

The National Aviation Operations Monitoring Service

Survey Methodology-Part 1

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Surveys Can Measure



- Attitudes
- Preferences
- Beliefs about the state of the world
- Predictions about the future
- Past behavioral experiences or events

NAOMS will be almost exclusively concerned with measuring events

You Can Learn



- Frequency of occurrences
- Changes over time
- Similarities and differences among groups

The Survey Approach to Data Gathering



- Human-centered
- Quantitative
- Flexible (versatile, topical)
- Comprehensive
- Well-developed methods
- Statistically accurate
- Stable

Survey Benefits



- Surveys have been used to shape national policy for many decades
- This use is extensive in areas such as public health policy and economics
- Aviation safety is a natural topic for survey data collection
- Survey methods are mature and well understood

Examples of Federal Surveys



- **Survey of Income and Program Participation (Census Bureau) 1984 -**
- **Consumer Expenditure Surveys (Census Bureau) 1968 -**
- **Annual Housing Surveys (Census Bureau) 1973 -**
- **Survey of Consumer Attitudes (NSF) 1953 –**
- **Health and Nutrition Examination Surveys (NCHS) 1959 -**
- **National Health Interview Surveys (NCHS) 1970 -**
- **American National Election Studies (NSF) 1948 -**
- **Panel Study of Income Dynamics (NSF) 1968 –**
- **National Longitudinal Surveys (BLS) 1964 -**
- **Behavioral Risk Factor Surveillance System (CDC) 1984 –**
- **Monitoring the Future (NIDA) 1975 -**

Federal Surveys that Measure Event Rates



- National Crime Victimization Survey
(crimes)
- Behavioral Risk Factor Surveillance System
(e.g., substance use, immunization, seat belt use)
- National Health Interview Survey
(e.g., injuries, disability, health insurance coverage)
- National Health and Nutrition Examination Survey
(food consumption)
- National Survey of Distracted and Drowsy Driving
- National Survey of Drinking and Driving

Validity of Event Rate Measurements



- National Crime Victimization Survey (NCVS)
 - Survey reports higher crime rates than FBI reported rates
 - “Did you experience this?” vs. Events reported to the police
 - Trends over time are very highly correlated (.91)

- Monitoring the Future (MTF) Survey
 - Rates of drunk driving higher than that found in NHTSA Fatality Analysis Reporting System (FARS)
 - Driving drunk vs. fatal accidents with drunk drivers
 - Trends over time are very highly correlated (.94)

Features of These Surveys



- Federally-funded via contracts or grants
- Long-term tracking studies
- Large constituencies use the data
- Important policy decisions are based on the data
- Conducted by knowledgeable and respected research organizations

Features of These Surveys (Cont'd.)



- Design done by collaborative teams of investigators
- Principal Investigators remain stable over time
- Advisory Oversight Boards oversee the entire project and make suggestions about project direction
- Methodological experts serve on advisory boards

Features of These Surveys (Cont'd.)



