The PARACHUTE
and its PILOT

Brian Germain

Foreword by
Dan Poynter

Foreword

Sport parachuting has two major parts: the freefall or skydiving portion and the canopy-flying segment. Brian's original book: *Vertical Journey* addressed the first part of the jump with an uncommon degree of wisdom and insight. This book covers the last few thousand feet, the part of the skydive that matters most. *The Parachute and its Pilot* is a much-needed, milestone book written by the parachute industry's foremost canopy designer.

Brian Germain is more than a canopy designer, he is a canopy pilot and he excels at both. As a designer, manufacturer, test-pilot, rigger and instructor, he knows what skydivers want and need as well as how to clearly explain canopy flight.

Brian combines exceptional knowledge of canopy design with a unique ability to explain how to squeeze maximum performance out of any ram-air canopy. Whether you are shopping for a canopy, are a competitive jumper pursuing maximum performance or simply studying what makes the ram-air canopy fly, Brian will lead you in the right direction with expertise, eloquence and care.

Like Brian, I am a skydiver, parachute designer, author and publisher. It is a privilege to pen this foreword for a kindred spirit.

--Dan Poynter, D-454.
ParaPublishing.com

Table of Contents

Introduction

The brave may not live forever,
But the cautious do not live at all.

We are a generation of risk takers, or so we tell ourselves. We distinguish ourselves from previous phases of humanity as being the ones that really get to celebrate it all. We have the best technology ever invented to take us higher and further. We benefit from incredible advances in medicine to fix us up and get us back out there. We are, in short, on top of the world. Unfortunately for many, this drive to explore the most extreme reaches of human experience can come with a very high price tag.

Although we have made great advances in the technology that takes us up mountains, across the water, and into the air, the percentage of participants that are injured or killed varies only slightly. In other words, the number of casualties associated with "extreme sports" is steadily rising, in direct proportion to the number of participants. It seems that our careful purchases of the "right equipment" are not enough to ensure our survival.

I have spent my entire adult life studying safety practices in adventure sports, and have concluded that the primary problem is that we are in fact the generation least prepared to engage high-risk situations. We have grown up in a society that lives far from "the edge". We watch life as spectators, more than as participants. We then go out and buy the gear that some website says is necessary, and we are surprised when we get hurt. We are a generation of naïve dreamers, who awaken occasionally to dare our fate in the real world.

I do not believe, however, that we are a hopeless bunch. It has been said: "what one man can do another can do." The trick is to develop the necessary skills and discipline. We have a vast amount of information available at our fingertips, if we only look for it. We can learn to do anything that is possible. All we need do is learn all the components necessary for survival.

If we are to survive, we must first accept the fact that the necessary skill-set is vast and multi-dimensional. We must explore all the relevant details necessary to engage in the particular adventure in which we are involved. This however, is just the beginning. We must also become self-analyzing psychologists, and come to understand the workings of our own minds. We must learn about the physiological responses to stress and emotional arousal so we can recognize and manage our physiological response to the situation. The list goes on, and so does the process. The learning must never stop.

The purpose of this book is to begin the process of education that will assist skydivers and other adventurers to live long and healthy lives. It is the groundwork for life's graduate degree. As with all mental models, it is not complete. The nature of reality is that of unpredictability. The more complex the situation, the more unpredictable the result will be. Even with perfect understanding, if such a thing were possible, there are variables that are beyond our control. People will continue to get hurt. If you want to avoid getting hurt,

there are any number of activities that are out there for you. As you have already realized, there isn't a whole lot going on that far from the edge…and you still die at the end, anyway.

Most modern models of risk-taking behavior point to the conclusion that the percentage of casualties will not change. Advanced mathematics, such as "Chaos Theory", suggests that it is impossible to predict the outcome, even when the number of variables is relatively low. Perhaps this is the case and perhaps not. These bleak theories do not, however, preclude the possibility that a single individual can engage in high-risk situations and live to a ripe old age. Although many math geeks and "primary prevention" dogma-thumpers may use these models to hide behind, there remains a growing sector of the population that is drawn to adventure despite what the statistics and predictive models suggest. Our kind does not make excuses. We simply do our homework, and then we: "Just Do It".

