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

Kathy Abbott, PhD, FRAeS
Chief Scientific and Technical Advisor
Flight Deck Human Factors
Federal Aviation Administration

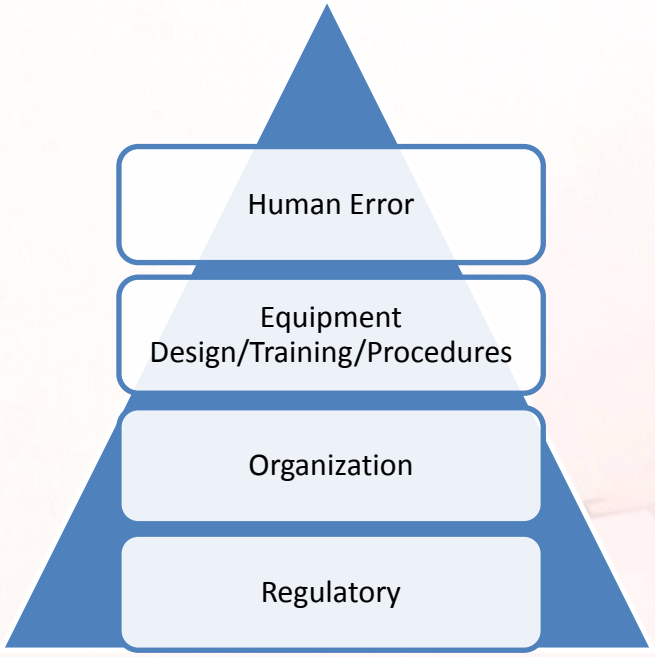
William Bramble, PhD
Senior Human Performance Investigator
Office of Aviation Safety
National Transportation Safety Board

