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Exploring Intercultural Factors in International Pilot-Air Traffic Controller Communications:

Validating a Taxonomy Using Mixed Methods Research

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Abstract

Effective communications and collaboration are essential in the multicultural, complex and dynamic context of international radiotelephony (RT) communications, in which pilots and air traffic control officers (ATCO) use aviation English (AE) as a lingua franca. Accidents that happened due to cultural differences in aviation have been investigated (e.g., Helmreich, 1994; Merrit, 2000), as well as cultural interfaces and cross-cultural factors in aviation safety (Monteiro, 2012). However, the impact of cultural background on interactions between pilots and ATCOs in English is still underestimated and the industry lacks a categorization of culturally influenced factors confirmed by aviation stakeholders. Therefore, with the purpose of providing the aviation industry with tools and strategies to improve language for communication as a human factor issue, this paper first describes a two-phase, exploratory sequential mixed methods study. It consists of a qualitative exploration of cultural issues arising from six scenarios of international RT communications, which informs a quantitative phase, aiming to validate the factors identified and to investigate pilots' and ATCOs' perceptions of their threat to aviation safety. Results are compared across groups and findings suggest that all constructs identified for each intercultural factor refer to situations that actually happen in RT communications and are considered relevant to safety. Secondly, the paper details the practical activities that participants engaged in during Workshop A, based on open-ended comments from the research study. Finally, workshop participants' contributions are presented, including suggestions for the training of pilots and ATCOs, both native and non-native speakers of English, and strategies to address the critical role of language and culture in aviation safety.

Keywords: intercultural pilot-ATCO communications; language and culture; intercultural communicative competence; aviation safety.

Exploring Intercultural Factors in International Pilot-Air Traffic Controller Communications: Validating a Taxonomy Using Mixed Methods Research

1. Introduction

The International Civil Aviation English Association (ICAEA) Conference hosted by Embry-Riddle Aeronautical University - Florida in May 2018, focused on the theme: “Building on the ICAO LPRs¹ – Communication as a Human Factor: New Perspectives on Aviation English Training and Testing”. It was a great opportunity for the aviation industry to discuss important topics associated with aeronautical communications, which were organized in five different sessions:

- 1) The role of communication in human factors;
- 2) Tools and strategies to improve language for communication as a human factor issue;
- 3) Developing language and communication skills for safety;
- 4) The long-term aim of the ICAO LPRs: Enhanced training for better communications and safety; and
- 5) Where are we heading with the ICAO LPRs?

My motivation to submit an abstract to this conference originated by the fact that I had previously written about cultural interfaces and cross-cultural factors in aviation safety (Monteiro, 2012). This included a discussion on two conceptual frameworks or models explored by ICAO (2004b) in the *Human Factors Digest N° 16*: the SHEL Model and the Reason Model², which I addressed focusing on pilot-ATCO communications. In the same

¹ ICAO LPRs is the short form of International Civil Aviation Organization Language Proficiency Requirements, established for aviation professionals involved in radiotelephony communications (ICAO, 2004a).

² The SHEL Model refers to an individual perspective and presents the interfaces of the Human element – Liveware – with the Environment, Hardware, Software and other Liveware. The Reason Model introduces a

study, I investigated factors that can lead to misunderstandings between pilots and ATCOs, proposing a taxonomy of linguistic, discursive-interactional and intercultural factors. As a number of the identified categories may be culturally influenced, I decided to further explore the multicultural workplace context of international RT communications and the complex interface between language, culture and communication. Results from this research study were the focus of Workshop A, which I presented during Session 2 of the conference.

Therefore, the goal of the present paper is twofold: describe this exploratory research study and detail the practical activities that participants engaged in during Workshop A. As stated in Section 2 of the conference program, my purpose was to provide a tool (outcome of the study) and strategies (workshop participants' contributions) to improve language for communication as a human factor issue. By giving voice to domain experts from different 'linguaculture'³ backgrounds, the study and the workshop activities aimed to address cultural diversity, include multiple viewpoints and provide a more comprehensive analysis of the way the cultural background of pilots and ATCOs can impact intercultural RT communications.

2. The Research Study

The research study, which is part of a larger multiphase mixed-method research, is an attempt to draw on current research and generate empirical data in order to address a practical language-related issue in the context of intercultural communications between pilots and ATCOs. International RT communications in aviation take place in a complex framework of language use, in which native speakers (NSs) and non-native speakers (NNSs) of English use aviation English as a lingua franca. Although I acknowledge that in the field of English as a

systemic perspective, directed at "identifying and mitigating these latent unsafe conditions on a system-wide basis" (ICAO, 2004b, p. 17).

³ The expression *linguaculture* was first used by Jenkins (2006), in her definition of English as a lingua franca (ELF), but Baker (2009) reinforces the relevance of the term "to highlight the language-culture connection and the importance of different languages and cultures in communication" (p. 569).

lingua franca (ELF) distinctions between NSs and NNSs are considered problematic (e.g., Baker, 2009, 2016) these terms are used in this paper because the International Civil Aviation Organization (ICAO) testing policy for pilots and ATCOs (ICAO, 2004a) clearly makes a distinction between them concerning formal language testing requirements. Specifically, the LPRs do not require “native and very proficient non-native speakers with a dialect or accent intelligible to the international aeronautical community” (p. A-2) to be formally assessed. As Douglas (2014) states, “native speakers of English are not assessed for their linguistic awareness or abilities to accommodate their use of English in the context of intercultural communications” (p. 2). Yet, the context of aviation English as a lingua franca demands, whatever their language background, that pilots and ATCOs interact appropriately with speakers who have different levels of English proficiency. When discussing the cultural aspect of language and ICAO standards related to the LPRs, Hazarti (2015) also argues that “attempts should be made to include intercultural communicative competence requirements instead of the sole language proficiency criterion to ensure that the standards are properly met” (p. 250). As Baker (2012) highlights, intercultural communications require additional strategies that he called ‘the skills of multilingual communicators’:

These include the role of accommodation in adapting language to be closer to that of one’s interlocutor in order to aid understanding and solidarity. Negotiation and mediation skills are also key, particularly between different culturally based frames of reference, which have the potential to cause misunderstanding or miscommunication. Such skills result in the ability of interlocutors to adjust and align themselves to different communicative systems and cooperate in communication. (p. 63).

Despite the standardized phraseology that pilots and ATCOs must adhere to, misunderstandings are still caused by communication breakdowns. The underlying rationale is that each professional belongs to a number of social groups or cultures, “carrying several layers

of mental programming within themselves, corresponding to different levels of culture” (Hofstede, 1991, p. 10). These differences will influence what they say, how they say it, the responses they expect, and how they react to them.

In order to understand the influences of culture in the aviation context, a number of studies applied Hofstede’s (1991) cultural dimensions, i.e., individualism-collectivism, power distance, masculinity-femininity and uncertainty avoidance. Some of these works investigated pilots’ behavior inside the cockpit while others discussed their impact on aircraft incidents and accidents (Helmreich, 1994; Merritt & Helmreich, 1996; Helmreich and Merritt, 1998; Merritt, 2000; Hazrati, 2015). However, the impact of cultural background on RT communications between pilots and ATCOs interacting in the English language is still underestimated. According to Douglas (2014), “we have a professional/ethical responsibility to continue to study the phenomenon of aviation radiotelephony and the role of both native and non-native speakers of English in maintaining communication” (p. 10).

Recently, an independent research report (Clark, 2017) commissioned by the UK Civil Aviation Authority (CAA) mentioned issues related to language and cultural awareness and to politeness in aviation discourse. Two recommendations were clearly stated: i) “Incorporate cultural factors in future research on language-related miscommunication between pilots and controllers. This could involve ethnography, questions in surveys or interviews, or some other means” (p. 72); and ii) “Incorporate awareness of politeness markers into future research on miscommunication between pilots and controllers” (p. 73).

Responding to these needs, this research study aims to explore how the cultural background of participants can influence intercultural pilot-ATCO communications and may have an impact on safety, based on naturally occurring data combined with experienced professionals’ perceptions of the phenomenon. Discussions of a more dialogic, dynamic and

emergent interaction of culture and language will advance the perspective of how participants, with their own set of expectations, assumptions, values, perceptions and interpretations, interact according to the various cultural groups they are inserted in. Apart from that, as the industry lacks a categorization of factors confirmed by aviation stakeholders, it is crucial to develop a tool that can be used to improve intercultural communications within the aviation community. Specifically, the goal of this study is to answer the following two research questions:

1) What intercultural factors arise from international pilot-ATCO communications that can affect the way they interact in the English language?

2) To what extent do experienced pilots and ATCOs perceive the potential threats of intercultural factors to the safety of radiotelephony communications?

