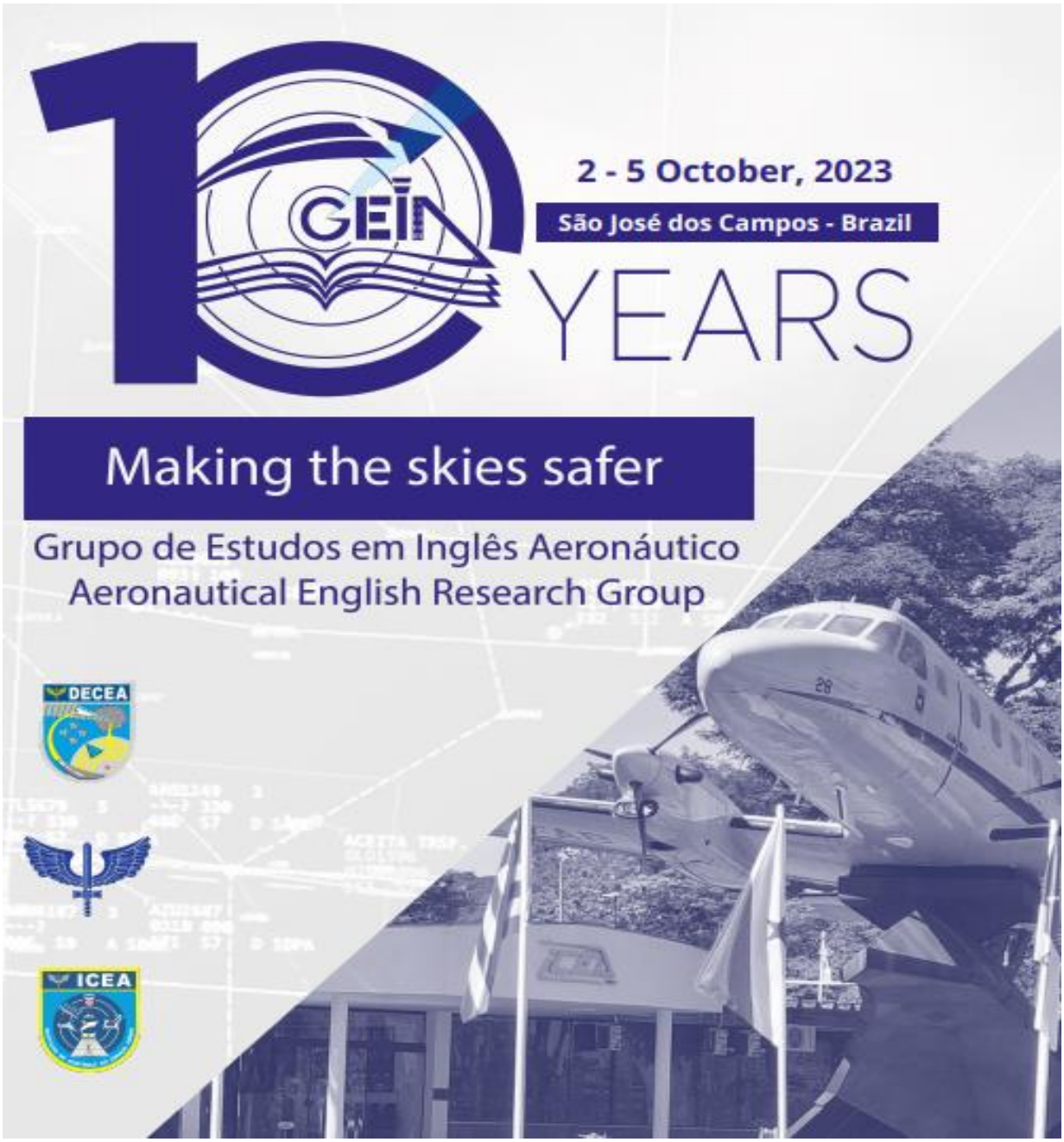
THE PROCEEDINGS OF THE GEIA SEMINAR (2023)



Hosted by the Airspace Control Institute (ICEA) - Brazil

Vol. 1 (2023)

THE PROCEEDINGS OF THE GEIA SEMINAR

10th GEIA Seminar, 2023

ACRONYMS AND ABREVIATIONS:

AE: Aeronautical English

AFA: Brazilian Air Force Academy

ATCO: Air Traffic Controller

DECEA: Brazilian Department of Airspace Control

EEAR: School of Aeronautics Specialists

EPLIS: Exame de Proficiência em Inglês Aeronáutico do SISCEAB

ESP: English for Specific Purposes

GEIA: Grupo de Estudos em Inglês Aeronáutico / Aeronautical English Research Group

ICAO: International Civil Aviation Organization

ICEA: Airspace Control Institute

LHUFT: Language as a Human Factor

LPRs: Language Proficiency Requirements

The Proceedings of the GEIA Seminar
10th GEIA Seminar, 2023
Vol. 1 (2023)

ISSN 3086-0962

DOI 10.5281/zenodo.17533519

https://doi.org/10.5281/zenodo.17533519

Authorized photocopying
This publication may be reproduced, stored or transmitted, with the prior consent of the leader and vice-leader of GEIA (geia.icea@fab.mil.br)
For further information, go to GEIA website:
https://geia.icea.decea.mil.br/geia/eventos.php

Promoted by:

DECEA

Director-General Lieutenant-Brigadier Alcides Teixeira **Barbacovi**

Subdepartment of Administration Chief Brigadier Eng André Eduardo **Jansen**

Professional Training Division Chief Lt. Col. Av. Cristiano de **Uzêda** Pinto

Aeronautical English Coordinator Prof. MSc. **Natália** de Andrade

ICEA

Director Colonel Aviator Plínio da Silva **Becker**

Teaching Division Chief Lt. Col. Met. Marcelo **George** dos Santos

Aeronautical English Section Chief Prof MSc. **Beatriz** Faria Aragão

Public Relations Chief Lieutenant **Raquel** Gonçalves A. S. Fernandes

Sergeant **Bruno** Thiago **Jardim** dos Santos

GEIA Organizing Committee

Prof **Patrícia** Tosqui Lucks

Prof **Juliana** de Castro Santana

Prof **Marcia** Ferreira de Souza

Prof **Patrícia** Palhares **Tupinambá** de Sá

Prof **Paula** Ribeiro e Souza

Lieutenant **Juliana** de Freitas Almeida Cunha

Sergeant **Aryanne** Junqueira de Moraes

Rafael Marinho de Albuquerque

Web developer: **Letícia** Cordeiro da Silva

Video editor: **André** Luis Faria de Moura

GEIA Scientific Committee

Patrícia **Tosqui Lucks** (ICEA)

Patrícia Palhares **Tupinambá** Fernandes de Sá (ICEA)

Paula **Ribeiro e Souza** (ICEA)

Juliana de Castro **Santana** (SDTP - ICEA)

Edition by ICEA – Airspace Control Institute

Praça Marechal-do-Ar Eduardo Gomes, 50 – Campus do DCTA
São José dos Campos, SP, Brazil.
Zip Code: 12228-615

THE PROCEEDINGS OF THE 10TH GEIA SEMINAR

Patrícia Tosqui Lucks (ed.)
Juliana de Castro Santana (ed.)

TABLE OF CONTENTS:

Preface **8**

SUMMARIES:

Using Team-Based Learning (TBL) to promote students' interaction in Aviation English classes
DANIELA TERENZI **10**

An overview of the English language performance of ab initio military air traffic controllers: a learner-corpora-driven study
ELIDA MARIA RODRIGUES BONIFÁCIO **14**

SQUAWK 9835: Role play in aviation language training and assessment
HENRY EMERY **22**

Making Use of Both Operational and Linguistic Knowledge and Skills
JENA LYNCH & JENNIFER ROBERTS **28**

Welcome on board…games and RPG for Aeronautical English Proficiency
KARIN QUAST; CARLOS ALBERTO BABBONI & PAULA TESSARE PICCOLO **34**

CASE STUDIES:

Case Study: Language Proficiency as a Human Factor in Flight Crew Training
DON TOUPS **43**

Handling error correction in cross-language transfer utterances
JULIANA DE CASTRO SANTANA **52**

Ten years of GEIA – a lot to celebrate!
PATRÍCIA TOSQUI LUCKS **64**

FULL PAPERS:

Reflections on raising communication awareness in pilot language training: Bridging gaps based on real-life occurrences from a LHUFT perspective
ALINE PACHECO……..……..……...…**74**

Writing multiple-choice items for aeronautical English tests: Principles and practices
ANA LÍGIA BARBOSA DE CARVALHO E SILVA; ANGELA CAROLINA DE MORAES GARCIA & DOUGLAS ALTAMIRO CONSOLO.....**100**

Exploring an Aviation English Corpus to Equip Professionals with Pedagogic and Lexicographic Skills
MALILA PRADO **126**

Building an Intepretation and Use Argument for EPLIS: a validity study
NATALIA DE ANDRADE **144**

Preface

In 2023, to celebrate GEIA[1] 10th anniversary we had a commemorative event held entirely in person at the Airspace Control Institute (ICEA), São José dos Campos, SP, Brazil. For four days, most GEIA members and practitioners, as well as DECEA and ICEA authorities, and foreign guests were brought together to enjoy cheerful moments and share key issues in the aviation field. There was a special program that included 2 keynote speakers, 7 workshops, and 4 sessions with oral presentations on different themes: Aeronautical English Testing, Language as a Human Factor, Aeronautical English Teaching Reports, Teacher Training and Teacher Development. The event website is ICEA (decea.mil.br).

On the occasion of the 2023 GEIA Seminar, two important publications were launched: 2 volumes of the Polish Journal "Applied Linguistics Papers", in partnership with the Aviation Communication Research Centre and the Faculty of Applied Linguistics of the University of Warsaw; and the Commemorative Bilingual (English – Portuguese) Issue of GEIA 10th anniversary, which captured important moments, memories, publications, and research that have been nourished and developed by the group over the years.

The 10th GEIA Seminar was characterized by high level presentations and discussions that led to different findings and guidelines for improving the Aeronautical English training, analysis, and assessment.

As a follow-up to the event, some of the workshops, lectures, talks and sessions presented during the in-person Seminar were gathered in this publication. The idea is to make it available for those interested in getting to know more about the relevant work and research carried out by GEIA members and participants. There are 5 summaries, 3 case studies and 4 full papers that present different themes and findings related to the authentic use of the Aeronautical English in air communications. We appreciate the contribution of the authors who have enriched this publication with engaging and useful content.

Our special thanks go to Embry-Riddle Aeronautical University Worldwide for making this online publication possible and for helping us spread GEIA contributions around the globe.

Enjoy your reading!

[1] Aeronautical English Research Group.

SUMMARIES

Using Team-Based Learning (TBL) to promote students' interaction in Aviation English classes

DANIELA TERENZI[2]
Instituto Federal de Educação, Ciência e Tecnologia de São Paulo (IFSP)
daniela.terenzi@ifsp.edu.br

Sometimes students are kind of lazy or even shy to talk to each other when they are asked to work in (small) groups. Team-Based Learning (TBL) is a method developed by Larry Michaelsen [at the Oklahoma University – USA – in a class of Administration], in the 1970s, for teaching Business students (Michaelsen et al. 2008) with the aim of decentralizing the teaching-learning process from the teacher, allowing students to become co-responsible for the conduction of their own academic education (Pinho, et al., 2018).

TBL methodology can be organized in a three-step cycle: (1) preparation, (2) in-class readiness assurance testing, and (3) in-class application focused exercise. During the preparation cycle, students must complete preparatory materials before the class. Such materials may be text, visual or others, at an appropriate level for the students' needs and for the purpose of the course.

The in-class readiness assurance testing (2) is supposed to be done in four phases identified as 2A, 2B, 2C and 2D. The first phase (2A) is the Individual Readiness Assurance Test (I-RAT), consisting of 5 to 20 multiple choice questions which must be answered before the Team Readiness Assurance Test (T-RAT). For I-RAT, students may use an Answer Sheet that allows them to 'bet' on the correct answer or on more than one answer if they are unsure. In face of a question that is worth 4 points and offers 4 possible answers, for example, if the learners are

[2] Daniela Terenzi holds a Ph.D. in Linguistics from UFSCar focused on ESP and finished her post-doctoral research in 2021 on Data-Driven Learning (DDL) at USP. She is the leader of a Research Group and has been teaching at IFSP for over 10 years, with experience in Teaching Techniques and ESP.

unsure of which answer to choose, they can bet two points on different options: option a and option c (Bollela, et al., 2014). After that, during the T-RAT (2B), as teams, students use scratch cards (Immediate Feedback Assessment Technique = IF-AT cards), hoping to find a star that indicates the correct answer. This kind of "Scratch-and-win"- style answer sheets was invented by Mike Epstein (Ryder University) and for each question there is a row of boxes as a lottery ticket. A small star, exposed by scratching one of the boxes, indicates the correct answer. Aiming to get to the right answer, students are forced into conversation as they try to generate shared understanding and consensus before choosing which box to scratch. This answer sheet gives students immediate and corrective feedback.