It is a matter of risk versus payoff. An adventurous personality is said to be one that is less afraid of dying than he is of not living. As a card-carrying member of this society of misfit toys, I appreciate this perspective intimately. We get such a good feeling by engaging real life and real risk that we are willing to let it hang out a bit. We are not, as some indoor psychologists suggest, suicidal. We simply believe that we have the "Right Stuff" that will keep us alive.

This is the heart of the issue, and the reason I have written this book. It is true that some people react in a manner more favorable to responding correctly to environmental stress than others. Making the right decision, without the impedance of emotion seems to be one of the big keys to survival. It is, as far as I can tell, not a skill given only to the fast and the strong. Natural selection is not, so it turns out, a process pre-determined by our genetics. We can learn in order to increase our "fitness", and our chances for survival.

We are a very clever species. We have a very large hard drive. When we can acquire the right information, and access this data at the right time, we have a pretty good chance of walking away from sketchy situations. Both aspects of the situation must be intact: acquisition of knowledge and the emotional intelligence to maintain access to these memories. Both sides must be constantly cultivated and maintained.

Learning is the beginning. It is when the mind stops incoming data that we die. Despite a cessation of new information, we may in fact live on physically for many years. Luck and probability have a strange way of calling the next contestant. By closing the door to new information about our worlds and ourselves, we have essentially taken a number for the Big Butcher Shop. We are unknowingly awaiting the situation for which we are unprepared. We may slide by for a while, but eventually the sun always sets. Having the "right stuff" isn't about knowing everything. It's about heading in the right direction and remaining open. It's about allowing the process of safety to continue.

When Apollo 1 burned up on the launch pad, the world went into a frenzy of finger pointing. We asked ourselves: "How could these great scientists have overlooked something as simple as a quick escape system for the spacecraft?" One astronaut aptly stated that the astronauts died in the fire because of a lack

of imagination. No one considered that something like that could happen. If they had considered it, an escape plan would have been formed long before the accident. We must remain thinkers if we are to become old skydivers. We must imagine the worst-case scenarios, and have solutions for all of them. Pretending that danger does not exist is the best way to ensure our demise.

The answers are many, and they are changing as quickly as the gear changes. As soon as some clever person comes up with a better, safer mousetrap, the situation usually becomes even more complicated, and therefore more dangerous. We therefore must not rely on innovation to save us. We must rely on ourselves and on the mentors available to us. We must think our way to survival.

Nobody intends to get hurt. If you planned on committing suicide, you probably would have selected a more cost effective means of “offing” yourself. It is more likely you are just like me. You want to have fun, and sometimes the dog you turned your back on comes back to bite you. This book is intended to show you some of the dogs that you didn’t know were there, and remind you of the ones that you knew of but have been ignoring. May it make you a better student of reality, and a better teacher of life.

Burn brightly,
But don’t burn out.

Brian Germain

Chapter 1
Governing Dynamics:

"Things derive their being and nature by mutual dependence and are nothing in themselves."

Nagarjuna,
Second-Century Buddhist Philosopher

"An elementary particle is not an independently existing, analyzable entity. It is, in essence, a set of relationships that reach outward to other things."

H.P. Stapp,
Twentieth-Century Physicist

"One cannot understand flight in a comprehensive manner without intimately and synergistically lacing the actions of the wing to the air in which it is flying."

Brian Germain
Twenty-First Century Parachute Designer

The System

Flight is a **"Complex System":** the net result of two or more interactive variables, resulting in a phenomenon that would be otherwise unachievable but for the cooperative and complimentary forces joining to achieve a new level of possibility. It is a multi-layered synergy of physics and human experience. In order to understand such a complex system, we must consider each variable separately, and then as a unified whole.

The Magnet Under The Table

If I were to scatter a handful of metal filings on the kitchen table, you would probably look at me with your head tilted to the side. If, however, I were to secretly place a magnet on the underside of the table and move it around, you would call me a magician. There is, of course, no magic happening here, only physical truth. The apparent reality is that the metal filings are mysteriously moving around on the table without a plausible reason. The truth is that the magnet is just doing what magnets do, nothing weird about it at all. Flight is exactly the same kind of phenomenon. Unless we understand the governing dynamics, we are stupefied as to the reasons why this "magic" is occurring. By attaining a deep understanding of the governing dynamics that keep us in the air, we transcend conscious thought and enter the realm of pure flight.