2.1 Theoretical framework.

In order to answer the research questions mentioned above, the analysis of data is underpinned by a theoretical framework that encompasses four areas of communication studies. Before drawing on each of them, it is important to explain how culture is approached in this paper. As Baker (2016) acknowledges, although English as a Lingua Franca research has adopted the more dynamic and fluid postmodernist approaches to the relationship between language and culture, tensions exist between this approach and national, essentialist positions. Therefore, following Keszkes (2014), in this paper both culture's a priori elements and emergent features are taken into account in a dialectical way, and interculturality is considered here as "a phenomenon that is not only interactionally and socially constructed in the course of communication but also relies on relatively definable cultural models and norms that represent the speech communities to which the interlocutors belong" (p. 14). In addition, Scollon and Scollon (2011) advocate for a discourse approach to intercultural communication, in which

“virtually all professional communication is communication across some lines which divide us into different discourse groups or systems of discourse” (p. 3). In line with these conceptualizations and approaches to intercultural communication data analysis is conducted.

First, from the field of discourse and pragmatics, I highlight the concept of language as action (Austin, 1962), the notion of face⁴ and politeness strategies (Brown and Levinson, 1987), as well as the theory of impoliteness (Culpeper, 1996).

Second, Hofstede’s (1991) cultural dimensions also integrate this framework, together with his notion of ‘different levels of culture’.

Third, theories of cross-cultural communications added great insight into the exploration of aviation RT discourse, such as: i) face-negotiation theory (Ting-Toomey, 2005); ii) conversational constraints theory (Kim, 2005); iii) expectancy violation theory (Burgoon & Hubbard, 2005); iv) anxiety/uncertainty management theory (Gudykunst, 2005); and v) communication accommodation theory (Gallois, Ogay & Giles, 2005).

Finally, the fourth set of concepts is related to intercultural communicative competence (Byram, 1997; Deardorff, 2006; Lussier, 2007) and intercultural awareness (Baker, 2011, 2012, 2016). Their relevance to the present study is confirmed by Hazrati (2015), who emphasizes that “intercultural awareness and intercultural communicative competence also need to be enhanced in aviation frontline personnel including pilots and air traffic controllers” (p. 250), in order to prevent tragedies caused by a single misunderstanding.

2.2 Method.

2.2.1. Study design.

⁴ Face is defined by Brown and Levinson (1987) as “something that is emotionally invested, and that can be lost, maintained, or enhanced, and must be constantly attended to in interaction” (p. 63). It refers to the notions of “being embarrassed or humiliated, or ‘losing face’ ”(p. 63).

With the purpose of addressing this research problem, a two-phase, exploratory sequential mixed-methods design was chosen, with the priority placed on the initial qualitative phase. The qualitative information obtained during the exploration of the context under investigation built up to the quantitative data collection and analysis. The reason for collecting qualitative data initially is that there are few taxonomies of intercultural factors specific to the context of aviation radiotelephony communications.

By using multiple sources of evidence, it is also possible to combine the best of each type of data, qualitative and quantitative, thus increasing the validity of results. By giving voice to study participants to respond to my initial findings, through the examination of their perceptions of the phenomenon, my aim was to develop what Matusov (2007) called the “dialogic truth of the research” (p. 328).

2.2.2 Phase 1 – Qualitative.

2.2.2.1 Instruments.

The first phase of the study was a qualitative exploration of culturally influenced categories that arise from pilot-ATCO interactions which can pose a threat to aviation safety, such as differences in communication styles, power distance, reluctance to declare emergency, face saving, attitudes, politeness, non-compliance with rules, among others. Six audio recordings and transcripts of RT communication extracts were selected from publicly available aviation-related websites, such as www.youtube.com, where we can find extracts of recordings from www.liveatc.net with subtitles included, and www.planecrashinfo.com, where we can find transcripts from previous incidents and accidents. It was a purposive sampling, in the sense that I was looking for six scenarios in which culturally related factors, beyond language proficiency, could have an impact on the outcome of the communication. Thus, examples of RT communications involving interlocutors with varied language backgrounds were chosen

(based on the country of the airline companies and location of ATCO facilities), in an attempt to capture how cultural differences may impact distinct types of interactions. Excerpts of the six scenarios are provided in Appendix A, with a more precise reference for each. The names of the airline companies involved have been removed.

2.2.2.2 Analysis.

The analysis of qualitative data followed Saldaña's (2009) methods of coding. For the First Cycle Coding, I explored the data by breaking it down into pilot's and ATCO's *utterances*, my unit of analysis, which are limited by the change of speaking subjects and represent a link in the chain of speech communication, in relation to both previous utterances and to subsequent ones (Bakhtin, 1986). In order to answer my research questions, I needed to go deep into the participants' emotions, values, conflicts, and judgements, which highlighted the need to employ Values Coding. According to Saldaña (2009), this affective coding method is appropriate to "explore cultural values and intrapersonal and interpersonal participant experiences and actions in case studies" (p. 90). During the Second Cycle Coding, Pattern Coding was employed to organize my First Cycle codes into sub-categories and categories according to similarity. At this time, it was also necessary to draw on Maxwell and Miller's (2008) connecting strategies, by considering a more holistic dimension in the interpretation of data and approaching my data analysis as an iterative process. Looking for antecedents and consequences, I benefited from considering any unexpected relationships among the 14 sub-categories that had been identified and their contextual connections.

As discussed in Section 2.1, the analysis was informed by theories and concepts associated with discourse and pragmatics, national cultural dimensions, theories of cross-cultural communications and intercultural communication/awareness. Those theories and conceptualizations enabled me to assign "Values" codes, and to thematically organize them

into a provisional taxonomy of intercultural factors that may affect pilot-ATCO international communications. In order to increase the reliability and validity of my research findings, I asked two other coders (one was a NS of English and experienced qualitative researcher, while the other was a NNS of English, and qualitative researcher with an aviation background) to independently code excerpts of the selected pilot-ATCO interactions that I had already coded. Inter-coder reliability was calculated using the SPSS Software, version 23, and Cronbach's Alpha provided a reliability measure of .921.

The emerging sub-categories from the taxonomy informed the development of a quantitative survey that was administered to a larger sample of participants. This was the purpose of Phase 2, detailed in the next section.

2.2.3 Phase 2 – Quantitative.

2.2.3.1 Participants.

Participants in the quantitative phase were the key stakeholders in international radiotelephony communications, pilots and ATCOs, both NSs and NNSs of English, males and females, experienced in international operations. Fully completed questionnaires were received from 38 professionals: 23 pilots and 15 air traffic control officers, comprising 28 males and 10 females. In terms of language background, seven participants speak English as a first language while 31 do not. Their nationalities are represented in the following way: American (5), Argentinian (2), Australian (1), Brazilian (20), British (2), Cape Verdean (1), Croatian (1), French (1), Irish (1), Japanese, (1), Nigerian (1), Portuguese (1), and Spanish (1).

2.2.3.2 Instruments.

A questionnaire (Appendix B) was designed to investigate the constructs highlighted in the proposed taxonomy. This was accomplished by transforming the codes that originated

within each sub-category into questions, as a building strategy. Section I of the questionnaire contains nine items eliciting background/demographic information. In Section II, items 10-17 elicit responses regarding participants' perceptions of expected practices in international communications, which refer to more positive attitudes or behavior. In Section III, however, items 18-34 elicit responses on the participants' perceptions of not so desired attitudes and behaviors in radiotelephony communication, including their importance as a potential threat to safety. Table 1 shows how the questionnaire was structured, including two Likert Scale questions for each item and a qualitative component asking participants to comment on the same issue.

Table 1. Questionnaire structure

Example of questions for pilots – Section II							Research question
(1= Never; 6= Very frequently)							
11.1 How often do you encounter air traffic controllers who avoid getting involved in conflicts or arguments?	1	2	3	4	5	6	Q1
(1= Not important; 6= Very important)							
11.2 If you selected 2 or higher: In your view, how important is this?	1	2	3	4	5	6	Q2
11.3 Please comment.							
Example of questions for air traffic controllers – Section III							Research question
(1= Never; 6= Very frequently)							
28.1 How often do you encounter pilots who show impatience and/or sarcasm in their speech?	1	2	3	4	5	6	Q1
(1= Not important; 6= Very important)							
28.2 If you selected 2 or higher: How important, in your view, were these events as potential threats to safety?	1	2	3	4	5	6	Q2
28.3 Please comment.							

The Likert-scale items in Sections II and III of the questionnaire are operational definitions of each of the sub-categories, or constructs, identified in the qualitative phase. Thus, Table 2 was designed to portray the use of integration strategies, in the form of a joint display (Creswell and Plano Clark, 2011), by aligning the qualitative sub-categories with the questions in the quantitative instrument.