As a team, each student is supposed to have different assigned roles: Reader → reads the questions to other group members; Moderator → keeps discussions on track; Tabulator → keeps track of the group's score on IF-AT form; and Reporter → reports results for teacher and other teams.

All members of each team share the same T-RAT score, and both I-RAT and T-RAT scores are added to the students' final grades.

The following phase (2C) is called "appeals" and that is the moment teams have the opportunity to write an appeal of a MCQ (multiple choice question) whose answer they feel had been poorly written, mistakenly coded, or mistakenly chosen. And, finally, "Instructor Feedback" is the last phase of the task when the instructor may review topics from the RAT that students still feel are problematic.

At the last step of the cycle, the in-class application focused exercise (3), teams are given a problem or challenge for which they are supposed to reach a consensus in order to choose the

"best" solution. Then, the teams display their answer choices, and the educator facilitates a classroom discussion, so that students are able to learn how to apply and extend the knowledge they have just acquired or discussed.

Michaelsen and Richards (2005) point out four principles underlying Team-Based Learning: groups should be properly formed by the teacher; students are accountable for their pre-learning and for working in teams; team assignments must promote both learning and team development; and students must receive frequent and immediate feedback.

Conclusion

TBL has potential to promote students' interaction in Aviation English classes because students are supposed to engage themselves in discussions and interactions to find out the right answers. Although all 3 steps are important (Roossien, et al., 2022), adaptations may be possible and promote good results when using TBL for grammar activities (fill in the blanks; Cloze), listening practices and reading comprehension.

Considering a "Scratch-and-win"-style answer sheet may be difficult to purchase or build, there is an online platform based on TBL steps: https://tblactive.com.br/ as an alternative to paper-based activity.

References

Bollela, V. R., Senger, M. H., Tourinho, F. S. V., & Amaral, E. (2014). Aprendizagem baseada em equipes: Da teoria à prática. *Revista Medicina* (Ribeirão Preto), 47(3), 293–300.

Michaelsen, L., & Richards, B. (2005). Drawing conclusions from the team-learning literature in health-sciences education: a commentary. *Teaching and Learning in Medicine*, 17(1), 85–88.

Pinho, G. C., Miranda, E. P., Tavares, M. de A. B., Alves, D. V. A., Morais, R. X. B. de., Sobreira, T. M., & Almeida, S. M. V. de. (2018). Peer-Assisted and Team-Based Learning: A new hybrid strategy for Medical Education. *Revista Brasileira De Educação Médica*, 42(3), 162–170.

Roossien, L.; Boerboom, T. B. B.; Spaai, G. W. G. & Vos, R. (2022). Team-based learning (TBL): Each phase matters! An empirical study to explore the importance of each phase of TBL. *Medical Teacher*, 44 (10), 1125-1132.

An overview of the English language performance of ab initio military air traffic controllers: a learner-corpora-driven study

ELIDA MARIA RODRIGUES BONIFÁCIO[3]
School of Aeronautics Specialists – EEAR, Guaratinguetá, Brazil
University of São Paulo – USP, São Paulo, Brazil
elidaemrb1@fab.mil.br
elida.bonifacio@usp.br

Abstract

English language communication in real air traffic control contexts has been discussed in several studies. Nonetheless, little research has been conducted in oral production of *ab initio* air traffic controllers. Thus, this study aims to collect and compile a spoken learner corpus, to present an overview of the *ab initio* air traffic controllers' English performance in the *corpus*, and to identify how the linguistic categories are presented – pronunciation, vocabulary, structure, comprehension, interaction, and fluency. In Brazil, the proficiency exam taken by air traffic controllers is called EPLIS and the exam structure was considered for carrying out the interviews and collecting the data. This is a study driven by *corpus* and the linguistic material collected is a spoken learner *corpus* of aeronautical English produced by *ab initio* air traffic controllers and therefore it's a specialized *corpus*. The data were collected at the School of Aeronautics Specialists: the only institution that provides initial professional training for military air traffic controllers in Brazil. The *corpus* was divided into four *sub corpora*: a) First semester – non-proficient students; b) First semester – proficient students; c) Fourth semester – non-proficient students; and d) Fourth semester – proficient students. The interactions recorded were part of the students' oral evaluation; they were transcribed and revised in the first semester of 2023. Some language errors were identified, and they will be useful for producing teaching materials that fulfill the students' linguistic needs.

Introduction

This summary, which was presented at the 10th GEIA Seminar, in 2023, is part of my doctoral research that is being pursued at the University of São Paulo. I am an aeronautical English teacher at the School of Aeronautics Specialists, henceforth EEAR, the only school in Brazil where military air traffic controllers (ATCO) attend the initial professional training, which lasts 4 semesters.

The primary objective of this research is to examine how the English language education at EEAR contributes to the students' approval in the Aeronautical English Proficiency Exam for Brazilian air traffic controllers (EPLIS). The other objectives are to collect and compile a spoken learner *corpus* of proficient and non-proficient learners attending the first and the last semesters

[3] Elida Maria Rodrigues Bonifácio is a PhD candidate in Linguistic and Literary Studies in English at the University of São Paulo – (USP). She is an English teacher at the School of Aeronautics Specialists in Brazil, where she teaches aeronautical English to ab initio military air traffic controllers.

of the course. Based on some linguistic features that emerged from the *corpus*, other objectives were to identify the ICAO language categories (ICAO, 2010) in the learners' production, and to analyze the most frequent language errors in each linguistic category – pronunciation, vocabulary, structure, comprehension, fluency and interaction.

Corpus Collection and Compilation

This research started with the analysis of the percentage of the students who have been approved in the EPLIS test right after the air traffic control (ATC) basic training, which includes English language training. The EPLIS results from 2015 to 2023 show that around 28% of the *ab initio* air traffic controllers were approved with ICAO level 4 or up (levels 5 and 6).

Based on this percentage, I sent a questionnaire to 198 air traffic controllers (ATCO) who graduated from EEAR in 2020, 2021, and 2022. Those ATCOs had been approved with at least level 4. The questionnaire was answered by 60 professionals; it contained the following questions: 'Do you think that the English classes at EEAR helped you in your EPLIS performance? If so, how was that? If not, why do you think it did not?' Out of 60 responses, 58 survey respondents answered that the classes helped them reach successful results; however, 2 students answered that their training at EEAR didn't help them.

Analyzing all the answers with LancsBox 6.0 (Brezina *et al*., 2021), a computational tool used to host and analyze large amounts of linguistic production; I generated a wordlist and detected that one of the most frequent words mentioned was 'vocabulary' – 22 occurrences. Considering this finding, I decided to verify if the other language categories had also been mentioned in the students' answers: 'pronunciation' and 'fluency' had appeared 3 times; 'interaction' and 'grammar' (structure), twice; and comprehension, once.

In order to verify how the categories were presented in students' oral production, I needed to collect a relatively large amount of language. This corpus will allow us to identify the language errors related to each ICAO language category and use them to develop teaching materials that are relevant to Brazilian speakers in the aeronautical context.

Thus, I decided to record the oral test taken by students attending the first and the last semesters of the course. I had the authorization of 88 out of 95 first-semester students, and 93 out of 127 last-semester students, making the *corpus* collected representative, according to Berber-Sardinha (2000) and Sinclair (1991).

This is the only spoken learner *corpus* of Brazilian *ab initio* military air traffic controllers. The corpus is composed of 315 audios transcribed and revised according to specific criteria. The estimated number of words of the whole corpus is around 300,000 words.

For the purpose of this study, I chose four *subcorpora*, totaling around 12 hours, 58 recordings, around 96,000 tokens, and 6,000 types:

a) *Subcorpus* 1: first-semester students – more proficient (2h49min; 14 recordings; 41,630 tokens; 1,650 types).
b) *Subcorpus* 2: first-semester students – less proficient (3h53min; 17 recordings; 20,462 tokens; 1,764 types).
c) *Subcorpus* 3: last-semester students – more proficient (2h52min; 14 recordings; 21,770 tokens; 1,595 types).
d) *Subcorpus* 4: last-semester students – less proficient (2h28min; 13 recordings; 13,360 tokens; 1,226 types).

Before the course starts, the students take a speaking placement test so that they can be divided into groups according to their levels of proficiency.

The recordings were transcribed with the software Transkriptor (2021), which provides an accuracy of 99% of the oral production, according to its developers. Next, they were revised and annotated with prosodic markings, language errors and phonetic transcriptions (Edwards, 1993; Cresti, 2000; Creer; Thompson, 2013; Caines *et al.*, 2017; Jurafsky; Martin, 2023) (see *Figure 1*). This last element was necessary to register pronunciation errors. As the use of the International Phonetic Alphabet (IPA) would be difficult to be identified by LancsBox (2021), the transcription of the mispronounced words was done with the use of the ARPABET (Advanced Research Projects Agency Alphabet). This alphabet was developed so that the computer tools could read the phonetic transcriptions (Luettin, 1997).

Markings	**De-codification**
/	Pauses after rising intonation turns
//	Pauses after falling intonation turns
<pause>	Pauses from 2 to 5 seconds
<long pause>	Pauses of more than 5 seconds
<sic>	Representation of grammatical errors (global or local)
<gap>	Interviewee's personal information removed
<word coinage>	Words created by the interviewee (*adaptated*, for example)
<code switching>	Portuguese word or expression
<uh>	Typical hesitations in English
<eh>	Typical hesitations in Portuguese
<aham> <hmm>	Backchannel
<laughter> <cough>	Non-linguistic sounds
[[	Overlapped turns
<unclear>	Nonunderstanding of what was said at the moment of the transcription and the revision
<trunc>	Truncated turns (initiated, but not continued)
AEENDIH <pr> (and)	Pronunciation errors transcribed with the ARPABET

Figure 1. Markings and their de-codification

Conclusion

The results concern the six language categories and the frequency of some elements as described below:

a) Vocabulary: the frequency of content words related to the aeronautical context (minimum 20 occurrences), as well as the strategies used by the students in the attempt to solve vocabulary limitations – code switching and word coinage.

b) Structure: the frequency of grammar errors.

c) Pronunciation: frequency and nature of phonemes errors identified.

d) Fluency and interaction: frequency of pauses and long pauses, backchannelling elements (hmm), and hesitations typical of English speakers (uh) and typical of Brazilian Portuguese speakers (eh).

e) Comprehension: frequency of expressions used to solve comprehension problems.

Vocabulary: in *Subcorpus* 1, 54 content words had relatively high frequency (minimum 20 occurrences) and "pilot" was the most frequent – 146 occurrences. There were 27 occurrences of created words (word coinage), and 26 occurrences of words in Portuguese (code switching). In *Subcorpus* 2, 42 content words were identified and again "pilot" was the most frequent – 169 occurrences. There were 24 occurrences of word coinage and 161 of code switching. In *Subcorpus* 3, 48 content words were identified and "aircraft" was the most frequent – 116 occurrences. There were 3 occurrences of created words and 20 of words in Portuguese. In *Subcorpus* 4, 29 content words were identified and "situation" was the most frequent – 121 occurrences. There were 9 occurrences of word coinage and 32 of code switching.

Structure: the following frequency of grammatical errors was identified: a) *Subcorpus* 1: 397 occurrences; b) *Subcorpus* 2: 330 occurrences; c) *Subcorpus* 3: 270 occurrences; and d) *Subcorpus* 4: 369 occurrences.

The nature of the errors will be identified and classified in a future analysis as the research is still in progress.

Pronunciation: the pronunciation errors were numerous, particularly the *hapax legomena* (the words or the linguistic elements that appears only once). Some examples of the most frequent errors are shown in *Figure 2*.

Subcorpus 1	**Frequency/Occurrences**
IHSCHUDAXENT student – add of an I in the beginning and the first T has the sound of tʃ, as in the CH in 'chalk'	18
PAARTIH part – add of an I in the end	14
KAXENJHIHSHAXENS conditions – D with the sound of dʒ	9
Subcorpus 2	**Frequency/Occurrences**
AEENDIH and – add of an I in the end	85
PAYLAXTIH pilot – add of an I in the end	22
AEHH air – R with the sound of H as in 'hotel'	17
Subcorpus 3	**Frequency/Occurrences**
STAOPAXD stopped – ED pronounced as ID	5
RAXSPEHK0TIHV1LIH respectively – stressed syllable on TIVE respecTIVEly	2
Subcorpus 4	**Frequency/Occurrences**
AEENDIH and – add of an I in the end	47
AERKRAEFTIH aircraft – add of an I in the end	17
PAYLAXTIH pilot – add of an I in the end	14

Figure 2. Pronunciation Errors

Fluency and Interaction: the frequency of fluency and interaction elements in *subcorpus* 1 was: a) Pauses (45); b) Long pauses (2); c) Hesitation uh (238); d) Hesitation eh (118); e) Backchannelling hmm (12). In *subcorpus* 2 there are a) Pauses (195 occurrences); b) Long pauses (0); c) Hesitation uh (244); d) Hesitation eh (335); e) Backchannelling hmm (50). In *subcorpus* 3 there are a) Pauses (69 occurrences); b) Long pauses (26); c) Hesitation uh (227); d) Hesitation eh (14); e) Backchannelling hmm (19). In *subcorpus* 4 there are a) Pauses (209 occurrences); b) Long pauses (5); c) Hesitation uh (153); d) Hesitation eh (68); e) Backchannelling hmm (39).

