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Plan Continuation Error and the Five Hazardous Attitudes: Can Your Hazardous Attitude Lead You into a Dangerous Place?

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The purpose of this paper is to explore and analyze the concepts of plan continuation bias and the five aviation hazardous attitudes. Both phenomena have significant implications for aviation safety and decision making. This paper will examine the impact that pilot hazardous attitudes have on plan continuation bias and plan continuation error. Multiple aviation accidents and incidents are used in this examination.

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Introduction

The human element remains the foremost contributor to aviation incidents and accidents with human error leading the way of contributing factors (Velazquez et al., 2015). Decisions made by pilots have the potential to lead to a successful outcome or a disastrous result. Fundamental to a pilot's decision making is his or her attitude towards what they are doing. An attitude impacts how we respond to an event; it is a predisposition that drives us toward a response (FAA, 2004; FAA, 2009; Nunez et al., 2019). The FAA has identified five Hazardous Attitudes, and these attitudes can negatively impact our ability to make good decisions (Wetmore & Lu, 2006). The FAA also identifies operational pitfalls. These are decision-making traps into which pilots can fall. One such pitfall is called "Get-There-Itis", defined by the FAA as a "tendency, common among pilots, clouds the vision and impairs judgement by causing a fixation on the original goal or destination combined with a total disregard for any alternative course of action" (FAA, 1991, p. 3). The purpose of this paper is to examine the relationship between the five hazardous attitudes and the operation pitfall, Plan Continuation Bias, which is also known as Get-There-Itis. This examination is accomplished by reviewing accidents and incidents where plan continuation bias was present, and identifying the hazardous attitude demonstrated by the pilot or crew.

Literature Review

The FAA provides Advisory Circular (AC) 60-22, which addresses Aeronautical Decision Making (ADM). The FAA's definition of ADM is "a systematic approach to the mental process used by aircraft pilots to consistently determine the best course of action in response to a given set of circumstances" (FAA, 1991, p. ii). Within ADM, an attitude can influence the mental process involved in determining the best course of action. A hazardous attitude like those identified by the FAA can lead a pilot to make a poor decision, compromising the safety of flight.

Plan Continuation Bias

One decision-making pitfall is Plan Continuation Bias. This bias is defined as a desire to continue a plan in the face of obvious cues indicating that continuing the pre-made plan presents significant challenges or danger (Orasanu et al., 2001). Decision making begins long before a flight departs, but those decisions are not made in a vacuum. The purpose of the flight, or the mission of the flight, can influence a pilot's decision-making process and can influence the go/no-go decision as well as decisions impacting the continued conduct of that flight. A flight to get lunch may carry a very low burden of completion. If the conditions are marginal, the flight can wait until another day. A flight to deliver a human organ for transplant bears a very high burden to complete, and the pilot may feel compelled to attempt or continue the flight in the face of hazardous conditions. Once airborne, and the planned flight has been implemented, pilots can fall into the trap of plan continuation for different reasons. Pilots' hazardous attitudes can contribute to the desire to continue a flight or an approach even when faced with cues indicating that the plan should be modified.

According to Orasanu et al. (2001), two components affect decisions made by pilots: situation assessment and choosing a course of action. Pilots can make situation assessment errors for several reasons. Mosier et al. (2012) explain that situation assessment can be influenced by many factors. In some situations, the cues defining the situation can be interpreted incorrectly; they may be misdiagnosed, even ignored entirely. In decision-making, a pilot must first define the problem and then complete an assessment of the risk that the problem poses and the time available to solve it. Considering the options available, the pilot then chooses a course of action to address the problem. A decision error can occur at this point if the pilot incorrectly assesses the risk, which can cause the pilot to choose an incorrect course of action (Orasanu et al., 2001).