The wonderful thing is, once you get it, you get it. If you really think about all the variables relevant to the flight experience, it all makes sense. It becomes a unified whole, a gestalt of sorts. This kind of general understanding of the complete situation is what allows birds to fly. Let's face it: birds are not all that smart. They wouldn't stand a chance in kindergarten, but their deep understanding of the relevant principles allows birds to have a greater ability to fly safely, and far more gracefully than humans. Perhaps this is because we think too much. Too much brain; not enough gut-level understanding.

Humans can fly, however. We can learn the relationships; the truths about the situation. It is our rational understanding of flight that makes it possible in the first place. We do not go where the mind has not gone first. When you really break it down, there are a great number of details that govern a flying body. We must take each one under the magnifying glass if we are to realize the global understanding that makes it all come together. To do this, we must first become fluent in the language of flight.

The Language of Spatial Orientation

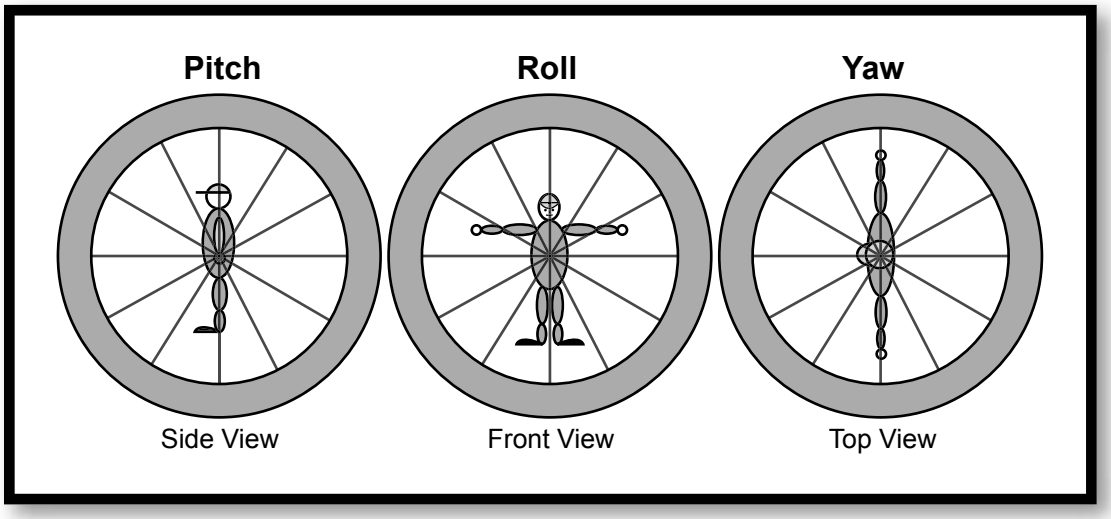
The many variables relevant to flight need illuminating light shining on them to make any cohesive sense. This light of understanding comes in the form of language. This language is specific to aviation, and the

meanings of common words become sharply defined to describe very specific concepts. We must therefore let go of our preconceived notions of the meaning of these words, and see them in the new light of the language of aviation.

Roll, Pitch and Yaw

Orientation, or **Attitude** as it is called in aviation, must be understood in relationship to something else. This "something else" is the closest celestial body, in this case the earth. When we begin skydiving onto other heavenly bodies, hopefully ones with less gravity and more atmosphere, we will define our special orientation with respect to the nearest planet. But I digress…

(figure 1)



The system we use to define our orientation requires three axes of orientation *(see figure 1)*. Let us simplify this by using the human body as the flying body. If you were to extend your arms out to the sides, your arms would be representing the **"Pitch"** axis. Changes in pitch could be simply described as leaning forward or backward. The **"Roll"** axis, also called "bank", is a pole sticking through your chest, extending forward and backward. Changes on the roll axis would be a tilt to one side or the other. If you fell over sideways, you might describe this as a roll problem; that or just too much tequila... The third axis is **"Yaw",** defined by a pole running from the top of your head out your feet. A change in yaw would be a pirouette turn to your right or left.

Let's rehearse the use of these terms. Assume you are an airplane, in level flight. If I requested a decrease in your pitch axis, you would cause the nose of the airplane to point more toward the ground. An increase would put your nose higher than your tail. If you were to roll right, you would lower your right wing, and raise your left. A yaw to the right would be a flat turn to the right.