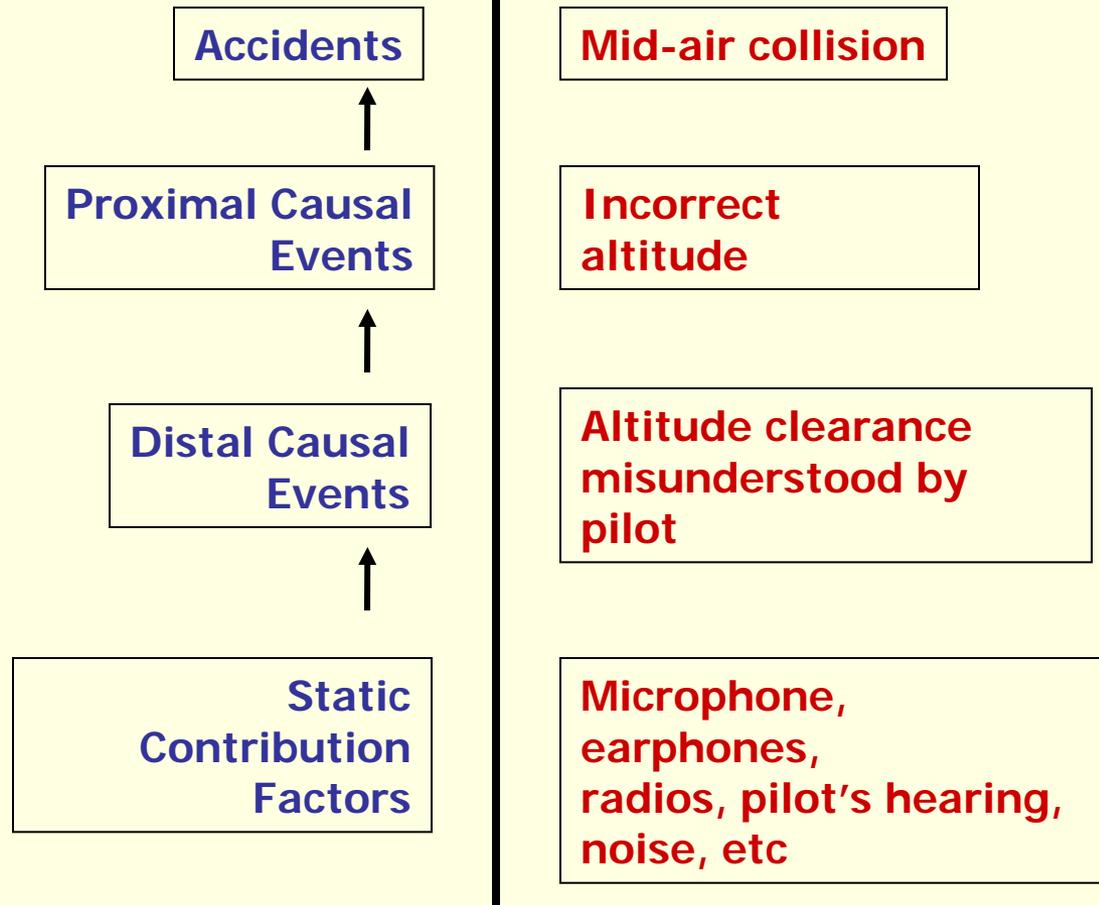
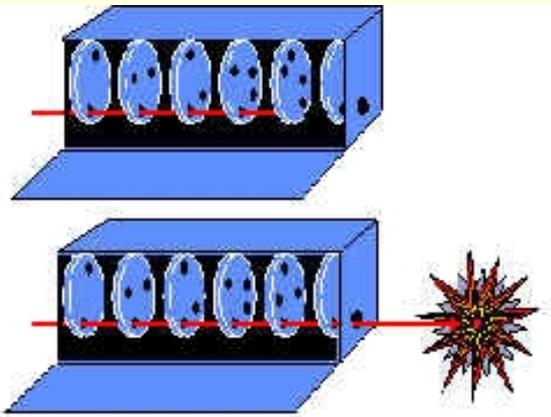
- Questionnaires have core items that remain constant from wave to wave
- Topical questions are rotated into and out of the questionnaire to reflect current interests
- Press releases and press conferences mark the release of new data (e.g., once a year)
- Publications by the project staff summarize a simple set of core trend findings
- De-identified and aggregated Information is released to the public
- Information forms basis for follow-up studies

NAOMS Design Decisions



- What events to address?
- What order of questions?
- How long of a recall period?
- What mode?

Types of Events



Building Lists of Events



- **Consultation with Industry/Gov't Safety Group, e.g.**
 - CAST
 - FAA
 - ASRS Analysts
 - Workshops

- **Review of Aviation Databases, e.g.**
 - ASRS
 - NTSB
 - NAIMS
 - BTS

- **Decision: Sample Events at Distal or Proximal Levels of Event Chain**

- **Focus Groups with Active Professional Participants**

Question Ordering



Question Ordering Relates to Memory Organization:

- Records of experiences are organized systematically and thematically in memory
- Understanding respondent memory organization is crucial to optimizing accuracy
- Asking questions in clusters that match a person's memory organization improves measurement precision
- Various hypotheses about how pilots might organize their memories discussed, but no hard data.

Memory Organizations



- Severity
- Causes
- Phase of Flight

Identifying Memory Organization



- Experiments
- Participants: Air carrier pilots
- Various tasks
 - Order of Recall
 - Labeling of Clusters
 - Sorting of Events into Categories
- Decision: A “hybrid” organization emerged: mostly causes with some phases

Recall Period



Recall Period - The optimal time between event occurrence and survey

- Respondent recall period is crucial to survey validity
- Needs to maximize recall and balance survey logistics
- Memories fade over time
- Participants should not be asked to recall things from too far in the past
- Literature Review: A literature review resulted in data that we felt to be insufficient for our purposes
- Our own study of pilots' recall of mundane flight events: 7 days maximum
- We needed to determine how long more serious events can be remembered

Recall Period: Validity Analysis



- Association of hours flown with number of events witnessed
- Association of days in the recall period with number of events witnessed
- Strongest relationships for one month and two months
- Decision: Keep recall period less than four months (60 days chosen as recall period)

Mode: Selection and Validation



■ Validation results:

- More hours flown should be associated with more events witnessed
- More days in the recall period should be associated with more events witnessed
- Stronger relationships indicate more accurate reporting

■ Mode selection:

- 30% stronger relationships for telephone than mail

■ Decision: Perform telephone interviewing (Computer Assisted Telephone Interview - CATI)

Summary of Design Conclusions



- Address as many safety events identified during preliminary investigations as practical
- Order questions to match hybrid clustering
- Use 60-day recall period to maximize documentation of rare events
- Use telephone interviewing to maximize measurement accuracy