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Identifying Interaction Variations that Affect the Effectiveness of Communication

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Identifying Interaction Variations that Affect the Effectiveness of Communication: Lessons from Cali

ICAEA, May 2018
Building on the ICAO LPRs: Communication as a Human Factor
Alex Perez Chavez and Jennifer Roberts
American Airlines Flight 965

- December 20, 1995
- Miami International Airport (MIA) → Alfonso Bonilla Aragon International Airport (SKCL) (Cali, Colombia)
- 1 hour and 55 minutes behind schedule
- Descending to Cali airport in full-automatic control mode
- Boeing 757 struck a mountain at 9:41 p.m. L.T.
- No equipment failures or problematic weather conditions
- Only 4 out of 162 passengers and flight crew survived the accident
Sequence of events of the crash is complex, subtle and difficult to trace… POST-FACT

Our Game: unpredictable outcome

Communications, language and culture are some of the ruptures being attributed to inappropriate – dynamic – human interventions.
A Framework of Expectations and False Assumptions

- The competence pilots learned from the aviation industry’s guidelines
  - Use automation!!!

- The captain’s expectation to reduce the delay as much as possible
  - Industry expectation

- The cross-cultural situation they confronted
  - What each actor (pilots and controller) expected to hear from the other in their linguistic exchange

- The role of the high navigational technology which reinforced the flight crew’s belief that they could land the airplane, even with loss of critical navigational positions
2134:40 at 6:28 from the crash

“Captain: …understand cleared direct to Cali VOR”

2135:28 at 6 mins.

Cap. to cop.: “I put Cali for you”
Copilot: “Ok, thank you”

2136:27 at 5 mins

“Controller: Are you able to approach runway one nine”? Cap. to cop.: “Would you like to shoot the one nine straight in?”

2137:29 at 3:58 mins

Can AA 965 go direct to Rozo and then do the Rozo Arrival”?

2138:49 at 2:39 mins

Copilot: “Uh where are we”

2139:07 at 2:21 mins

Captain: “ULQ (Tulua), I’m goin’ to give you direct Tulua

2139:20 at 2:08 mins

Cap. to cop.: “It’s in your map. Should be”

2139:28 at 1:58 mins

“Controller: You cleared direct to Cali VOR”
Factual Information of the AA 965 Accident
Factual Information...
Evolution of the System and the Relation to Safety Deviations

- No Radar (No back-up terrain protection)
- ATC Bogota didn’t inform (Failed awareness information)
- Fly Direct to Call: Automation capability (Unavailable Complete Navigational Information)
- Do the “Rozo One Arrival” [Approaching Tulua] (Tightly coupled events)
- Loss of Tulua radio signal: wider silence cone?
  + ND didn’t show nav aids already behind the airplane (Failed redundant nav. information: i.e. regain Tulua position)
- Two “Rs” in the nav. data bank (Tightly coupled events)
- The ND scale was set in a short scale [Zoom in] (Tightly coupled events)
AA 965: A System in Deterioration

Trigger Events

Minor Safety Deviation
- Unknown & unusual event or situation
- Framework of false assumptions and beliefs

The Collapse of the Whole System

Major Safety Deviation
- System in a state of complete deterioration
- Too late to recover
- Pilots don’t known what is happening due to incapability to reconcile elements of multiple contexts

Complexity: automation
- Tightly coupled
- Unexpected relationships remain incomprehensible for a critical time
- Lead to unintended consequences

Events can escalate into crisis
Group Interactions

Each team will generate interactions (e.g., commands, instructions, displays of tension, agreements, disagreements) in such a successfully or unsuccessfully coordinated way that only one team will be the winner.

Interactions and operational decisions were guided by a culturally patterned orientation to task efficiency based on the use of automation.
Rules of the Game

- Form three groups
- Everyone has a specific role within the group:
  - Player
  - Controller
  - Language Observer
  - Timekeeper + Referee
  - Jury Member
Players

- Choose a callsign to be referred to throughout the game
  - Create a sign to give yourself a tailnumber
- YOUR TASK: get the balls into the appropriate hole as fast as possible
  - Balls must enter into the holes in the order SMALL, MEDIUM, LARGE
- But...
  - You will be blindfolded
  - All of you may use only one hand to hold the board
Referee + Timekeeper

- Keep track of time, from start to finish.
- Using the handout, mark penalties for the team.
- One penalty every time...
  1. A ball goes through the wrong hole
  2. A ball gets stuck in a hole and a controller must release it
  3. Someone uses two hands
  4. Someone speaks a language other than English
  5. A ball goes into the right hole, but in the wrong order
- Each penalty will add 10 seconds to the team’s final time
Language Observers

- Your job is to monitor language use
- Handout provided
- Think about the *interactions* between players and the controllers (or perhaps the players with each other!)
Jury Members
Pay close attention to the game, monitoring interactions
But...how to communicate?

- Before the game, each team has five minutes to choose roles.
- As a team, you must come up with your team’s phraseology.
  - Maximum ten lexical units.
- Write your phraseology on the large piece of paper.
  - Alex or Jennifer must approve your phraseology.
Your Tasks

- Choose your roles
  - 4 players (try to diversify the players by occupation, culture, native language, etc.)
  - 2 language observers (choose linguists if possible!)
  - 1 referee + timekeeper (choose the strictest, meanest teacher of the group 😊)

- Choose your phraseology (TEN words maximum)
  - Write it on the big paper and ask Jennifer or Alex to approve it

- Practice!
Debrief

- Referees deliver report to group, then return to your own team
- Players/Controllers and Language Observers fill in Part 1 of Final Report together
- Teams divide into players/controllers and language observers
  - Remaining jury members split between players/controllers and language observers
  - Complete Part 2 of Final Report
- Teams reunite and discuss answers – are there any differences between what the players/controllers experienced vs. the others observed?
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