A Refresher Publication
www.refresher.com
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Introduction

**Pilot Performance** was originally published as a series of articles on creative leadership in The CEO Refresher online @ [www.refresher.com/ceo.html](http://www.refresher.com/ceo.html).

**Pilot Performance** explores a metaphor for business leadership based on techniques in aviation and the performance of pilots. The metaphor of executing with skill and precision in “turbulence” seems particularly relevant within the challenging environment we face in business and organizations today.

*In life you’re either a passenger or pilot ...  
It’s your choice.*

Flying Magazine

*Be a pilot or be a passenger.  
Just don’t be baggage!*  
Henry K.

It’s time to take a good look in the mirror as yes this is all about leadership – and ultimately ... it’s all about you.

Enjoy!
Leading is learning
... and learning faster!

Belasco & Stayer
The Right Stuff!

There is a mystique and sense of awe surrounding pilots and flying where it is generally believed that pilots possess special skills and unusual abilities. This is reinforced by the heroic images of pilots and the perceived element of risk and danger of flying by the general public.

The image of the great daring of the fighter pilot remains with us today, reinforced not only through the media but also by pilots themselves. The early aviators were indeed courageous and daring, if not also bold and reckless, as they were breaking new ground and testing the limits of new technologies, equipment, and human capabilities. They were not unlike business entrepreneurs and innovators who led industrial and economic development with bold and daring ventures to create new business opportunities.

Pilots must be superb strategists and decisive leaders.

Pilots today may well be motivated by the exhilaration and adventure of the experience of flight, however, there has been a transition from the entrepreneurial to the professional in aviation skills as well as in organization leadership and management. Advances in technology and the increasing sophistication and reliability of aircraft systems have placed the current pilot in command of an aircraft in the position of strategist, and decision maker.

Flying an aircraft involves effective planning, forecasting and ongoing monitoring of performance, accurate interpretation of information from a variety of sources, excellent judgment, and the decisive and flawless execution of procedures and maneuvers.

The pilot in command is responsible and accountable for the safe operation of the aircraft, the concerted actions of
the flight crew, and indeed, the lives of the passengers and crew. The professional pilot has the required certifications for the position as defined by aviation authorities, and possesses the skills and proficiency to assume command of the aircraft and flight crew.

The pilot in command is a leader, a coordinator, a decision maker, a strategist, a captain, and a master of his or her craft, with a personal responsibility and commitment to effectiveness. This is not unlike the leader of an organization or work unit charged with the responsibility for charting an effective course of action within an environment that is challenging, changing rapidly, with multiple competing demands, and with the ultimate personal responsibility for success or failure.

**Personal responsibility and commitment**

Pilots do possess the abilities to execute complex skills in guiding an aircraft through an ever changing and three dimensional environment. This competence is achieved through a thorough understanding of the flight environment, the mastery developed through training and personal discipline, extensive experience, an ongoing and critical flight awareness, and continuous learning and performance improvement.

The right stuff is about adventure, courage and risk taking. It is also about mastery, skill and proficiency, accurate judgment, decisive action, and very high levels of human performance.

The men and women that serve as pilots on airlines, charters, commuter flights, bush runs, and in flight training and general aviation are indeed a special breed, as are their flight crew members, ground crew and support staff. All share a courageous spirit of the adventure of flight as well as a profound sense of responsibility for safety, performance, and flawless execution.
The ‘right stuff’ is about assuming command and taking personal responsibility for the effectiveness of your performance, and that of your team and supporting group. The ‘right stuff’ is about being ‘at cause’ and confident in an uncertain and ever changing environment and executing competently, with the "successful outcome of a maneuver never in doubt."

Aviation is proof, that given the will, we have the capacity to achieve the impossible.

Eddie Rickenbacker
In Command

The concept of pilot-in-command conveys the essence of the ultimate and singular sense of responsibility, stewardship, and accountability of personal performance. It’s a powerful expression of just what makes the difference and it is particularly relevant to business leadership.

The pilot-in-command of an aircraft is subject to a multitude of regulations and controls governing almost every aspect of flight preparation, planning and execution. At every turn the pilot-in-command is regulated, monitored, and vectored with a clear expectation of total knowledge, understanding, and compliance to each and every rule in the book. One false move - in terms of the adherence to regulations - and you’re busted. But there is a significant difference.