Chapter 2
Flight Modes and Canopy Dynamics

"Playing with your toy"

Turns, Spirals and other Fun Stuff

Once you have realized that you are going to make it back with time to spare, there is nothing wrong with playing with your canopy a bit. In fact, it is essential to explore all of the parachutes flight modes in order to be a safe canopy pilot. Up high is the time to do this stuff, not down below cutaway altitude, or worse yet, in traffic.

Back in 1987, I went to my first big Boogie. They had a Twin Otter, and we were exiting from 13,500', well above my DZ's normal 7500. I was pumped. I got under canopy after my first 70-second freefall, and my body was leaking adrenalin from every pore. As I had done on many occasions back home, I celebrated by hooking my knees over my slider, and spiraling radically while hanging upside-down. Not a good choice. Fortunately, the guy I almost took out was my friend Chris White, who promptly read me the Riot Act about how to behave in traffic. It could have been much worse.

Control Inputs

There are many ways to manipulate the flight of a ram air canopy. Ultimately, it is a matter of deciding where you want to go and selecting the appropriate action. Pulling on the right strings is only one aspect of what happens next; how we apply the input also has a tremendous amount to do with the response we get out of the system.

Soft Input is the way most people apply control inputs. We pull the toggle slowly, and if it does not turn fast enough, we simply pull more. The amount of input and duration are therefore how we determine the aggressiveness of the maneuver. The trouble with this paradigm stems from the fact that a significant amount of time is necessary to pass in order to see the results of our inputs.

Sharp Input, also referred to as hard input, is more energetic in its application. By pulling sharply on one or both toggles, we can create a similar effect with less actual steering line motion, and in a shorter period of time. If the goal is to reduce the decent rate quickly, long slow "soft" input may be the wrong choice if altitude is running out.

The value of a control input is very much like everything else in life: The more you put into it, the more you get out. If the amount of energy put into the process of pulling a toggle down determines how quickly the flight path of the parachute is changed. Sharp inputs, therefore, are more "valuable", and are essentially worth more, inch for inch. In other words, an inch of soft input may be roughly equivalent to over a foot of slow, soft input.

Experimenting with the distinction between soft and hard inputs can save your life. "Punching" out of a dive with a short stab can keep you from a trip to the hospital, while "punching" a toggle down too close to the ground can take you there, or end your life. Knowing how and when to apply our control inputs is essential to the ram air pilot, and may be the determining factor in the local records of seismic anomalies.

Line Tension

When performing fast turns and spirals, one must always take into account the one thing that keeps parachutes stable: **Line Tension.** If your lines go slack at any point, bad things can happen. Parachutes can collapse, and lines can twist. In essence, the suspension lines are the structural skeleton of the parachute. Like a puppet on strings, we are only in control of the situation as long as there is an energetic connection between the pilot and the wing.

Let's take some examples. If you are flying along in full flight, which is one "G", (your body weight only), and you hammer a toggle down as hard as you can, one of two things is going to happen. The first possibility is that the parachute will turn quickly, and you will laugh uncontrollably and yell: "Yeeeha!" This is usually the goal of a hard toggle turn. The other likelihood is that you will remain in place, and the parachute will promptly spin into line twists. If you are high enough, you may be able to kick out or cut away. If not, your skydiving career is over.

The difference between these two results is line tension. Beginning the turn, as mentioned, your weight is at one "G". Depending on the design of the canopy, how far you pull the toggle and how hard, you may break the connection with the parachute. The canopy will still do exactly what you asked: it will turn. One way to prevent line twists due to quick turns is to initiate the turn a bit slower, and then increase the amount of input. This method gives your mass a chance to catch up to the canopy, and perform a more coordinated spiral. The only concern thereafter is the possibility of providing excessive toggle input, and stalling out the wing on the inside of the turn. This will result in a faster, but uncontrolled spin, and often line twists. Optimum toggle input for the fastest spiral is generally not all the way down anyway.

Another solution to the danger of quick turns is to create line tension through an increase in angle of attack. By applying the opposite toggle during or immediately following the turn input, the pilot noses the wing up. This increases the Positive "G" forces, and therefore the line tension. This method becomes even more useful when reversing the direction of the turn. This is what is called "Collective Toggle Application", and it can be the difference between having a fun experience or a radical spinning malfunction.

