

Aug 16th, 8:15 AM - 9:45 AM

## A Preliminary Comparison of Pilots' Weather Minimums and Actual Decision-Making

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Walters, Nathan W.; Milner, Mattie; Marte, Daniel A.; Adkins, Evan A.; Aidonidis, Marie; Pierce, Matt B.; Pasmore, Abigail K.; Roccasecca, Angela; Rice, Stephen; and Winter, Scott R., "A Preliminary Comparison of Pilots' Weather Minimums and Actual Decision-Making" (2017). *National Training Aircraft Symposium (NTAS)*. 32.

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### **Presenter Information**

Nathan W. Walters, Mattie Milner, Daniel A. Marte, Evan A. Adkins, Marie Aidonidis, Matt B. Pierce, Abigail K. Pasmore, Angela Roccasecca, Stephen Rice, and Scott R. Winter

# A Preliminary Comparison of Pilot's Weather Minimums and Actual Decision Making: A Case Study

Nathan W. Walters, M. Nicole Milner, Daniel A. Marte, Evan A. Adkins, Marie Aidonidis, Matthew B. Pierce, Abigail K. Pasmore, Angela Roccasecca, Stephen Rice, & Scott R. Winter

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## Problem Statement

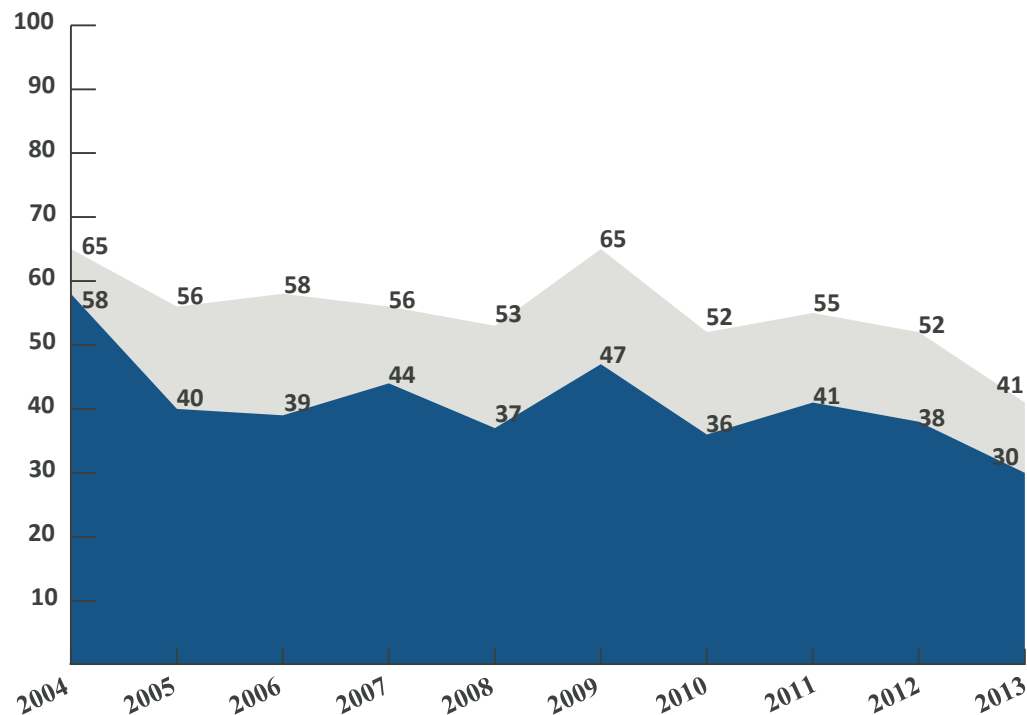
- Adverse weather conditions remain a leading cause in aviation accidents.



## The Problem

- Pilots continue to make poor decisions when flying in severe weather conditions.
- Training and technology have provided little assistance.