Plan continuation bias (sometimes plan continuation error) is often referred to as get-there-itis; that compulsion to complete the flight even in the face of obvious changing conditions that exceed the pilot’s or aircraft’s capabilities (Orasanu et al., 2001). Plan continuation bias can lead to a pilot passing opportunities to divert or change the planned flight because of the compulsion to see the original plan through to completion. While plan continuation bias is often referred to as get-there-itis, it can encompass situations beyond the desire to get to the planned destination. Examples of this decision-making pitfall can include continuing an unstable approach, or an approach with convective activity near the airport, and others (Mosier et al., 2012).

Five Hazardous Attitudes

The FAA identifies five attitudes that are hazardous to safe operations in aviation. These Hazardous Attitudes are *macho, impulsivity, resignation, invulnerability, and anti-authority.* These attitudes can impact the decisions pilots make, potentially leading to incidents and accidents. Advisory Circular (AC) 60-22 (FAA, 1991) discusses aeronautical decision-making (ADM) and includes a hazardous attitude inventory. Completing the inventory will identify an individual pilot’s top hazardous attitudes.

A pilot who exhibits a hazardous, macho attitude is one who shows off or wants to show that they are better than others. They will attempt to prove that they are better by taking risks to impress others; they may exhibit a “can-do” attitude. While this hazardous attitude is commonly thought to influence males, women can also exhibit this trait (Nunez et al., 2019). Impulsivity is the hazardous attitude that causes a pilot to decide to do something, anything, as quickly as possible (FAA, 1991). These pilots do not use a formal decision-making process; they simply do the first thing that comes to mind. Resignation is a hazardous attitude that leads a pilot to believe that they have little impact on the outcome of a situation; they think, “What’s the use?”. These pilots attribute outcomes to luck or happenstance (FAA, 1991). The invulnerable pilot believes that accidents happen to other people, not them. Pilots with an invulnerable, hazardous attitude recognize that accidents happen, but they happen to others. Because of this attitude, invulnerable pilots are prone to taking additional risks (FAA, 1991). The pilot exhibiting anti-authority is a rule breaker, one who believes that rules are for others; their mindset is one of independence; they do not want to be told what to do. Pilots with this attitude view rules, standard operating procedures (SOPs), and regulations as unnecessary, and as a result, they do not abide by them (Neff, 2022; Nunez et al., 2019). The anti-authority pilot may be aware of company standard operating procedures (SOPs) but, for any of several reasons, chooses not to follow those procedures (FAA, 1991). These attitudes lead to poor judgment, and what can follow poor judgment is poor decision-making. Poor decision-making can lead to disastrous results.

For each hazardous attitude, the FAA (1991) identifies an antidote (Table 1). The antidote is intended to act as a reminder to the pilot that hazardous attitudes exist and that they can be countered by redirecting that attitude in a way that leads to correct actions. The FAA explains the steps for applying an antidote. The process begins with recognition of the hazardous thought and continues with stating the antidote. This process should be practiced until the correct antidote can be recalled immediately.

Table 1

Five Hazardous Attitudes and the Antidotes

Hazardous Attitude	**Antidote**
Macho	Taking chances is foolish.
Impulsivity	Not so fast. Think first
Resignation	I'm not helpless. I can make a difference.
Invulnerability	It could happen to me.
Anti-Authority	Follow the rules. They are usually right.

The Impact of Hazardous Attitudes on Decision-Making

Wetmore and Lu (2006) conducted a study examining the effect of hazardous attitudes on pilot decision making and Crew Resource Management (CRM) skills. Their findings suggest that hazardous attitudes, in general, can lead pilots to accept more risky flights, make pilots more prone to making bad decisions, and make them more likely to make errors. In a review of general aviation fatal accidents, the authors identified different hazardous attitudes in National Transportation Safety Board (NTSB) factual reports. Of 50 randomly selected NTSB reports reviewed, 20, or 40%, the authors found three hazardous attitudes demonstrated by the accident pilot. In 37 accidents, multiple hazardous attitudes were present (Wetmore & Lu, 2006).

