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The Effects of Cultural Factors on Safety in Aviation Focusing on Asian and Western Cultures

Jiyeon Song
Embry-Riddle Aeronautical University, jy0519s@gmail.com

THE EFFECTS OF CULTURAL FACTORS ON SAFTEY IN AVIATION FOCUSING ON ASIAN AND WESTERN CULTURE

Piedmont Airlines
Jiyeon Song

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Introduction

Asiana Airlines Crash, 2015

- Asiana Airlines Boeing 777 accident in San Francisco, CA
- Many media sources in various countries outside of Asia, such as CNN, CNBC, BBC and CCTV, reported that Korean culture contributed to the Asiana crash
- Media sources in Korea claimed that Korean culture was not related to the crash
- Kim. J (2016). International Comparative Study of Media Coverage on Asiana Airlines Crash Accidents: With an Emphasis of Semiotic Network Analysis

Hypotheses

- Just Culture

A factor of Safety culture in aviation which describes the degree of pilot's ability to recognize an unacceptable situation during the flight.

- Reporting Culture

A factor of Safety culture in aviation which describes the degree of pilot's willingness to report an unacceptable situation.

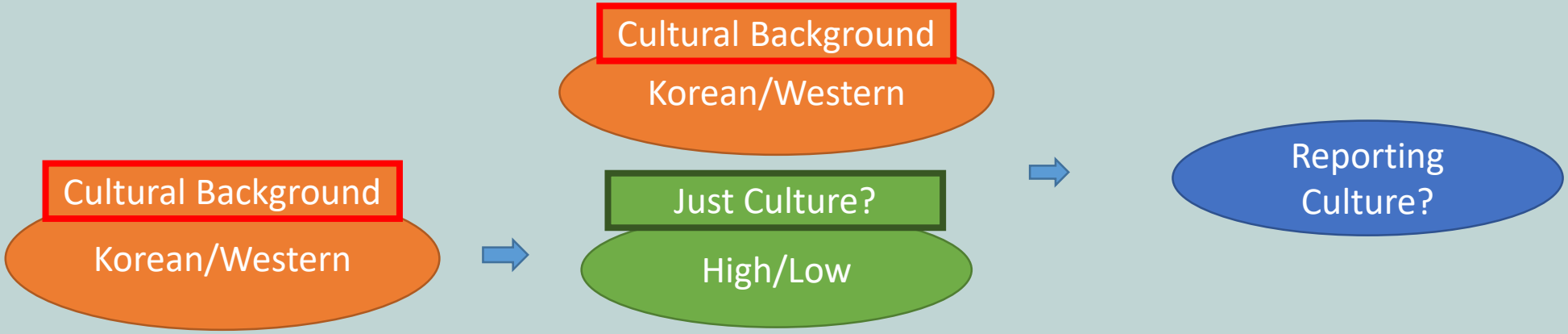
Hypothesis 01: There is no difference between the number of Korean and Western student pilots recognizing an unsafe situation during the flight.

Hypothesis 02: There is no interaction between cultural background and the degree of just culture for student pilots, which affects student pilots' decision to refuse an unsafe instruction.

Hypothesis 02-a: There is no difference between the number of Korean and non-Korean student pilots refusing to accept an unsafe instruction.

Hypothesis 02-b: There is no difference in the number of student pilots refusing to accept an unsafe instruction between the two groups to which they belong: (a) high Just Culture or (b) low Just Culture.

Hypothesis 03: There is no difference between the number of students who expected themselves to report any unsafe situation and the number of students whom the researcher and the observer observed reporting the unsafe situation.



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Lit. Review

Crew Resource Management

- Asiana Flight 214 (Ohleiser, 2013)
- Korean Air Flight 801 (Halperin, 2013)
- Avianca Flight 52 (Harris & Li, 2008)

- Collectivism: prioritization of society's needs over individual's own needs (Liao, 2015)
- High-power distance: an unequal distribution of power between people of higher and lower ranks (Hofstede & Bond, 1988).