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

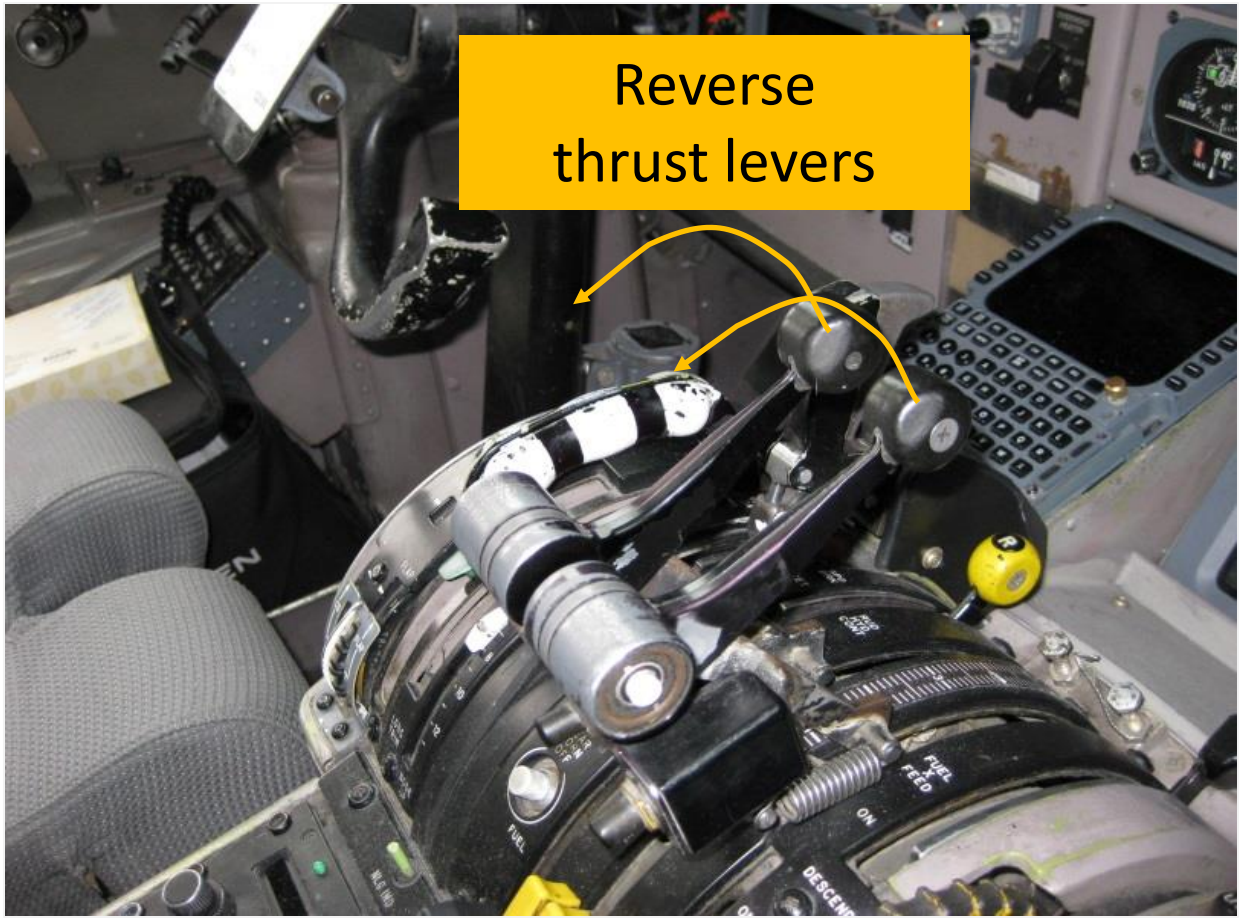
Fundamental Attribution Error

Confirmation Bias

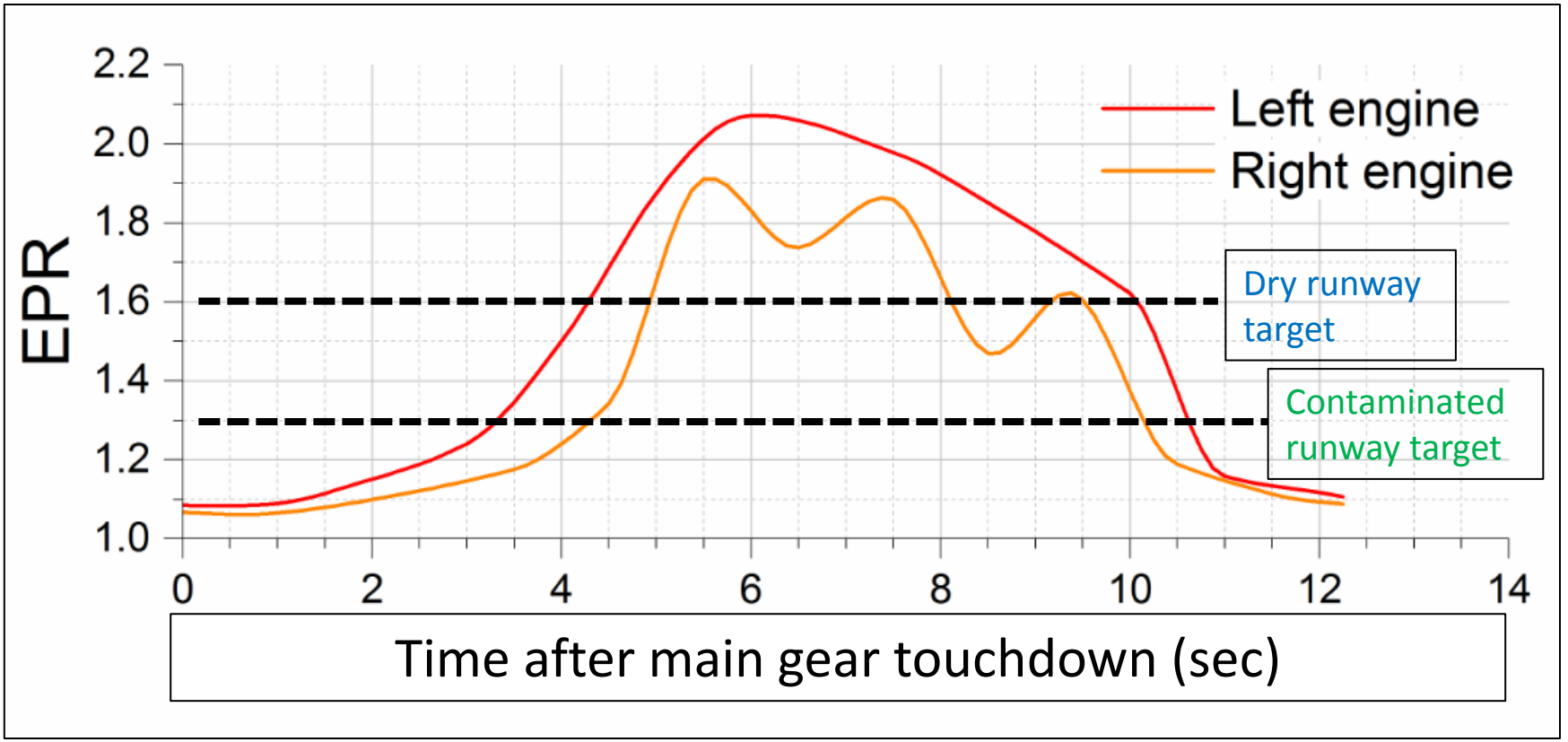
Outcome Bias

Example 1: Accident Involving Delta Flight 1086 at LaGuardia International Airport