Changing Direction

Changing direction radically is the most common cause of induced line twists. Once relieving the turn input, the "G's" drop to zero. At this point, the parachute is not energetically connected to the jumper at all. Any impulsive control input will not change the direction of the jumper, only the canopy. You therefore have the option of waiting until the system has a chance to catch up to itself before initiating a reversal turn, or applying both brakes as your aggressively roll and yaw your canopy in the other direction. Double-brake application during such high-speed maneuvers will result in very high "G" forces, as well as heavy

Chapter 4
Navigation and Accuracy

"Controlling your destiny"

Ground-speed & Ground-track: *Where you are actually going*

Navigating your canopy back to the LZ is very much like paddling a kayak in a river. The sky is a flowing river, and we are making our way amidst the ever-moving flow of energy. Understanding how to get around up there requires a bit of very easy math. Depending on your canopy's heading with respect to the wind, your flight path and groundspeed varies greatly, but can be easily ascertained.

Ground-speed is the velocity with which we move across the ground. **Ground-track** describes the direction. When combined with **Airspeed**, the speed at which we are flying through the air, we are able to calculate our flight path across the earth below.

Holding: *(Airspeed minus Wind Speed= Ground-speed)*

Holding is defined by a canopy heading directly into the wind. Calculating your ground speed in a hold is a subtraction of the wind speed from your canopy's airspeed. Remember that parachutes have an airspeed range of about 15 to 40 mph. If the winds are equal to your parachute's airspeed, you will be motionless over the ground when you face into the wind. If the parachute's airspeed is greater than the wind velocity, you will be moving forward across the ground, albeit slower than the airspeed of your canopy. For example, if the wind is 10 mph, and your canopy has an airspeed of 20mph, you have a 10 mph **Dominance** over the wind. Therefore your groundspeed will be exactly 10 mph while facing into the wind. Likewise, if the wind is 30 mph, using the same parachute, you will be moving backwards across the ground at 10 mph.

Running: *(Airspeed plus Wind Speed = Ground- speed)*

When you turn to face downwind, your groundspeed will be the sum of your airspeed plus the velocity of the wind. This is why we refer to going downwind as **Running.** This is also why we usually jump out of the airplane upwind of the landing area. It is faster to go up downwind than upwind. A canopy with an airspeed of 20 mph, when pointed in a "run" on a day with 20 mph wind will fly across the ground at 40 mph. You can also then see the benefit of facing into the wind for landing.

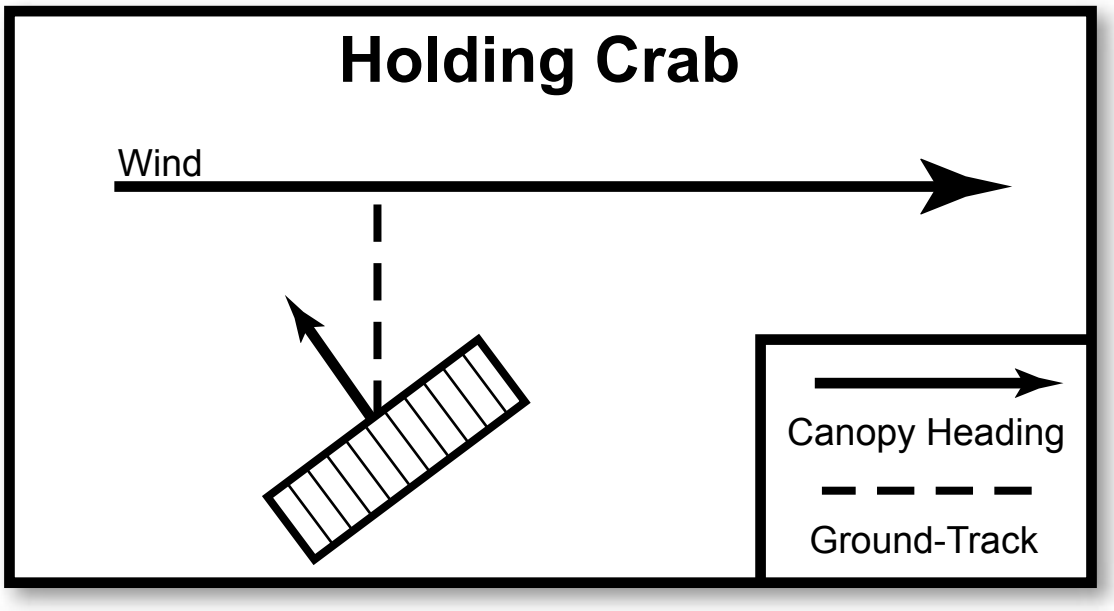
Crabbing

Crabbing, or facing off the wind line, is a little more complicated to calculate quickly. Fortunately, it isn't necessary to know your precise *groundspeed* while crabbing, only the **ground-track**. Take, for example, a day in which the wind

speed is equal to the airspeed. Let's start with the canopy facing in a "hold'. Obviously, the groundspeed will be zero. The way to determine your ground-speed and ground-track is to look at your foot, and use it as a reference to discern how the ground is moving below you.

