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## Aviation Weather and Decision Making: A Human Factors Perspective

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# Aviation Weather and Decision Making: A Human Factors Perspective

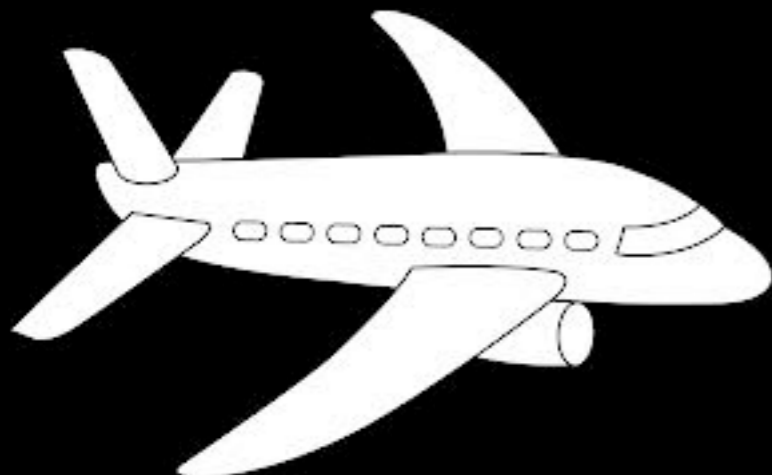
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# Overview

- A History of Decision Making Research
- Pilot Decision Making
- Future Research Directions



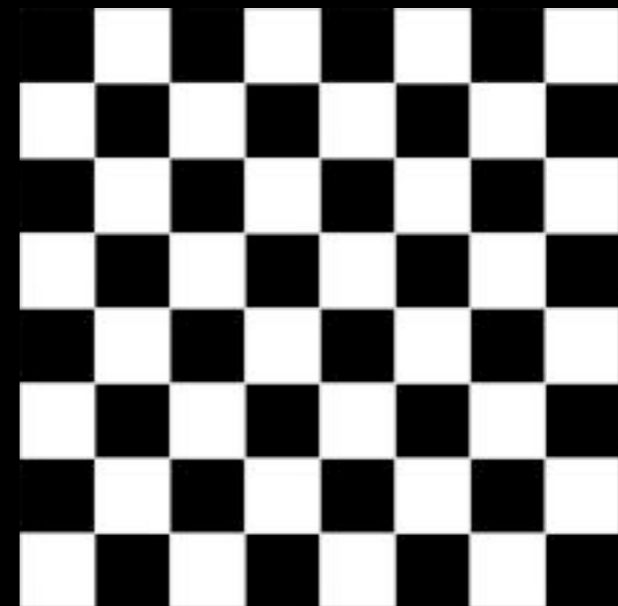
# History of Decision Making Research



- **Simon & Chase (1973)**
- **Tversky & Kahneman (1974)**
- **Klein (1993)**

# History of Decision Making Research

- Simon & Chase (1973)
  - Experts recall more domain specific knowledge than novices.
  - Expert pilots may not be expert decision-makers.



# History of Decision Making Research

$$9x + 5x(7) + 14$$

$$2x + 3y + 15$$

- Klein (1993)
  - How experts make decisions under time pressure.
  - Studied Expert Firefighters
  - Recognition decision making over analytical

$$3y(2) - 4b + 3a$$

$$9x + 5x(7) + 14$$

# History of Decision Making Research

- Tversky & Kahneman
  - Framing Effect
  - Anchoring Effect
  - Better understanding of biases and heuristics can help with decision making.