The authors examined the effect of multiple hazardous attitudes on decision making and CRM skills and found that those pilots exhibiting multiple hazardous attitudes were willing to accept twice the number of risk factors, made five times the number of poor decisions, and reduced the pilots' use of resources. The authors found evidence that suggested that as the number of hazardous attitudes demonstrated by an accident pilot increased, the number of bad decisions made by that pilot increased (Wetmore & Lu, 2006).

According to Wetmore and Lu (2006), hazardous attitudes have a detrimental impact on evaluating risk, making good decisions, and using resources available to a pilot. The authors describe a sequence of events that can lead to the type of accident they reviewed. The sequence begins with a pilot, influenced by their hazardous attitudes, knowingly accepts a high-risk flight. When conditions during the flight begin to deteriorate, the pilot's hazardous attitudes impact decision-making, leading to poor decisions. In the final step in this sequence, because of the hazardous attitudes present, the pilot is unable to make full use of all available resources, impacting the outcome of the flight (Wetmore & Lu, 2006).

Decision-making is a fundamental skill for all pilots that relies on situational awareness, critical thinking skills, and risk management. Pilots continue to make poor decisions, sometimes in the face of what others would identify as obvious indications that a better way forward exists. The hazardous attitudes influence our decision-making, and not for the better.

Examples of Hazardous Attitudes Contributing to Plan Continuation Error

The following are aircraft accidents where a plan continuation error is evident. In each of these accidents, at least one aviation hazardous attitude was present and was identified. Often, multiple hazardous attitudes can be identified.

Macho

Orasano et al. (1997) describe the crash of a US Air Force CT-43 aircraft that killed then-Secretary of Commerce Ron Brown. The CT-43 is the military version of the Boeing 737-200 aircraft. Multiple issues were identified as contributory to the accident. The aircraft was not properly equipped with the required avionics to be authorized to conduct the instrument approach; unauthorized, civilian approach charts were used, and the crew was not adequately trained to read the charts. The crew executed the approach, knowing they were not authorized to conduct the instrument procedure. The crew continued with their original plan to get the aircraft and its passengers to the intended destination. With the prevailing weather conditions, the aircraft instrumentation, and the charts available, the approach should never have been attempted. The authors continue that flight crews can be rewarded for exhibiting a “can-do” attitude. This mindset exemplifies the Macho hazardous attitude. Their macho, hazardous attitude led them to make a series of decisions, to choose a course of action, and ultimately to continue the flight as planned to complete the mission.

Impulsivity

A student pilot working towards his Private Pilot Certificate experienced a sudden gust of wind while attempting a normal landing. The student overcompensated, panicked, and pitched down aggressively in an attempt to get the airplane on the runway. The nosewheel of the aircraft contacted the runway first, ultimately leading to a propeller strike. The aircraft sustained minor damage, and the student was unhurt. During a post-incident interview with the student, he stated that when he encountered the gust, his initial reaction was to get the airplane on the runway quickly. He was panicked. The student stated, “Looking back at it, I realize I was impulsive, I should have done a go-around. I just wanted to get it on the ground” (Anonymous, personal communication, 2019).

This student’s experience is not unique, but it demonstrates the hazardous attitude of impulsivity. The student wanted to do something, anything, to get out of the situation he found himself in. He continued a botched landing attempt, trying to get the airplane on the runway when the best course of action was to execute the go-around. In this case, he chose a course of action that was incorrect. The student learned a valuable, though costly, lesson.