Comprehension: the comprehension elements were identified in the *subcorpora* as questions or statements used to solve misunderstandings. In *subcorpus* 1 there are the following questions and statements: 'Can you repeat?' (13 occurrences); 'What's the meaning?' (1). In *subcorpus* 2: 'Can you repeat?' (37 occurrences); 'I don't understand' (6); 'Repeat, please' (23). In *subcorpus* 3:

‘Can you repeat?’ (9 occurrences); ‘I didn’t understand’ (2); ‘Could you repeat?’ (2). In *subcorpus* 4: ‘Can you repeat?’ (20); ‘Repeat, please’ (40); ‘I don’t understand’ (9).

The forthcoming actions will be based on the results of *corpus* analysis. As a corollary, the results will serve as the basis for the production of teaching materials that fulfill the learners’ linguistic needs (the language lacks or gaps identified in the *corpus*) related to the ICAO categories.

References

Berber-Sardinha, T. (2000). Linguística de Corpus: histórico e problemática. *Delta*. 16 (2), 323-367.

Brezina, V.; Weill-Tessier, P.; Mcenery, A. (2021). *LancsBox.* Version 6.0 [software].

Caines, A.; Nicholls, D.; Buttery, P. (2017). Annotating errors and disfluencies in transcriptions of speech. *Technical Report.*

Creer, S.; Thompson, P. (2023). *Processing Spoken Language Data:* the BASE experience.

Cresti, E. (2000). *Corpus di Italiano Parlato.* Firenze: Accademia dela Crusca.

Edwards, J. A.; Lampert, M. D. (Editors). (1993). *Talking Data:* Transcription and coding in discourse research. New York: Psychology Press. 3-31.

Friginal, E.; Lee, J. J.; Polat, B.; Roberson, A. (2017). *Exploring Spoken English Learner Language Using Corpora*: learner talk. Charn: Macmillan.

Granger, S.; Gilquin, G.; Meunier, F. (2015). *The Cambridge Handbook of Learner Corpus Research*. Cambridge: CUP.

ICAO (2010). *Manual on the Implementation of ICAO Language Proficiency Requirements.* Montreal: ICAO.

Jurafsky, F.; Martin, J. H. *Speech and Language Processing:* an introduction to natural language processing, computational linguistics and speech recognition.

Luettin, J. (1997). *Visual Speech and Speaker Recognition*. Department of Computer Science. University of Sheffield.

Sinclair, J. (1991). *Corpus, Concordance, collocation*. Oxford: OUP.

SQUAWK 9835: Role play in aviation language training and assessment

Henry Emery[4]
Latitude Aviation English Services
henry@latitude-aes.aero

Talk and workshops

This talk explored role play in aviation language teaching and assessment. We began by looking briefly at industry guidance on task types before setting out a definition of a role play and exploring the key characteristics of role play tasks. We then analysed the target language use domain of aeronautical radiotelephony and identified those features of real-world communications which need to be incorporated into role play tasks. We then moved on to some of the many reasons why role play is indispensable in the aviation language classroom and test room before concluding with an exploration of some of the limitations, challenges and dangers of role play as task type. The full talk can be found on YouTube here: https://youtu.be/fVjO99LmOHk?si=O9OtJtX0qHZFuV_U

Workshops

In the workshops that followed, we explored the potential for the features of the TLU domain to be operationalised in the specifications for role play tasks, and we considered issues related to the specification of participant roles, task length and language focus. We then looked at the sequence of routine and non-routine events that are captured in an evolving radiotelephony role play scenario and how problems, information gaps and conflicting needs and wishes can be

[4] Henry Emery is an aviation language teaching and assessment practitioner. He has worked as an author of several language training courses and tests and has acted as consultant and manager on various language assessment and training projects. Henry is Managing Director of Latitude Aviation English Services and an ICAEA board member.

woven into task storyboards. We considered the importance of setting out the operational 'starting point' in a task briefing before presenting a series of operational 'facts' supported by contextualisation cues in the form of realia, graphics and icons to develop interactive authenticity. We then discussed the importance of the role play 'script' comprising standard phraseology and plain language, drafted with sufficient flexibility to allow for unrehearsed and spontaneous interaction between role play participants. After running through a role play task for pilots for demonstration purposes, the workshop participants worked together in groups to draft specifications, a storyboard, a script and an artwork brief for a role play task of their own.

Below are selected references specific to the use of role play in language teaching or assessment.

References

Al-Arishi (1994), 'Role-play, real-play, and surreal-play in the ESOL classroom', *ELT Journal*, 48 (4): 337–346.

Benson, S. (2016), 'Task-based language teaching: An empirical study of task transfer', *Language Teaching Research*, 20 (3): 341-365.

Bullard, N. (1990), 'Briefing and debriefing', in Crookall, D. and Oxford, R. (eds.), *Simulation, gaming and language learning*, 55-66, New York: Newbury House.

Christopher, E. and Smith, L. (1990), 'Shaping the content of simulation/games', in Crookall, D. and Oxford, R. (eds.), *Simulation, gaming and language learning*, 47-54, New York: Newbury House.

Crookall, D. and Oxford, R. (1990), 'Linking language learning and simulation/gaming', in Crookall, D. and Oxford, R. (eds.), *Simulation, gaming and language learning*, New York: Newbury House.

García-Carbonell, A., Andreu-Andrés, M. A. and Watts, F. (2014), 'Simulation and gaming as the future's language of language learning and acquisition of professional competences', in Kritz, W. C. and Duke, R. D. (eds.) *Back to the Future of Gaming*, 214-227, Beilefeld: WB Verlag.

García-Carbonell, A., Rising, B., Montero, B. and Watts, F. (2001), 'Simulation/gaming and the acquisition of communicative competence in another language', *Simulation and Gaming*, 32 (4): 481-491.

Gastão Saliés, T. (1995), *Teaching language realistically*: Role play is the thing, Rio de Janeiro: Pontificia Universidade Catôlica do Rio de Janeiro. Available online: https://files.eric.ed.gov/fulltext/ED424753.pdf (accessed 7 September 2023).

Hutchinson, T. and Sawyer-Laucanno, C. (1990), 'Science and technology: Specific purpose language training', in Crookall, D. and Oxford, R. (eds.), *Simulation, gaming and language learning*, 135-142, New York: Newbury House.

Kasper, G. and Youn, S. J. (2017), 'Transforming instruction to activity: Roleplay in language assessment', *Applied Linguistics Review* 9 (4): 589-616.

Kormos, J. (1999), 'Simulating conversations in oral-proficiency assessment: a conversation analysis of role plays and non-scripted interviews in language exams', *Language Testing*, 16 (2): 163-188.

Littlejohn, A. (1990), 'Testing: The use of simulation/games as a language testing device', in Crookall, D. and Oxford, R. (eds.), *Simulation, gaming and language learning*, 125-134, New York: Newbury House.

Livingstone, C. (1983), *Role play in language learning*, London: Longman.

Lopez, S., Condamines, A., Jesselin-Leray, A., O'Donoghue, M., and Salmon, R. (2013), 'Linguistic analysis of English phraseology and plain language in air-ground communications', *Journal of Air Transport Studies*, 4: 44-60.

McNamara, T. and Lumley, T. (1997), 'The effect of interlocutor and assessment mode variables in overseas assessments of speaking skills in occupational settings', *Language Testing*, 14 (2): 140–156.

Monteiro, A.(2019), *Reconsidering the measurement of proficiency in pilot and air traffic controller radiotelephony communication*: From construct definition to task design, Ph.D diss., Carleton University, Ottawa.

Park, M. (2021), 'Domain definition inference for a virtual interactive aviation English test (VAET) for military air traffic controllers', in Chapelle, C. and Voss, E. (eds.), *Validity argument in language testing*: Case studies of validation research, 73-95, Cambridge: Cambridge University Press.

Park, M. (2015), *Development and validation of virtual interactive tasks for an aviation English assessment*, Ph.D diss., Iowa State University, Ames.

Porter Ladousse, G. (1987), *Role play*, Oxford: Oxford University Press.

Roever, C. and Ikeda, N. (2022), 'What scores from monologic speaking tests can (not) tell us about interactional competence', *Language Testing*, 39 (1): 7–29.

Scarcella, R. and Crookall, D. (1990), 'Simulation/gaming and language acquisition', in Crookall, D. and Oxford, R. (eds.), *Simulation, gaming and language learning*, 223-230, New York: Newbury House.

Shapiro, S. and Leopold, L. (2012), 'A critical role for role-playing pedagogy', *TESL Canada Journal*, 29 (2): 120-130.

Sharrock, W. and Watson, D (1987), '"Power" and "realism" in simulations and gaming: Some pedagogic and analytic observations', in Crookall, D., Greenblat, C., Coote, A., Klabbers, J. and Watson, D. (eds.), *Simulation-gaming in the late 1980's*, 35-42, Oxford: Pergamon.

Sinwongsuwat, K. (2012), 'Rethinking assessment of Thai EFL learners' speaking skills', *Language Testing in Asia*, 4 (2): 75-85.

Stokoe, E. (2014), 'The conversation analytic role-play method (CARM): A method for training communication skills as an alternative to simulated role-play', *Research on Language and Social Interaction*, 47 (3): 255–265.

Vernon, R. (1990), 'Ethical issues', in Crookall, D. and Oxford, R. (eds.), *Simulation, gaming and language learning*, New York: Newbury House.

Youn, S. J. (2020), 'Managing proposal sequences in role-play assessment: Validity evidence of interactional competence across levels', *Language Testing*, 37 (1): 76-106.

Making Use of Both Operational and Linguistic Knowledge and Skills

JENA LYNCH[5] & JENNIFER ROBERTS[6]
Embry-Riddle Aeronautical University Worldwide
jena.lynch@erau.edu
roberj62@erau.edu

Abstract

In ICAO Document 9835, even the minimum qualifications for aviation language trainers include both language-related knowledge and skills as well as the "ability to work well with a [subject matter expert]" for the aviation operational side (ICAO, 2010, p. D-1). The highest qualifications for an Aviation English (AE) trainer include both linguistic and operational knowledge and skills, the latter ideally coming from experience as a pilot or a controller. As SMEs in aviation operations and knowledgeable language teachers, such well-qualified AE teachers are able to help students improve their AE proficiency in targeted ways that translate directly to their students' professional lives. Because of these trainers' unique skillsets, they can provide AE instruction using pedagogical best practices, while also ensuring operational accuracy, relevancy, and appropriateness. In this interactive workshop session, participants will complete a self-assessment to discover, and appreciate, just how much value they bring to their AE teaching contexts and identify areas where they may want to seek collaboration. Then, they will unlock a variety of opportunities to bring both operational and linguistic knowledge and skills into their teaching. Some tips for collaborating with experts in other areas will be shared. Participants will make plans for how they can enhance their teaching from both angles.

Worshop Aims and Structure

In this workshop, the presenters' (Jena in person, Jennifer *in abstentia*) aim was to show the participants how valuable their skillsets could be. The interactive, participant-driven workshop began with discovery, moved into self-reflection, and finished with an application of the new information.

[5] Jena Lynch serves an Associate Program Coordinator for the Aviation English Department in the College of Aviation at Embry-Riddle Aeronautical University-Worldwide. In this role, Jena currently serves as a program administrator and teacher coordinator for an online program training 1300 Brazilian air traffic controllers in Aviation English. She holds an MA in Teaching English as a Second Language (TESL) from Northern Arizona University. Prior to Embry-Riddle, Jena taught English in the USA, Turkey, Thailand, and Cambodia.

[6] Jennifer Roberts serves as an Assistant Professor and Curriculum Chair in the Department of Aviation English at Embry-Riddle Aeronautical University-Worldwide, where she focuses on developing and implementing aviation English training and testing programs. Before coming to Embry-Riddle, she served as an English Language Fellow in Indonesia through the U.S. Department of State, after receiving her MA in Applied Linguistics and ESL from Georgia State University.

Discovery

The warm-up activity asked participants to pretend to give feedback to a colleague's sample lesson plan (see Appendix 1). While the presenters did not initially disclose this information to participants, the lesson plan had been purposefully designed to be lacking in key areas for language learners (e.g., Blok, Lockwood, & Frendo, 2020), such as creating conditions for language learning, planning material that is appropriate for the students' context, and providing opportunities for the teacher to assess language learning. Participants in the workshop identified many shortcomings, and the presenters commented on possible other areas of weakness in the sample lesson plan.

