

# Improving airline passengers' comprehension of the Type-III exit operation procedures with an interactive safety card

Alexandros Kontotasios, University of Leeds  
and  
Dr. Rebecca Grant, Coventry University

Presented by Alexandros Kontotasios



- High usage of Type-III exits due to location (Galea 2003)
- Difficulties in comprehending the Type-III operation procedures:
  - actual evacuations (e.g. NTSB 2000)
  - studies (Chittaro 2016; Corbett et al. 2008)
- Comprehension can relate positively to behaviour:  
Bloom's taxonomy of cognitive learning objectives  
(Bonaci et al. 2013)

- The safety information is required to be conveyed before flight (e.g. FAA 121-24C/2003; 14 CFR 121.571)
- Regulations are not specific about the details regarding the operation of Type-III exits
- More details about the operation of Type-III exits are needed:
  - Improved evacuation through Type-III exits in trials (Cobbett et. al. 2001; Wilson et al. 2007)
  - Higher level of comprehension with safety videos than with typical safety cards (Chittaro 2016; Mills 1999)

- Issues with the retention of information in some pre-flight safety briefing videos (Seneviratne and Molesworth 2015)
- Active briefing perceived as more helpful in airplane evacuation (Thomas et al. 2006)
- Interaction can improve comprehension (e.g. Cairncross and Mannion 2001)
- Videos with interactive controls:
  - improve comprehension (e.g. Schwan and Riempp 2004)
  - improved comprehension more than a typical safety card but not sig. (Chittaro 2016)
- Suggestions for more creative and effective briefing methods (Chang and Liao 2010; DOT/FAA/AM-04/19 2004; NTSB 2000)

- More details than the typical safety card
- Videos close to related images improve comprehension (Wickens and Carswell 1995)
- A number of interactive features to:
  - enhance information processing through questions & feedback (Wetzel 1993)
  - facilitate control over the details (e.g. navigation)
- Human Computer Interaction principles (e.g. Standard for Software Ergonomics for Multimedia User Interfaces – BSI 2003)

- 4 safety cards:
  - Typical (images)
  - Non-combined (images and video independently)
  - Combined (images and video combined)
  - Interactive (images and video combined, interaction)
- 4 groups (20 participants each)
- Questionnaire evaluating comprehension of the Type-III operation procedures & user-experience

- Narrow-bodied, widely used airplane
- 44 safety cards of currently operating airlines
- Categorized by the researcher and SMEs

## Safety Instructions

*(Other evacuation procedures)*

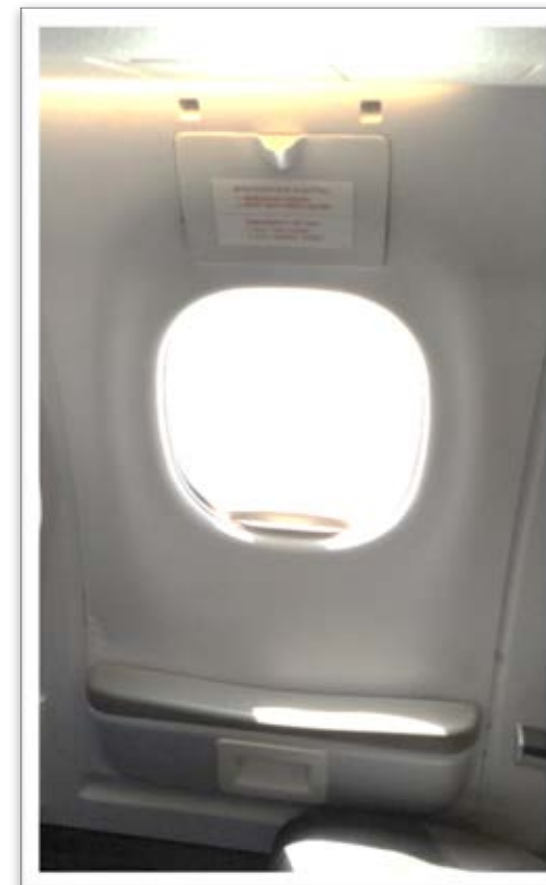


### Safety Instructions

*(Other evacuation procedures)*



### Video





# Safety Instructions

*(Other evacuation procedures)*



# Video



# Interactive safety card

What should I do to open a Type-III exit?