- A set of training procedures for use in environment where human error can have devasting effects.
- Essential to understand that CRM was introduced and developed in the USA by people from the Western culture, and therefore, it is tailored to the Western mentality (Kanki, Helmreich, & Anka, 2010)

Liao's Research - Asian Culture

- How do Asians perceive their superiors in everyday life and the workplace?
- Pilots from China tended to think that a new supervisor, not new regulations, would change the company culture and the environment.
- Chinese Culture

  (1) Guanxi (creation of more personal relationships with work partners).

  (2) Power distance index was shown higher than in Western culture.

  (3) Collectivism.

Liao’s Research - Western Culture

- How do Westerns perceive their superiors in everyday life and the workplace?
- Pilots from Western Culture tended to think that a new regulations, not a new supervisor, would change the company culture and the environment.
- Western Culture

  (1) Rule-oriented (showed more trust to and felt more protected by the law)

  (2) Sharing culture (sharing flight experience with their co-workers)
- Employees should report feedback promptly when faced with any unacceptable situations.
- Chinese failed to do that because it might bring a negative response from their colleagues.

Research Design

Survey

- Survey results are not reliable enough when compared to the behavior that can be observed (Privitera, 2017)
- “A Dominance & Authority Culture negatively affects a Just culture”;
- “Would you report your higher-ranking crewmember’s rule violation without any hesitation?”;

FAA Regulations

- FAA-P-8740-60

  For a safe flight, pilots should make sure that they have at least a 2,000-foot ceiling over the highest pass they will cross.”

Participants

- Korean culture is one of Asian cultures with the Confucian connection (Seo et al., 2012)
- Most previous research related to safety culture in CRM was generally conducted with Chinese participants representing the Asian culture (Bedford, 2011; Liao, 2015; Tsui et al., 2006).

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Methods

Materials and Apparatus

- Microsoft Flight Simulator X software
- Survey 1: Demographic data
- Experiment: Flight simulation
  - Practice flight: Daytona Beach, FL area (KDAB), Cessna 172
  - Test flight: Asheville, NC area (KAVL), Cessna 172
- Simulation setting
  - Mountain peak heights ranging between 3,000 feet and 5,700 feet
  - Broken layer of clouds with tops at 5,000 feet and base at 3,000 feet
- Survey 2: Questions regarding simulated flight and the decisions that the participants made.

Procedure

- 20 student pilots with a
  group, 10 from Western

Appendix C-b

Survey 2

Participant # ____

1. On a scale from 1 to 10, how confident are you in the decisions you made during the flight?

1 2 3 4 5 6 7 8 9 10

Not confident at all Very confident

2. When you were instructed to descend, did you comply with the instruction or refuse it?

Complied Refused

3. What was/were the reason(-s) for this decision?

_____

_____

_____

4. Would you report another ERAU pilot's rule violations regardless of their rank and age?

Yes / No

5. Have you ever felt uncomfortable working with a colleague who had a higher rank, position, etc.? Provide details if possible

_____

_____

_____

0. Descend to 6,000 feet
1. Turn left heading 0-9-0 degrees
2. What is your current airspeed?
   a. _____
3. Climb to 6,500 feet

Increase speed to 105 knots

Turn right heading 1-5-0 degrees

What is your current altitude?

a. _____

Turn right heading 1-8-0 degrees

Reduce airspeed to 95 knots

Increase speed to 100 knots again

Descent to 4500 feet

Turn left heading 1-0-0 degrees

Overall, how safe do you think the instructions and flight are? (in your own words)

a. _____

, let's stop the flight session."

uestioned-Accepted	Questioned-Denied	Denied
2	3	4

4

Results & Discussion

Demographics-Reliability Test

Background		Uncomfortable (1 = Yes, 2 = No)	Flight Hours (Hours)	Confidence	Age (Years old)	Academic Year	Gender (1 = Male, 2 = Female)
Western	Mean	1.50	208.10	8.00	22.00	3.90	1.20
	N	10	10	10	10	10	10
	Std. Deviation	.527	67.655	1.886	2.582	.876	.422
Korea	Mean	1.20	381.50	9.10	23.80	3.80	1.10
	N	10	10	10	10	10	10
	Std. Deviation	.422	308.293	1.287	1.687	.422	.316
Total	Mean	1.35	294.80	8.55	22.90	3.85	1.15
	N	20	20	20	20	20	20
	Std. Deviation	.489	234.738	1.669	2.315	.671	.366

Note. N = Number of samples; Background = Cultural background; Uncomfortable = Uncomfortable experiences of working with higher-rank colleagues at ERAU; Confidence = Confidence during the flight simulation; Confidence was coded from 1 (Not confident at all) to 10 (Very confident).