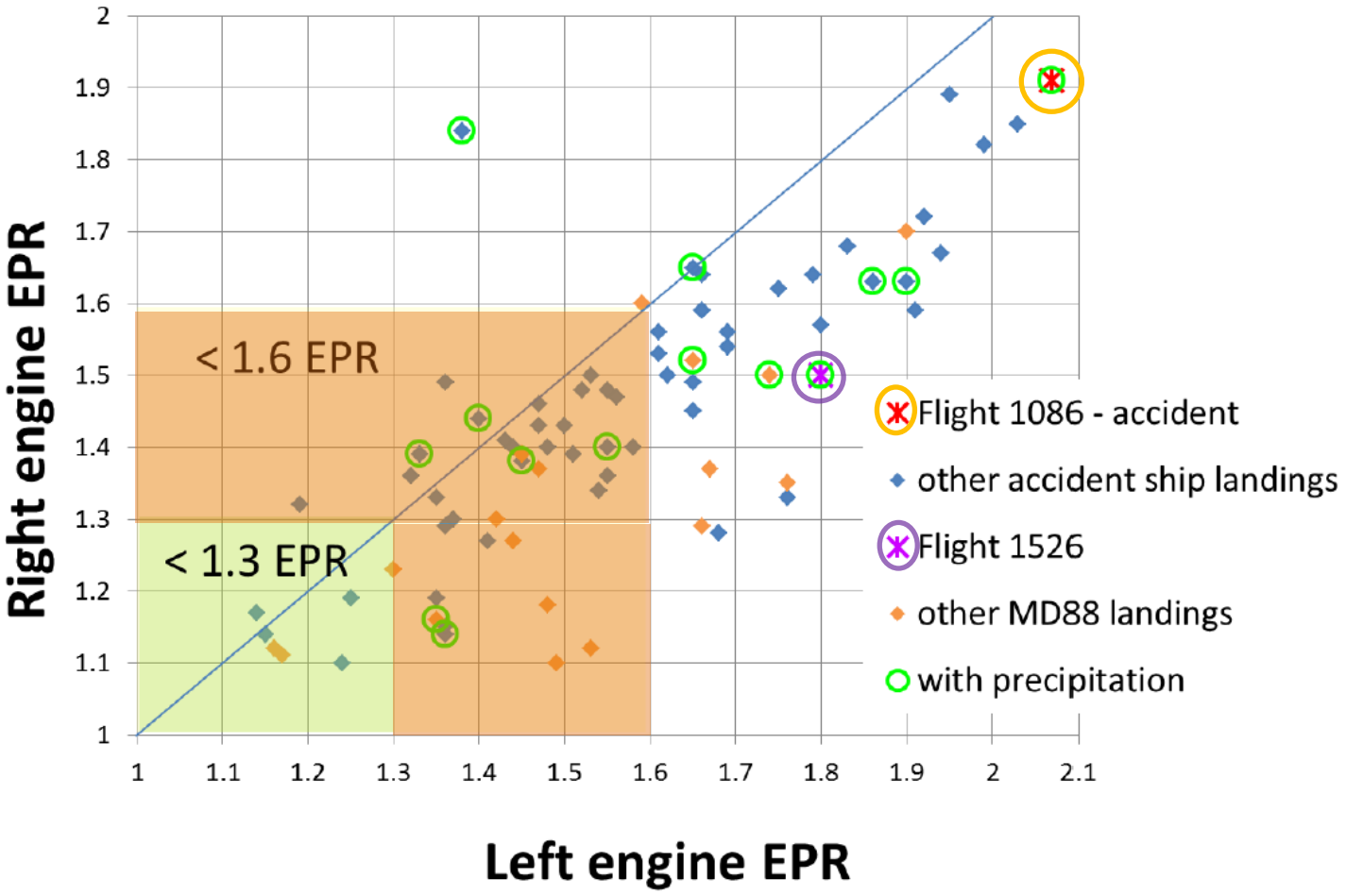
Example 1: Accident Involving Delta Flight 1086 at LaGuardia International Airport



Example 1: Accident Involving Delta Flight 1086 at LaGuardia International Airport



Example 1: Accident Involving Delta Flight 1086 at LaGuardia International Airport



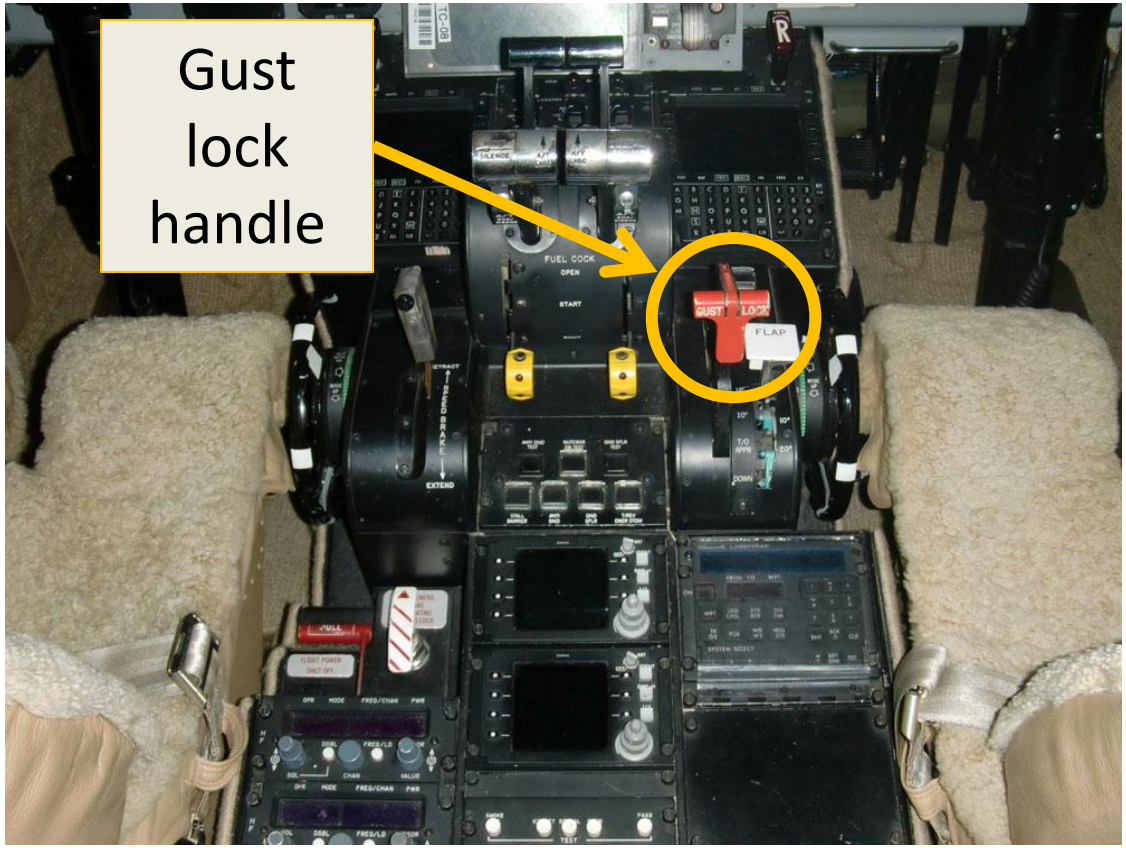
Outcome Bias

Our evaluations of others' decisions are disproportionately influenced by outcome