The pilot-in-command of an aircraft is by law, regulation, and practice, directly and personally responsible for, and is the final authority as to, the operation and safety of the aircraft and the well being of the community of people on board. That’s a mouthful to say but an awful lot more to live up to. Being the ultimate and final authority is - non delegable (period.) It is this sense of personal accountability that is at the heart of being - in command.

The entire set of regulations and controls are designed to improve the safety of flight and minimize the risks of collision or disaster. Pilots know and usually appreciate that. Aviation is a field of endeavour where the consequences of failure are significant to say the least. Any control designed to reduce the risk of death can be appreciated, especially by those charged with the ultimate responsibility for safety.

The pilot-in-command has a critical responsibility that goes well beyond compliance to rules and regulations. As the final authority the pilot-in-command has the personal
responsibility to break every rule in the book, if that is what is necessary to ensure the safety and survival of the aircraft, crew, and passengers. This expression of the essence of command would only be visible in emergency situations, where decisive action is required to effectively meet that emergency. In-command does mean - final authority, and all the regulations, controls and systems are merely ancillary supporting tools.

The controlling systems, in spite of the very best of intentions and designs, can often fail to ensure flawless execution. The pilot-in-command must exercise his or her final authority to ensure total system performance. And if the risks of system ineffectiveness increase with instability and turbulence in the environment, the competence, experience, and training of your pilots-in-command will make all the more difference between your success and failure - or if you’re in an aircraft - the difference between a smooth landing or a ‘controlled flight into terrain.’

'In command' is this sense of personal responsibility, stewardship, authority, and accountability for performance. It’s the right stuff, and it makes all the difference in the world.
In the Crunch!

In times of turbulence, pilots are trained to adjust to potentially damaging situations by adjusting the configuration of their aircraft and their priorities. Managing through turbulence requires reverting to the fundamentals, to ensure the aircraft can withstand the blows and maneuver to clearer skies.

Upon encountering turbulence pilots are advised to revert to VA - the maneuvering speed. This is usually well below cruise speed and is the prescribed limitation for full or abrupt movements to avoid structural damage to the aircraft. At this slower speed the pilot is better assured the ability to withstand the abrupt blows without sustaining damage to the aircraft and to maintain positive control through the temporary but potentially threatening encounter.

The pilot’s priorities revert to the fundamentals. In any circumstance of disruption, severity, disorientation, or sensory overload, all pilots will likely hear the three words drilled into their brain by their first instructors and reinforced throughout their training - first things first - fly the airplane! The obvious priority is to have positive control over the aircraft, by adjusting to the appropriate maneuvering speed, properly orienting yourself to the circumstance, and maintaining or recovering positive control.

The inherent principles of managing turbulence in flight are that of making the necessary adjustments to maintain structural integrity to withstand the blows, and then restoring positive control and positional awareness to chart an alternate course to your destination. And in these difficult and challenging circumstances the pilot reverts to the fundamentals of flying the aircraft first, and then determining the next best course of action.
A turbulent environment for business demands a similar set of adjustment by the CEO as the pilot-in-command. In Managing In Turbulent Times Peter Drucker advises that “an enterprise has to be managed both to withstand sudden blows and to avail itself of sudden expected opportunities. This means that in turbulent times the fundamentals have to be managed, and managed well.”

A key fundamental according to Drucker, is managing for liquidity and financial strength. “In turbulent times, the balance sheet becomes more important than the profit and loss statement.” The minimum liquidity needed to stay in business becomes something like the maneuvering speed to avoid severe structural damage.

“Concern for sales and market position, innovation and earnings, has to be balanced with concern for financial strength, solvency, and liquidity. Liquidity by itself is not an objective. But in turbulent times it becomes ... a survival need.” In turbulent times the priority is structural integrity and survival.

In turbulence it is critical to have the fundamentals handled exceptionally well - and when in doubt, or suffering severe blows, disorientation or sensory overload - fly the airplane first and foremost! This most definitely means dealing intensely - with complete attention and awareness - on the fundamentals for survival. It also implies suspending or deferring attention from the host of other activities until a sense of positive control and positional awareness are re-established.
The Flight Environment

The flight environment is a rapidly changing three dimensional world that we can only begin to appreciate at ground level. Weather conditions take on new meaning in aviation as you are actually inside of the environment that you could take shelter from on the ground. An understanding of meteorology and weather, and the effects on flying is a prerequisite for pilot licensing and critical to the planning and execution of safe and efficient aviation.