Table 2. Provisional taxonomy and alignment of sub-categories with online survey questions

THEME	CATEGORIES	SUB-CATEGORIES	OPERATIONAL DEFINITIONS IN THE QUESTIONNAIRE
Intercultural factors in international pilot-ATCO communications	Power Distance	Power relations	Q18, Q19
		Deferential role	Q20, Q21
	Face-work strategies	Self-face concern	Q22
		Mutual-face concern	Q12
	Conflict management	Conflictual direction	Q23, Q24
		Neutral direction	Q10, Q11
		Expectancy violations	Q25
	Communication styles	Directness	Q13
		Indirectness	Q26, Q27
	Non-collaborative behavior	Unprofessional tone	Q28, Q29
		Unprofessional attitude	Q30, Q31, Q32
		Non-compliance with rules	Q33, Q34
	Collaborative behavior	Professional attitude	Q14, Q15, Q16
		Supportiveness	Q17

By submitting their online survey responses, participants provided their informed consent. The study was considered minimal risk research and this phase began only after receiving approval from the Carleton University Research Ethics Board (Project number: 103859).

2.2.3.3 Analysis.

Quantitative data from participants' responses were inserted into the SPSS software, version 23, and analyzed using descriptive statistics and frequency distribution (Vogt, 2007; Larson-Hall, 2016). The purpose was to extract mean values and frequencies, as a strategy of data reduction, by reducing the quantitative findings into manageable chunks of information.

Analysis of data considered all responses together, but also compared perspectives from different groups of participants, i.e., pilots vs. ATCOs, NSs vs. NNSs of English, and male vs. female. The focus of the analysis was directed toward participants' perceptions on the

frequency of occurrence of the situations presented in the questions, as well as their opinions on the importance of those issues to the safety of RT.

For triangulation purposes, open-ended responses were thematically coded with the final goal of validating the questionnaire, validating the provisional taxonomy, and addressing the research questions. Following Saldaña (2009), Magnitude Coding was conducted by attributing: (0) when no comment was provided; (1) when the comment contradicted the sub-category; (2) when the comment was neutral; (3) when the comment validated the sub-category. In addition, Provisional Coding was used to identify if, within a comment, reference to other sub-categories from the draft taxonomy was present.

2.2.4 Results and discussions

The results from the analysis are presented and discussed in this section in relation to each research question.

2.2.4.1 Research question 1.

What intercultural factors arise from international pilot-ATCO communications that can affect the way they interact in the English language?

Evidence to answer this question was collected mainly from the qualitative phase of the study; however, findings from the quantitative phase and from the analysis of survey open-ended responses also substantiate my discussions.

First, the interpretation of the six scenarios suggests how the intercultural factors identified may affect pilots' and ATCOs' discourse in different ways. Worth noting is how safety may be compromised by a combination of culturally related factors, which can also be detected in interactions involving very proficient speakers of English. Table 3 summarizes the main factors associated with each scenario, which were organized into the 14 sub-categories and six broader categories, generating the taxonomy.

Table 3. Intercultural factors identified in the speech of pilots and ATCOs in each scenario

Scenario	Context	Pilot	ATCO
1	Male pilot who does not comply with female ATCO's orders and states readiness, when in fact he was not ready for departure, causes trouble for the ATCO and other aircraft in a busy airport.	concern with his own interests/non-compliance with ATCO's orders/competing conflict style/unprofessional tone	concern with efficiency/relations of power (resorts to own authority in an effort to solve the situation)
2	After four previous contacts requesting the ATCO to confirm information, the dialogue shows the way the ATCO reacted to a new request for clarification from the same pilot.	less-confident pilot/accommodating conflict style/confirmation seeking/face-work (restore face loss)	non-standard phraseology/condescending language/aggressive conflict style/impatient/sarcastic tone/judgmental attitude
3	This interaction between a NS air traffic controller and a NNS pilot is part of the transcript of a fatal accident. It had as one of the contributing factors the pilot's (First Officer) deferential and submissive communicative style, which may have prevented him from declaring an emergency.	deferential style/agreement to act despite operational limitations/failure to declare an emergency/issues of power distance and different attitudes towards authority in a busy and native-speaking environment inhibited the pilot from assertively stating his needs	professional, neutral tone/concern for efficiency/failure to question severity of problem/lack of critical information prevented the ATCO from acting according to the seriousness of the situation
4	A native-like ATCO asks many questions in sequence to the pilot, but does not accommodate to his communicative needs. Differences in expectations give rise to issues of impoliteness and power relations.	increased level of anxiety/face under attack/expectancy violations/reaction to disrespectful behavior	impatience and aggressiveness/non-standard phraseology/lack of accommodation and collaboration/conflicting style/impoliteness (blaming the other for lack of comprehension)
5	An ATCO with limited English proficiency had previously authorized the pilot to land via the Instrument Landing System (ILS) of runway 35, which had been out of service for years. This generated an operational limitation for the aircraft concerning fuel reserves, and a far from effective interaction between the pilot and ATCO.	dominant conflict style/assertiveness/concern for clarity and efficiency/power relations (resorts to higher authority after getting involved in an operational complication)	less powerful role due to language limitations/unclear, confusing information/fear of losing face/avoiding conflict style
6	Interaction between two proficient speakers shows how aviation professionals may react when their expectations are violated.	seeking support/concern for efficiency/expectancy violations/unprofessional tone/competing conflict style	unwilling to cooperate/unnecessarily conflictual/unprofessional tone/aggressive conflict style/no time to support, but time to reprimand

It is important to mention how the cultural dimension of power distance and inequality may affect the outcome of pilot-ATCO interactions. This may be due to distinct hierarchical posts (e.g., Scenario 3), differences regarding participants' professions (all Scenarios: pilot vs. ATCO), gender (e.g., Scenario 1), differing levels of language proficiency (e.g., Scenario 5), or to a combination of all these features, creating what Scollon and Scollon (2001) called sources of "power disparities in discourse" (p. 24). In some of the scenarios analyzed, it was possible to note the relation between the more powerful participant and the freedom to use impoliteness strategies (e.g., Scenario 2 and Scenario 4), and, at the other extreme, how a deferential and submissive style contributed to a fatal accident (e.g., Scenario 3).

In addition, violations to the expected flow of communication or to expected attitudes may increase the levels of anxiety and uncertainty of pilots and ATCOs. As a result, conflicts may arise, as noted in some of the analyzed transcripts (e.g., Scenario 4 and Scenario 6). However, the way participants managed conflict situations, the face-work strategies they used, and how they continued communicating after a face-threatening act, varied according to their own cultural background. This may be because pilots and ATCOs have their own set of expectancies, according to their national, professional and organizational cultures, but also according to their individual values and assumptions. In regards to the organizational level, the safety culture of each organization can also shape certain attitudes, beliefs and values. Tolerance for non-compliance with orders or rules and for the use of non-standard phraseology are some of the negative examples.

Considering the limited number of scenarios analyzed, combined with the fact that they were not randomly selected, one might say that these were just localized examples, or even extreme instances that do not reflect the reality of daily practices in aviation around the world. Therefore, this set of concepts or constructs still needed to be validated or recognized by the professionals directly involved in RT communications, both on the basis of the frequency of

their occurrences and also on their importance and potential threats to aviation safety. This was possible through the analysis of quantitative data from Phase 2. Responses to the questionnaire items ‘How often do you encounter pilots/ATCOs who...?’ corroborate to answer the first research question. Descriptive statistics of these responses, in terms of means (*M*) and standard deviations (*SD*), revealed the situations that were perceived as the most and least frequent in the participants’ opinion, as shown in Table 4. Nonetheless, a variation of $M = 1.89$ (Q32.1) to $M = 5.38$ (Q15.1) in a scale from 1 to 6, confirms that all situations do occur in RT communications, based on the sample analyzed.

Table 4. All respondents’ perceptions per section – Frequency of occurrence

All respondents	Least frequent	Most frequent
Section II – 10.1 to 17.1	Q 12.1 ($M=3.00$, $SD=1.41$)	Q 15.1 ($M=5.38$, $SD=0.79$)
Section III – 18.1 to 34.1	Q 32.1 ($M=1.89$, $SD=1.06$)	Q 33.1 ($M=3.60$, $SD=1.35$)

It was anticipated that responses from Section II questions (e.g., Q15.1 – compliance with orders/rules, and Q12.1 – be concerned with both parties’ images and group interests), would be rated higher as they presented expected practices in international communications, while Section III questions (e.g., Q32.1 – be unwilling to help) would probably be rated as less frequent because they included situations that may pose a threat to safety. Concern arises from the fact that Q33.1 (use of non-standard phraseology), was rated as the most frequent from Section 3. This means that many respondents from the analyzed sample are encountering pilots and ATCOs who are not complying with radiotelephony standard expressions, which may be a serious threat to safety, especially due to the increasing number of NNSs of English involved in RT communications around the world.