Resignation

An example of resignation can be observed in the crash of Empire Airlines Flight 8284. In this case, resignation observed in a first officer contributed to the outcome. The Aerospatiale Alenia ATR 42-320 was conducting an instrument approach into Lubbock, Texas, during night, instrument meteorological conditions. The accident sequence began with the first officer acting as the pilot flying, and appropriate briefings were conducted, including a review of the missed approach procedure. The flight encountered icing conditions during the descent and approach. The Lubbock approach controller advised the flight crew that the visibility at the airport was 2 miles with light freezing drizzle and mist. The first officer called for the flaps to be set to 15 degrees and for the landing gear to be extended. A flap asymmetry occurred with the left flap partially extending and the right flap remaining in the up, retracted position. The flap asymmetry caused the autopilot to deflect the yoke approximately 20 degrees to counter the flap condition. Because of a perceived acceleration, the first officer reduced power on both engines, and the airspeed subsequently reduced from 160 to 125 knots. At this point, several things happened: the aural stall warning sounded, the stick shaker activated, and the autopilot disconnected. The first officer increased engine power to approximately 70% and began manually flying the aircraft. They were 900 feet above ground level. The first officer asked the captain, "Should I go around?" to which the captain replied, "No, keep descending" (NTSB, 2011, p.5).

The NTSB accident report indicates that the first officer made another comment to the captain, and that the first officer's voice sounded strained. The captain stated he was surprised to see the first officer manually flying the airplane, could see she was struggling with the controls, and asked if the first officer wanted him to finish the approach. The first officer accepted. During the last portion of the approach, the airspeed deteriorated, the stall warning systems activated, and the aircraft impacted the ground short of the runway and slid (NTSB, 2011).

A combination of factors led to this outcome. This crew chose a course of action to continue the approach with a flap anomaly in icing conditions. The first officer's inquiry about the go-around indicates that she felt that was the appropriate course of action, but she was countermanded by the captain, and at this point, she demonstrated her resignation. The crew demonstrated a plan continuation error by not conducting a go-around, which would have allowed them time to troubleshoot the flap anomaly and devise an appropriate plan for the conclusion of the flight.

Invulnerability

American Airlines Flight 1420, a McDonnell Douglas DC-9-82 (MD-82), overran runway 04R during landing at Little Rock National Airport in Little Rock, Arkansas, on June 1, 1999. The captain and 10 passengers were killed, 105 passengers and five crew were injured, and the aircraft was destroyed by impact forces and post-impact fire. In their final report, the NTSB stated that the probable causes of the accident were "the flight crew's failure to discontinue the approach when severe thunderstorms and their associated hazards to flight operations had moved into the airport area…" (NTSB, 2001, p xii). The accident report continues that the crew continued the approach to land when the maximum crosswind component limitation was exceeded, the crew was fatigued and experiencing situational stress (NTSB, 2001).

While en route, the crew received an Aircraft Communication Addressing and Reporting System (ACARS) message from the flight's dispatcher that there was the possibility that adverse weather might impact their arrival, and suggested the crew expedite their arrival to beat approaching thunderstorms at the destination. In an after-accident interview, the first officer remarked that "there was no discussion of delaying or diverting the landing" (NTSB, 2001, p. 2) because of the thunderstorm activity approaching Little Rock National Airport.

The NTSB accident report describes the conversation between the captain and first officer and communications with Air Traffic Control when the flight reached the terminal area. The crew remarked several times about the intensity of the rain; the captain, who was the pilot flying, had difficulty maintaining sight of the runway environment and depended on the first officer to guide him to it. The controller issued several windshear advisories with winds gusting as high as 45 knots. The crew recognized that the current conditions at the airport exceeded the maximum crosswind limitation for a wet runway, yet they continued.

The NTSB accident report depicts a chaotic atmosphere in the cockpit of Flight 1420 with a fatigued crew that was rushing and knowingly operating in wind conditions exceeding allowable limits. This crew committed a plan continuation error by continuing the approach to Little Rock National Airport when the evidence was clear that they should not have attempted it. They chose a course of action that was incorrect for the given weather conditions. The crew believed that an accident would not happen; they believed they were invulnerable to the conditions.