An aircraft in flight is supported within the atmosphere enveloping the earth. The earth’s surface agitates the lower portion of the atmosphere and adds moisture, causing shifting winds, powerful up and down drafts, clouds, and storms within a layer approximately seven miles deep. Like water in the oceans, the air is in continual motion creating wind and turbulence. Moisture in the atmosphere varies, existing as water vapour or becoming visible as water droplets, ice crystals, clouds, and precipitation. Air density also varies affecting an aircraft’s performance and flight characteristics. Temperature and pressure also play an important role in the interaction of factors that produce weather phenomena. Temperature variations cause pressure variations, which lead to air movement, which in turn creates further variations in temperature and pressure. The surface of the earth contributes by supplying heat and moisture to the atmosphere, and through the variations in topography.

Turbulent, chaotic, rapidly changing, uncontrollable

The flight environment is characterized by major weather patterns affected by the movement of air masses, continental factors and topographical features and also by the very localized features and geographical characteristics. Weather changes very rapidly, often within minutes and conditions may vary significantly.
between short distances. Some weather hazards such as downdrafts, wind shifts, winds shear and low air density are invisible, with no discernible warning of their occurrence. Icing is a significant hazard often occurring at temperatures when it is least expected. Weather changes in flight at different altitudes can be insidious and difficult to discern, presenting an ongoing challenge to the successful and safe operation of an aircraft.

Great advances have been made in the understanding of the characteristics, composition, and dynamics of the atmosphere. Weather phenomena and conditions can to a large degree be forecasted with a reasonable degree of accuracy, and there is an extensive weather monitoring and information network available. The flight environment is understandable to a high degree, predictable to a degree, but in the final analysis it is totally uncontrollable.

**How do you execute with skill and precision in an uncontrollable environment?**

Effective performance requires the ability and skill to adapt quickly and decisively to the changes in the world in which we operate, developing a new and unique response to every new and unique set of circumstances. In this respect the challenge is not one of control or bringing order to chaos, but rather accepting chaos, change, and turbulence, embracing it, and operating with skill and proficiency within it to achieve your objectives.

*Sounds just like business.*
Situational Awareness

Piloting an aircraft involves a continuous process of accurately recognizing what is happening and adjusting actual performance to the desired performance for each task or activity. In a very general sense, in terms of reaching a destination safely, and from moment to moment, the pilot determines the desired performance and the actions needed to maintain the effectiveness of the aircraft’s systems, other crew members, and passengers.

Situational awareness refers to an anticipation and outwards focus on the environment and those vital internal systems and processes and is the basis of skill, proficiency and competency in execution.

An awareness, anticipation and outwards focus on the world to ensure the achievement of desired objectives

The task of piloting an aircraft from a small area of ground, flying safely in all kinds of weather, avoiding collision with the terrain or other aircraft, and then returning smoothly to another small area of ground places significant demands on the human sensory processes. Very early in pilot training, trainees are made aware of the necessity to disregard the sensations from different senses, as the development of aviation has placed demands on the human sensory systems that are beyond their normal limits. Flying tests the capability of humans to accurately perceive reality and therefore respond effectively. The processes developed to perform in spite of these limitations provide a useful roadmap for any activity in which the accuracy of perception is important to successful execution and competent performance.

A continuous assessment and accurate interpretation of reality
Situational awareness in aviation is the aware attention to the external reality, and more importantly, the accurate interpretation of events, conditions and phenomena. It is the full or maximum available deflection of one’s aware attention to the external environment to know with a very high degree of certainty what is really going on. An accurate assessment of reality starts with the very basic assumption that one does not know! Typical intellectual processes of categorizing patterns and rationalizing phenomena to fit with past experiences cannot suffice in dealing with the reality of an ever changing and unique set of circumstances in a turbulent environment. The ‘know it all before it happens’ assumption creates an attitude of complacency which can prove to be fatal. Awareness and attention remain focused externally only when we do not know, and have an intense need to find out!

**Competence, precision, and safety**

Situational awareness is an ongoing process of the continuous assessment and accurate interpretation of reality. Effective environmental scanning when combined with the awareness of the performance capability of the aircraft, and the self awareness of personal capabilities and skill of the pilot result in competency and precision in the execution of maneuvers, and flight safety.