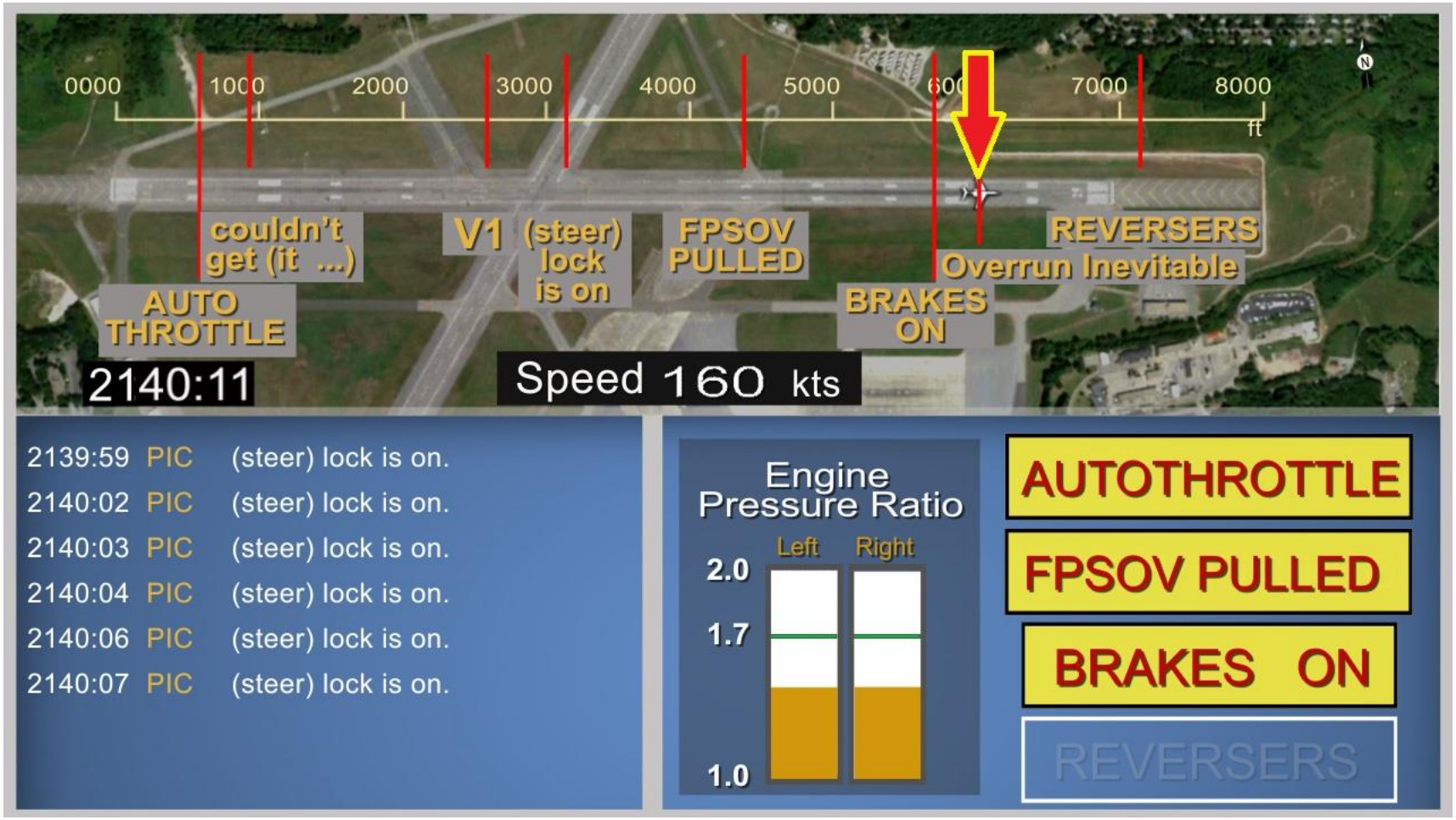
- Many decisions are sub-optimal, but…
- Sometimes a bad decision works out and
- Sometimes a good decision leads to disaster

Example 2: Accident Involving Gulfstream G-IV at Hanscom Field (Massachusetts)

Example 2: Accident Involving Gulfstream G-IV at Hanscom Field (Massachusetts)



Example 2: Accident Involving Gulfstream G-IV at Hanscom Field (Massachusetts)