Self-Reflection

Participants were then asked to consider the skills and experience that they had which enabled them to provide meaningful feedback on the lesson plan. After a short brainstorming session, participants completed a self-assessment (see Appendix 2) and were encouraged not to be overly modest. Once they finished the self-assessment, participants were asked to discuss with a partner the areas where they felt they brought the most value to students, and to brainstorm resources for any areas where they perceived having less value.

Application

Next, the presenters provided a list of guiding questions to help participants use their operational and linguistic knowledge and skills in lesson planning (see Appendix 3). Finally, participants were asked to return to the undesirable lesson plan from the beginning of the workshop and revise it using the guiding questions. The workshop concluded with participants sharing some of their ideas to improve the lesson plan.

References

International Civil Aviation Organization. (2010). *Manual on the implementation of ICAO language proficiency requirements* (Doc 9835 AN/453) (2nd ed). Retrieved from: https://skybrary.aero/sites/default/files/bookshelf/2497.pdf.

Blok, S., Lockwood, R.B., & Frendo, E. (2020). *The 6 principles for exemplary teaching of English learners®: Academic and other specific purposes.* Alexandria, VA: TESOL International Association.

Appendix 1

Warm-up Activity: Feedback on a Lesson

Provide feedback and suggestions to your colleague who prepared this 1-hour lesson for Operational Brazilian ATCOs at ICAO Level 3. Your colleague wants to improve as an Aviation English teacher.

Lesson Objectives:

- Students will be able to define a thunderstorm and explain how they form.
- Students will be able to identify the different types of thunderstorms.
- Students will be able to describe the hazards of thunderstorms to aviation.
- Students will be able to identify safety procedures for avoiding thunderstorms.

Procedure:

1. Begin by **reviewing** the vocabulary related to thunderstorms. Some key terms include:
    - Thunderstorm: A weather system characterized by strong winds, lightning, and rain.
    - Updraft: A rising column of air that carries moisture and heat upward.
    - Downdraft: A sinking column of air that carries cold air downward.
    - Cumulonimbus cloud: A tall, dense cloud that is associated with thunderstorms.
    - Hail: Frozen water particles that fall from thunderstorms.
    - Tornado: A rotating column of air that extends from a thunderstorm to the ground.

2. **Explain** how thunderstorms form. Thunderstorms are formed when warm, moist air rises rapidly. As the air rises, it cools and condenses, forming clouds. The water droplets in the clouds collide and grow, eventually becoming too heavy to stay suspended in the air. They fall as rain or hail.

3. **Discuss** the different types of thunderstorms. There are two main types of thunderstorms:
    - Ordinary thunderstorms: These are the most common type of thunderstorm. They are typically short-lived and produce moderate amounts of rain and lightning.
    - Severe thunderstorms: These are more intense than ordinary thunderstorms. They can produce large hail, strong winds, and tornadoes.

4. **Explain** the hazards of thunderstorms to aviation. Thunderstorms can pose a significant hazard to aircraft. The strong winds and turbulence can damage aircraft, and the lightning can strike aircraft, causing electrical damage. In some cases, thunderstorms can even cause aircraft to crash.

5. **Review** safety procedures for avoiding thunderstorms. Pilots should avoid flying through thunderstorms whenever possible. If a pilot must fly through a thunderstorm, they should take steps to minimize the risk of damage or injury. These steps include:
    - Flying at a high altitude, where the turbulence is less severe.
    - Turning off all electrical equipment, to avoid the risk of lightning strike.
    - Staying alert for signs of turbulence or lightning.

6. End the lesson by **answering** any questions that students may have.

Appendix 2

Self-Assessment: You are VALUABLE!

Give yourself a rating between 1-5 on each of the areas below. There are basic descriptions below each number. Don't be too modest – rate your skills accurately. There are 3 blank lines in each category. Write in another related skill/ability/experience that you have and give it a rating!

	1	**2**	**3**	**4**	**5**
My knowledge/ability/experience in this area is most similar to…	*the average person on the street in my hometown*	*someone with a casual interest or hobby in this area*	*a typical person in my profession*	*someone in my profession who has additional training in this area*	*an expert in this area, perhaps with a special license or degree*
Operational Knowledge and Skills					
Knowledge of national/international aviation guidelines for English proficiency					
Aviation operational experience					
Training to become an aviation professional					
Familiarity with radio communications and phraseology					
Knowledge of local aviation procedures					
Desire to improve aviation safety and efficiency					
Aviation English Knowledge and Skills					
Experience learning Aviation English					
Knowledge of local aviation English testing practices					
Experience developing Aviation English curriculum					
Experience as an Aviation English teacher					
Experience as an Aviation English rater					
Language Learning Knowledge and Skills					
Experience as a language learner in any capacity					
Experience learning English in any context					
Proficiency in English					
Proficiency in your students' first language					
Familiarity with the student demographic (e.g., age, English level, previous training)					
Experience as a language test rater					

Experience as an English teacher					
Knowledge of language teaching methodology					
Knowledge of any teaching methodology					
Experience as a teacher trainer					

Appendix 3

Guiding Questions for Using Operational and Linguistic Knowledge and Skills

Operational Knowledge and Skills

1. Given what you know about the students,
    a. Why is the topic relevant to the local context?
    b. Why is the depth of information appropriate?
2. Where in the lesson do students
    a. Demonstrate comprehension of content information?
    b. Apply content information to real-world operations?
    c. Practice real-world aviation communication skills?

Linguistic Knowledge and Skills

1. Given what you know about the students,
    a. What makes the language level of the content information appropriate for their English proficiency?
    b. What makes the language instruction specifically targeted to these students?
2. What is the balance of student production versus teacher talk?
3. Where in the lesson do students
    a. Activate their background knowledge?
    b. Practice language skills?
    c. Receive feedback?
4. Where are opportunities for students to demonstrate achievement of the learning outcomes?

Welcome on board…games and RPG for Aeronautical English Proficiency

KARIN QUAST[7]
University of Taubaté - UNITAU, SP, Brazil
ludificar.ensinolinguas@gmail.com

CARLOS ALBERTO BABBONI[8]
Brazilian Air Force School of Specialists- EEAR, Guaratinguetá, SP, Brazil
babbonicab@fab.mil.br

PAULA TESSARE PICCOLO[9]
University of Taubaté - UNITAU, SP, Brazil; JEDAI Institute
teacherpaulapiccolo@gmail.com

Developing communication skills for safe radio communication is the aim of English courses and training programs focusing on communication between pilots and air traffic controllers (ATCOs). This means not only mastering standard Phraseology, but also plain English, in order to be prepared to communicate efficiently even when facing non-routine or unusual events. Thus, the focus of the workshop was Aeronautical English (Scaramucci, Tosqui-Lucks & Damião, 2018; Tosqui-Lucks & Silva, 2020).

How, then, can simulations of real communication be achieved when there is no access to simulators, for example, and role-plays might not be sufficient to elicit real and meaningful

[7] Karin Quast holds a Ph.D. in Education from the State University of Campinas and a master's degree in Applied Linguistics from the University of Taubaté (UNITAU). She has taught English for over 40 years. Since 2015, she has been working in the Graduate Program in Applied Linguistics (UNITAU).

[8] Carlos Alberto Babboni holds a master's degree in Applied Linguistics from UNITAU and is a specialist in English from the same university. Since 2010, he has been teaching English for Specific Purposes at the Brazilian Air Force School of Specialists (EEAR) and developing educational materials related to air traffic control and aircraft maintenance.

[9] Paula T. Piccolo holds a master's degree in Applied Linguistics from UNITAU and is a specialist in Distance Education and Educational Design. She teaches English and conducts research on board games in education. Founder of the Jedai Institute, she conducts workshops on how to use board games in education.

communication, or when there is the need to engage students via a more relaxed and ludic atmosphere? Also, learning a language involves repetition, which can be boring or even be carried out inattentively, thoughtlessly. So, how can language practice be fostered in a meaningful and mindful way? Games, when carefully chosen by the teacher/instructor in order to achieve clear objectives and taking into consideration the characteristics of their students, tend to create a space for meaningful and contextualized learning, in which students participate more actively, feel freer to take risks and experiment with language because they are not afraid of making mistakes or errors (Gee, 2003), as they are considered part of the process and have no real consequences in 'real life', or the consequences can be negotiated (Juul, 2003). In addition, scenarios can be created according to learning objectives; specific challenges/obstacles can be designed; feedback is immediate and the sense of accomplishment is, in itself, motivating. As Koster (2013) argues, games are puzzles to be solved and provide lessons to be learned. "Fun from games arises out of mastery. It arises out of comprehension. It is the act of solving puzzles that makes games fun" (Koster, 2013, p. 40); hence, fun in games arises from learning. Also, players get invested into reaching the objective of the game and, consequently, persist in achieving the goal.

Moreover, in a game, players may experience and develop a new identity (Gee, 2003). Games immerse us in certain social practices, in a semiotic domain (Gee, 2003), which involve certain "ways of doing things, thinking about things, valuing things and interacting with other people" (Gee, 2003, p. 18). Not rarely, games provide us with opportunities to participate in social practices we would otherwise not be able to. And by actively participating in those practices we appropriate (internalize) the language that emerges in the interactions (Vigotski, 2001).

One way to simulate excerpts of real communication and which does not require specific equipment (not always available in certain contexts), digital technology and/or good Internet connection, is by using board (or table) games which can be adapted so that teachers can focus on specific objectives and content. The term board games generally encompasses table games, card games, collectible card games, eurogames, americangames and RPG-Role Playing Games (Woods, 2012). In our workshop, we mainly used card games. RPG could not be experienced due to time constraints.

In addition to their role in the development of cognitive functions and several abilities and competencies (Quast, 2022), games are good at promoting immersion; they can be engaging, motivating, and provide meaning to tasks (and keep students focused); they turn students into active protagonists and can foster autonomy and critical reflection. They can be used to create an ambience for the introduction of a certain topic; to check or 'activate' background knowledge; to introduce new content; for further practice; to revise content; for simulations of situations that pilots and ATCOs may experience and will have to respond to; for diagnostic, formative or summative assessment, among other possibilities.

Modern board games were chosen because of their distinctive characteristics, as discussed by Woods (2012). Some of those are: (a) they incorporate more mechanics than traditional games - there are over 200 board game mechanics (Engelston & Shalev, 2019); (b) most of them are more complex than those prior to the 1990's; (c) many have a very short learning curve (i.e., the rules are easy and fast to explain and players quickly learn how to play the game); (d) playing time: some games can last 15 minutes (ideal for class use); (e) they cover lots of themes; (f) short downtime (i.e., the time you wait until it's your turn to play again); (g) players decisions are valued over chance; there are cooperative games; (i) there can be multiple paths to victory.

As the games have been adapted with specific educational purposes, the adaptations can be included into the category of serious games, which are, according to Abt ([1970]1987, p. 9), games that "have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement."

Taking into consideration time constraints in class, the focus on oral communication, situations that pilots and ATCOs may face in real life and products that could be easily adaptable and are low cost and quick to produce (that is, print-and-play games), we selected some games (listed below), which were then adapted to include Aeronautical English:

- *Just One!* (this game was adapted to large groups and simply using the white board while focusing on Aeronautical English)
- *Cards Against Humanity* (CAH)
- *Black Stories* (inspired the game *WOTFH? What on the flight happened?*)
- *Loaded Questions*
- *Action Cats*
- *Dream On*
- *Once upon a time*
- *Bring your own book* (was adapted into *FotLoP-For the Love of Phraseology*)

It can be argued, however, that some of the games chosen may, in fact, not be considered games (Juul, 2003), but game-like activities or ludic activities. However, they create a game-like environment and were considered suitable in terms of our educational purposes. Inspired by the games above, we created: (a) *WOTFH? What on the flight happened?* (inspired mainly by *Black Stories*); (b) *CAH – Crew and controllers Avoiding Havoc* (inspired by *Cards Against Humanity*, *Apples to Apples*, *Loaded Questions*); (c) *Once Upon a Flight* (a card-based narrative game,

inspired by *Once Upon a Time*, *Dream On*, *Action Cats*); (d) *FotLoP-For the Love of Phraseology*.[10]

In addition to the games' own rules, we added one common rule to all games: only Aeronautical English could be used (Phraseology and plain English).

The process of adapting the games was carried out following several steps (see Figure 1). When choosing events and language for the games, we tried to articulate: (a) students' main language difficulties/problems identified by teachers/trainers; (b) ICAO's documents; (c) Phraseology; (d) language tasks carried out by ATCOs in Brazil; (e) real events/situations, in order to be as close as possible to the communicative behavior in the target context. As this was our first attempt, there is considerable room for further development. Ideally, such games could be designed in conjunction with experienced ATCOs. Still, the main objective is to show that many commercial games can be adapted to practice Aeronautical English, thus increasing teachers' options in terms of ludic activities and game choices.

The process of adapting the games was carried out following the steps in Figure 1 (though not always linearly, some of them being circular).