Pre-flight routines and preparation are designed to minimize in-flight operational distractions and disruptions. It has become standard procedure for pilots to employ checklists for important transitionary maneuvers to ensure details and specifics are carried out without exception. These checklists are very brief sequences of the required actions to ensure a thoroughness and accuracy of execution. The checklists of vital operating procedures are also designed to minimize the internal routines that require attention yet ensure the proper performance of aircraft systems.
Full outwards direction of conscious attention;

Unlearning dysfunctional sensory perceptions, assumptions, and behaviours;

Overlearning: training, experience, and mastery.

At all levels of proficiency and experience, pilots are cautioned to avoid flying by ‘feel’ as the sensory perceptions can often be deceiving. The techniques of environmental scanning based on our physiological reality of vision are designed to deflect maximum attention externally.

The ‘unlearning’ of dysfunctional perceptions and ‘overlearning’ of procedures and maneuvers are also designed to free up the maximum of aware attention to the external environment for the accurate interpretation of reality. The activity of piloting an aircraft requires a constant and conscious aware attention focused outwards on the environment and on those vital internal functions that are critical to the achievement of desired specifications of performance and effectiveness.

The foundation for high performance in a rapidly changing environment

Situational awareness is the foundation for high performance in a rapidly changing context. The awareness, anticipation, and outwards focus of attention on the environment, accurately matched to the capabilities of aircraft systems and pilot proficiency can ensure the achievement of desired objectives. The achievement of flawless levels of execution in an uncontrollable environment attests to the almost limitless capabilities of individuals to achieve very high levels of performance in very challenging circumstances.
A continuous process of accurately recognizing what is happening and adjusting actual performance to the desired performance for each task or activity.

... competent performance of a procedure or maneuver ... requires that the pilot be the obvious master of the aircraft, with the successful outcome of the maneuver never in doubt.

F. A. R. 135.293 (d).

Life is short, fly fast!

Roy Lopresti
Rods, Cones, and Visual Flying Rules

Situational Awareness is ... a continuous assessment and accurate interpretation of reality.

Visual Flying Rules

Two aircraft flying at 150 knots on a head on collision course will travel one quarter of a mile toward each other in three seconds. It has been estimated that from the earliest detection of the oncoming aircraft, the point at which it is barely discernible, there is a maximum avoidance window of 8 seconds. A more likely point of recognition is at the 4 second time frame.

Obviously in flying under visual flying rules as with smaller, general aviation aircraft, the safety of flight depends on the ability to see and to avoid other aircraft and obstacles. The visual component is a key element of maintaining situational awareness for maximum effectiveness.

Rods and Cones

Rods and cones are the two types of photoreceptors found in the human eye. Rods are found in the periphery of the retina, while cones are concentrated centrally and more densely packed. Cones provide the focus on fine detail and distinguish colour and require relatively high levels of illumination. Cones provide our straight ahead focused line of sight with the degree of perception and accuracy influenced by the level of available light. Rods on the other hand are much more sensitive to light providing a superior capability to detect movement in low levels of illumination but not distinguishing colours. Rods provide our peripheral vision that is our visual capability to detect movement.
Visual Scanning

Visual scanning techniques are designed to employ the movement detection capabilities of the rods, and the clear, sharply focused ability of the cones, while recognizing the limitations of the time needed to adjust and refocus while switching from one view to another. The most effective scanning patterns are based on how your eyes function, and incorporate a series of short, regularly spaced eye movements bringing successive areas of the environment into your field of vision. Successive scans should move 10 degrees and focus on that segment for at least one second. The most effective scan pattern covers the entire field of vision in successive movements and focusing of this nature. This environmental scanning technique is a continuous and ongoing activity for the early detection of aircraft and weather phenomena, and a general high level of flight awareness.

It is a continuous process of accurately recognizing what is happening and adjusting actual performance to desired performance for each task or activity.

The strategies, research, processes and methods developed in the field of aviation provide a framework for effectiveness within the very turbulent and rapidly changing environment we face today. Pilot Performance deals is flawless execution within an ever changing environment, and is based on individual competence, mastery, and a very positive and courageous spirit of adventure.
The Right Angle of Attack

An understanding of the fundamentals is vital, as with flying and in business the ‘intuitively obvious’ and ‘knee jerk’ responses are often incorrect, especially when operating outside of the ‘envelope.’