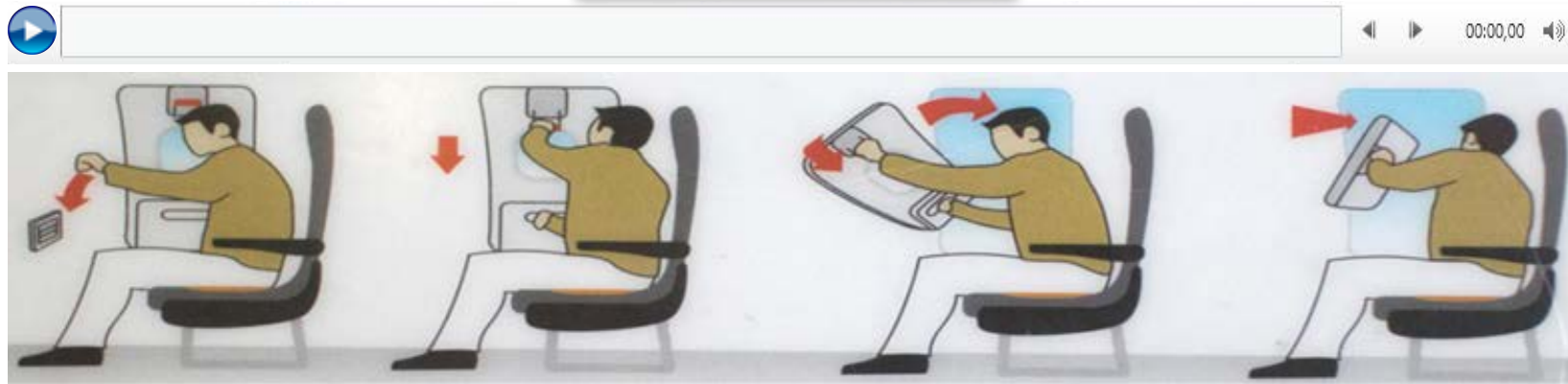
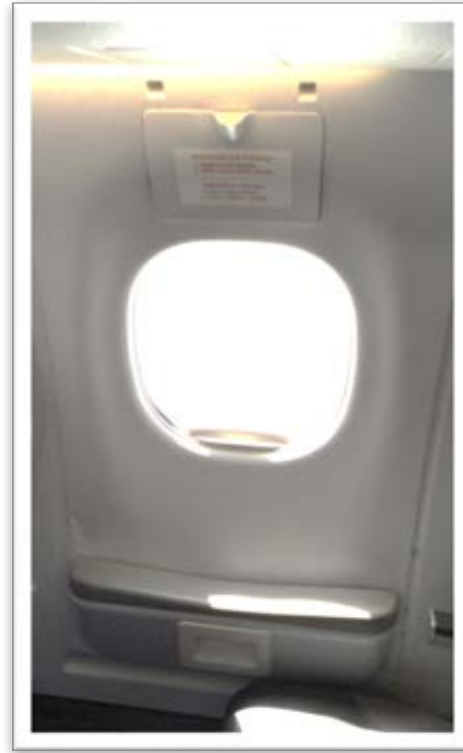


Click on me to watch a video about what you should do



Back

# Video





Click on the correct **icon** to find the handle cover





Correct!





*(click the correct)*  
To remove the handle  
cover you have to:

pull it

push it





Correct! You have to pull it.