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

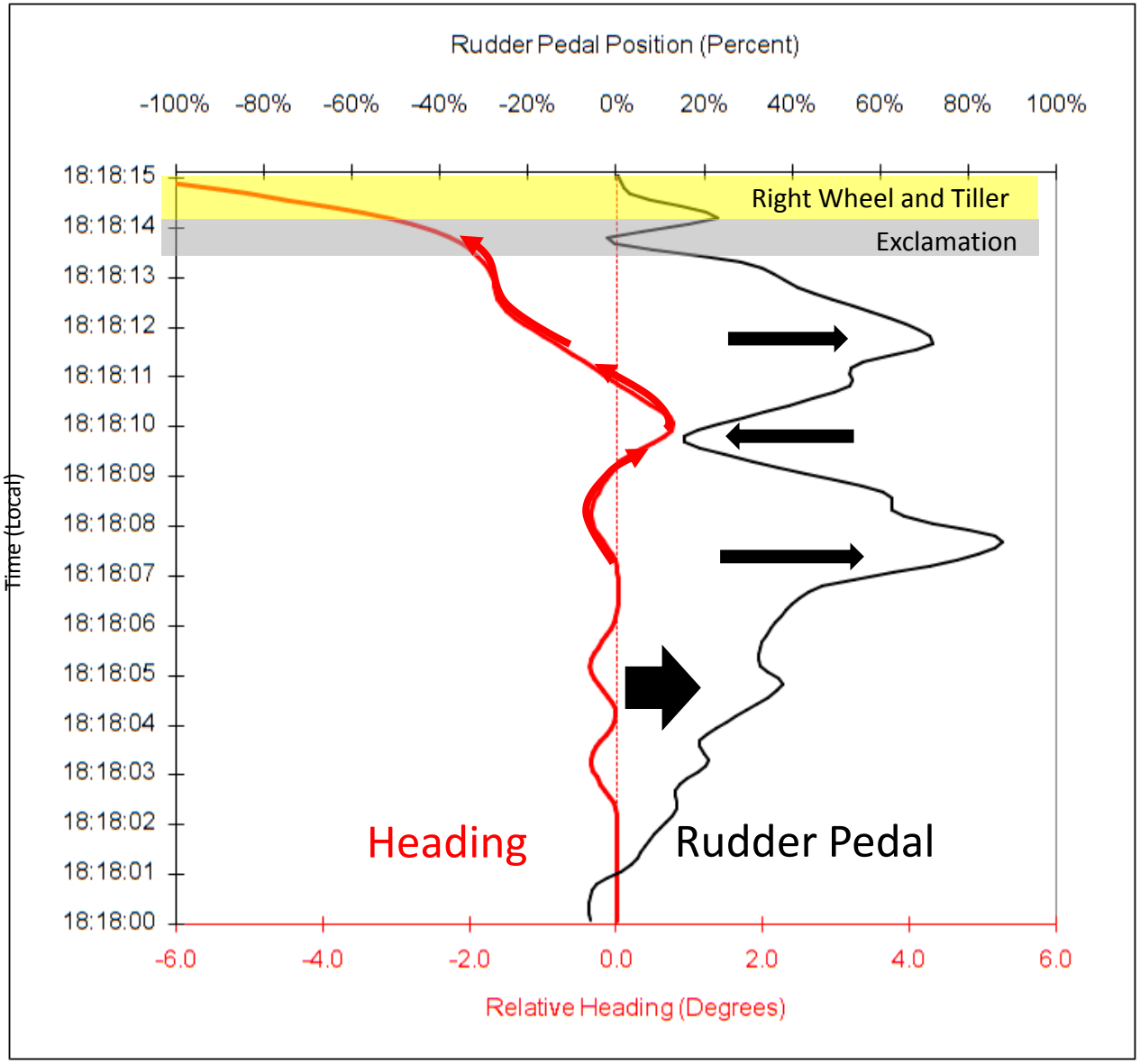

WIND

Confirmation Bias:

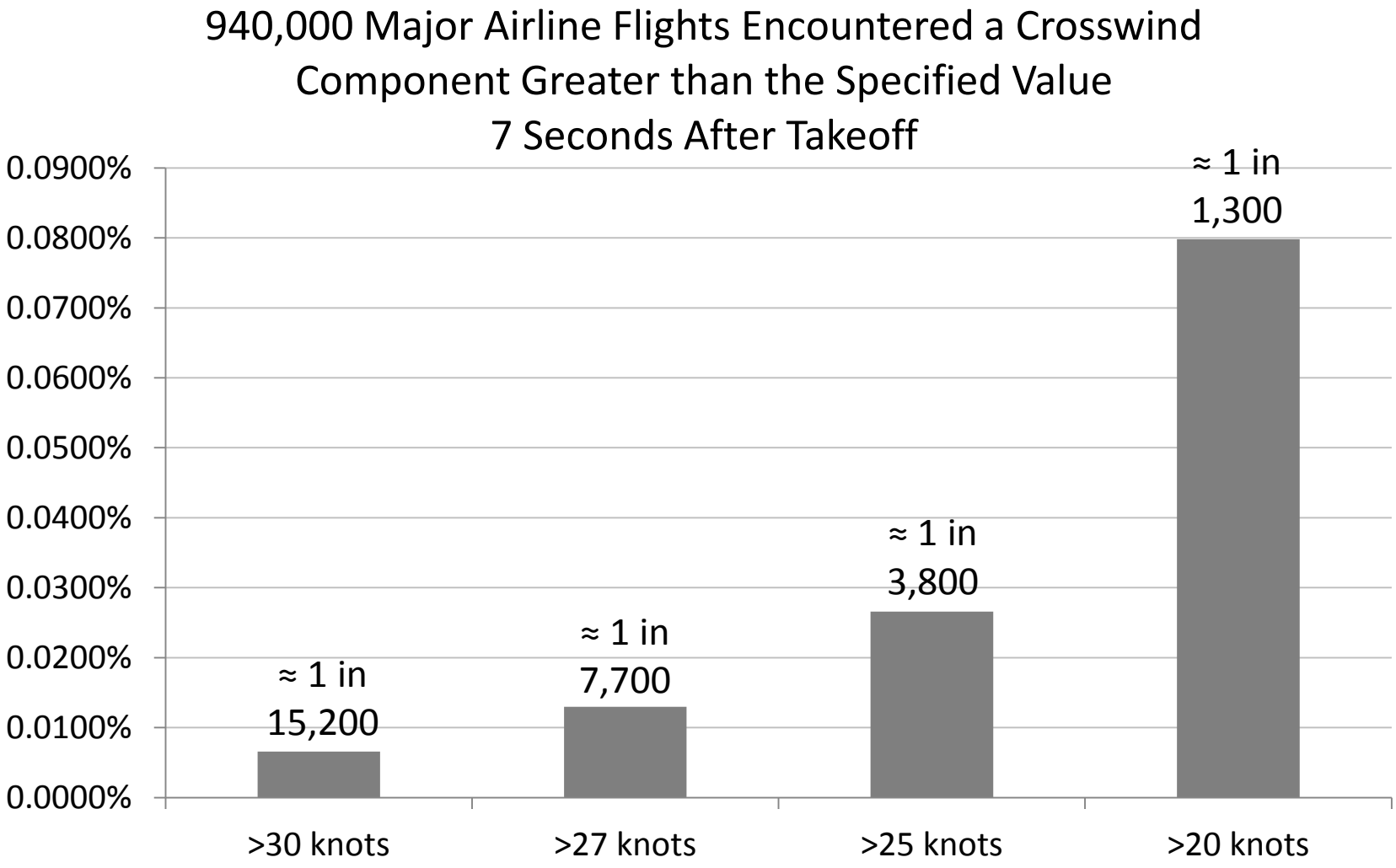
Judgment disproportionately influenced by initial ideas

WINGLETS!

Example 3: Accident Involving Continental Airlines Flight 1404 at Denver International



Example 3: Accident Involving Continental Airlines Flight 1404 at Denver International