### WEATHER ACCIDENT TREND



## Purpose

Baseline Personal Minimums				
Weather Condition	VFR	MVFR	IFR	LIFR
<b>Ceiling</b>				
Day	2,500		800	
Night	5,000		999	
<b>Visibility</b>				
Day	4 miles		1 mile	
Night	8 miles		3 miles	
<b>Turbulence</b>				
	SE	ME	Make/Model	
Surface Wind Speed	10 knots	15 knots		
Surface Wind Gust	5 knots	8 knots		
Crosswind Component	7	7		
<b>Performance</b>				
	SE	ME	Make/Model	
Shortest runway	2,500	4,500		
Highest terrain	6,000	3,000		
Highest density altitude	3,000	3,000		



## Research Questions

- What is the difference in distance between pilot's stated personal minimums and their actions toward a missed approach during missions where the cloud cover is lower than expected?
  - Distance below personal minimums
  - Distance below federal minimums

## Method & Design

Participants	Equipment	Conditions	Design
<ul style="list-style-type: none"><li>• 35 Instrument Rated pilots (4 female) from Embry-Riddle Aeronautical University</li><li>• Mean age: 23</li><li>• Compensation: \$25</li></ul>	<ul style="list-style-type: none"><li>• Elite-1000 flight simulator</li><li>• Desktop Computer</li><li>• iPad</li><li>• Aviation Safety Attitude Scale</li><li>• Hazardous Attitude Scale</li></ul>	<ul style="list-style-type: none"><li>• Controlled Laboratory Environment</li><li>• Cloud cover reached the ground</li><li>• No ability to detect obstacles by using visuals</li><li>• Non-towered airport</li></ul>	<ul style="list-style-type: none"><li>• Simple correlational design</li><li>• Descriptive statistics</li><li>• CITI certified researchers</li><li>• ERAU Institutional Review Board</li><li>• Signed consent by all participants</li></ul>



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## By the Numbers – Preliminary Results

Total Participants	Participants who flew below stated personal minimums (SPM)	Participants who flew below federal minimums
35 Instrument Rated Pilots	24 (69%) Instrument Rated Pilots	22 (63%) Instrument Rated Pilots

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## Participants Totals – Preliminary Results

Total Participants	Average stated personal minimums (SPM): All participants	Average point “missed approach” executed: All participants
35 Instrument Rated Pilots	367 ft. (MSL)	226.59 ft. (MSL)

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## Preliminary results – Stated Personal Minimums (SPM)

24 (69%)  
Participants flew  
below (SPM)

On average the  
SPM of 24 (69%)  
participants  
equals 443 ft  
(MSL)

Distance these 24  
participants flew  
below their stated  
personal  
minimums

231 ft

Average height at  
which these 24  
participants executed  
“missed approach”

211.8 ft.  
(MSL)

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## Participants who flew below Federal Minimums – Preliminary Results

Federal regulated  
minimums for ILS

213 ft. (MSL)