1	Identifying students' major difficulties in classroom activities/tasks and in tests, regarding oral communication. Before selecting and adapting the games, the first step was to informally gather information from teachers/trainers in different contexts regarding the most prevalent difficulties faced by the students in class and in tests/exams so that they could be addressed through board games;
2	Choosing games that involve a high level of oral communication;
3	Selecting games whose duration spans for 10 to 30 minutes, considering time constraints in class;

[10] The games, details of how to play them and some suggestions for follow-up activities can be found at https://drive.google.com/drive/folders/1BChKiKDr00PTCTxWUlZI3Weuk8sTyCTX?usp=sharing

4	Selecting games which have a short learning curve, taking time constraints and students' previous experiences and/or game repertoire (that is, games whose rules are fast to explain and easy to learn);
5	Keeping in mind the Phraseology, ICAO's language proficiency requirements (Doc 9835, ICAO, 2010)
6	Identifying the tasks that ATCOs in Brazil carry out. Before selecting linguistic content to include in the games and thinking of the Brazilian context, first we had to consider the tasks ATCOs carry out in Brazil, as detailed in Aragão and Scaramucci (2020). The authors list 8 major tasks, which are further divided into sub-tasks (which amount to 145).
7	Using real language extracts. To choose the linguistic aspects to use in the games, it was necessary to consider specialized *corpora* and real communication between pilots and ATCOs. In order to gather such data, we watched dozens of videos and listened to dozens of audios of real interactions.[11]
8	When there was an opportunity to choose specific lexical items to use in the games, we also took pronunciation issues into consideration (most common pronunciation problems faced by speakers of Brazilian Portuguese as their L1), based on the discussion in Babboni and Quast (2018, 2020).

Figure 1. Guidelines for adapting board games for Aeronautical English classes

[11] Among those we can cite: *VASAviation*, accessible at: https://www.youtube.com/@VASAviation ; *AirTrafficVisualized*, accessible at: https://www.youtube.com/@AirTrafficVisualised ; *You can see ATC*, accessible at https://www.youtube.com/@YouCanSeeATC ; *Real ATC*, accessible at https://www.youtube.com/@REALATCchannel ; *ATC Audio*, accessible at https://www.youtube.com/@TheATCAudio , among others.

References

Abt, C. C. (1987) *Serious Games*. University Press of America, 1987. Reprint. Originally published: New York: Viking Press, 1970.

Aragão, B. F., & Scaramucci, M. V. R. (2020). A brief analysis of language tasks used by air traffic controllers in radiotelephony communications in Brazil. *The ESPecialist*, 41(4). https://doi.org/10.23925/2318-7115.2020v41i4a5

Babboni, C. A., & Quast, K. A questão da pronúncia em livros didáticos de Inglês Aeronáutico. In: Scaramucci, M.V.R., Tosqui-Lucks, P., & S.M. Damião (Ed.). (2018). *Pesquisas sobre Inglês Aeronáutico no Brasil*. Campinas: Pontes Editores.

Babboni, C. A., & Quast, K. (2020). Pronunciation and Aeronautical English: Brazilians' difficulties and possible routes to intelligibility. *The ESPecialist*, 41(4). https://doi.org/10.23925/2318-7115.2020v41i4a3

Engelstein, G., & Shalev, I. (2019). *Building Blocks of Tabletop Game Design*: An Encyclopedia of Mechanisms. Boca Raton, US: CRC Press.

Gee, J.P. (2003). *What Videogames have to teach us about learning and literacy*. New York: Palgrave Macmillan.

Juul, J. (2003). The game, the player, the world: Looking for a heart of gameness. In *Level Up: Digital Games Research Conference Proceedings*, edited by Marinka Copier and Joost Raessens, 30-45. Utrecht: Utrecht University.

Koster, R. (2013). *A Theory of Fun for Game Design*. CA: O'Rilley Media. 2nd. ed.

Quast, K. (2022). O que está em jogo quando jogamos? In: Piccolo, P.T., & Carvalho, A.V. *Jogos de Tabuleiro na Educação*. São Paulo: Devir.

Scaramucci, M.V.R.; P. Tosqui-Lucks; S.M. Damião (Ed.). 2018. *Pesquisas sobre Inglês Aeronáutico no Brasil*. Campinas: Pontes Editores.

Tosqui-Lucks, P., & Silva, A. L. B. de C. e. (2020). Aeronautical English: Investigating the nature of this specific language in search of new heights. *The ESPecialist*, 41(3). https://doi.org/10.23925/2318-7115.2020v41i3a2

Vigotski, L.S. (2001). *A Construção do Pensamento e da Linguagem*. São Paulo: Martins Fontes.

Woods, J. (2012). *Eurogames*: The design, culture and play of modern European board games. North Carolina: McFarland & Company.

CASE STUDIES

Case Study: Language Proficiency as a Human Factor in Flight Crew Training

DON TOUPS[12]
Embry-Riddle Aeronautical University Worldwide
toupsd1@erau.edu

English Language Proficiency and Aviation Safety

Language plays a critical role in aviation safety.

In the last several decades, following a number of well-publicized aviation accidents (such as the 1977 accident in Tenerife that claimed 583 lives), communication between pilots and air traffic controllers has been the subject of increased scrutiny.

The ICAO Language Proficiency Requirements (LPRs) have helped to raise global awareness of the role of language proficiency in pilot-ATC communications. However, language proficiency is critical to aviation safety beyond the realm of pilot-ATC communications. A few examples:

- Pilots often rely on written information contained in equipment manuals that are published only in English. (As examples, Boeing and Airbus only publish equipment manuals in English.)
- Pilots receive and respond to datalink communications (CPDLC and others) that provide safety-critical information in English.
- Aviation Maintenance Technicians (AMTs) perform precise maintenance and repair tasks based in some cases on equipment manuals published in English, and they complete aircraft maintenance records in English.

[12] M.A. - Master of Arts in English, Louisiana State University; Graduate Certificate in Geographic Information Systems, University of Denver; B.A. - Bachelor of Arts in Journalism, Louisiana State University. Don Toups Bio was brought back into the Embry Riddle fold in May 2021 to lead ERAU Worldwide's Aviation English team. As Chair of the Aviation English Department within the Worldwide College of Aviation, Don oversees AE course development and delivery, liaises with other ERAU departments on initiatives related to Aviation English, and collaborates with worldwide business development staff to pursue AE opportunities.

- Controllers and pilots often complete training on systems in English; and documentation, visual displays, and in some cases audible alarms associated with those systems are in English.

This paper focuses on the last of these examples: pilots with limited English proficiency receiving training in English on aircraft systems and procedures, and subsequently committing unsafe acts that reflect an insufficient understanding of those systems and procedures.

Flight Crew Training

The purpose of flight crew training is to increase pilots' operational proficiency. This seems obvious. When flight crew complete a training program or course, they are expected to be more proficient at a skill or procedure, or possess increased knowledge about a topic that helps them to make better decisions on the flight deck.

What makes flight crew training effective?

1. The training must be relevant to pilots' jobs, challenges, and work environments.
2. Pilots must have opportunities to interact with instructors; flight crew training is not a series of lectures.
3. Pilots must have opportunities during training to practice skills—such as in simulator sessions or CRM role plays.
4. The training must be at the right level of difficulty – challenging but not impossible.

What happens if flight crew training meets all the criteria for effective training, but the training, including any associated written materials, is not fully comprehensible to pilots? What if training participants comprehend the main ideas of a training, but miss important details due to their limited proficiency in the language in which that training is conducted?

Tatarstan Airlines Flight 363

On November 17, 2013, Boeing 737-53A aircraft operated by Tatarstan Airlines was destroyed in an accident at Kazan International Airport (KZN), Russia. All 44 passengers and six crew members were killed.

The following is a summary of events on that day, as documented in the Russian Federation's Interstate Aviation Committee accident investigation report (AAIC Final Report, 2015) and the Aviation Safety Network website:

1. The aircraft airframe, components and systems, engines and APU were operative before the aircraft departed from Moscow.
2. The flight departed from Moscow at 14:25 local time on a scheduled service to KZN.
3. En route the crew noted that their navigation system map was displaced. In other words, the position shown on the flight deck instruments was not accurate. As a result, the descent towards Kazan was flown 4 km to the north of the published approach procedure.
4. The approach was conducted in IMC with a strong tailwind and was unstabilized; and as the aircraft turned towards the runway heading, the first officer noticed based on the PAPI lights that they were too high. (PAPI lights are a set of lights positioned beside the runway which provide pilots with a visual indicator of their aircraft's position relative to the correct glidepath for the runway.) The flight crew initiated a go-around.
5. While executing the go-around, the aircraft impacted the ground between the runway and the main taxiway about 1850 meters past the runway 29 threshold, at over 450 km/h, and a negative pitch angle of about 75°.

Accident Investigation Findings

The final accident report issued by Russia's Air Accident Investigation Commission, or AAIC, indicated the following:

> The accident involving Tatarstan Airlines Flight U9363 was caused by systemic deficiencies in hazard identification and risk management, inoperability of airline SMS, and lack of oversight over flight crew training (…) which resulted in authorizing an unduly trained crew for flights (AAIC Final Report, 2015, p. 236).

As is often the case, this accident involved a number of contributing factors. Among the factors identified in the AAIC report: "the PIC and FO's English language proficiency was insufficient for the Boeing 737 conversion training" (AAIC Final Report, 2015, p.153). A team of independent language experts involved in the investigation concluded, based on audio files of the two pilots obtained from the Tatarstan Airlines' training department, that the pilots "demonstrated the general level of ELP [English Language proficiency] at ICAO Elementary Level 2" (AAIC Final Report, 2015, p. 152). As context for that finding, the ICAO Language Proficiency Requirements indicate that the minimum level of language proficiency for pilots that is "acceptable to ensure safe operations" is Operational Level 4 (ICAO Document 9835, 2010, p. 2-4). Tatarstan Airlines sent the pilots involved in this accident to 737 type training even though they did not meet the language proficiency prerequisites of the training program, a decision that was approved by Russia's Federal Air Transport Agency (FATA) (AAIC Final Report, 2015, p. 196).

Human Factors Analysis

Was language proficiency the only contributing factor to this accident? No. If we look at this accident through the lens of Reason's Swiss cheese model, we see:

1. A precondition: Language proficiency of flight crew was insufficient for 737 type training

2. Organizational influences: systemic deficiencies in hazard identification and risk management and lack of oversight over flight crew training
3. Supervision: authorization of an insufficiently trained crew for flights
4. Specific acts by the flight crew: Failure to resolve map shift, failure to implement upset recovery, loss of spatial orientation, transfer of the aircraft into a steep dive

Establishing insufficient English language proficiency as a precondition for an unsafe act is more achievable if evidence of the language inadequacy is identifiable in pilot-ATC communications. Establishing this relationship is more complex when the insufficient language proficiency is associated with a previous training event. There are, however, statements in the Tatarstan accident report that suggest that pilots' English language proficiency was insufficient to comprehend Boeing 737 conversion training. One example in the accident report:

> (…) neither of them [PIC or FO] was able to completely understand documentation critical for safe operations of Boeing 737 type aircraft. This conclusion is confirmed by the difficulties that both pilots had during the final computer-based testing of theoretical knowledge during the type training. (AAIC Final Report, 2015, p. 195)

Exploring Language Issues in Aviation Accident Investigations

One might conclude from the above referenced accident investigation process that language proficiency is routinely investigated in aircraft accident investigations. Not so. The team that investigated both accidents referenced above included Sergey Melnichenko, the Russian Federation's representative to the ICAO Proficiency Requirements Study Group (PRICESG), member of the ICAO EUR/NAT Training Task Force, developer of the Test of English Language Level for Controllers and Pilots (an ICAO-endorsed test used in Russia), and former Editor-in-Chief of AeroSafety World's Russian Edition (ICAO EUR/NAT Regional Report, 2010). Mr. Melnichenko participated in six aviation accident investigations involving Russian operators between 1988 and 2016.

Why is language proficiency *not* routinely explored in aviation accident investigations? There are a number of possible answers to this question. One reason is that accident investigators typically lack background training that would assist in a systematic exploration of possible language factors. Consider ICAO Document 9756 Manual of Aircraft Accident and Incident Investigation, Part III: Investigations **(**ICAO Document 9756, 2011**)**. There are 11 references to "language" in this document. Only five of those references allude to problems that can arise related to language—for example, the mention, with no explanation or process for exploration, of "language barriers" between people involved in maintenance (ICAO Document 9756, 2011, p. 423). In contrast, Chapter 4 of the document, Operations Investigation, suggests specific questions to pursue related to crew histories, crew qualifications/proficiency, task management, CRM, and nine additional topics (ICAO Document 9756, 2011, pp. 49-62). Likewise, Chapter 16, Investigating Human Factors, provides background information on the SHELL Model and Reason's Model, a detailed outline of Latent Unsafe Conditions and associated factors, an integrated process for occurrence investigation, and additional information intended to guide and inform the work of accident investigators (ICAO Document 9756, 2011, pp. 489-506). But nowhere in the document is there guidance on exploring language as a contributing factor to aviation accidents.

Let's review what we know and what we don't know:

1. Pilots who speak English as a foreign language sometimes complete flight crew training in English.
2. Some flight crew training, such as type training, involves reading of complex documents that can be challenging even for ICAO Level 4 speakers of English.