Apart from displaying results from all respondents ($N=38$), comparing different groups’ opinions on how frequently they encounter certain situations revealed a lot of similarities, but also some differences in perception of the impact of culture on RT communications. For example, pilots and ATCOs agreed on the most frequent situations from both Sections II and

III and the least common one from Section II, which are the same shown in Table 4, but had a different opinion on the least frequent situation from Section III. Interestingly, this pattern repeated for all three types of comparisons/contrasts that were conducted: pilots vs. ATCOs, NSs vs. NNSs of English, and males vs. females. Similar to pilots and NNSs of English, males considered Q32.1 (be unwilling to help) as the least frequent situation, whereas females, like ATCOs, ranked Q 24.1 (engage in upfront and aggressive conflicts) as the least frequent one. NSs of English, on the other hand, ranked Q27.1 (be reluctant to share critical information about a fact/state) as the least frequent situation in Section III. Comparison of perceptions across groups were also portrayed as graphic representations (for some examples, see slides 10, 11 and 12 of the Workshop Presentation, in Additional Files).

It was also possible to find evidence from the survey open-ended responses to support the validation of the sub-categories from the provisional taxonomy, and thus to answer the first research question. Figure 1 presents the number of valid comments for each sub-category organized according to the Magnitude Codes attributed, i.e., if the comment contradicted the sub-category, was neutral or validated it.

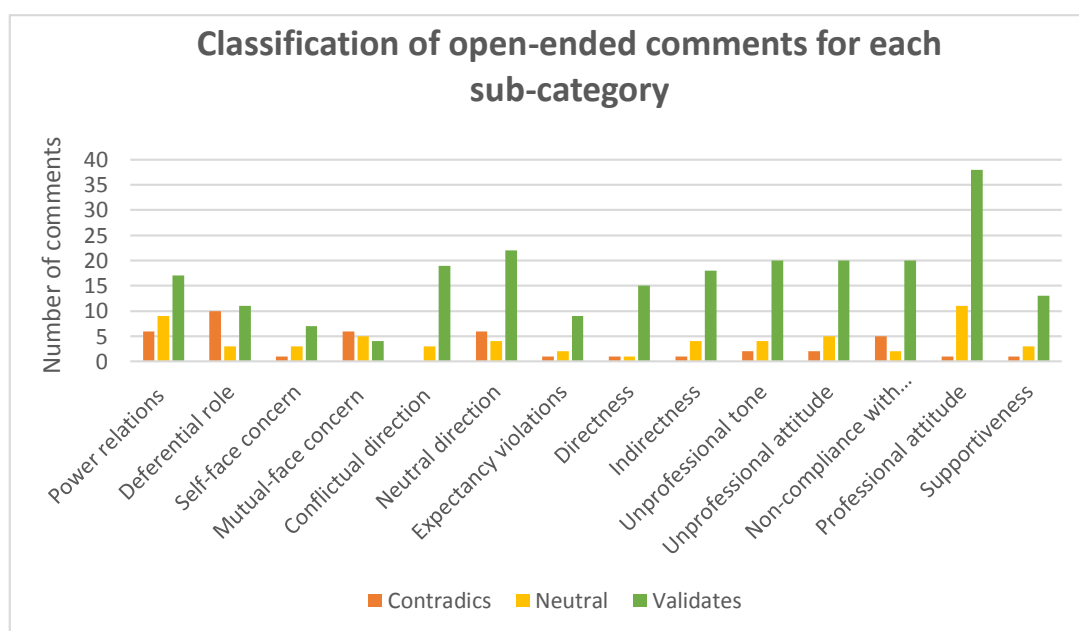


Figure 1. Summary of Magnitude Coding (Contradicts, Neutral, Validates) of survey open-ended responses

As can be seen, all sub-categories received more comments that validated the situations presented in the questions than contradicted them, except for the sub-category of mutual-face concern, operationalized in the questionnaire by Q12 (be concerned with both parties' images and group interests). However, in six comments from other questions, reference was made to the construct operationalized in Q12, which contributed to its validation.

Participants' use of expressions such as "very common in the USA", "it's easy to find", "it happens sometimes", "it still happens" in their comments, support the confirmation that the situations presented in the questions are real instances in international RT communications. Due to limitations of space, a detailed discussion of how participants' open-ended responses support the validation of the sub-categories will not be presented in this paper. However, as these comments were used in the workshop activities to trigger group discussions, a few of them have been selected and are presented *ipsis litteris* in Appendix C, as anonymous quotes. For the purpose of providing a better understanding of the participant's perspective portrayed in the quote, the group (pilot vs. ATCO), gender (male vs. female) and language background (English as L1 vs. English as L2) of the respondent is provided.

To conclude, regarding the analyzed sample, the intercultural factors arising from international pilot-ATCO communications that can affect the way they interact in the English language are the ones displayed in the provisional taxonomy (see Table 2), as validated by survey participants.

2.2.4.2 Research question 2.

To what extent do experienced pilots and ATCOs perceive the potential threats of intercultural factors to the safety of radiotelephony communications?

Evidence to answer this question comes mainly from the quantitative phase, but also from participants' open-ended comments. Responses to the questions 'How important is this?', in Section II, and 'How important were these events as potential threats to safety?', in Section

III, provide the answer to this research question. Descriptive statistics of the survey questions revealed the situations that were considered the most and least important in the participants' opinion, as shown in Table 5. Nonetheless, a variation of $M = 3.45$ (Q20.2) to $M = 5.97$ (Q14.2), in a scale from 1 to 6, indicates that all situations were considered important and related to the safety of RT communications, based on the sample analyzed.

Table 5. All respondents' perceptions per section – Importance to safety

All respondents	Least important	Most important
Section II – 10.2 to 17.2	Q 12.2 ($M = 4.48$, $SD = 1.29$)	Q 14.2 ($M = 5.97$, $SD = 0.16$)
Section III – 18.2 to 34.2	Q 20.2 ($M = 3.45$, $SD = 1.54$)	Q 26.2 ($M = 5.56$, $SD = 0.82$)

The situation that was considered the least important as a potential threat to safety was the one presented in Q20.2 (respond in a deferential/submissive style and use excessive politeness), from Section III. Surprisingly, although politeness per se may not be a risk to safety, its excess might compromise effective communication and, above all, a deferential style coming from issues of power relations, may inhibit a pilot or ATCO to interact assertively. At the other extreme, Q14.2 (be concerned with safety and potential complications), from Section II, was rated as the most critical to safety. No doubt, this should be the driving force of all involved in aeronautical communications and operations: to strive for safety and be aware of and prepared to deal with unexpected situations. Moreover, Q 26.2 (speak in a confusing and unclear way) was considered the most important from Section III. In ordinary conversations this style is not desirable, much less in safety-critical communications as aviation radiotelephony, in which being clear, concise and unambiguous is the norm. However, certain cultures are known to be more direct, objective and right to the point, whereas others not so much.

Pilots' perceptions of importance to safety were exactly the same as the ones presented in Table 5. ATCOs, NNSs of English and males, on the other hand, had a different opinion in relation to the most important situation from Section III. The three groups rated Q 34.2 (to

encounter pilots who do not comply with ATCO's orders/ATCOs who do not comply with rules), as the most critical one as a potential threat to safety. In Section II, apart from Q14.2 (be concerned with safety and potential complications), females rated as equally important responses to Q16.2 (speak in a professional tone) and to Q15.2 (to encounter pilots who comply with ATCOs' orders/ATCOs who comply with rules). In relation to the least important situation, males' and females' opinions diverged in Section III. Males rated Q20.2 (respond in a deferential/submissive style and use excessive politeness) as the least important situation, whereas females considered Q22.2 (be concerned with preserving their own images and interests) as the least critical to safety. Comparison of perceptions across groups were also portrayed as graphic representations (for some examples, see slides 14, 15 and 16 of the Workshop Presentation, in Additional Files).

Participants' open-ended responses also illustrate their perceptions of the importance of intercultural factors to the safety of pilot-ATCO communications using the English language, as potential triggers of incidents and accidents. Statements such as "in the name of safety", "crucial for a better understanding and for safety", and "very important for safety", corroborate to answer research question 2.

In sum, it is possible to say that pilots and ATCOs in this sample perceived, to a great extent, the potential threats of intercultural factors to the safety of radiotelephony communications. Although to different degrees, participants considered that all intercultural factors operationalized in the questions are important to safety.

A last figure (Fig. 2), comparing the means for frequency and importance per question, discloses the fact that the frequency of occurrence of intercultural factors that can affect pilot-ATCOs communications was generally lower than their perceived importance as a potential threat to safety. However, based on the frequency means it is possible to state that all situations do happen in international RT, from the survey respondents' perspectives.