For an aircraft in flight if you want to climb and gain altitude you pull back on the control column to raise the nose of the aircraft and add power. Conversely, to descend you reduce power and lower the nose to the desired rate of descent and airspeed. The coordinated use of the flight controls becomes automatic with training and generally holds true for most normal operating conditions encountered. The difficulties arise in the more extreme and unusual conditions where these reflex responses are not appropriate. And most unfortunately, these circumstances are the most demanding and perilous if not responded to correctly and decisively.

A few fundamentals:

The angle of attack!

The underlying fundamentals are in the physics of flight and the operating limitations or ‘envelope’ of the aircraft. Lift is achieved through the shape of the airfoil (wing) and the angle of the airfoil in relation to the relative airflow. The angle of the wing vs. the relative airflow is ‘the angle of attack.’

Generally (and intuitively), an increase in the angle of attack will translate into greater lift and vice versa. However, increasing the angle of attack to more than approximately 17 degrees (slight variations between aircraft) will cause a separation of airflow from the wing’s upper surface and a loss of lift. A complete loss of lift (or stall) will occur over the threshold of the angle of attack regardless of airspeed, flight attitude or weight, and every aircraft has an angle of attack where maximum lift occurs.
immediately preceding the stall. The intuitively obvious response, taken beyond the threshold of the fundamental capabilities of the aircraft will be wrong.

A stall or loss of lift is undesirable to say the least. Complete loss of lift means loss of altitude in a rather dramatic fashion - imagine several thousand pounds of metal falling through the sky - the ultimate career limiting move. The untrained reflex response to a stall will also be wrong. A knee jerk reaction to a loss of lift is to pull back on the control column and to reduce power. This increases the angle of attack further and therefore aggravates the stall making the recovery much more difficult. The correct and learned response to a stall is to push the control column forward to lower the nose and add power. The control inputs are designed to decrease the angle of attack to the ‘operating envelope’ below 17 degrees to regain the airfoil’s capability to provide lift.

To complicate matters the knowledge of the fundamentals creates the awareness that it is not solely the angle of the airfoil or attitude of the aircraft that determines lift. It is the relative angle of attack vs. the relative airflow that is critical. In more severe weather the angle of attack may change purely through the outside airflow through updrafts, downdrafts, micro bursts, wind shear and wind gusts and an aircraft can be ‘stalled’ in almost any attitude or configuration.

The trained response for stall recovery - nose down add power - is put to a severe test in a stall experienced in a descent. Imagine the conflict between reflex and knowledge - of being in a nose down attitude accelerating towards terra firma and being instructed to push the nose down farther and add power. The intuitive and untrained response to severe or unusual conditions which exist outside of the normal operating range will be wrong, and with very serious consequences.
More of what works within normal circumstances will not work outside the ‘envelope!’

The knowledge of the fundamental principles and the capabilities of the craft are vital to ensure success. What is often intuitively obvious in normal operating circumstances may not (or likely will not) hold true beyond the operating envelope. More of the same response will therefore degrade performance. The knowledge of the fundamentals in terms of the angle of attack respecting the design features of the craft (airfoil) and the external conditions is vital to deal accurately and decisively with the more severe and challenging circumstances. As in business, more of the same response will seriously degrade performance in more severe ‘weather’.

The angle of attack, in terms of the external relative airflow and the design capabilities of the aircraft must be ‘right’ to execute maneuvers safely, and with precision. A knowledge of the fundamentals is vital for success.

It’s all about attitude and power ... and a knowledge of the fundamentals.
Unlearning

Unlearning dysfunctional sensory perceptions, assumptions, and behaviours ... to free up conscious attention and awareness.

Pilots are trained to recognize the limitations of the sensory systems that can produce false perceptions of reality. A few simple maneuvers are usually enough to prove that we cannot rely on the senses when outside visual cues are obscured. Effective performance requires an ‘unlearning’ of typical perceptions and responses, and the systematic cross checking of perceptions and senses to aircraft instruments and navigation aids.

There are many situations encountered in which the sensory systems malfunction or are liable to produce false perceptions. Illusions occur with a lack of differentiation as in whiteouts, black holes, texture, perspective, gradients, precipitation, and a variety of factors in combination. The spatial senses of positioning and balance are especially erroneous under instrument flying conditions and must be ignored to execute maneuvers accurately.