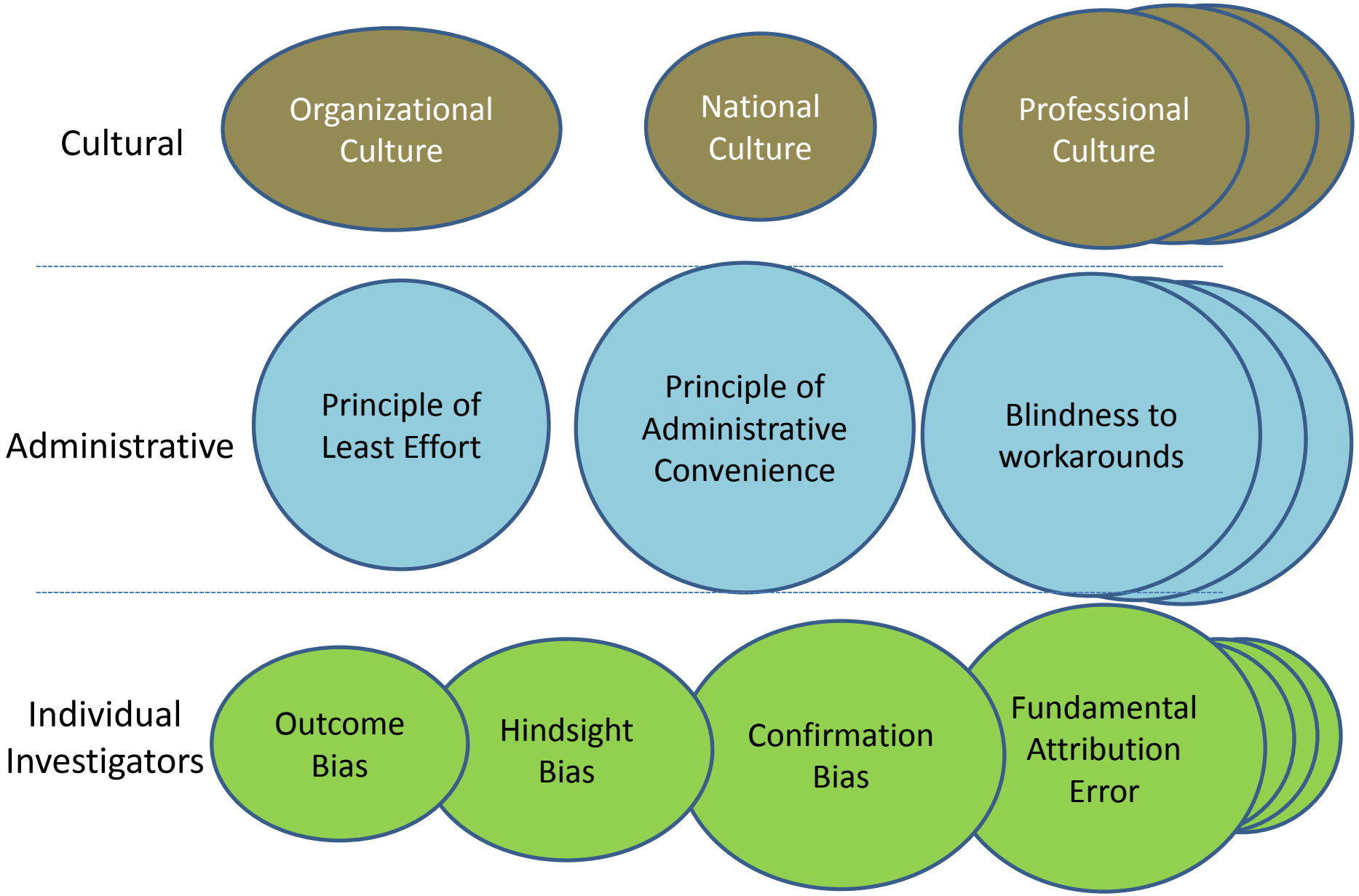


Fundamental Attribution Error:

Estimating the Influence of Situations on Behavior

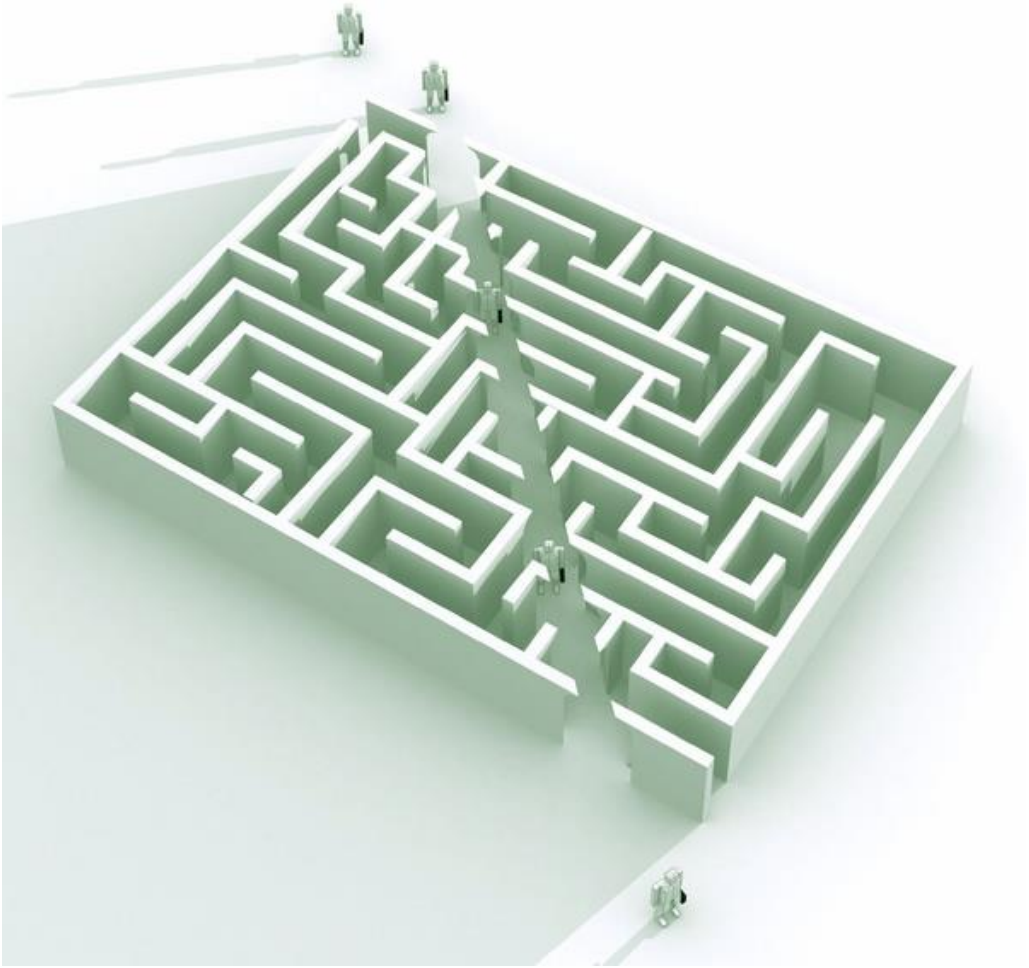
	Failures	**Successes**
Other people	They are dumb, incompetent	They got lucky!
Ourselves	We were unlucky!	We are smart, competent

Potential Biases



(Adapted from Reason, 2013; Dekker, 2015)