3. Insufficient English language proficiency during training has been identified by investigators as a contributing factor in several aviation accidents.
4. Language has been noted, but not investigated, in other aviation accidents.
5. Language proficiency in relation to flight training is not systematically investigated by aviation accident investigators.
6. Because language proficiency is not investigated in aviation accident investigations, we don't know the scope of the language problem. Are there other accidents in which insufficient language proficiency during training resulted in flight crew not achieving the operational proficiency that the training was designed to provide? We don't know.

These observations suggest that when pilots with limited English language proficiency complete flight crew training in English, there is a risk that they may not have fully acquired the skills or knowledge the training was designed to provide.

Conclusion

When pilots with limited English language proficiency complete flight crew training in English, there is a risk that they may not have fully acquired the skills or knowledge the training was designed to provide.

References

Mathews, E., Carson, J., Singleton, S., Valdes, E., and Williams, D. (2022). Investigating Language Factors in Aviation Accidents. *Aviation Psychology and Applied Human Factors, 12(2),* 99-108. https://web-p-ebscohost-com.ezproxy.libproxy.db.erau.edu/ehost/detail/detail?vid=0&sid=8b3e3741-8720-4f8f-94b4-d76a14c5db10%40redis&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=2023-03746-003&db=pdh

Air Accident Investigation Commission (AAIC). Russia Interstate Aviation Committee. (2015). Final report on results of investigation of accident.

Aviation Safety Network. Accident Description. Retrieved February 15, 2023. https://asn.flightsafety.org/asndb/320643

ICAO Document 9756: Manual of Aircraft Accident and Incident Investigation, Part III: Investigation, First Edition. (2011). http://www.icscc.org.cn/upload/file/20190102/Doc.9756-EN%20Manual%20of%20Aircraft%20Accident%20and%20Incident%20Investigation%20Part%20III%20-%20Investigation.pdf

ICAO Document 9835: Manual on the Implementation of ICAO Language Proficiency Requirements, Second Edition. (2010). https://skybrary.aero/sites/default/files/bookshelf/2497.pdf

Cookson, S. (2021). Communication on the flight deck: What lessons can we learn from past accidents? In N. Stanton (Ed.), Advances in Human Aspects of Transportation:

Proceedings of the AHFE 2021 Virtual Conference on Human Aspects of Transportation (270), 603-611. https://link.springer.com/chapter/10.1007/978-3-030-80012-3_70

Hutchins, E., Nomura, S. & Holder, B. (2006). The ecology of language practices in worldwide airline flight deck operations [White paper]. Boeing Commercial Airplanes Group. https://pages.ucsd.edu/~ehutchins/documents/hciaero-hutchins.pdf

ICAO EUR/NAT Regional Report. (2010). https://www.icao.int/publications/journalsreports/2010/ICAO_Reg_report_EUR-NAT_2010.pdf

Handling error correction in cross-language transfer utterances

JULIANA DE CASTRO SANTANA[13]
Airspace Control Institute (ICEA), São José dos Campos, SP, Brazil
julianajcs@decea.mil.br

Abstract

As an Aeronautical English instructor I've realized that the errors Brazilian students usually produce in English are quite similar in terms of syntax, once they tend to transfer the features of their mother tongue (L1) to the second language (L2). As a result, they can hardly tell the sentence they have built in English carries a global error that affects intelligibility. The aim of this study is to access cross-language transfer with respect to sentence building, in order to come up with meaningful ways of correcting errors that are Portuguese-like. The difficulty Brazilian speakers of English have presented identifying errors that derive from language blending (Portuguese – English) will be discussed through practical activities done by ATCO whose English proficiency level is either 5 or 6. Reflections on how the form, meaning and use of both languages (L1 and L2) relate to and differ from each other can lead us to more effective error correction strategies that rely on language awareness.

Introduction

A couple of years ago, during the 9th GEIA Seminar (Santana, 2023), I started exploring cross-language influence in second language acquisition, by paying special attention to authentic communication errors Brazilian Air Traffic Controllers (ATCO) usually make when using Aeronautical English (AE). It's quite common to hear, for example, "Happened an accident", instead of "There was an accident" or "An accident has just happened". Brazilian Portuguese speakers, even the ones whose English proficiency level is higher, can hardly tell that the words have been inverted in that original utterance.

The influence of the speakers' first language (L1) in the process of learning a second language (L2) has already been addressed by other researchers such as Crystal (2008), Odlin (1989), and Selinker (1972) who first came up with the Interlanguage Hypothesis to refer to a unique

[13] English Language Consultant at the Airspace Control Institute (ICEA), Brazil and GEIA's vice-leader. She holds a Ph.D. in Applied Linguistics pursued at Campinas State University (UNICAMP) where she also conducted a Postdoctoral research on translation. She has published many papers, chapters and books, mainly on foreign language teaching and learning. Her main fields of research include: foreign language teaching, ESP, Aeronautical English teaching and learning; material development; teacher training courses; language, culture and identity.

linguistic system developed by foreign-language learners in the face of a L2. In other words, when struggling to acquire and master a target language, cross-language influence and negative transfer (Zhao, 2019) that can cause structural misuses of the L2 are quite common. Selinker (1972) defends that the L1 is seemingly the source language that provides the initial building materials to be gradually blended with materials taken from the L2, resulting in new forms that are a mixture of both languages. That's why most speakers who share the same mother tongue (i.e. Portuguese) can't recognize mistakes in utterances that have been produced in English but are closer to the Portuguese language, in terms of sentence building (word order, word formation, etc.).

Recognizing the nature and pattern of some L2 mistakes, especially the ones that may affect intelligibility in aeronautical communications is quite important to provide error correction in a more effective way. For this purpose, raising language awareness is crucial (Pacheco, 2022). The process of acquiring a second language is rather complex and requires further layers of linguistic, pragmatic, and strategic skills. By analyzing some activities done by ATCO who were about to undergo a training course to become AE instructors, I intend to focus on error correction - without losing sight of language blending (Portuguese ↔ English) and cross-language influence - to promote a deeper understanding of the AE teaching and learning process.

Contextualizing…

Once or twice a year, ICEA's training team offers a teacher's training course called (CTP011) "Pedagogical practice course for the instruction of Aeronautical English". It's a three-week on-site course whose target audience is ATCOs who have reached proficiency level (PL) 6 or 5 (Doc 9835) and are interested in becoming AE instructors in their working regions.

The admission process is composed of 2 steps: an interview and a practical activity in which the applicants are supposed to correct a short text that had been written by genuine students while attending AE online courses also designed and conducted by ICEA's training team. These online courses are addressed to ATCO from different facilities (Tower, ACC and APP) whose PL is either 3 or 4.

The idea of having potential instructors correct the activities done by genuine students is to assess the way they offer feedback when correcting structural English mistakes, which requires a sense of language awareness. Right after the oral interview, the CTP011 applicants receive, by e-mail, a short text (practical activity) to be corrected within 2 hours. The only instructions offered are: "Considering that the text below has been sent to you by one of your students:

1) Make the necessary corrections in English;

2) Justify your corrections by offering further explanations and/or examples".

The texts chosen for correction had been written by real students as assessment tasks that usually take place by the end of every two online units. In general, the tasks are based on relevant AE topics covered during the lessons, such as: my job as an ATCO, medical emergencies, non-routine situations, etc.

In the following section, the corrections sent by potential AE instructors will be discussed. We don't mean to focus on the people responsible for the corrections, but on some examples of cross-language transfer utterances, in order to understand the way it affects error correction.

Analysis: handling error correction

After attending 2 units of the online course, the students were asked to write about their routine as ATCOs, as if they were talking to someone who knows nothing about their job.

TEXT A

I work at XXX[14] International Airport, as an air traffic controler[15], and we need to organize the aircraft that comes to land and to take off...We divide our work in three positions: Tower, Ground and Clearance. The position Clearance gets the authorization for departures; the ground position gives instructions to the pilots during your taxi to runway and gives instructions to the pilots who have just landed, and the position tower controls the aircraft that intends to use the runway. In other words, the aircraft that comes to land and the aircraft that wants to take off. We call the aircraft using its names, I mean, your tail number or call sing. For example, you flew last month on TAM 3665, its your call sign, whose tail number is "PTMAX". In aviation, we use the phonetic alphabet, each letter has a "name". For example, we call "PTMAX" as PAPA TANGO MIKE ALFA X-RAY. When we need to use numbers, we say each one separately, like TAM THREE-SIX-SIX-FIVE, and not TAM THREE THOUSAND SIX HUNDRED SIXTY FIVE. We use some expressions, like AFFIRM when the pilot got properly the information that the ATCo sends him, and if the pilot got an wrong instruction, we need to say NEGATIVE, I'LL SAY AGAIN, and send the correct instruction.

Figure 1: Text written by a real student and delivered as an assessment task.

See below the corrections sent by a potential Instructor as part of the admission process for the teacher's training course.

All mistakes are highlighted in yellow in the text.

a) "Controller" is misspelled in the text, it has two L.

b) Instead of "gets", you should use "gives", like you used in all other examples.

c) "Your" – I would use "their", when plural, or "his",when singular, instead.
The first two errors I would just point out, because based on the text was written, the student knows enough to understand his mistake.

The last one, I would explain him that, although, used this way in Portuguese, in english the possessive adjectives to avoid repetition of the subject, in this case, the pilots or the aircraft. I would also present a chart with the pronouns and adjective that are regularly used.

Figure 2: Practical activity sent by a CTP 011 applicant. The text was kept the same way it had been written.

[14] The name of the airport has been omitted.
[15] Some words were highlighted in yellow by the potential Instructor as a correction strategy. The mistakes made by the online student were kept in the text that has been reproduced here.

In the first sentence of the student's text: *I work at XXX International Airport, as an air traffic controler, and we need to organize the aircraft that comes to land and to take off…*, only the misspelled word was pointed out as a mistake. Actually, the whole sentence requires attention, once its construction seems to result from a literal translation from Portuguese into English, especially the last part of it: *we need to organize the aircraft that comes to land and to take off…* To make it clearer and more English-like, some other ways of writing it could have been suggested, such as: "we need… to organize inbound and outbound traffic / to organize arrivals and departures / to organize landing and departing traffic".

By analyzing the correction delivered, we can tell that a lot of major mistakes haven't been mention and, perhaps, not even noticed by the applicant. A possible explanation refers to language blending and cross-language transfer. In other words, Brazilian speakers of English - including the most proficient ones - tend to transfer the structural system of their own language (Portuguese) to the target language - TL (English). As a result, they can hardly realize that the TL utterance produced carries a mistake that might affect comprehension.

Another important mistake that Brazilian speakers of English usually make refers to word order. Depending on the language used, the order of the words (syntax) within the sentences varies a lot. For example: because of the Portuguese language influence, the following sentence was written this way: *The position Clearance gets the authorization for departures*. Besides the word order issue, we can also notice combination of words that are closer to Portuguese than to English, such as "gets the authorization". A more English-like version could've been suggested during the correction, such as: "The Clearance position authorizes departures". In order to make this suggestion, though, it's necessary to be aware of different language forms and the way they differ from one language to another.

The use of the possessive adjectives also poses a lot of difficulties for Brazilian students, specially the use of *your* and *its*. For example: (…) *during your taxi to runway / your tail number or call sign / its your call sign*. Even though the potential Instructor pointed out these mistakes, the correction isn't clear enough. In the original sentence written by the online student: *For example, you flew last month on TAM 3665, its your call sign, whose tail number is "PTMAX"*, not only the word your is misused, but also its that might refer to the contraction for *it is* (it's) and not to the possessive adjective *its*. Correcting those mistakes would require breaking that long utterance into smaller sentences, paying special attention to the appropriate syntax of the English Language: "Last month you flew on TAM 3665. It's the call sign of the aircraft whose tail number is 'PTMAX'". In Portuguese we tend to produce longer sentences whereas in English we'd rather use shorter ones.

Let's move on to a different text produced by another online student.