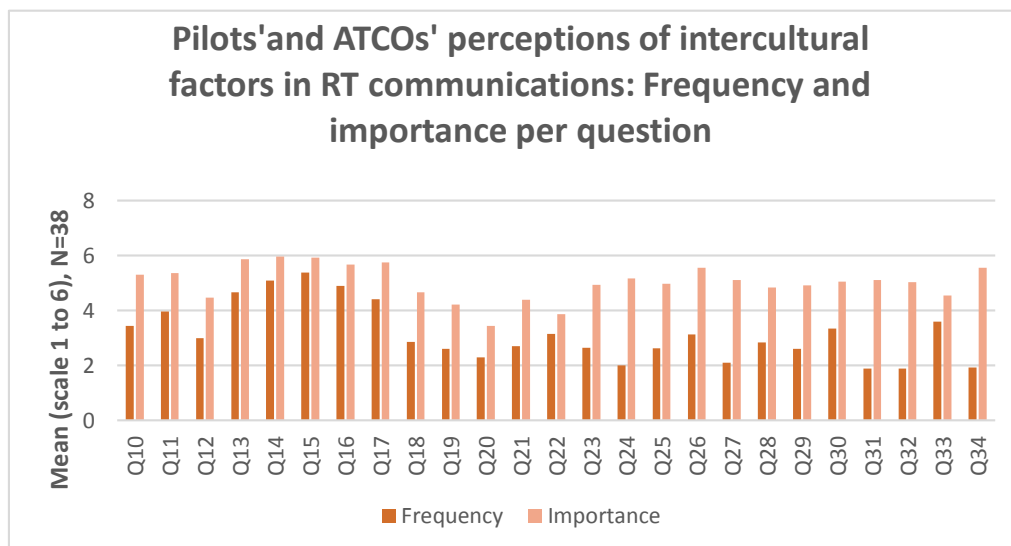


Figure 2. Comparison of means for frequency and importance per question

As a final comment, considering that most of the analyzed scenarios disclosed a combination of intercultural factors at play, which were validated by survey participants, interlocutors should be aware of their impact and develop skills on how to accommodate to differences and be effective intercultural communicators. Clearly, it is not just a matter of being proficient in the English language.

3. Workshop Activities

After presenting my research study on culturally influenced factors arising from international radiotelephony communications, workshop participants were invited to engage in group discussions based on research subjects' (i.e., pilots and ATCOs who responded to the online survey) open-ended comments, which expressed their perceptions of those factors and potential threat to aviation safety. My goal was to trigger insightful discussions among distinct groups of aviation stakeholders based on empirical data. Not only did I aim to raise awareness of communication problems that do occur in pilot-ATCO intercultural radio exchanges but also to provide an opportunity for consideration of possibilities to address those problems within the aviation community.

3.1 Participants.

Two sessions of my workshop (Workshop A) were conducted during the Conference, giving delegates the opportunity to attend Workshop B as well. Therefore, in the first session around 41 participants engaged in the proposed activities, whereas in the second this number increased to 47, including both native and non-native speakers of English from different regions of the world. Their professional background comprised pilots, ATCOs, AE teachers, AE examiners/test developers, researchers, regulators, Human Factors specialists, and Applied Linguistics specialists.

3.2 Materials.

Workshop participants were divided in groups and each group received: i) a set of 3-6 comments from pilots' and ATCOs' open-ended responses to the online survey; ii) a yellow handout, where participants wrote their responses, comments, suggestions, etc (Appendix D); iii) a blue handout, containing the online survey questions and their respective numbers (Appendix B); and iv) a white handout, providing relevant definitions, theoretical framework and a list of references that appeared during the workshop presentation (Appendix E).

3.3 Procedures.

In Part I, workshop participants were asked to read and discuss in groups the set of comments they received in order to:

- 1) Identify the main themes that emerged from the comments;
- 2) Organize the comments per theme;
- 3) Decide which dimension(s) – awareness, knowledge, skills and attitudes – best corresponded to each comment; and
- 4) Rate their importance/significance to aviation safety, on a scale from 1 (Not important) to 6 (Extremely important).

In Part II, based on the themes identified in Part I, workshop participants continued the discussion with group members and were asked to:

- 1) Repeat the main themes;
- 2) Brainstorm possible training activities to focus on these themes; and
- 3) Discuss strategies to address/remediate these issues (e.g., through testing, policy change, regulations, sanctions, etc).

The groups wrote their responses and comments in the yellow handouts, which were later compiled and analyzed by the researcher.

3.4 Contributions from workshop participants.

First, the themes or topics that emerged from discussions during the two workshop sessions were organized according to the taxonomy of intercultural factors presented during the workshop introduction. As some groups used the level of categories, others the level of sub-categories and some used the even more detailed level of codes while referring to the themes/topics identified, it was important to keep the hierarchy of the taxonomy while at the same time preserving participants' own expressions, but placing them in the associated category. By doing so, it was then possible to count the total number of occurrences for each category of the taxonomy. Table 6 presents these findings and reveals that the categories related to "Non-collaborative behavior", "Collaborative behavior", "Power distance" and "Conflict management" comprised the greater number of themes/topics identified by workshop participants. Two new themes/topics emerged from the discussions and appear in the last two lines of Table 6: expectations based on gender and lack of language proficiency. Although the first refers to one of the 'layers of culture' (Hofstede, 1991) or 'discourse systems' that we are members (Scollon & Scollon, 2001), the second is related to linguistic factors.

Table 6. Themes that emerged during group discussions and their importance to safety

Themes that emerged during group discussions	Number of Occurrences	Importance to safety (1-2-3-4-5-6)
Power distance	6	M=4.83, SD=0.82
Power relations/excessive authority/power	8	M=4.79, SD=0.81
Deferential role	3	M=6.00, SD=0.00
Sub-total:	17	
Face-work strategies	3	M=5.25, SD=0.35
Self-face concern	2	M=5.00, SD=0.00
Mutual-face concern	0	NR ^a
Sub-total:	5	
Conflict management	9	M=5.56, SD=0.49
Conflictual direction (arguments on the RT)	2	M=4.00, SD=0.00
Neutral direction (accommodation)	1	M=3.00, SD=0.00
Expectancy violations/communication expectations and reality	4	M=5.33, SD=0.58
Sub-total:	16	
Communication styles	7	M=4.64, SD=1.03
Directness (efficiency)	3	M=4.00, SD=0.00
Indirectness (linguistic behavior)	2	M=2.00, SD=0.00
Sub-total:	12	
Non-collaborative behavior	10	M=4.72, SD=0.75
Unprofessional tone (impatience/sarcasm)	2	M=4.00, SD=0.00
Unprofessional attitude (unwilling to help)	5	M=4.80, SD=0.45
Non-compliance with rules (lack of standard phraseology)	8	M=5.60, SD=0.89
Sub-total:	25	
Collaborative behavior	6	M=4.60, SD=1.08
Professional attitude (safety, seeking clarification, readbacks)	14	M=5.65, SD=0.41
Supportiveness	2	M=6.00, SD=0.00
Sub-total:	22	
Expectations based on gender	1	NR ^a
Lack of language proficiency	1	M=6.00, SD=0.00

^aNR= Not Rated

Second, the ratings related to the participants' opinions on the importance to safety of each comment (on a scale from 1 to 6) were also compiled according to the taxonomy organization. These data were inserted into the statistical software SPSS, version 23, and analyzed using descriptive statistics, in order to extract mean values (*M*) and standard deviations (*SD*) for each category and sub-category (see last column of Table 6). Thus, it was possible to distinguish the most critical themes/topics to the safety of intercultural air-ground

communications from the workshop participants' perspective, namely: deferential role and supportiveness ($M=6.00$, $SD=0.00$), professional attitude ($M=5.65$, $SD=0.41$) and non-compliance with rules ($M=5.60$, $SD=0.89$). Only two themes were rated as 3.00 or below in terms of importance to safety in a scale from 1 to 6: neutral direction, specifically the act of accommodating to restore neutral/non-conflictual communication ($M=3.00$, $SD=0.00$) and indirectness, the act of speaking in a confusing and unclear way, which was considered by workshop participants as a linguistic behavior ($M=2.00$, $SD=0.00$). Paradoxically, pilots and ATCOs from the research study considered speaking in a confusing and unclear way as the most important situation as a potential threat to safety from Section III questions.

Further, in relation to the dimensions (awareness, knowledge, skills and attitudes) that best corresponded to each comment, their frequencies were summed up separately, so as to give an idea of the total number of references to each of the four dimensions. It is important to note, however, that the groups attributed more than one dimension to the majority of the comments they analyzed. This confirms that most of the time it is difficult to isolate only one dimension (e.g., awareness) that needs to be addressed when dealing with an intercultural communication issue, but rather a combination of them. In addition, it supports the fact that models of intercultural communicative competence (e.g., Byram, 1997) and explanations of its dimensions (e.g., Fantini, 2000) address awareness and attitude along with knowledge and skills. Considering the two workshops together, the total number of references to each dimension was as follows: attitude (AT) = 57, awareness (AW) = 35, knowledge (K) = 17, and skills (S) = 16, with very similar results in the two separate sessions.