The sensory limitations are further complicated by the emotional and intellectual processes that distort reality and lead to inaccurate judgments and errors. Expectations play an important role in the interpretation of information, as information is screened by known experience and images, distorting the new and unique aspects of what is in view. When there is a clear expectation of what should have been said, the listener often remembers this as being what was heard, even though something different was said. Expectations and assumptions can seriously limit the accuracy of perception, and pilots are constantly aware of the potential of error in anything less than the full attention to the operations at hand.
Situational awareness is limited by the profound emotional makeup of individuals, and the process of unlearning requires discipline to override the pervasiveness of ego, fear, and self confidence. The lack of self confidence can be moderated by training and proficiency although a healthy measure of conscious respect is appropriate to stimulate awareness and the ‘juice’ of intensity for peak performance. The limitations and distortions related to ego and over confidence however, remain constant challenges to accurate judgment and decision making.

Objective awareness is further complicated by typical tendencies of human behaviour as in an increase in confidence as more information is acquired even though the information may be unreliable or irrelevant. More vivid and ‘memorable’ events tend to be overestimated, while less vivid events that are rarely experienced tend to be underestimated.

Through having no assumptions, an awareness of the limitations of expectations, and in being trained to cross reference instruments to ensure accuracy, pilots perceive and interpret the environment with precision, as it is only then that the appropriate responses can be developed.

The flight environment places demands on humans far beyond normal capabilities, and requires the unlearning of dysfunctional perceptions, assumptions, and behaviours for effective performance.
**Overlearning**

Pilots do possess the abilities to execute complex skills in guiding an aircraft through an ever changing and three dimensional environment. This competence is achieved through a thorough understanding of the flight environment, the mastery developed through training and personal discipline, extensive experience, an ongoing and critical flight awareness, and continuous learning and performance improvement.

A continuous process of accurately recognizing what is happening and adjusting actual performance to the desired performance for each task or activity.

Piloting an aircraft involves a continuous process of accurately recognizing what is happening and adjusting actual performance to the desired performance for each task or activity. In a very general sense, in terms of reaching a destination safely, and from moment to moment, the pilot determines the desired performance and the actions needed to maintain the effectiveness of the aircraft’s systems, other crew members, and passengers. *Situational awareness* refers to an anticipation and outwards focus on the environment and those vital internal systems and processes and is the basis of skill, proficiency and competency in execution.

The ‘unlearning’ of dysfunctional perceptions and ‘overlearning’ of procedures and maneuvers are designed to free up the maximum of aware attention to the external environment for the accurate interpretation of reality. The activity of piloting an aircraft requires a constant and conscious aware attention focused outwards on the environment and on those vital internal functions that are critical to the achievement of desired specifications of performance and effectiveness.

*Overlearning is - training, experience, and mastery.*
We can move from ‘unlearning’ to free up aware attention, to ‘overlearning’ to reinforce and enhance the outwards focus of attention. Piloting an aircraft involves an ongoing process of recognizing and reducing differences between what is happening and what is needed. From moment to moment the pilot is aware of and acting to match actual to desired performance, determining the attitude, altitude, heading and speed to fly, and the actions needed to maintain the functional effectiveness of the aircraft’s operating systems.

Skill in flying, as in most skills training, is acquired in demonstration and performance techniques, involving the demonstration of perfect or desired performance, a detailed explanation of the maneuvers, student performance with supervision, and subsequent evaluation and debriefing. Training is highly effective if it incorporates perfection in demonstration and student practice until done competently with development in manageable segments.

Perfection in demonstration is a key to the full understanding and conscious awareness of the student in mastering the maneuvering of the aircraft, and the vital aspects of the judgment and decision making of operating as pilot - in - command. Through a variety of exercises, maneuvers, and activities a student develops the skill to execute proficiently and demonstrate his or her capability to assess and manage risk, quickly consider options and alternatives, and take decisive action in challenging conditions. Perfection in performance, within very narrow tolerances, is a requirement to proceed in flight training, as we are dealing with an area of human endeavour where there is little margin for error. Imagine the heightened responsibility of both the instructor and the student in releasing the student for solo flight.

**Full conscious attention is available to cope with the unexpected.**
A continuous overlearning and very high level of proficiency are achieved through frequent updates, flight simulation training, emergency maneuver training, and ongoing currency requirements. Mastery exists in a continual learning mode to develop and improve the capabilities to deal accurately and decisively with new situations.

Through flight simulators, pilots hone judgment and decision making skills to fully explore the capabilities of their aircraft and their proficiency. Simulators allow the exploration of a variety of emergency conditions that are either too risky or costly to experience in actuality. The focus is on emergency maneuvers to develop and reinforce the capability for immediacy of awareness and action to maintain full operational command of the aircraft in any unusual circumstance.