Anti-Authority

Neff (2022) provides a deeper understanding of the hazardous attitude of anti-authority. The author explains that pilots exhibiting this hazardous attitude identify different kinds of authority, specifically, legitimate authority and illegitimate authority. Standard Operating Procedures (SOPs) and Federal Aviation Regulations (FARs) are examples of legitimate authority. These documents are written by a recognized authority. Illegitimate authority is perceived to come from a source that does not have delegated authority. Examples include an organization or an individual that does not have authority. Because of the delegated authority from the FAA or the airline, knowingly violating FARs or SOPs is a clear demonstration of an anti-authority, hazardous attitude.

On March 5th of 2000, a Southwest Airlines Boeing 737-300 overran the departure end of runway 08 at the Burbank-Glendale-Pasadena Airport in Burbank, California. Several factors combined to result in this accident. The accident flight departed for Burbank almost 2 hours late. The approach controller kept the flight higher than normal and requested the flight maintain 230 knots to control the sequencing of multiple flights to the airport. During the approach, the crew noted a 20 knot tailwind (NTSB, 2002).

During the approach, the captain worked to slow the aircraft. He deployed speed brakes, made the initial flaps extension, and extended the landing gear. He then quickly added flaps to 15. The captain called for flaps 30 and four seconds later flaps 40, stating "put [flaps] forty. [I]t won't go, I know that. [I]t's all right" (NTSB, 2002, p.3). At the time of this comment, the aircraft's airspeed was 180 knots and climbed as high as 190 knots. His comment indicates that he knew he was exceeding an airspeed limitation for that flap position. The target speed for touchdown was calculated by the crew to be 138 knots. When the aircraft touched down, it was flying at a speed of 180 knots (NTSB, 2002).

The Southwest Airlines Flight Operations Manual (FOM) requires that crews use the Onboard Performance Computer (OPC) anytime certain conditions exist during operations. These conditions include operations with a tailwind and or to a short runway. Runway 08 at Burbank is 6,032 feet long, and as previously indicated, the crew recognized they were operating with a 20 knot tailwind during the approach. After the accident, the first officer admitted to the NTSB that he did not use the OPC, and the captain did not request that it be used (NTSB, 2002).

The Southwest Airlines FOM lists the requirements to be met and crew actions required during an approach. Callouts are required during normal approaches, and the manual requires additional callouts in the event of deviations from approach parameters. The pilot monitoring must make these callouts, and the pilot flying is required to acknowledge the callout and take immediate corrective action. The first officer acknowledged that he did not make the required callouts referencing excessive airspeed or sink rate deviations (NTSB, 2002).

Per Southwest's FOM, the flight must meet certain criteria, and the approach must be stabilized by the point at which it enters the "slot". The "slot" is identified as a point at 1,000 feet above ground level (AGL) where the aircraft speed and configuration must meet certain standards. The FOM requires that if these speed and configuration criteria are not met, the aircraft and crew are not prepared for a normal landing, and that a go-around procedure should be executed. When asked in a post-accident interview, the captain indicated that he recognized that he did not meet the criteria to be considered in the slot but could not explain why he did not execute the go-around (NTSB, 2002).

The crew's failure to follow the requirements in the company FOM demonstrates their anti-authority, hazardous attitude. The company FOM represents a legitimate authority, yet the crew chose a course of action in direct violation of the requirements of the document. The crew continued the approach when clear evidence existed that they were not in a position to make a safe landing, committing a plan continuation error. Fortunately, no one was killed; however, several passengers and crew were injured (NTSB, 2002).

In all these examples, the aviation hazardous attitudes and plan continuation error are evident. An attitude impacts how we respond to an event; it is a predisposition that drives us toward a response (FAA, 2004; FAA, 2009; Nunez et al., 2019). In these examples, the pilot's or crew's hazardous attitudes acted as a predisposition that contributed to their decision to continue when clear evidence existed that an alternate plan was needed to avoid an accident or incident.