22 out of 35 (63%)  
instrument rated  
pilots

On average flew 40  
ft. below federal  
regulated  
minimums

Feet (MSL) at which  
these 22 (63%) pilots  
executed miss

On average these  
pilots executed  
missed approach  
at 173 ft MSL

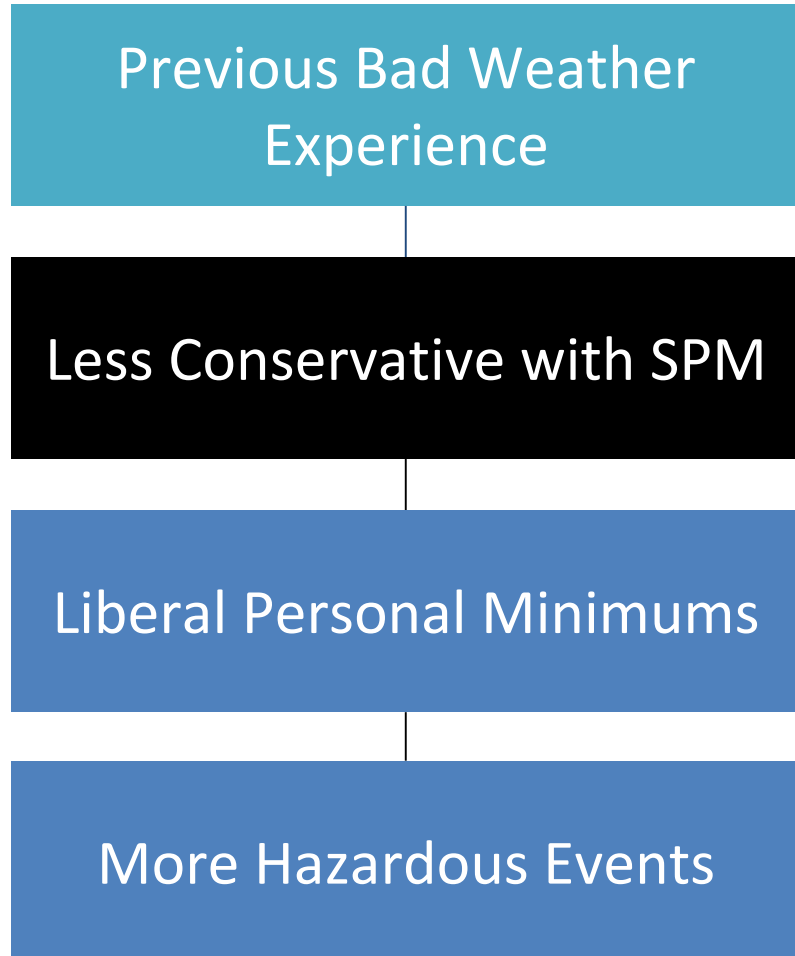
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## Discussion