Emergency maneuver training is also undertaken in live activities such as in flying with partial instrument panels, practicing simulated engine failures and forced landings for an ongoing demonstrated proficiency to execute under any circumstance.

Currency requirements are also prescribed to ensure pilots continue to demonstrate their capabilities and remain current in their ratings. A pilot’s personal currency criteria are usually well beyond that prescribed to fulfill the responsibilities of being ‘in command’ and executing flawlessly. Pilot licensing requirements involve demonstrated proficiency in the set of performance criteria for each license or rating, with flying experience and current proficiency also specified as requirements. The criteria for each successive license or rating are increasingly stringent to ensure the necessary knowledge, skill, and discipline for safe operations within the tolerances of the rating. A pilot must consistently demonstrate the ability to control the aircraft at the performance levels and under the prescribed conditions to achieve, and to maintain the specific rating or license.
Demonstrated performance and perfection

Judgment and decisive action

Emergency maneuver training

Continuous learning

Effective performance in a rapidly changing and turbulent environment requires the continuous awareness and ongoing incremental action to achieve the desired results. With full conscious attention available the processes of managing risk, assessing options and alternatives, judgment, decision making, and taking decisive action are enhanced to operate with precision and confidence in unexpected and emergency situations.
The Power of Leverage and Trim

Pilots are trained to execute complex skills in guiding an aircraft safely and efficiently through an ever changing and three dimensional environment. Very early in training pilots learn that small and focused actions can produce significant results. This notion of ‘leverage’ - making a small change with a minimum of effort to create a major impact on direction and performance - is one that we can very easily apply if we are aware of the dynamics and the ‘physics’ of what we are dealing with.

**Small, focused actions can have the largest impact!**

The best illustration of the concept of leverage is the effect of the control surfaces of an aircraft - the rudder, the ‘elevators’, and ‘trim tabs’. The tail section of an aircraft or ‘empennage’ consists of two important surfaces - the vertical stabilizer or fin to which the rudder is attached, and the horizontal stabilizer or smaller ‘wings’ to which the ‘elevators’ are attached. The rudder provides directional control. The ‘elevators’ provide ‘attitude’ control, moving the nose of the aircraft up or down to direct the aircraft to a new altitude.

The entire empennage of which most is stationary, provides directional stability, acting like the feathers on an arrow or dart to help maintain a straight path through the air. The control surfaces, namely the rudder and the elevators, are very small in relation to the total surface but are extremely effective in providing positive directional control for the aircraft.

But back to ‘leverage’. Two important aspects of leverage are - that small actions can create large changes, and that high leverage changes are not readily obvious unless you understand the dynamics of what you are dealing with.
Understand the underlying dynamics!

If you want to turn an airplane i.e. you want the nose to go towards the left, you apply left rudder. What actually happens is that the very small rudder deflects to the left, causing the air rushing past to deflect the entire empennage or tail assembly to the right, thereby pointing the nose of the aircraft to the left. This is the same principle as steering a ship. You can’t change direction by affecting the bow of the ship. The leverage lies in deflecting the stern.

Similarly, the elevators affect the attitude of the nose of the aircraft. To climb you pull back on the elevator control. What actually happens is that the elevator deflects upwards, the air rushing past deflects the empennage downwards, thus raising the nose of the aircraft. These very small control surfaces are very effective in providing complete directional control for the entire aircraft. The coordinated use of the ‘controls’ with small positive movements and adjustments to changing circumstances is a basic flying skill.

The smallest control surface has the most significant impact!

One of the most powerful leverage points however, is the smallest control surface in terms of surface area. A ‘trim tab’ is usually installed on the elevator to assist in its effectiveness. The trim tab is a fraction of the size of the control surface and acts as the mini elevator for the elevator (and in the case of ships - the rudder for the rudder). Its purpose is to relieve the pressure necessary to deflect the elevator (or rudder) in the desired direction. Its function is to make it easier to deflect the elevator which in turn makes it easier to deflect the aircraft.