If you were to turn the canopy 45 degrees to the right or left, you would then be in a **"holding crab"** *(see figure 10)*. In this specific situation, you would then find your ground track to be at an angle to your canopy's heading, forward and sliding to the right at the same time. In fact, your movement over the ground would be precisely perpendicular to the wind line. To use the kayak metaphor, you are now "ferrying" the boat across the river.

(figure 13)



Now change your heading 45 degrees more in the same direction of the previous turn, to face perpendicular to the wind line. This is what might be referred to as a **"pure crab"** or a **"total crab"** *(see figure 11).* Noticing your ground track, you will see that you are moving across the ground at a greater rate than in the holding crab. Your movement is now at a 45-degree angle to your canopy's heading, drifting you downwind at the speed of the wind, in this case 20 mph. Your canopy's airspeed is not negating the wind's urge to push you across the ground. Nevertheless your airspeed is acting to move you laterally across the earth, sliding you to the right at a 45-degree angle to your flight heading. In kayak terms, you are crossing the river, but will drift downstream as you do so, at precisely the speed of the river.

Chapter 6
High Speed Approaches and Landings:

"Kicking the horse"

The Perfect Swoop

This chapter is all about survival. Despite conservative efforts to the contrary, “Turf-surfing” has become a dominant force in our sport. Rock and roll is here to stay. One can either stubbornly stand in front of the boulder and get flattened, or run along side and gently redirect where it is going.

Swooping across the ground once or twice requires little more than the strength to pull the front riser down, and sufficient visual acuity to let it go at the right time. Surviving this task with repeated success requires all of the skills of a fighter pilot, racecar driver, and martial arts master wrapped into one. These skills include: *discipline, judgment, awareness, humility, bravery, understanding, physical strength, excellent eyesight, and a good night’s sleep beforehand.* The list is actually far longer than this, but to get down to the deep reality of the situation would bore the hell out of you, or perhaps scare you out of ever trying such a stunt… not that this would be a bad thing.

The truth is, human beings do not have what it takes to perform the act of swooping without getting hurt. It requires something that humans do not possess: impeccable consistency. When it comes to inventing, creating, and being impulsive, we are masters of the universe. Ask us to write our name the same way twice, and we find ourselves in a distant second to simple machines. It is foolhardy to expect our race to survive such a tall order of requirements.

We will, however, continue to try. We do so because we love the feeling of flight, the rush of the wind, the buzz of adrenaline coursing through our veins. It’s the same stuff that drives us to climb mountains and cross oceans. We are, in our hearts, adventurers. Many of us will die along this path; that is inevitable. As long as we remember the truth, that we all eventually die, such acts are justified in the grand scheme of things. *To live is to risk dying*. We don’t, however, have to sacrifice it all right away. There is a path that reduces the risks, and increases our chances of getting the result that we were looking for.

The first place to start when learning to swoop is to ask ourselves the hard questions. We must honestly answer questions like: “How much am I willing to risk” and “How much am I willing to give up for this experience.” The most important sacrifice, if you are to survive as a swooper, is **Innocence**. You must toss into the fire your childhood fantasies of super-humanness; your belief in your magical ability to survive anything. This trait does not exist in real life. In the real world, the earth is incredibly hard and unforgiving. It is not generous in the least, and gravity waits for no man. You are playing with fire.

Fear, it has been said, is the enemy. Emotional reactions in a moment that requires immediate, thoughtful action usually leads to disaster. This is fact. Emotions, however, are our thermometer to what is going on inside us. If we are feeling an excess of fear, we should consider holding back rather than charging forward. It has been aptly said: “*The superior pilot uses his superior judgment to avoid using his superior skills*”. Sometimes we must take the feeling as an indication that today is not the day to go for it. Swoopers that live long lives learn this one sooner or later.