Finally, the training activities put forward by the workshop groups were also organized in Table 7 based on the categorization of intercultural factors. These suggestions represent brainstormed ideas, which may assist teachers in the development of classroom activities, according to the needs of their students. In the same way, the proposed strategies to address or

Table 7. Contributions from workshop participants – Training activities and strategies to address/remediate issues

Themes/topics	Brainstorming of possible training activities	Strategies to address/remediate issues (e.g. through testing, policy change, regulations, sanctions, etc)
1. Power distance	Workshops for both pilots and ATCOs to address communications and the promotion of safety culture Grouping of pilots and ATCOs to work together Problem-solving situations /Practice of real scenarios / Role-plays (change roles)	Team Resource Management (TRM) training
1.1 Power relations/excessive authority/power	Role-plays, switching roles Military experience transition training – awareness of military culture challenges Analysis of examples/scenarios Discussion of consequences Teaching of phrases to handle this situation Simple CRM training	
1.2 Deferential role	Role-play activities and debate of relevant topics Practice of word families to increase vocabulary	
2. Face-work	Recognition of positive face Simulation/role playing with further discussion	Team Resource Management (TRM) training
2.1 Self-face concern	CRM courses for pilots and ATCOs , showing examples of incidents and accidents Awareness raising activities Team work activities / Case study analysis	Policy change: testing and training Updating of procedures and manuals Study of conflict resolutions Sanctions? After investigations? Regulations update
3. Conflict management	Role-plays – reflection on personal responses to stress (neutral expressions?; ignore/respond with silence?) Simulator exercises on maintaining radio discipline Human Factors workshops – tolerance, respect, patience Workshops, scenario-based activities, role-plays Awareness raising / Recognition of markers of politeness Contrasting of examples across cultures/languages Video case studies Creation of inappropriate scenarios to identify problems	Conflict resolution course Pairing ATCOs and pilots Remediate with industry

3.1 Conflictual direction (arguments on the radio)	Cultural awareness Listening practice to identify issues/disagreements Listening activities to defuse and reduce tensions	
3.2 Expectancy violation/communication expectations and reality	Recognition and discussion of problems through listening of actual pilot-ATCO communication	
4. Communication styles	Reinforcement of procedures (drills?) Prioritization (decision-making task?) Awareness of intercultural communication language Role playing – teacher plays the ‘devil’ role	
4.1 Directness (efficiency)	Standard Operational Procedures (SOPs) – practice on how to stick to them and awareness of deviation problems	
4.2 Indirectness (linguistic behavior)	Development of scenarios of bad outcomes due to indecisiveness – discussion of solutions to improve the outcomes Rating exercise of the strength/clarity of expressions For NSs (monolingual) – workshops, so NS can put themselves in the shoes of NNS	
5. Non-collaborative behavior	Recognition and practice of language expressions related to being helpful ATCO + pilots workshops to share experiences Training of pilots and ATCOs with manuals, to reinforce procedures Analysis of samples with good and bad examples Discussion of possible reasons and explanation of this type of behavior	
5.1 Unprofessional attitude (unwilling to help)	Job familiarization between pilots and ATCOs to develop awareness of each other’s issues, pressures, procedures, etc. Role-plays	
5.2 Non-compliance with rules (lack of standard phraseology)	Use of standard ICAO language as course subject	
6. Collaborative behavior	ATCOs and pilots together: problem solving activities, acting each other’s role, brainstorming, using real life material and discussing in groups Role-play with different registers Distractors activity to the point that communication is not so frustrating when difficult situations arise Awareness raising to build pilots’ confidence Team work, group work, pair work / Problem-solving activities	Teaching of phraseology

6.1 Professional attitude (safety, seeking clarification, readbacks)	Role-plays – put the professional in the other’s shoes (ATCO experiencing the difficulties of the cockpit and vice-versa) Scenario-based practical exercises in simulators – to be more assertive Dealing with conflicts – practice with interlocutor being difficult on purpose Awareness raising – CRM and psychological exercises Activities for efficient language use (role-play) Situations relevant to job (role-play then proposal of solutions) Use of real RT as prompt – teams develop solutions, all teams discuss these solutions and compare to original video	Incorporate “assertiveness training” into training program Bring pilots to teach ATCOs and vice-versa Training of NSs of English Standard phraseology training Pairing roles Recommend policy changes Phraseology needs to be re-tested (worst issue – use of non-standard phraseology)
6.2 Supportiveness	Team-work activities Cross-cultural awareness raising Development of scenarios for a team/have the team change roles/resolve the safety issue Responsibility sharing/roles Roleplay and discussions – comparison of supportive vs. non-supportive attitudes Training on awareness of cultural differences Training on ability to work in a multicultural environment Development of strategies aiming at successful communications	Cultural differences testing Policy to oblige pilots and ATCOs to be trained to deal with these issues
7. Lack of language proficiency	Continuous training Development of negotiating skills	

remediate issues related to the identified topics/themes may inform the development or amendment of regulations, manuals, training and testing policies, among other related actions.

4. Conclusions

By answering the research study questions and by exploring how the cultural background of participants can impact intercultural pilot-ATCO communications, some intercultural factors that can cause misunderstandings and threaten the safety of air-ground communications were identified and key stakeholders' perceptions of those issues became known. Similarities but also some differences in perception across groups of participants were observed, as well as complex connections and relationships that exist among the recognized sub-categories. Most importantly, questionnaire responses suggested that the constructs identified for each sub-category of intercultural factors refer to situations that do happen in international RT communications, which were also considered relevant to safety by the pilots and ATCOs sampled in the research study. Added to that, survey open-ended comments corroborated quantitative findings for each question and substantiated other sub-categories.

Despite sample size (N=38), validation of the provisional taxonomy was possible using mixed methods research. As more evidence was yielded throughout the study, this exploratory sequential MM design increased confidence in the findings and added further insights into the complex phenomena of multicultural RT communications in aviation. However, although comments related to gender issues and a topic referring to 'expectations based on gender' were alluded to in the workshop activities, at this point there is not enough evidence to confirm it as a new category in the taxonomy.

As stated in the purpose of this paper in the Introduction, some implications may be derived from the study's findings and workshop activities. First, the use of the proposed taxonomy as a tool to raise awareness of the identified intercultural factors within the aviation

community may increase the effectiveness of pilot-ATC interactions. In addition, the development of pilots' and ATCOs' intercultural communicative competence, whatever their language background, may contribute to more efficient and safer radio communications. This can be achieved by taking into consideration the contributions of workshop participants related to the training of pilots and ATCOs, both NSs and NNSs of English, and also by integrating the strategies proposed to address the intercultural communication issues into policy making, in order to improve language for communication as a human factor.

Effective and efficient communication is not a matter of knowing the language, but knowing how to use the language appropriately taking into account its connection with one's own and others' cultures. Clearly, in the dynamic and intercultural workplace context of aviation RT communications, communicative success is impacted by several layers of culture and achieved through a combination of awareness, knowledge, skills and attitudes.

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Appendix A – Excerpts of the six scenarios analyzed⁵

Scenario 1 – Transcript (Available at https://www.youtube.com/wATCOh?v=uWg7lpPhPc8)		
5	ATCO	[] 845 proceed onto runway 28 now and vacate right onto runway 34, there is traffic behind you waiting to depart.
6	PILOT	Yep, we've just got a phone call standby...
7	PILOT	And [] 845, we are actually fully ready.
8	ATCO	[] 845, line up runway 28 and wait.
9	PILOT	Line up and wait 28, [] 845.
10	ATCO	And for future reference [] 845, err, I suggest you advise the, err, ground controller...that you are unable to take departure yet and you shouldn't really be taxiing out to E1 when you're not ready for departure...because there is traffic behind, waiting, that is ready.
11	PILOT	Standby.
12	ATCO	[] 845, are you fully ready for departure?
13	PILOT	Affirm [] 845, we're just doing the checks whilst err, whilst you keep talking over us, standby.
14	ATCO	Ok, negative! Turn right please onto runway 34. That's the third time I've asked you to vacate onto runway 34 if you are not ready, turn right onto runway 34.
15	PILOT	Madam, we are fully ready, we're just trying to complete the checklists, but err, you just keep interrupting our checks, standby.
16	ATCO	Negative! Turn right onto runway 34, I've asked you three times now! Turn right, to vacate onto runway 34.