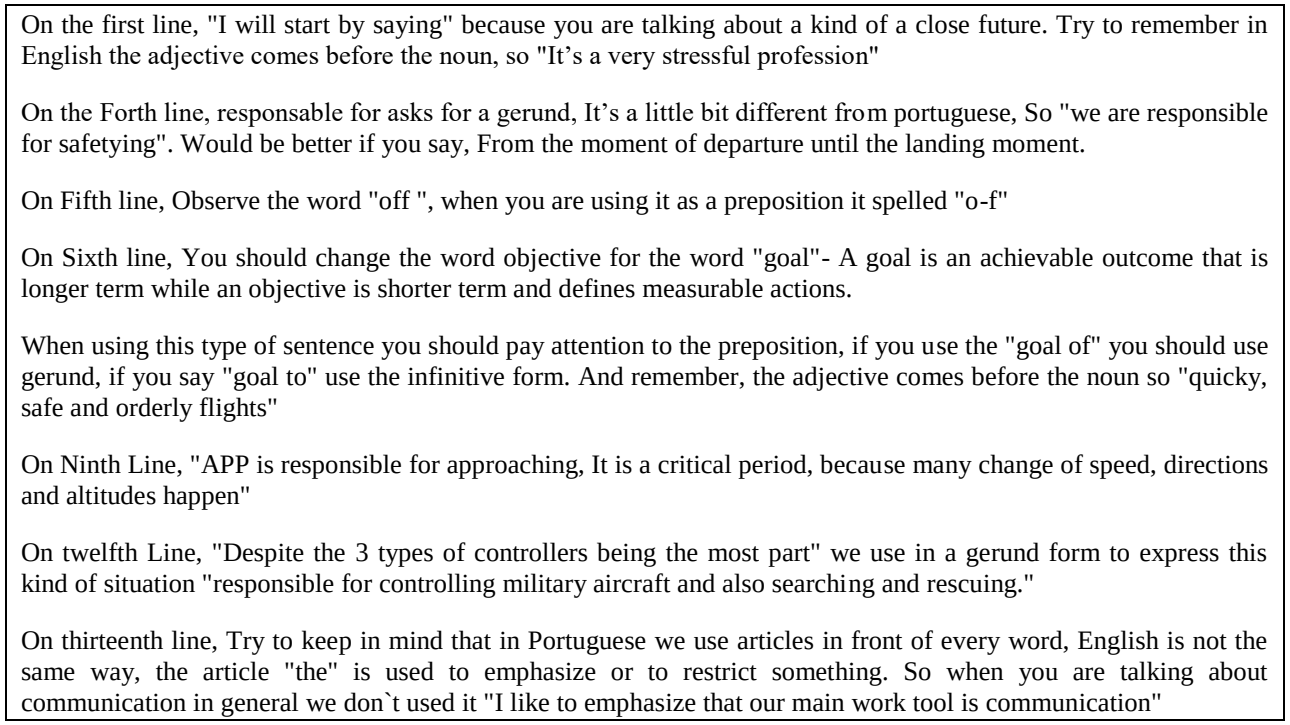
TEXT B

I start saying that is a profession very stressful[16], due to high level of accurate decisions that we need to make under pressure and at the same time very rewarding. The profession that I'm talking about is air traffic controller. We controllers are responsible for the safety of all the airplanes on the ground and flying. From the moment that they departure till their landing. The aircraft communicate with different types off controllers during their flights, but all with the objective of guarantee a flight quickly, safe and orderly. Basically there are 3 types of air traffic controllers: tower controller, approach controllers (APP) and center controllers (ACC). Briefly the tower is responsible for landings and departures, the APP is responsible for the approximation of aircraft, critical period, because many changes happen of speed, directions and altitudes, and finally the ACC, that control the traffics in high altitudes. Despite these 3 types of controllers be the most part, we also have those that are responsible for aircraft military and search and rescue. I like to emphasize that our main work tool is the communication, this is a process that is vital to the safe and efficient control of air traffic. The controllers must issue authorizations clearly, and the pilot must answer in the same way. Some caution are essentials to maintain a clear communication, for the words we use the international phonetic alphabet, for example: the letter A, we say "alpha", the letter B, we say "Bravo", the letter C, we say "Charlie". The numbers must be spoken one at a time. There are words that must be avoid, because can be confused as a number, for example: the word "to" could be confused with the number "2", and the word "for" could be confused with the number "4".

Figure 3: Text written by a real student and delivered as an assessment task.

[16] The phrases or sentences underlined in the text were pointed out as mistakes by the potential instructor.

See below the corrections suggested by another potential Instructor as part of the admission process for the teacher's training course.



On the first line, "I will start by saying" because you are talking about a kind of a close future. Try to remember in English the adjective comes before the noun, so "It's a very stressful profession"

On the Forth line, responsable for asks for a gerund, It's a little bit different from portuguese, So "we are responsible for safetying". Would be better if you say, From the moment of departure until the landing moment.

On Fifth line, Observe the word "off ", when you are using it as a preposition it spelled "o-f"

On Sixth line, You should change the word objective for the word "goal"- A goal is an achievable outcome that is longer term while an objective is shorter term and defines measurable actions.

When using this type of sentence you should pay attention to the preposition, if you use the "goal of" you should use gerund, if you say "goal to" use the infinitive form. And remember, the adjective comes before the noun so "quicky, safe and orderly flights"

On Ninth Line, "APP is responsible for approaching, It is a critical period, because many change of speed, directions and altitudes happen"

On twelfth Line, "Despite the 3 types of controllers being the most part" we use in a gerund form to express this kind of situation "responsible for controlling military aircraft and also searching and rescuing."

On thirteenth line, Try to keep in mind that in Portuguese we use articles in front of every word, English is not the same way, the article "the" is used to emphasize or to restrict something. So when you are talking about communication in general we don`t used it "I like to emphasize that our main work tool is communication"

Figure 4: Practical activity sent by a CTP 011 applicant. The text was kept the same way it had been written.

By analyzing the corrections above, we realize that, once again, some major errors that might affect comprehension were neither identified, nor corrected. In the first sentence, for example, the corrections suggested were: "I will start by saying" / "It's a very stressful profession". In fact, the entire sentence needs checking, so that the ideas could get clearer and more coherent, specially the period that mentions an advantage and disadvantage of being an ATCO: "(…) due to high level of accurate decisions that we need to make under pressure and at the same time very rewarding". The entire sentence needs a different construction that demands a deeper understanding of the target language form and use in contrast with Portuguese. A possible correction could be suggested as: *Due to a high level of accurate decisions that we need to make*

under pressure, it's a very stressful profession, but, at the same time, it's very rewarding. As a whole, the way the student punctuated and divided the text into sentences demands a careful review. Some of the sentences are too long and confusing, while others are too short and incomplete like the following one: "From the moment that they departure till their landing".

In Portuguese it's quite common and acceptable to produce sentences without a subject, but in English, every sentence needs a subject, even the ones that express weather phenomena, such as: *<u>It</u> rained a lot*. That's why Brazilian speakers of English tend to omit the subject of some sentences built in English. Once instructors are aware of this potential mistake that results from differences in the syntax of both languages (English – Portuguese), he/she can draw the students attention to such difference, by offering them a contrastive analysis of the languages form and use.

Based on the corrections above, when a contrastive analysis of the languages (English ↔ Portuguese) is offered to emphasize some structural differences, it's is not done properly. The sentence wrote by the online student was: "We controllers are responsible for the safety of all the airplanes on the ground and flying". The correction suggested by the potential instructor was: *On the Forth line, responsable [sic] for asks for a gerund, It's a little bit different from portuguese, So "we are responsible for safetying". Would be better if you say, From the moment of departure until the landing moment*. Actually, the instructor rewrote a phrase that didn't need any correction, considering that *responsible for* is not followed by a verb, but a noun: "We are responsible for <u>the safety</u> (…)". There is just a little mistake at the end of the sentence that could've been easily corrected like this: "We controllers are responsible for the safety of all the airplanes on the ground and <u>in the sky</u>".

Regarding the utterances: “The aircraft communicate with different types off controllers during their flights, but all with the objective of guarantee a flight quickly, safe and orderly” only the underlined words or phrases were signed as mistakes. The corrections offered by the potential instructor did not address the structural errors that harm the sentence. In fact, some unimportant details that don’t change the meaning of the statement were marked and corrected as major mistakes, such as the use of *objective* instead of *goal* while other global errors were not explained. The entire period could have been reviewed as to make it shorter and clearer. For example: *The aircraft communicate with different types of controllers during their flights, with the objective of ensuring quick, safe and orderly flights*. Once again, the Brazilian student made global errors that might result from a negative structural transfer from Portuguese to English. More specifically, in Portuguese the noun tends to be placed before the adjective, whereas in English is the other way around. That would explain the word order mistake in: “a flight quickly, safe and orderly”. Word formation (*quickly* instead of *quick,* for example) is also a challenge for Brazilian speakers of English.

The following period carries some important errors that probably wouldn’t make sense to other foreign speakers of English rather than Portuguese ones: “*Despite these 3 types of controllers be the most part, we also have those that are responsible for aircraft military and search and rescue*”. In other words, the first part of the sentence is quite close to Portuguese in terms of sentence building and word-for-word translation. Maybe that’s why the potential instructor could not identify some errors that affect intelligibility in that sentence. A possible correction could be as follow: “Although these 3 types of controllers are the most common ones, we also have those who are responsible for military aircraft and SAR (search and rescue).”

Once again, the last correction suggested by the potential instructor did not cover the main errors of the following sentence: "I like to emphasize that our main work tool is the communication". Some mistakes such as "I would like to... / working tool" were not even highlighted by the applicant. The lack of the (*–ing*) when forming adjectives is another common mistake among Brazilian students of English that requires further attention.

Final remarks

The aim of this study was to access cross-language transfer (Portuguese ↔ English) with respect to sentence building, in order to come up with meaningful ways of correcting L2 errors that derive from Portuguese-like constructions.

Considering that some of the corrections analyzed were made by controllers who were about to undertake a teacher training course to become AE Instructors, reflecting on the way they address structural errors and offer feedback is of great importance, as they will be teaching other controllers whose English proficiency is lower.

Despite the fact that most applicants (potential instructors) were quite proficient in English, many of them couldn't identify some errors that Brazilian students had made in their texts, due to cross-language transfer (Portuguese ↔ English). In other words, mistakes that are Portuguese-like, in terms of sentence building, are not usually identified as errors that may affect intelligibility by bilingual speakers (Portuguese – English), even by the most proficient ones.

Brazilian students tend to make similar mistakes that resemble the syntax and form of the Portuguese language, such as word order inversion (Subject /Verb /Object) and word-for-word translation. Once these errors are anticipated by language instructors, they can be addressed through more effective and meaningful correction strategies. Just by showing the learners the

accurate way of using the intended sentences in English doesn't seem to be very helpful, as they tend to keep on making the same mistakes. Recognizing the nature of the mistakes (local or global mistakes) and how close they are to the L1 form and use can help learners 'cross the interlanguage bridge' to get closer to the TL and its dimensions.

Taking into account that most of the analyzed errors derive from cross-language transfer, reflections on how the form, meaning and use (Larsen-Freeman, 2007) of both languages (English – Portuguese) relate to and differ from each other ought to be encouraged, so that the learners can actually produce accurate, meaningful and appropriate utterances in the TL. Language awareness goes far beyond language competence, as it requires a deeper understanding of the functioning of both languages and the way it affects comprehension.

References

Crystal, D. (2008), *A Dictionary of Linguistics and Phonetics* (6th ed.). Oxford: Blackwell.

Doc 9835 AN/453 (2010), *Manual on the Implementation of ICAO Language Proficiency Requirements*. ICAO publication.

Larsen-Freeman, D. (2007), *Grammar Dimensions 1:* Form, Meaning, Use (4th ed.). Heinle & Heinle.

Odlin, T. (1989), *Language Transfer*. Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9781139524537

Pacheco, A. (2022), *Reported speech in Aviation English*: an analysis through two specific corpora (:in) P. Tosqui-Lucks / J. Santana (Eds.), Aviation English [e-book]: a global perspective - analysis, teaching, assessment. Bookerfield, 55-70.

Santana, J. C. Global or Local Errors? Cross-language Influence in Aeronautical Communication. In: *Applied Linguistics Papers*, vol. 27/2, 2023, p. 63-71. https://doi.org/10.32612/uw.25449354.2023.2.pp.63-71

Selinker, L. (1972), *Interlanguage*. IRAL: International Review of Applied Linguistics in Language Teaching, 10, 209-231.

Zhao, Y. (2019), *Negative transfer of mother tongue in English.* Creative Education, Vol. 10, N. 5.

Ten years of GEIA – a lot to celebrate!

PATRÍCIA TOSQUI LUCKS[17]
Airspace Control Institute
patricialucks@fab.mil.br

Abstract
The aim of this paper is to highlight the most important features presented during the opening ceremony of the 10th GEIA Seminar, held in person in Sao José dos Campos - SP, Brazil in October, 2023. It celebrated the 10 years of the Aeronautical English Research Group sponsored by the Brazilian Department of Airspace Control and accredited by Brazil's National Council for Scientific and Technological Development. This informative text presents some data about members profile, research lines and topics, number of degrees achieved, international collaboration, events and publications, contributions to teaching and assessment, grants and awards and plans for the future.

Research on Aeronautical English

This paper reports on the main characteristics of the *Grupo de Estudos em Inglês Aeronáutico* (GEIA), an Aeronautical English research group supported by the Airspace Control Institute (ICEA), a military organization in Brazil. GEIA was created in 2013 and is accredited by Brazil's National Council for Scientific and Technological Development (CNPq). Joining CNPq as a recognized research group requires that members be researchers of affiliated institutions and fulfill some requirements.