I know of very few great hook-turners that have not smacked the ground

with tremendous velocity at one point or another. I, too, have felt gravity's fury. I, like many young male skydivers, thought that I had that magical quality that would get me out of anything. I thought this until I crossed paths with my greatest teacher: **IPA: "Incredible Physical Agony".** This teacher is the only one that could really get through to me. Dick Swanson and Barry Waling, my instructors, used everything in their power to get my attention, including public humiliation. It was the "Great Teacher", however, that was necessary to break through my impenetrable ego. Unfortunately, the Great Teacher is not always as gentle with his students; I was fortunate to get out with my life.

In 1987, I was working at the Blue Sky Ranch in New York. I was living in an old school bus, and packing parachutes for jump money. One day, some guys were doing a demo into a singles convention up in the Catskills, and needed a fourth. I had about 350 jumps at the time. At 19 years old, as you might imagine, my ego was big enough to pull a freight train. Of course I jumped right on the load, expecting to dazzle the ladies with my newly acquired swooping skills. A wise pilot once told me that: "Just because you are good at one thing, doesn't mean that you are good at everything". The advice, unfortunately, came too late to save my butt, quite literally.

Since I had the least experience on the load, I was to land last so that I could follow the other canopies to the small baseball field nestled in the trees. I figured that was fine, as landing last just put the spotlight on me. As far as I was concerned, I was the star in my own action series, "*Brian in Space*" or something. I set up for my hook visually, as I always had, expecting to "Go Huge" and surf to a perfect stop on home plate. When I finished my 180, I pulled my toggles down to half brakes, as I always had. The result I got was not what I expected.

Sinking into the ground is a very strange sensation, especially when you are expecting a different result. Impacting near second base, feeling your ass-bone compress into your shoulder blades is even more poignant. I will never forget that feeling. The ground, which previous to this moment had been a friendly playmate, was instantly transformed into a huge and dangerous beast. It felt like a car accident. My innocence promptly came to an end; Camelot was dead.

As I said, pain is a great teacher. It changes the way you look at the world. Many would choose to turn away from high-speed approaches after such and impact. I'm not that way. I'm an adrenalin junkie. By holding this book in your hands and grinning, I suppose that you are too.

So, if we realize that a particular activity, such as turf surfing, can hurt us, how do we go on? The best bet, in my not-so-humble opinion, is to learn. We must learn all there is to know about parachutes. We must learn micrometeorology. We must learn about physics. We must learn, above all else, about ourselves.

Chapter 8
The Psychology and Physiology of Flight

Limitations: *How we hold ourselves back*

Parachutes work perfectly on their own; at least most of the time. Deploy a canopy with a sack of potatoes under it, and it will fly at the expected glide ratio, and land pretty much where you expect it to. It will not land in a diving turn, and it will not cutaway at an altitude insufficient to deploy the reserve. Clearly, the weakest link in the system is the "lug-nut" hanging beneath it.

This section will delve into the subtle workings of the human mind, as it relates to flight safety. Physics is not the only set of truths that keep us safe. Understanding ourselves is perhaps the ultimate defense against gravity. The greatest hindrance to the acquisition and implementation of the knowledge that can save us is our **Personality**. Over time, we have come to accept a certain set of beliefs about who we are. Limitations caused by this solid sense of self stand directly between us and the bare attention to the empirical reality that is right in front of us.

Life is very much like a game of Solitaire. The shuffle of the deck, and the random chance that presents the cards in a particular order is usually not the determining factor in winning and loosing. Recently, I managed to lose ten games in a row. I was playing late at night, and my mind was dim with exhaustion. Although my understanding of probability leads me to believe that the cards necessary to win were presented to me over and over, somehow they escaped my gaze. Although it was exhaustion that had dimmed my perception in this instance, there are many other aspects of personality that cause the very same effect.

The attitude of the **Long-Term Survivor** must be one of openness and positivism. Once the mind switches into an attitude of negative expectation, the keys that we need slip through our fingers. It is essential that we remain completely open to the cards that are directly in front of us. The winning cards are usually there, in the form of information and sense perceptions. Unfortunately, the personality is forming a screen between the data and us. Like wearing a pair of dirty sunglasses, we see the world not as it is, but as we expect it to be. We do not see the world, we see ourselves.