Scenario 2 – Transcript (Available at https://www.youtube.com/watch?v=2t_NT7aUrE0)		
33	PILOT	And...[] 7997, uh...just want to confirm you the point before Hartford, could you give me the name again, please?
34	ATCO	[] you gonna kill me, what do you want now?
35	PILOT	Okay, ground, (...) checking (...) our routing just the point before Hartford and Partham, could you give me the point again?
36	ATCO	Now sir, you've been given a change of frequency, you'd be talking to the same guy all night long, see? You're going back for a million questions, but let's go over it: MERIT intersection, that's spelled: Mike Echo Romeo India Tango; direct Hartford, that is Hotel Foxtrot Delta; direct Partham, that is Papa Uniform Tango, and then as filed. Do you have any further questions about your route, your taxi route, the route you gotta fly, anything else?
37	PILOT	Not for now, sir, thanks.
38	ATCO	...now. I'm sure in 30 seconds you'll have another one, but continue to the runway.
39	PILOT	Okay.

⁵ These excerpts refer solely to the main parts of each interaction analyzed, which were the ones selected for inter-coder reliability.

Scenario 3 - Transcript (Available at <http://www.planecrashinfo.com/cvr900125.htm>)

14 PILOT Approach, [] zero five, ah, two heavy, we just missed a missed approach, and ah, we're maintaining two thousand and five on the...

15 APPR [] zero five two heavy, [], good evening, climb and maintain three thousand.

16 Captain *(Advise him we don't have fuel.)*

17 PILOT Climb and maintain three thousand, and ah, we're running out of fuel, sir.

18 APPR Okay, fly heading zero eight zero.

19 PILOT Flying heading zero eight zero, climb to three thousand.

20 Captain *(Did you already advise that we don't have fuel?)*

21 FO *(Yes sir, I already advise him, hundred and eighty on the heading. We are going to maintain three thousand feet, and he's going to get us back.)*

22 *(Some time later...)*

23 APPR [] zero five two heavy, turn left, heading zero seven zero.

24 PILOT Heading zero seven zero, [] zero five two heavy.

25 APPR And [] zero five two heavy, ah, I'm going to bring you about fifteen miles northeast, and then turn you back onto the approach, is that fine with you and your fuel?

26 PILOT: I guess so, thank you very much.

27 Captain *(What did he say?)*

28 FE *(The guy is angry.)*

29 *(Some time later...)*

30 PILOT Ah, can you give us a final now? [] zero five two heavy.

31 APPR [] zero five two, affirmative sir, turn left, heading zero four zero.

32 PILOT [] zero five two heavy, left turn two five zero, and ah, we're cleared for ILS.

33 APPR [] fifty two, climb and maintain three thousand.

34 PILOT Ah, negative sir. We just running out of fuel. We okay three thousand. Now okay.

35 APPR Okay, turn left, heading three one zero sir.

36 PILOT Three one zero, [] zero five two.

Scenario 4 - Transcript (Available at <https://www.youtube.com/wATCOh?v=ZW00KQIEe5s>)

1 ATCO [] 503, where you park?

2 PILOT Bravo 28, Sir.

3 ATCO Not taxiway, the LETTER!

4 PILOT Oh negative sir, we are on 22R holding short of Foxtrot.

5 ATCO What taxiway do you enter the ramp?

PILOT Okay, so we just exit the runway and we're holding short of Foxtrot on 22R.

6 ATCO You are not listening to what I'm asking you. What taxiway do you enter the ramp?

7 PILOT I'm not on the ramp yet, sir.

8 ATCO What taxiway do you enter the ramp. Tell me. What letter?

9 PILOT Okay we can enter at KILO for [] 503.

10 ATCO That's what I need get out of you. We talked like 6 times. Straight ahead and hold short of HOTEL, sir.

11 PILOT Straight ahead, hold short of HOTEL, roger.

(Some time later...)

12 ATCO [...] 503 follow [...] 222, hold short Juliette on the runway.

13 PILOT Yes, we'll follow the [...], and next time I would like you to be polite with me. Thank you.

14 ATCO Okay, but if I got to talk to you 6 times, and I got all other people I got to talk to, and you don't know what I'm saying.

15 PILOT (...)...nice day, polite with me. All right?

16 ATCO Are you impolite with me?

17 PILOT I'll make a report.

18 ATCO Go ahead!

Scenario 5 - Transcript (Available at <https://www.youtube.com/watch?v=P9WzQRxf3uM>)

1	PILOT	Could you please confirm we are cleared to ILS 35?
2	ATCO	Authorized ILS 35.
3	PILOT	[] 417, could you confirm the ILS is serviceable, we are not receiving it.
4	ATCO	ILS to 35....out of service, 417
5	PILOT	417,Roger. We are unable to continue this approach. I inquired about the ILS on runway 35 before. I want you to know that I asked you many times if the ILS 35 was operative and you said it was. Tell me, how can it not function anymore?
6	ATCO	([ATCO] does not respond) (Some time later...)
7	PILOT	I am declaring a low fuel.
8	ATCO	([ATCO] does not respond)
9	PILOT	[ATCO], [] 417, did you copy?
10	ATCO	Affirmative, Sir. Report established on localizer...
11	PILOT	OK, we are taking heading 310 and I would like to see the authorities on the ground.
12	ATCO	([ATCO] does not respond)
13	PILOT	Did you copy my request about seeing the people on the ground?
14	ATCO	([ATCO] does not respond)
15	PILOT	Still low fuel. So I want priority for landing.
16	ATCO	([ATCO] does not respond)
17	PILOT	Did you copy, [] 417?
18	ATCO	Affirmative, 417.
19	PILOT	I will be filling a report about this charade because it's quite amazing what happened.
20	ATCO	Can you repeat, please?
21	PILOT	I'll be filling a report against you, what happened is truly, truly amazing.

Scenario 6 - Transcript (Available at <https://www.youtube.com/watch?v=ZW00KQIEe5s>)

1	PILOT	And [], we are VFR under the clouds right now. And if you could give me a (inaudible).
2	ATCO	You're not familiar with this airspace?
3	PILOT	Yes sir, I'm very familiar with this airspace. But just coming through the clouds now it would be easier if you just give me my heading for a moment.
4	ATCO	What kind of NAV equipment do you have on board?
5	PILOT	Slant Uniform, VOR sir.
6	ATCO	[] fly heading 150. Vectors Mile Square Park.
7	PILOT	Okay, we are currently 150 sir. Thank you sir, just wanted a little help. Thank you.
8	ATCO	Well, let me give you some advice. We are really busy. We've got one controller working all the airspace and a lot of inbounds coming in, the last airliners coming into John Wayne. I probably don't always have time to hold your hand. Sorry to say that, but that's the truth.
9	PILOT	25 years I have been flying this airspace sir. I've never had a controller talk to me like that.
10	ATCO	Well, you are welcome to call me on the phone.
11	PILOT	Love to!

Appendix B – Questionnaire (Workshop blue handout)

ICAEA International Conference – ERAU, Daytona Beach – May 9-11, 2018

“Building on the ICAO LPRs – Communication as a Human Factor:

New Perspectives on Aviation English Training and Testing”

Workshop Title: Exploring intercultural factors in international pilot-air traffic controller communications: Validating a taxonomy using mixed methods research

Presenter: Ana Lúcia Tavares Monteiro

Organization: Carleton University (Canada) and ANAC (Brazil)

Online survey – Pilots’ and ATCOs’ perceptions of intercultural factors in international radiotelephony communications

Section 2:

I) How often do you encounter ...

Q10 ...pilots/ATCOs who, in a conflict situation, attempt to accommodate and restore neutral communication?

Q11 ...pilots/ATCOs who avoid getting involved in conflicts or arguments?

Q12 ...pilots/ATCOs who are concerned with both parties’ images and group interests?

Q13 ...pilots/ATCOs who are concerned with clarity and efficiency?

Q14 ...pilots/ATCOs who are concerned with safety and potential complications?

Q15 ...pilots who comply with ATCOs’ orders/ATCOs who comply with rules?

Q16 ...pilots/ATCOs who speak in a professional tone?

Q17...pilots who are aware of ATCO’s needs/ATCOs who are aware of pilots’ needs and willing to help?

II) In your view, how important is this?

III) Please comment.

Section 3:

I) How often do you encounter ...

Q18 ...pilots/ATCOs who demonstrate excessive authority or superiority in their speech?

Q19 ...pilots/ATCOs who resort to higher-level authority to solve a conflict?

Q20 ...pilots/ATCOs who respond in a deferential/submissive style and use excessive politeness?

Q21 ...pilots/ATCOs who avoid any kind of disagreement or demand in their speech?

Q22 ...pilots/ATCOs who are concerned with preserving their own images and interests?

Q23 ...pilots/ATCOs who dominate or compete during an argument?

Q24 ...pilots/ATCOs who engage in upfront and aggressive conflicts?

Q25 ...pilots/ATCOs who violate your expectations of a standard flow of communication?

Q26 ...pilots/ATCOs who speak in a confusing and unclear way?

Q27 ...pilots/ATCOs who are reluctant to share critical information about a fact/state?

Q28 ...pilots/ATCOs who show impatience and/or sarcasm in their speech?