Note. N = Number of samples; Background = Cultural background; Academic Year was coded as 1 (Freshman), 2 (Sophomore), 3 (Junior), 4 (Senior), 5 (Graduate), or 6 (Others).

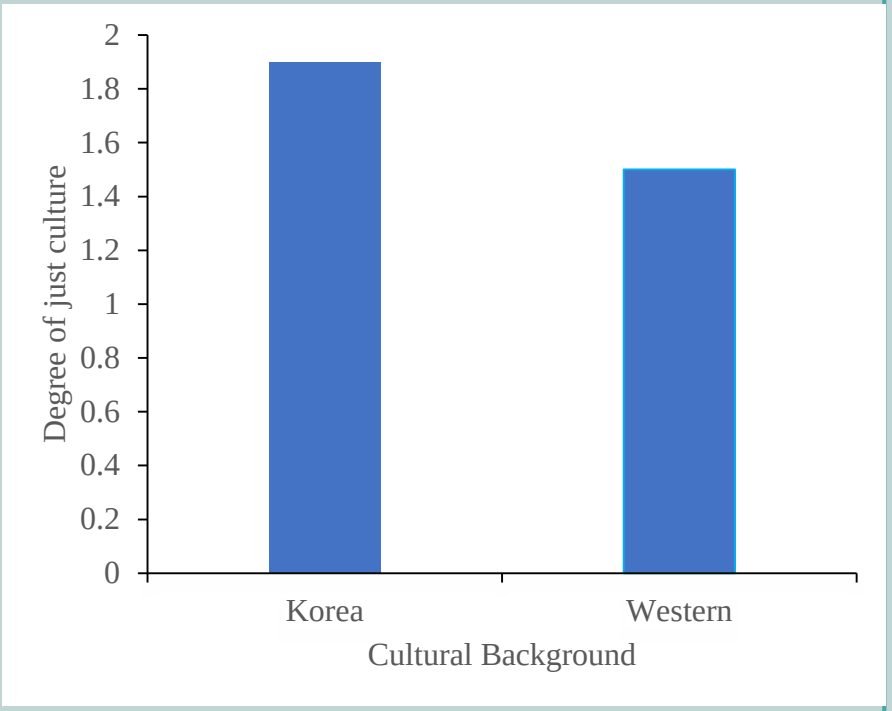
	t	df	Sig. (2-tailed)	Mean Difference
Age	-1.846	18	.081	-1.800
Academic Year	.325	18	.749	.100
Flight Hours	-1.737	18	.099	-173.400
Confidence	-1.524	18	.145	-1.100
Gender	.600	18	.556	.100

Note. df = Degrees of freedom; Gender was coded as 1 (Male) or 2 (Female).

Neither group included participants who had significantly different age, knowledge, experience, confidence and/or gender.

