Cognitive Biases and Other Challenges in Going Beyond Human Error in Safety Investigations

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Disclaimer:

The views presented are those of the authors and do not necessarily represent the views of the U.S. National Transportation Safety Board or the U.S. Federal Aviation Administration.
Prevention is the Goal of Investigation

• Still an emphasis on error
• Effective investigations go beyond the actions of individuals and examine underlying factors
Target Audience:
Safety Investigators and their Organizations

- Governmental organizations
- Manufacturers
- Airlines
- Air traffic service organizations
- Maintenance organizations
What is **Cognitive Bias**?

A systematic error in thinking that affects the decisions and judgments of people

- Hindsight Bias
- Confirmation Bias
- Fundamental Attribution Error
- Outcome Bias
Example 1: Accident Involving Delta Flight 1086 at LaGuardia International Airport
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Reverse thrust levers
Example 1: Accident Involving Delta Flight 1086 at LaGuardia International Airport
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Outcome Bias

Our evaluations of others’ decisions are disproportionately influenced by outcome

– Many decisions are sub-optimal, but...

– Sometimes a bad decision works out and

– Sometimes a good decision leads to disaster
Example 2: Accident Involving Gulfstream G-IV at Hanscom Field (Massachusetts)
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Hindsight Bias

• Hindsight ≠ Foresight

• Minimizes the uncertainty faced by those involved in an event

• Difficult to overcome, even when we are aware of it
Example 3: Accident Involving Continental Airlines Flight 1404 at Denver International
Confirmation Bias:
Judgment disproportionately influenced by initial ideas
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940,000 Major Airline Flights Encountered a Crosswind Component Greater than the Specified Value 7 Seconds After Takeoff

≈ 1 in 15,200
≈ 1 in 7,700
≈ 1 in 3,800
≈ 1 in 1,300
### Fundamental Attribution Error:
Estimating the Influence of Situations on Behavior

<table>
<thead>
<tr>
<th></th>
<th>Failures</th>
<th>Successes</th>
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<tbody>
<tr>
<td><strong>Other people</strong></td>
<td>They are dumb, incompetent</td>
<td>They got lucky!</td>
</tr>
<tr>
<td><strong>Ourselves</strong></td>
<td>We were unlucky!</td>
<td>We are smart, competent</td>
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</tbody>
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Potential Biases

Cultural
- Organizational Culture
- National Culture
- Professional Culture

Administrative
- Principle of Least Effort
- Principle of Administrative Convenience
- Blindness to workarounds

Individual Investigators
- Outcome Bias
- Hindsight Bias
- Confirmation Bias
- Fundamental Attribution Error

(Adapted from Reason, 2013; Dekker, 2015)
Principle of Least Effort
Blindness to workarounds
Professional Culture

• Attitudes about responsibility and accountability - “trade indignation”
• Counterfactual thinking – “if only”
Signs of Potentially Biased Thinking by Investigators

What a couple of clowns

They should have seen that coming a mile away

That was a stupid decision
More Signs of Potentially Biased Thinking by Investigators and Organizations

• “Safety investigations will be just as effective if we compress investigative timelines.”

• “That accident (incident) can be easily explained...The crew didn’t do X, Y, and Z.”

• “Recommendations will be just as effective if we avoid controversy.”

• “We can eliminate accidents through total compliance.”
What Do We Do About It?

- Educate investigators and their organizations about biases
- Be alert to signs of potentially biased thinking
- Be aware of tradeoffs between resources expended and investigative depth/breadth
- Identify/develop recommended investigative processes for addressing underlying factors in safety events
- Identify opportunities for peer review
Concluding Remarks

• Get beyond human error in investigations

• Avoid or mitigate biases by accident and incident investigators

• Awareness and education are the first steps