Principle of Least Effort

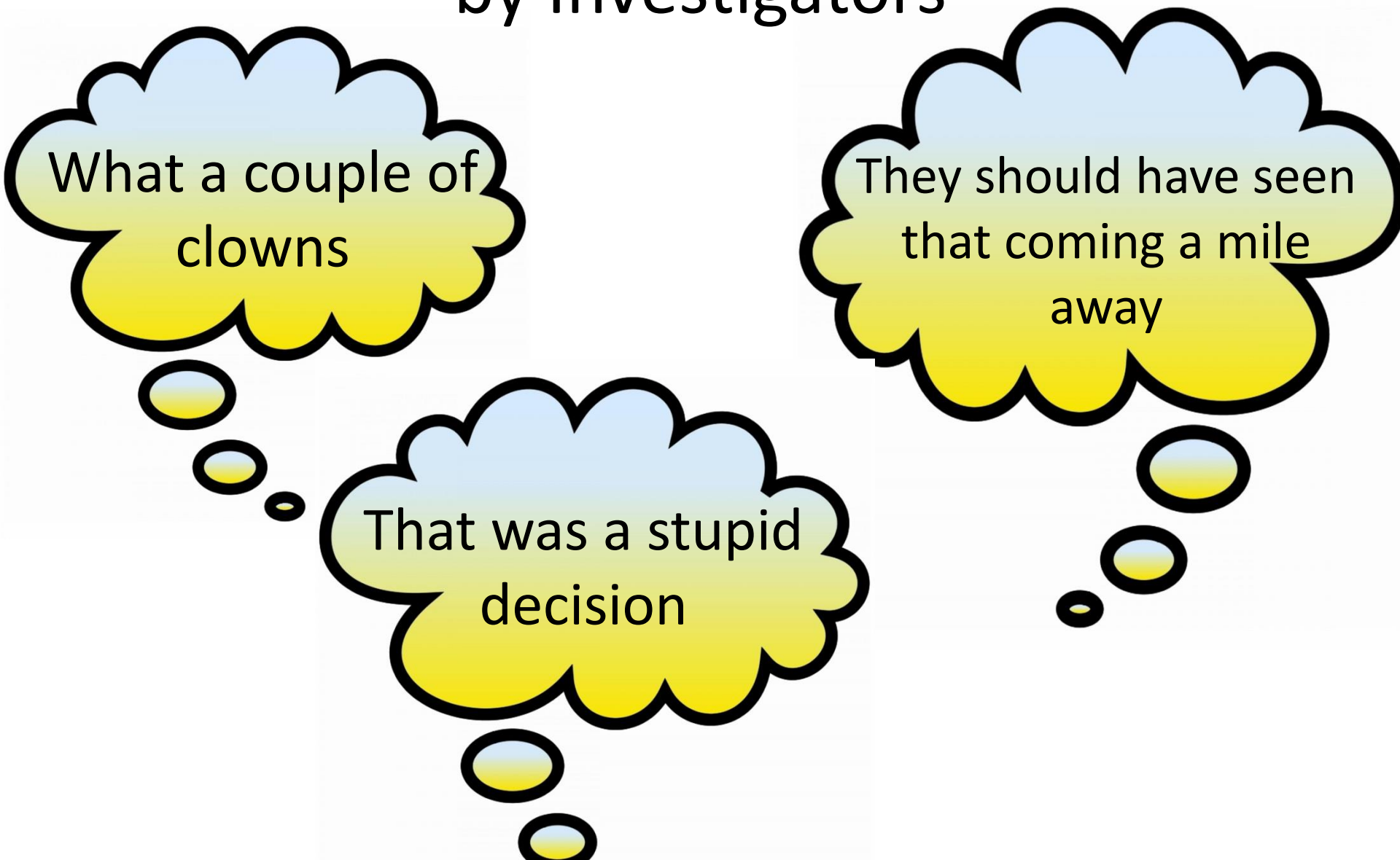


Blindness to workarounds

Professional Culture

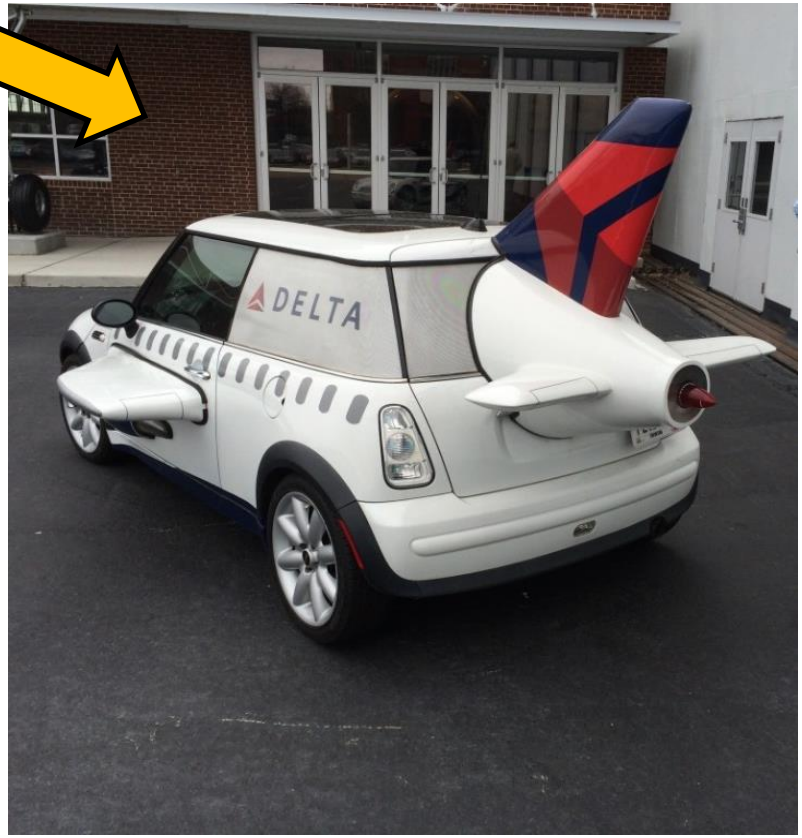
- **Attitudes about responsibility and accountability - “trade indignation”**
- **Counterfactual thinking – “if only”**

Signs of Potentially Biased Thinking by Investigators



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