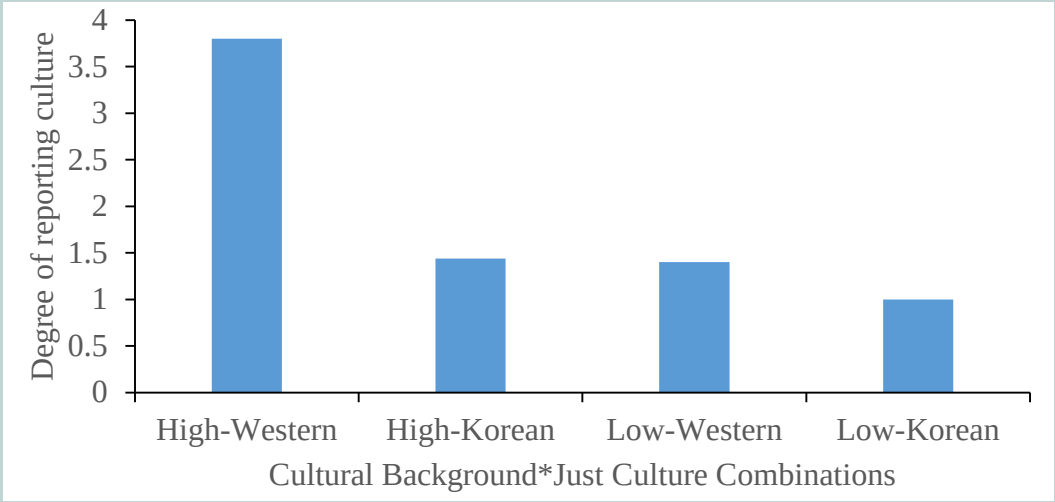
Just Culture by Cultural Background

- One-way between-subject ANOVA test was significant at F (1,19) = 4.235, $p < .05$
  - H01 was rejected
- Higher degree of just culture for Koreans than that for Westerners
  - More Korean pilots recognized that the instruction was dangerous



Reporting Culture by Just Culture * Cultural Background

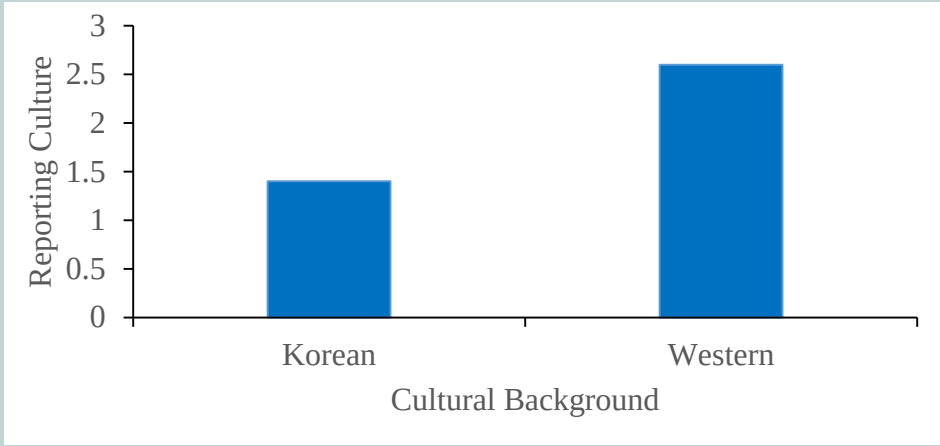
- Two-way between-subjects ANOVA was significant at $F(1,19) = 4.925$, $p = 0.05$
  - H02 was rejected
- Just Culture * Cultural Background
  - High*Western: M = 3.80, SD = .447
  - High*Korean: M= 1.44, SD = .726
  - Low*Western: M = 1.40, SD = .894
  - Low*Korean: M= 1.00, SD = .00

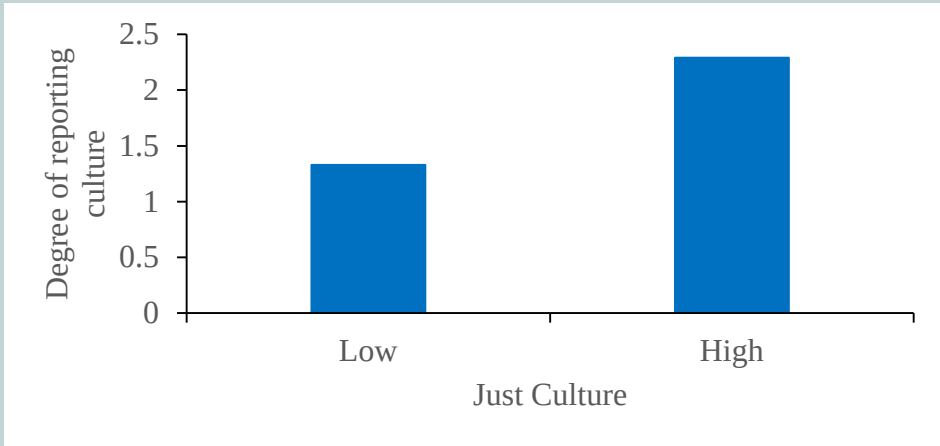


- Western culture * High Just Culture group has the best Reporting Culture.

