Aviation Weather Products in General Aviation: Interpretability and Usability Research Trends

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Aviation Weather Products in General Aviation: Interpretability and Usability Research Trends

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Presentation given at the 21st International Conference on Human-Computer Interaction, Orlando, Florida, July 2019
Agenda

• Introduction
• Current Study
• Trends
• Summary
• Conclusion

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Introduction

- General Aviation (GA) pilots have access to a wealth of aviation weather information
  - Pre-flight weather planning
  - In-cockpit weather displays
- Limited research addressing the interpretability of these weather displays
Current Study

- Study conducted by Blickensderfer et al. (2018) tested pilots' aviation weather knowledge and product interpretability
  - 5 separate tests with different products were distributed to the AOPA
  - 837 pilots fully completed the tests
- Trends found in this study will be presented
Trend 1

Flight experience has a limited effect on GA pilots' ability to interpret weather displays

- Student and private pilots scored lowest
- More experienced pilots still scored lower than 80% on average
- Weather product learnability may be low

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Trend 1
Flight experience has a limited effect on GA pilots' ability to interpret weather displays.

Average Weather Product Interpretability Score

- Private: 64.7, 65%
- Private with Instrument: 67.3, 67%
- Commercial: 70, 70%
- CFI: 72.7, 73%
- ATP: 72.6, 73%

Commercial, CFI, and ATP pilots all held instrument ratings.

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Trend 2

GA pilots do not understand Weather Radar displays

- Pilots exhibit more hazardous behavior while using enhanced radar displays (Beringer and Ball, 2004)
- Radar display questions had some of the lowest performance scores
- May provide insight into VFR to IMC incidents
Trend 2

GA pilots do not understand Weather Radar displays

Radar Interpretability Scores

- Private: 54%
- Private with Instrument: 61%
- Commercial: 67%
- CFI: 67%
- ATP: 61%

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Trend 3

Some categories of aviation weather products yielded higher scores than others

- Winds Aloft scores were high (m = 86%)
- Many scores were low:
  - Satellite (m = 58%)
  - TAF (m = 57%)
  - METAR (m = 55%)
  - Station Plots (m = 39%)
- Many of these low scoring products are featured in new overlay displays

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Trend 3
Some categories of aviation weather products yielded higher scores than others

Comparison of Interpretability Scores

- Winds Aloft: 85.5, 86%
- TAF: 56.9, 57%
- Satellite: 58.1, 58%
- METAR: 54.5, 55%
- Station Plot: 39, 39%

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Trend 4

The interpretability scores align with results from external usability assessments

- Remy (2017) used a modified System Usability Scale to evaluate the Aviation Weather Center website
- Usability scores in this study trended in the same direction as interpretability scores from Blickensderfer et. al (2017) study
Trend 4
The interpretability scores align with results from external usability assessments
Summary

Trends reveal the following:

1. Flight experience has a limited effect on interpretability
2. Pilots do not understand Weather Radar displays
3. Some categories of aviation weather products yielded higher scores
4. Interpretation scores align with external usability assessments

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Conclusion

Pilots struggle to interpret aviation weather displays

- Can lead to inadequate understanding of current and forecasted weather
- GA flights that encounter hazardous weather typically end in fatalities

Imperative that new displays are created with the user at the forefront
Thank You!
References

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