Recommendations

Aeronautical decision-making skills are trainable (Li et al., 2014). Decision-making is discussed at multiple points along a pilot's flight training journey. The topic is tested on FAA knowledge exams as part of that journey. It is incumbent on aviation educators at all levels to include realistic scenarios that require higher-order thinking skills to develop decision-making skills. Aviation educators must discuss hazardous attitudes and the impact they have on the decisions we make. All students should complete the Hazardous Attitude Assessment provided in AC60-22 (1991), understand how these attitudes impact the decisions we make, and have a strong grasp of the antidotes to the attitudes.

In aviation, we use mnemonics extensively. The DECIDE Model (Detect, Estimate, Choose, Identify, Do, Evaluate) is one such decision-making tool. Li et al. (2014) evaluated four decision-making mnemonic tools and determined the FORDEC model (Facts, Options, Risks & Benefits, Decisions, Execution, Check) to be the most effective in all decision-making scenarios. Pilot training should include the use of mnemonics, and the industry may consider moving from DECIDE to FORDEC.

Certified flight instructors, when conducting a flight review, should include scenarios specifically designed to evaluate a pilot's decision-making skills and should emphasize the danger of plan continuation. Commercial operators within their initial and recurrent training modules should include scenarios specifically designed to reinforce good decision-making skills. These scenarios should include an emphasis on the danger of continuing an operation when clear evidence exists that continuing is hazardous. Decision-making training, to include the five hazardous attitudes and operational pitfalls, must permeate all levels of flight training and operations.

Conclusions

Mosier et al. (2012) identified multiple factors impacting pilot decision making, including attention, automation heuristic/bias, expectation-driven processing, memory issues, operator state, team communication, monitoring/challenging, and resource management. According to the authors, these can all influence the situation assessment process and the initial steps taken in decision making. Advisory Circular 60-22 (FAA, 1991) addresses aeronautical decision making and outlines steps pilots must take to make good decisions. The first step the FAA lists is understanding one's hazardous attitudes.

Operational Pitfalls, as outlined in AC 60-22 (FAA, 1991), are "traps" that pilots can fall victim to; these are tendencies that can lead to poor decisions by pilots. Included in the list of operational pitfalls is what the FAA calls get-there-itis, which is another term for plan continuation bias. Plan continuation error, or bias, is an all-too-common occurrence among pilots. The NTSB (1994) found that nearly two-thirds of decision errors were classified as plan continuation. Plan continuation bias influences pilots to continue a flight or approach when conditions are such that it is not safe to do so.

The aviation Hazardous Attitudes can influence the decisions we make and how we make them. These attitudes can influence us to a point where we continue a planned flight even when conditions or circumstances clearly indicate that continuing is ill-advised at best or hazardous at worst. Plan continuation errors committed by flight crews have led to multiple aircraft accidents and incidents where the pilot or crew of the accident flight had ample information and time to recognize the conditions. While the hazardous attitude antidotes are the appropriate place to start, pilots must go beyond these to acknowledge that their hazardous attitudes may promote plan continuation error. A thorough risk assessment should be completed before any flight, and honest, realistic alternatives should be considered and planned.

Human beings make mistakes; we are fallible. It can be easy to look back at an event and critique the actions and decisions of others. This paper was not written to bring judgment on any pilots or flight crews, but rather to highlight a phenomenon that acts as a trap in some situations. As pilots, we need to first honestly identify the hazardous attitudes most prevalent within ourselves. Every flight should include some time for self-reflection about any hazardous attitudes and how they may manifest in the decision-making process. We need to complete a risk assessment with an eye to how our hazardous attitudes can influence any decisions that we may need to make. We must recognize that our hazardous attitudes may cause us to be more prone to plan continuation error and remain vigilant for that tendency to press on when conditions indicate we should re-evaluate the original plan and adjust (Orasanu et al., 2001). Aviation safety and our passengers' safety demand that we do this.

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