## Weather Ceiling Minimums

- Personal minimums were first introduced in 1996.



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## Decision Making

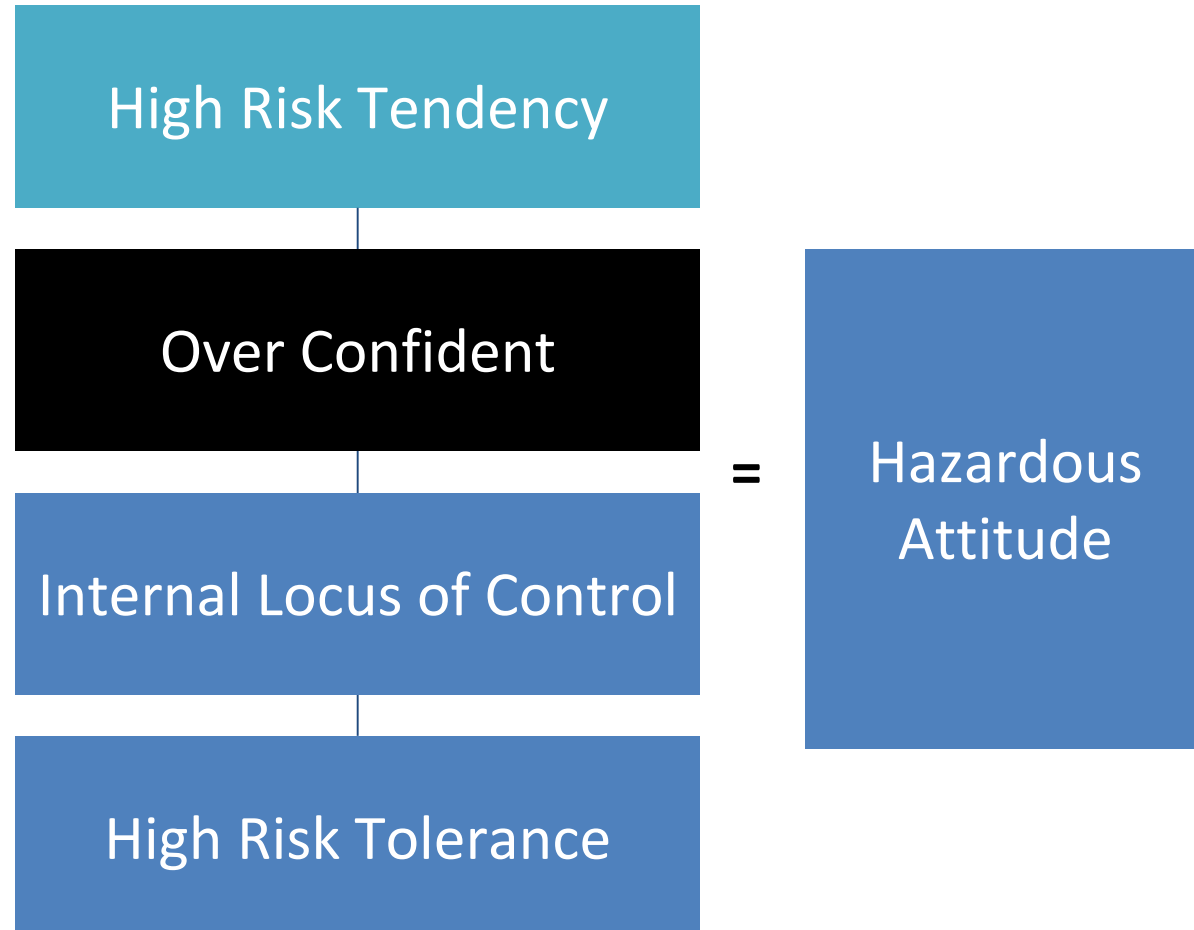
- What factors affect decision making?
- Particularly, what factors influence risky decision making?