# Pilot Decision-Making



Anchoring Bias

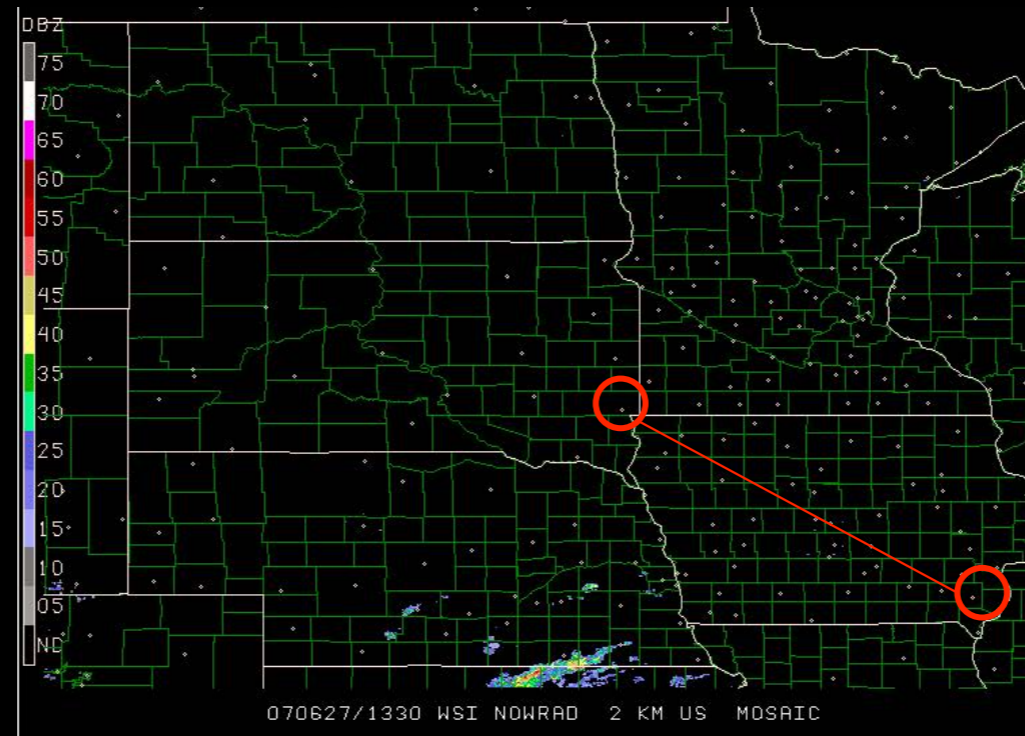
Motivational influences/pressures

Usability of Weather Information



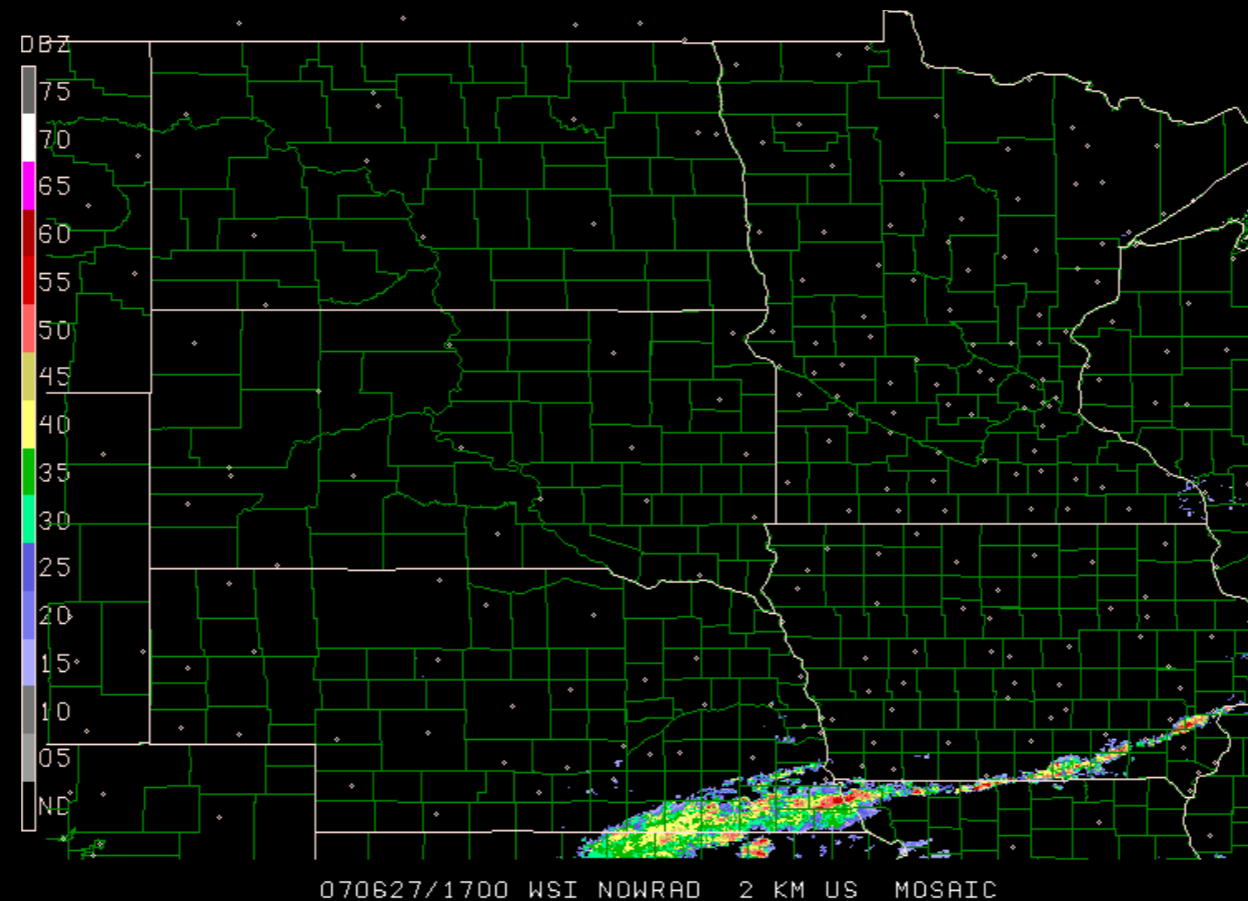
# Anchoring Example

- You plan to attend a reunion in Burlington, Iowa and TAF's indicate cloudy but VFR weather at the scheduled ETA



# Anchoring (cont.)

- 2 Hours into the flight, data link NEXRAD indicates a line of thunderstorms just outside of Burlington



# Anchoring (cont.)

## TAFs

KFSD XX1830Z XX19/XX19 33005KT P6SM  
BKN090

FMXX2000 33006KT P6SM SCT090

FMXX2200 33008KT P6SM SKC

FMXX0000 35010KT P6SM SKC

TEMPO XX03/XX06 SCT070

FMXX0800 02006KT P6SM SKC=

KBRL XX1835Z XX19/XX19 22006KT P6SM  
SCT100 SCT250

FMXX2300 25008KT P6SM SCT035

FMXX0200 29006KT 6SM HZ VCTS

BKN040CB

TEMPO XX02/XX06 4SM SHRA BR OVC030

FMXX0600 32008KT P6SM BKN050=





# Motivational Pressures

- Possible External Pressures:
  - Passenger pressure to make the reunion on time.
  - Management pressure to return
- Possible Internal Pressures:
  - Not wanting to admit defeat
  - Wanting to live up to own reputation



# Weather Information: Usability

- Where is the information?
  - Users can't find the information.
- Information Comprehension
  - Difficulty understanding the information with confusing displays
  - Display design doesn't mesh with decision making process.
- Information Availability
  - Information users want is not readily available.
- Information overload

# Where to go from here...

- Multidisciplinary approach
- The role of Human Factors
- Research needs





# Multidisciplinary Approach

- Working together, meteorologists, domain experts, and human factors professionals can develop research driven solutions.





# Human Factors: Methods and Tools

- Vast literature on human performance
- Established methods for behavioral research
- User analysis
  - Cognitive Task Analysis (CTA)
  - User interviews
  - Observation based user analysis

# Research Needs

- Display Design (what & how)
- Training
  - Scenario-based training practice
  - Tools and technology enabling pilots to practice and receive feedback.
- Measuring/Assessing effectiveness of aviation weather products



★ *human-machine system*



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