**Follow these procedures in an emergency landing.  
Any questions then ask a flight attendant.**



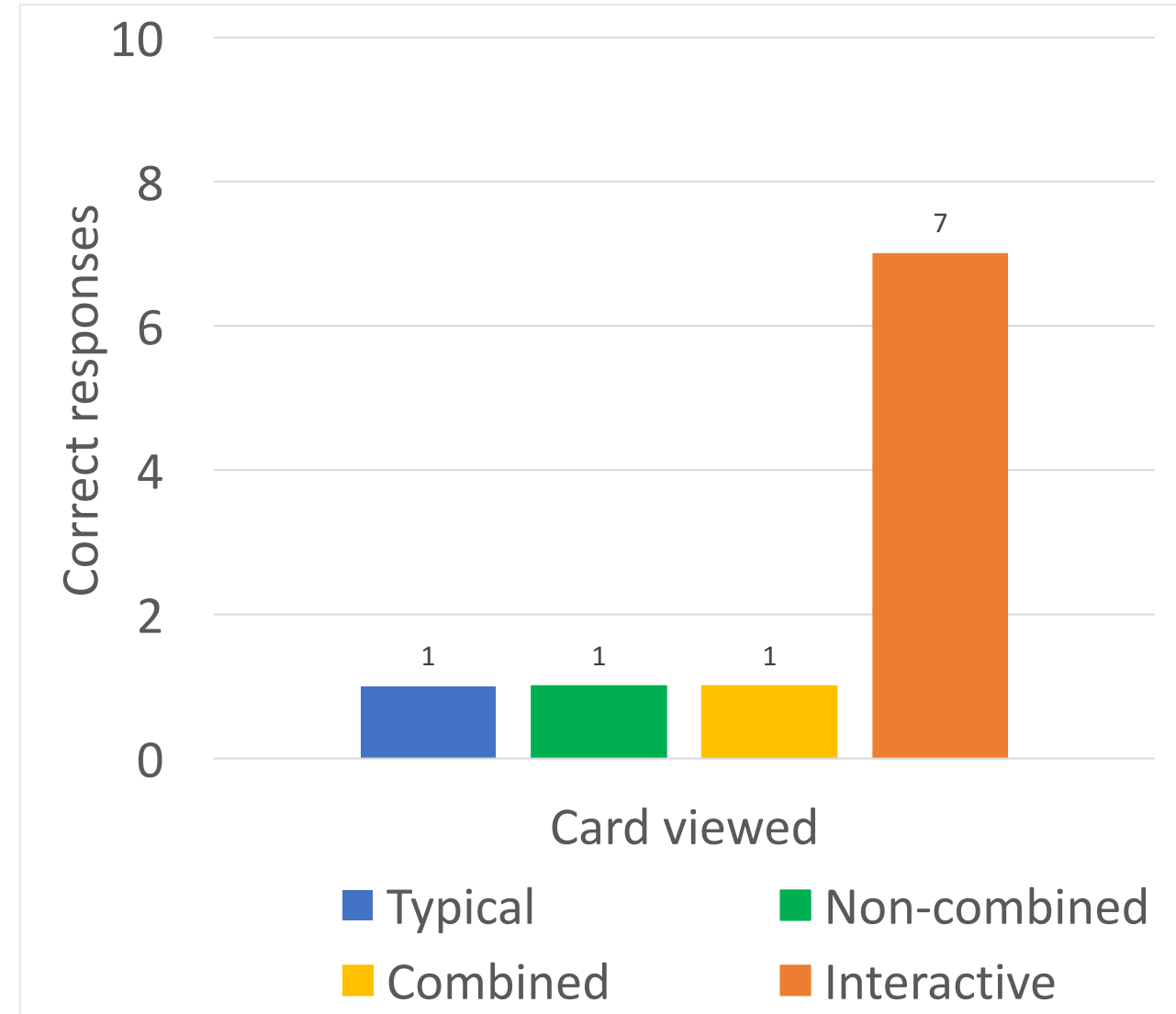


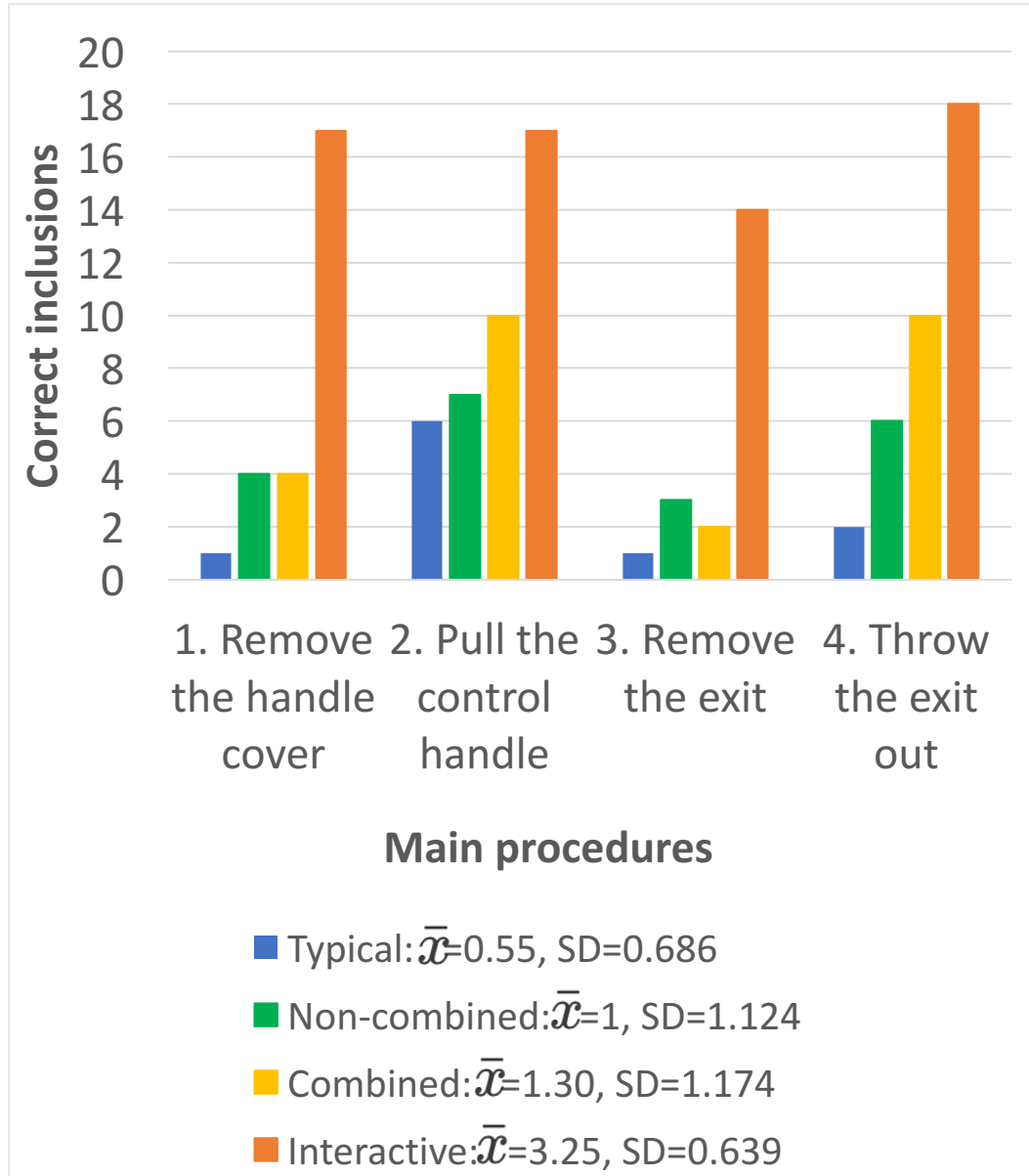
- **Comprehension:**
  - Criteria established by SMEs based on an Hierarchical Task Analysis (HTA)
  - Inclusion of all the 4 main steps of the HTA to be accepted as correct
  - Revision for any details (8 sub-steps)
  - Inter-rater reliability check
- **User-experience:** quantitative & qualitative analysis

- 80 participants: 50% male and 50% female
- Age: 93.75% between 18 and 30 & 6.25% between 31 and 40
- Last flight within: 7 days (3%), 8-30 days (9%), 1 month-6 months (27%), 7-12 months (20%), 13 months or more (42%), 9% had never flown
- Number of flights (return trips): 1-10 (65%), 11-30 (23%), more than 30 (12%)
- No sig. differences between the groups

- Participants who viewed the Interactive card gave sig. more correct responses than all the other groups (no other sig.)

4x2 Fisher Exact Test. FET (3, 80) = 11.638,  $p = .002$ . 2x2 Fisher's Exact Tests revealed sig. dif.: interactive – all others (all  $p < 0.022$ ).





### Chi-square tests & z-tests:

The Interactive group comprehended sig. more often all the procedures than all the other groups (except procedure 2 compared to the Combined)

***‘How much did the card improve your knowledge of the operation of a Type-III exit?’***

(5-point Likert item) \*

Sig. higher ratings for the Interactive group compared to all the others (no other sig.)

***‘How visually appealing did you find the safety card?’*** (5-point Likert item) \*

Sig. higher ratings for the Interactive group compared to all the others (no other sig.)

***‘Would you suggest adding something to the card?’***

- The group who viewed the Typical card asked for more details and videos
- All groups asked for improved images

\*One-way ANOVA and Tukey test

# Conclusion

- The typical safety card lacked comprehension of the Type-III exit operation procedures
- Sig. higher levels of comprehension with the Interactive card
- Providing more details appeared to improve comprehension (individual steps)
- The way details were presented was important (video combined with pictogram)
- Control over the details and active thinking could have contributed to higher levels of comprehension

## Suggestions for future work

- Interaction may be one way to help passengers comprehend the Type-III exit operation procedures
- Further research to investigate the individual effects of various interactive features
- Research with larger/enhanced samples
- Trials in cabin simulators



**Thank you**

**Alexandros Kontotasios**  
**Human factors and safety group**  
**Institute for Transport Studies**  
**University of Leeds**  
**[tsako@leeds.ac.uk](mailto:tsako@leeds.ac.uk)**