Q29 ...pilots/ATCOs who show annoyance and/or arrogance in their speech?

Q30 ...pilots/ATCOs who do not accommodate to less proficient speakers’ needs?

Q31...pilots/ATCOs who seek disagreement and/or make the other feel uncomfortable?

Q32 ...pilots/ATCOs who are unprofessional and/or unwilling to help?

Q33 ...pilots/ATCOs who use non-standard phraseology?

Q34 ...pilots who do not comply with ATCO’s orders/ATCOs who do not comply with rules?

II) How important, in your view, were these events as potential threats to safety?

III) Please comment.

Q35. Please, share any additional comments regarding other communication issues that you feel pose a threat to safety.

Appendix C – A few open-ended comments from the online survey⁶ (Phase 2 of study)

Q21 – “Yes. Sometimes pilots contest our order specially because I'm a woman and this makes my frequency busy”. (ATCO 29, female, English as L2)

Q23 – “There is no room for such persons in aviation. Such behaviour can be very destabilising and threatening to a controller. The basis is generally cultural which thankfully is slowly changing (re CRM/TRM and inter-cultural behaviour programmes)”. (ATCO 4, male, English as L1)

Q24 – “Sometimes the controllers do not take into consideration the real outcome that there response might have”. (Pilot 10, male, English as L1)

Q26 – “Miscommunication might be a threat for aviation. One of such events almost led to a collision because a fellow air traffic controller failed to understand what the pilot really wanted”. (ATCO 5, male, English as L2)

Q26 – “Same comment as in previous question - very common in the USA. Once I've got, for instance the following question: "What can you give me". He was intending to know how fast could I fly. However, this is not the way they should address a pilot, moreover a foreigner”. (Pilot 10, male, English as L2)

Q27 – “It still happens specially when the issue is declaring emergency and that adds workload for the controller that works under the suspicion that he is not holding all the cards and that can really affect safety and efficiency”. (ATCO 13, female, English as L2)

Q28 – “By not showing respect one is not being professional. Impatience has been identified as one of the causes of fatal accidents”. (ATCO 7, male, English as L2)

Q29 – “Just not professional. The controller must accomodate a great deal of varied experience and pilots with different backgrounds”. (Pilot 25, female, English as L1)

Q30 – “Native speakers of English usually tend to take for granted foreing/non-native air traffic controllers. Some of the events I witnessed almost led to colissions”. (ATCO 5, male, English as L2)

Q30 – “It's easy to find this kind of behavior in regions OR countries where the mother language is English, the air controllers ONLY speak English and NEVER had the need to know how to speak another language, besides the English language (lack of empathy in communications with foreigners). For example, it happens sometimes with United States air controllers. Sometimes, it looks like that they don't care if they are being understood, and if the pilot ask "say again", they repeat the same words and they are not able to say the same information using another words (lack of the ability to paraphrase)”. (Pilot 8, male, English as L2)

Q32 – “Sometimes it happens. These pilots often think only about themselves and don't care about the possible problems that this attitude may cause. They want all the advantages to themselves. Controllers must be alert to this type of pilots so that they cannot interfere with his job and jeopardize safety”. (ATCO 3, male, English as L2)

Q33 – “Some times it happens, mainly between natives air controllers and pilots that use and accept the same slangs, but it's not good for foreign pilots using the same radio frequency, because may put in risk the safety of the flight”. (Pilot 8, male, English as L2)

Q33 – “It happens ALL time everywhere. Pilots are also guilty”. (Pilot 17, male, English as L2)

⁶ The comments have been copied *ipsis litteris* from the actual online texts produced by the participants, and have not been corrected for any typos or grammatical/lexical mistakes.

Appendix D – Workshop yellow handout

ICAEA International Conference – ERAU, Daytona Beach – May 9-11, 2018
“Building on the ICAO LPRs – Communication as a Human Factor:
New Perspectives on Aviation English Training and Testing”

Workshop Title: Exploring intercultural factors in international pilot-air traffic controller communications: Validating a taxonomy using mixed methods research

Presenter: Ana Lúcia Tavares Monteiro

Organization: Carleton University (Canada) and ANAC (Brazil)

a) Please write the number of participants in your group according to their roles. If anyone has overlapping roles, include him/her in the option that best represents his/her main activity:

() pilots () ATCOs () aviation English teachers () aviation English examiners/test developers
 () researchers () regulators () Human Factors specialists () other: _____

b) Please write the number of participants in your group according to their language background:

() English as L1 () English as L2/foreign language

c) Do you consent to use your notes anonymously for research purposes? () Yes () No

Part I: Your group will receive 3-6 selected comments from pilots’ and ATCOs’ open-ended responses to the online survey. Discuss them with group members and:

- 1) Identify the main themes that emerge from the comments;
- 2) Organize the comments per theme;
- 3) Decide which dimension(s) – awareness, knowledge, skills and attitudes – best correspond(s) to each comment;
- 4) Rate their importance/significance to aviation safety, on a scale from 1 (Not important) to 6 (Extremely important).

Themes	Comments per theme	Awareness (AW), knowledge (K), skills (S), attitudes (AT)	Importance to safety 1 – 2 – 3 – 4 – 5 – 6
e.g., Power distance	e.g., Comment # 2	e.g., K	e.g., 5
	# 7	AW + AT	6
1)			
2)			
3)			

Part II: Based on the themes identified in Part I, continue the discussion with group members and:

- 1) Repeat the main themes
- 2) Brainstorm possible training activities to focus on these themes
- 3) Discuss strategies to address/remediate these issues (e.g., through testing, policy change, regulations, sanctions, etc).

Themes	Training activities	Strategies to address/remediate issues
1)		
2)		
3)		

Thank you for your participation!!
 If you have any further comment, do not hesitate to contact me at
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Appendix E – Workshop white handout

ICAEA International Conference – ERAU, Daytona Beach – May 9-11, 2018

**“Building on the ICAO LPRs – Communication as a Human Factor:
New Perspectives on Aviation English Training and Testing”**

Workshop Title: Exploring intercultural factors in international pilot-air traffic controller communications: Validating a taxonomy using mixed methods research

Presenter: Ana Lúcia Tavares Monteiro

Organization: Carleton University (Canada) and ANAC (Brazil)

Theoretical framework:

➤ **Discourse and Pragmatics:**

Speech Acts Theory (Austin, 1962)

Facework and politeness strategies (Brown & Levinson, 1987)

Impoliteness theories (Culpeper, 1996)

➤ **National cultural dimensions (Hofstede, 1991)**

Individualism-collectivism, power distance, masculinity-femininity, uncertainty avoidance

➤ **Theories of cross-cultural communications:**

Face-negotiation theory (Ting-Toomey, 2005)

Conversational constraints theory (Kim, 2005)

Communication accommodation theory (Gallois, Ogay & Giles, 2005)

Expectancy violations theory (Burgoon & Hubbard, 2005)

Anxiety/uncertainty management theory (Gudykunst, 2005)

➤ **Intercultural communication:**

Intercultural communicative competence (Byram, 1997; Lussier, 2007)

English as a lingua franca (Jenkins, 2000; Seildhofer, 2001)

Intercultural communication: A discourse approach (Scollon & Scollon, 2001)

Interculturality (Kecskes, 2014)

Intercultural awareness (Baker, 2011, 2016)

Definitions:

Intercultural communicative competence (ICC) – “someone with Intercultural *Communicative* Competence is able to interact with people from another country or culture in a foreign language. They are able to negotiate a mode of communication and interaction which is satisfactory to themselves and the other and they are able to act as mediator between people of different cultural origins” (Byram, 1997, p. 71).

English as a Lingua Franca (ELF) – “an additionally acquired language system which serves as a common means of communication for speakers of different first languages” (Jenkins, Cogo & Dewey, 2011, p. 283).

Intercultural communication: A discourse approach – “Each of us is simultaneously a member of many different discourse systems. We are members of a particular corporate group, a particular professional or occupational group, a generation, a gender, a region, and an ethnicity. As a result, virtually all professional communication is communication across some lines which divide us into different discourse groups or systems of discourse” (Scollon & Scollon, 2001, p. 3).

Interculturality - “a phenomenon that is not only interactionally and socially constructed in the course of communication but also relies on relatively definable cultural models and norms that represent the speech communities to which the interlocutors belong” (Kesckes, 2014, p. 14).

Culture is “neither relatively static nor ever-changing, but both” (Kesckes, 2014, p. 4). He argues that culture has a priori elements (ethnic or cultural marking in communicative behavior) and emergent features (co-constructed in the moment of interaction), which should be combined to approach culture in a dialectical and dynamic way (p. 5).

Intercultural awareness (ICA) – “a conscious understanding of the role culturally based forms, practices and frames of reference can have in intercultural communication, and an ability to put these conceptions into practice in a flexible and context specific manner in real time communications” (Baker, 2011, p. 202).

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