Main Effects

- Reporting culture by Cultural Background
  - One-way between-subject ANOVA test was significant at $F(1,19) = 9.778$, $p < .05$
  - H02-a was rejected
  - Western Group showed higher reporting culture than Korean Group
- Reporting culture by Just culture
  - One-way between-subject ANOVA test was significant at $F(1,19) = 10.419$, $p < .05$
  - H02-b was rejected
  - Better Just Culture brings better Reporting Culture

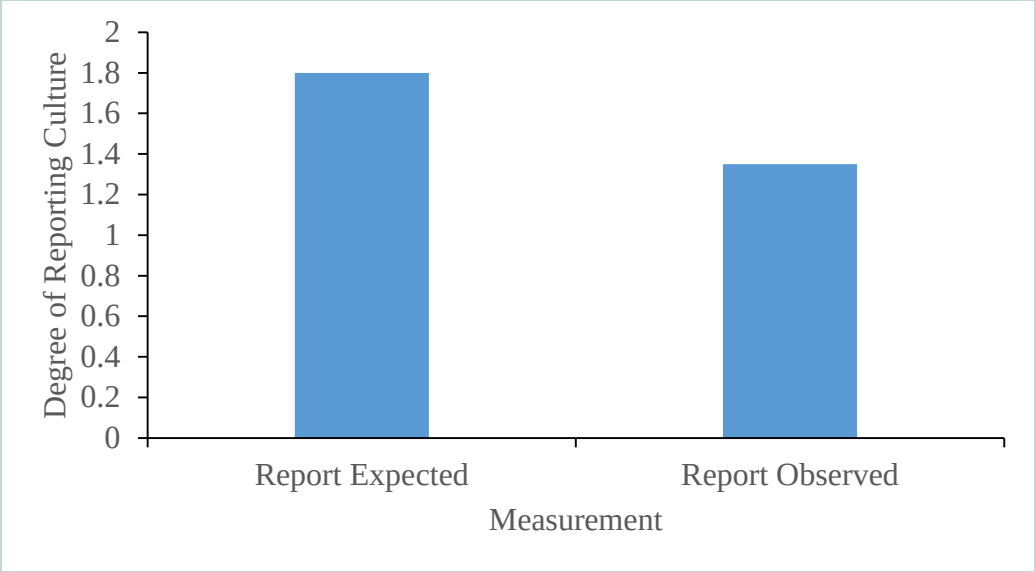




- Observed Power: Just Culture>Cultural Background>Interaction
  - Just Culture has a more positive impact on Reporting Culture than pilots' national identities.

Reporting Culture by Measurement Type

- Measurement type – Survey (expectation) or Experiment (observation)
- *t*-test was significant at $t\ (1,19) = 3.943,\ p < 0.05$
  - H_{03} was rejected



- Observed data (experiments) would significantly differ from expected data (surveys)
- More participants said that they would report in the survey (expected data)
- The number of participants who actually reported an unsafe instruction was lower (observed data)
- It is recommended to conduct experiments and collect observed data to study pilot behavior

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Conclusion

Conclusion & Recommendations

Summary

- This research looked at differences in behavior between Western and Korean pilots
- Pilots in Asian culture tend not to report an unacceptable situation.
- Being able to recognize an unsafe condition will lead to improved Reporting Culture

- For ICAO: To consider cultural differences when applying safety programs around the world
- For Asian airlines: To minimize the effect of hierarchy and authority among pilots and train pilots to speak up their opinion
- For Western airlines: To intensify safety education of pilots for better recognition of unsafe conditions

Recommendations – Further Research

Diversify the sample and increase its size
Include pilots from the industry and not only student pilots from ERAU

Sample Korean participants from Korea
Having lived in the USA might have affected participant's decisions

Broaden the scope of the research to include other (not only Asian or Western) cultures

Elaborate the research by looking at effects of age, gender, and rank among pilots sampled from different East Asian cultures.

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Thank You