There is a psychology term called: "**Learned Helplessness**". This idiom refers to a state of mind that can result from repeated failure. Due to what the mind perceives as an un-winnable game, the awareness dulls into a state of negative expectation, self-fulfilling failure and depression. I am not suggesting that skydivers are depressed. In fact, nothing could be further from the truth. Skydivers, nevertheless, do follow this pattern of consciousness when it comes to the expansion of their understanding of canopy flight. They cease to learn. If you believe that you can go no further, you are helpless to help yourself.

This is due to two cognitive conditions. The first is the tireless obedience to what might be described as a **"Winning Formula".** We find a method and a mindset that works for us and gets us down alive, and we stick to it. We do not consider that there is another possible reality because we are afraid that changing any of the conditions will cause us to have an accident. This closed-mindedness can cause us to miss key elements, and apply our "Fixed Action

Patterns" in an inappropriate context.

The most common winning formulas for skydivers have to do with how we relate to fear. In most cases, skydivers are unable to relax in flight beyond a certain level when they are in the air. Unconsciously, they believe that their habitual level of fear is what keeps them alive. In most cases, the truth is that fear is what stands in the way of trying new things and learning from our experiences. Furthermore, if we are physiologically aroused, we are limited in our ability to retrieve long-term memory. Through the acceptance of this winning formula the jumper limits how skillful, aware, and safe they can become.

The opposite winning formula also exists. Some jumpers believe that any fear at all is bad, and that they should simply ignore any cues from their body that they are afraid. In fact, noticing our "somatic" reaction to the circumstances can provide useful information about our perceived ability to handle the situation. It may even be telling us that we are simply not up to the challenge; that the skills necessary to survive are simply not there, or the risk is too great. If we use our fear as a measuring stick, we can avoid entering the realm of "misadventure". Regardless of your version of this tendency, unconsciously holding on to a solid attitude creates a rut from which we must extricate ourselves if we are to survive in the long run.

The second condition is what many psychologists call: "**Psychological Inertia**". As Isaac Newton discovered, an object in motion tends to continue on in the same direction. Due to this unconscious force, we do not change our thinking because we are driven to continue with the momentum we have. Regardless of our tendencies toward consistency and oversimplification, the sky is a constantly changing environment. It requires us to be completely awake and flexible. Rigid mindsets with solid ways of understanding will be quickly found guilty, and banished from the sky.

Flying safely is really about forming a "**Mental Model**" of the situation and of ourselves, and adjusting it as we continue to engage reality. Without a mental map of the dangers, we can have no expectations about the situation. Uncertainty creates fear, and preparation obviously improves the chances for survival. Unfortunately, no mental model is perfect. To attempt to superimpose a preconceived notion on the world of physical reality is a very dangerous undertaking. Reality is always more complex than we think it is. The secret is to continuously update the model, based on real world experience. This is how the organism adapts to a changing world. Adaptation, so it turns out, is the same thing as fitness. Fitness, the same as survival.

Mental Model: *The Illusion of Safety*

Adventure situations are what mathematicians would refer to as a **Complex System**. There is a set of variables woven together to form a "matrix" of sorts that determines the outcome of the situation. Due to the complexity of the situation, it is mathematically impossible to predict or control the outcome.

About the Author

Photo by Karen Lewis

Brian Germain began his skydiving career on April 13, 1986. Since then, he has been a successful competitor in canopy swooping, sport accuracy, four-way relative work and freeflying. Brian is also active in many other adventure activities including: rock climbing, backpacking, caving, kayaking, skiing and snowboarding. He has worked as a leader in outdoor adventure activities, safely guiding people of all ages through potentially dangerous circumstances.

In the field of Psychology, Brian has a B.A. from the University of Vermont, and did his Psych Master's work at Naropa University. Focusing on Adventure Psychology and Contemplative Psychotherapy, his research targets the implications of mental state on safety issues in adventure situations, as well as effects on personality transformation and personal growth. Brian is also the author of Vertical Journey, an educational and philosophical perspective on the sport of freeflying.

Brian is the President of Big Air Sportz, Inc., and has designed many canopies such as the Jedei, Lotus MAX, Samurai and the Sensei. He continues to head up the Research and Development Department at Big Air Sportz. Brian Patented the Valve Apparatus for Ram-Air canopies, as well as contributing to many of the design features used on today's canopies. Brian continues to lecture worldwide on the topic of safety in sport parachuting.

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