The elevator trim tab on small aircraft is deflected by the pilot’s use of a mechanical or electric trim setting, which relieves the pilot of the need to manually hold the controls.
in a desired setting. For example, to maintain a desired climbing ‘attitude’ the trim tab is activated or adjusted to the setting that relieves the pilot from holding the positive pressure. Once levelled at cruise altitude, the trim is adjusted to the setting that relieves the pilot from exercising positive pressure to hold straight and level. The pilot sets the attitude, adjusts the trim, and carries on with the business of ensuring that all systems are functioning properly and the aircraft will safely reach its destination. In the case of a light aircraft, the tiny trim tab of several square inches, through the ‘physics’ of leverage influences the functioning of two thousand pounds of metal and pilot moving through the air.

And if we look deep into the ‘physics’ of this leverage we can see that with trim tabs, elevators, rudders, and indeed with the wings of an aircraft, when air is deflected around both sides of a surface a pressure differential is created. It is this pressure differential that ‘sucks’ the control surface in the desired direction. The shape of an airfoil (wing) is designed to ‘leverage’ the pressure differential.

The elevators and rudder are designed to leverage the empennage to achieve directional control. The trim tab is designed to leverage and enhance the action of the elevator or rudder. The entire aircraft is wonderfully engineered to apply the principles of leverage to enable a mass of metal to be maneuvered with precision through the ever changing atmosphere.

*Look beyond the obvious!*

How do we apply the principle of leverage in business and in organizations? Perhaps by looking beyond the obvious - to raise the nose of the ‘craft’ by lowering the ‘tail’, turning the bow by deflecting the stern, ‘installing’ trim tabs to deflect the rudder which in turn makes it easier to change course or hold the desired configuration with a minimum of effort.
Perhaps through the application of new metaphors to identify areas of high leverage not obvious to most participants in a ‘system’. Definitely by a greater appreciation and understanding of the dynamics and the underlying ‘physics’ of the organizational and human processes involved.

... competent performance of a procedure or maneuver ... requires that the pilot be the obvious master of the aircraft, with the successful outcome of the maneuver never in doubt.

F. A. R. 135.293 (d).
The Journey is the Reward

The rapid rate and the complexity of the changes we face today will if anything, increase in the future. We are facing a new reality that requires a brand new set of strategies, structures, processes, and behaviours to be effective. The ultimate goal for individuals and organizations is to develop the capabilities to master new challenges by responding in new and unique ways to new and unique circumstances. The techniques and methodologies applied in aviation provide a useful roadmap for developing these capabilities.

Effective performance within this new context requires the unlearning of many traditional management behaviours, and overlearning of new skills. The metaphor of Pilot Performance provides an insight into the capability to respond decisively and navigate effectively through a rapidly changing and uncontrollable environment.

The key lessons:

1. Control and predictability can no longer suffice!

The objective is not to bring order to chaos but to develop the mind set and skills to respond effectively to the dynamics of continuous and rapid change. Being ‘in control’ is at best an illusion. Change 'in control' to being ‘in command’ - the awareness of the performance capability of your ‘aircraft’, a self awareness of personal capability and skill, and a continuous process of assessment and accurate interpretation of reality.

2. Performance ultimately depends on the human factor!

In spite of the sophistication of operations, machinery or technology, competence and performance ultimately depend on the human factor. ‘The right stuff’ is about personal skill, proficiency, mastery, and continuous
learning and improvement. The objective - to respond decisively to changes in the environment and to adjust your course as necessary to navigate ‘safely’ to your destination.

3. The journey is the reward!

From the first session in ground school on the physics of flight and the first walk-around and solo, flying challenges the soul and opens a door to a new dimension of freedom and the spirit of adventure. Every flight provides a new challenge and source of learning, as well as the exhilaration of maneuvering in a new dimension. Each new challenge is unique and the ‘pilot-in-command’ accepts the full responsibility for flawless execution and performance.

The training methodologies that have been applied in aviation have ensured superior levels of performance and continuous improvement to be the rule. New skills in developing internal proficiency and external situational awareness can greatly enhance the capability of individuals, work teams, and organizations to deal effectively with change. These new skills can form the foundation for an ongoing and creative learning process.

Our journey begins with an appreciation of pilot performance skills and methodologies, and their application to business leadership and management. Within a context of continuous learning and development the journey will not end, and as with the experience and adventure of flight, the journey will be a rewarding one.
Up is never where you are now!

Belasco & Stayer
About the Author

Henry K. is a private pilot, author, artist, actor, whale watcher, fly fisherman, tour guide, seasonal server and surfer residing in Tofino, B.C. Canada, as well as a contributing editor to The CEO Refresher.

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