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## Attitudes

- Can training improve response times to weather hazards for those with high risk tendencies?



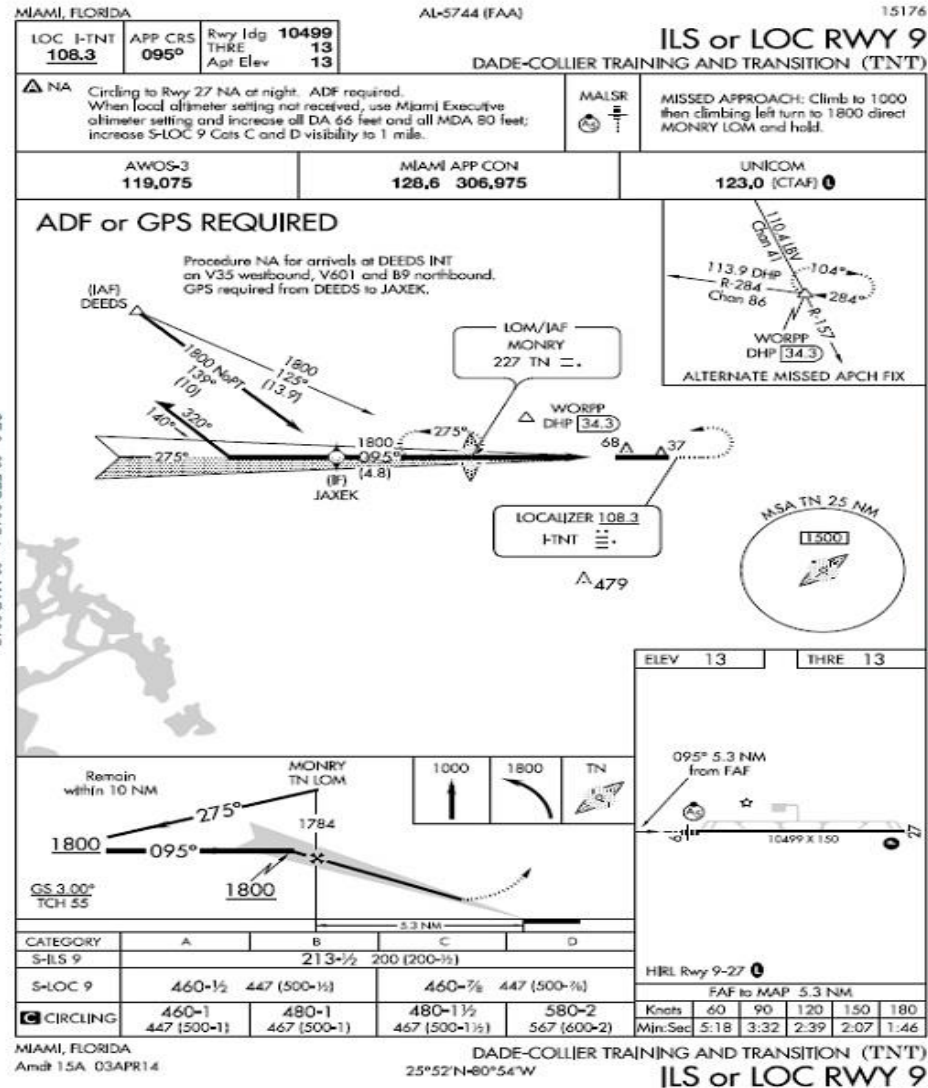


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## Case Study: One Example



# Flight Chart

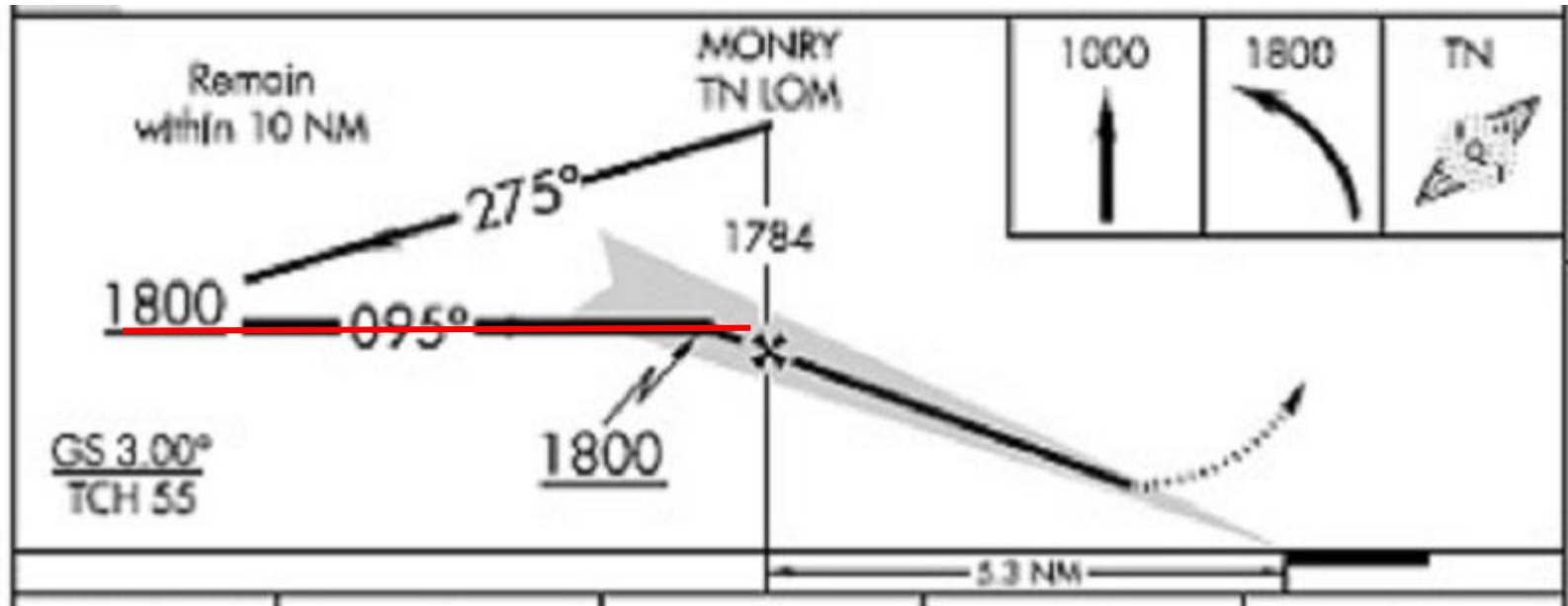


## What Happened?

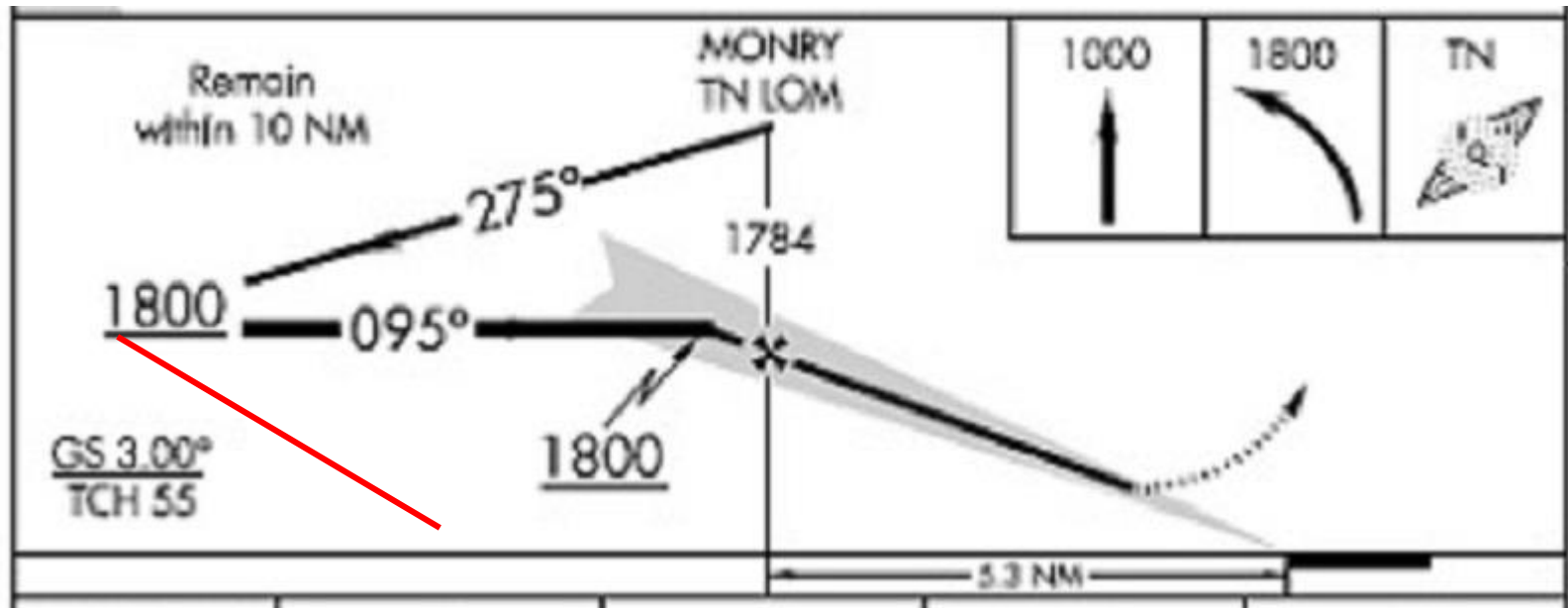
- One pilot did not correctly identify the information from his display.



## Normal Flight Path



## Estimated Participant Flight Path



Then this happened!



## Which Led to This!





## Lessons Learned





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# Questions