Alberto Santos Dumont, the Patron of Aviation in Brazil, once said, "Inventing is imagining what no one has ever offered; it is believing in what no one else has stated; it is risking what no

[17] Patrícia Tosqui-Lucks is the Head of the Aeronautical English (AE) Training Sector for air traffic controllers at the Airspace Control Institute (ICEA), a Brazilian Air Force Organization. Since 2009, her main activities involve leading a team of Language Experts and Subject Matter Experts into developing materials, courses and training solutions for online and onsite AE instruction; coordinating teacher training courses and providing pedagogical support to the AE Program for ATCOs in Brazil. She is also a rater for the AE test for Brazilian ATCOs. She is the leader of GEIA (Aeronautical English Research Group) in Brazil and a member of the ICAEA Research SIG. Patricia holds a post doctoral research on Corpus Linguistics applied to material development and is the author and co-author of several papers about Aviation and Aeronautical English.

one has ever dared; it is accomplishing what no one has tried yet. To invent is to transcend." This spirit of innovation perfectly encapsulates GEIA's mission in advancing Aviation and Aeronautical English (AE). As we mark ten years of the Aeronautical English Research Group (GEIA - Grupo de Estudos em Inglês Aeronáutico), we reflect on a decade filled with significant achievements, collaborations, and milestones. GEIA's growth and success are a testament to the dedication and hard work of its members and the invaluable contributions from participants across the globe.

It is important to point out that we use the term *Aviation English* as an umbrella term to refer to the use of the English language by any aviation-related professionals including not only pilots and ATCOs, but also mechanics, meteorologists, flight attendants and others. The term *Aeronautical English* (AE), on the other hand, refers to the language used solely by ATCOs and pilots while communicating on the radio which is the object of the International Civil Aviation Organization's Language Proficiency Requirements (ICAO LPRs) as set out in ICAO Doc 9835 (Tosqui-Lucks and Silva, 2020). Therefore, AE refers specifically to pilot-ATCO communication, which is the line of most of the research conducted by GEIA members, aligned with ICEA's mission. Studies about the use and needs of English by other aviation professionals are the exception rather than the rule among GEIA's production.

The studies conducted by GEIA members focus on aspects of communication, language description, assessment, teaching and learning without losing sight of the multicultural context in which language is used. Since its creation, the group has made concrete contributions to the activities of the teaching and assessing activities of ICEA's Aeronautical English Section and, consequently, to the Brazilian Department of Air Traffic Control (Tosqui-Lucks, Santana & Silva, 2024).

Inter-institutional Collaboration

A cornerstone of GEIA's success is its broad network of collaborators. Our members are all from Brazil and come from diverse military and civilian institutions, such as: the Airspace Control Institute (ICEA), the Department of Air Traffic Control (DECEA), the Aeronautical School of Specialists (EEAR), the Technological Institute of Aeronautics (ITA), the National Civil Aviation Agency (ANAC), and prominent universities such as the Pontifical Catholic University (PUC-RS), the University of Campinas (UNICAMP), Sao Paulo State University (UNESP) and the University of Sao Paulo (USP). Some of our members complemented their studies at foreign universities in Australia, Canada, England, and the USA, with Brazilian Professor Malila Prado contributing from China. GEIA's global reach is further enriched by events featuring guest speakers from around the world. In the past 10 years, 24 academic degrees were obtained by GEIA members. *Figure 1* shows the distribution of the research conducted by GEIA members according to the three lines: AE Language Analysis and Description; AE Language Teaching and Learning and AE Language Assessment.

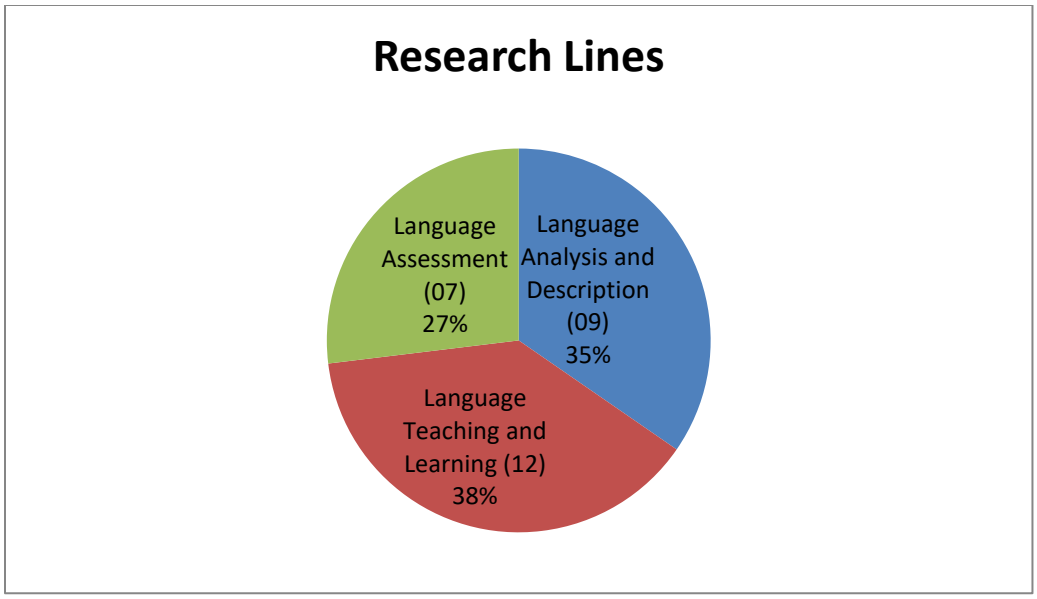


Figure 01 - Distribution of Research Lines

Some research themes are: material and course analysis, material design, test design, error correction, needs analysis, washback effect, interactive listening, pragmatics, pronunciation, lingua franca, lexical grammar, terminology, proficiency construct, validity evidences, interpretation and use argument, intercultural awareness, language as a human factor (LHUFT), among others. *Figure 2* shows the number of academic production of GEIA members in the past 10 years.

Female representation

It is important to highlight that GEIA members are mostly women, and many of them are mothers. More than that, it is remarkable that many of them got pregnant and had their babies while doing academic research (MA, PhD) and kept active, attending and presenting research findings at GEIA Seminars, in person and online, inclusively during the COVID 19 pandemic.

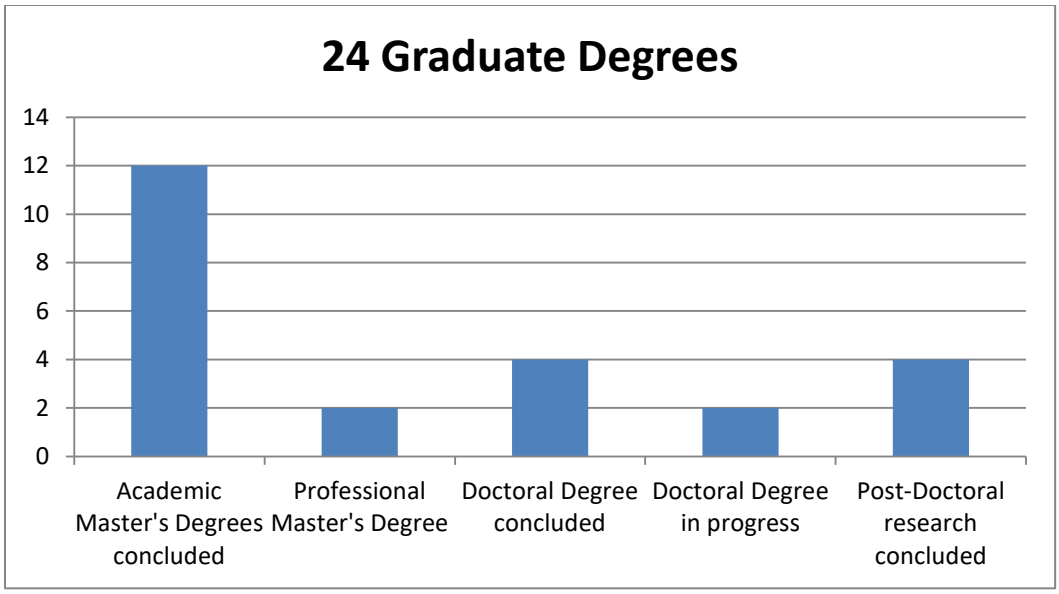


Figure 02 - academic degrees obtained by GEIA members in the past 10 years

Contributions to AE Teaching and Assessment

The research focus on aeronautical English teaching and learning has driven significant improvements in pedagogical practices. Key developments include the creation of a learner corpus from distance learning courses, which informs the design of training tools and courses. Notable initiatives like the Intensive AE course (CTP010) and Teacher Trainer course (CTP011) have integrated updated topics and methodological improvements, such as LHUFT and a lexical grammar approach into their curricula, reflecting ongoing research findings. The emphasis on interactive listening, pragmatic usage, and error correction has contributed to more effective teaching and assessment practices. GEIA Seminars have become a crucial professional development platform for AE instructors and raters, with many participants reporting enhanced teaching practices as a result of the seminars.

Since its foundation, GEIA has strengthened the validation process of the EPLIS test for Brazilian air traffic controllers, consolidating interpretations of the critical role of listening and

addressing issues with the ICAO rating scale. Washback investigations have identified gaps both in the test and in the policies regarding the implementation of ICAO language proficiency requirements. The Aeronautical English Assessment Literacy Course, a major initiative stemming from research on EPLIS's influence, exemplifies GEIA's commitment to the continuous improvement of assessment tools and processes.

Academic Contributions and Recognition

GEIA has made substantial contributions to academic literature through presentations, lectures, and workshops at national and international events in the area of Applied Linguistics, Linguistics, Language Testing, etc. We highlight the International Civil Aviation English Association (ICAEA) conferences, both in person and online, which have had presentations delivered by GEIA members in the past years. GEIA members are also part of the ICAEA Board and ICAEA Research Special Interest Group (SIG).

Publications include books (Scaramucci, Tosqui-Lucks & Damião), book chapters (Friginal, Roberts & Prado), e-books (Tosqui-Lucks & Santana), and special volumes in prestigious journals such as *The ESPecialist* (Tosqui-Lucks & Prado 2020 a, b) in Brazil and *Applied Linguistics Papers* (Borowska & Tosqui-Lucks, 2023 a, b), in a GEIA partnership with the Aviation Communication Research Centre and the Faculty of Applied Linguistics of the University of Warsaw – Poland. The Proceedings of the 10th Seminar are published by the Scholarly Commons of the Embry-Riddle Aeronautical University. Apart from that, GEIA members have been publishing papers and book chapters in prestigious journals and books hosted by Brazilian and international publishers. These contributions underscore GEIA's role in advancing aeronautical communication research and enrich the fields of applied linguistics and

aviation safety worldwide. A list of the dissertations and publications, as well as other relevant information is constantly updated at GEIA's website.[18]

Grants, Awards, and Achievements

GEIA members have been recognized with awards and grants, reflecting their outstanding contributions to the field. Notable recipients include travel awards from international Linguistics associations such as the *International Language Testing Association* (ILTA), the British Council Language Assessment SIG, the International Association of Teachers of English as a Foreign Language (IATEFL) and the *Association Internationale de Linguistique Appliquée* or International Association of Applied Linguistics (AILA); a commendation from the Brazilian Agency for Granting Post-graduate studies (CAPES) and individual nominations for several prestigious awards, highlighting the high level of our researchers.

GEIA's success is largely due to the dedication and enthusiasm of its members and the positive feedback from participants. Members' testimonials frequently highlight words like "opportunity," "development," and "international exchange," emphasizing the collaborative spirit and professional growth fostered by GEIA (Tosqui-Lucks & Santana, 2024). For the future, we envision expanding the areas of LHUFT and Teacher development in research and events, as well as fostering exchange with international researchers, institutions and associations.

Conclusion

The decade of GEIA's activities reflects an unwavering commitment to innovation, collaboration, and advancement in the field of AE. The continuous growth and significant impact of GEIA are testaments to the collective effort and dedication of its members and the invaluable

[18] https://geia.icea.decea.mil.br/geia/viiiseminariogeia/en-us

support of its participants. As we celebrate this milestone, we look forward to further achievements and contributions in the years to come. As the leader of the group, I am profoundly grateful for the commitment of our members and the support of our participants. GEIA's continued growth and impact are a testament to the collective effort and passion of our community. Here's to many more years of innovation, collaboration, and success!

References

Borowska, A. P. & Tosqui-Lucks, P. (eds.) (2023a), *Applied Linguistics Papers.* Aviation English Special Volume: Enhancing Efficiency in Aeronautical Communications, 9th GEIA Proceedings, 27 (1), University of Warsaw, Poland.

Borowska, A. P. & Tosqui-Lucks, P. (eds.) (2023b), *Applied Linguistics Papers.* Aviation English Special Volume: Enhancing Efficiency in Aeronautical Communications, 9th GEIA Proceedings, 27 (2), University of Warsaw, Poland.

Scaramucci, M. V. R., Tosqui-Lucks, P. & Damião, S. M. (eds) (2018), *Pesquisas sobre Inglês Aeronáutico no Brasil [Research on Aeronautical English in Brazil]*, Campinas: Editora Pontes.

Tosqui-Lucks, P. & Prado, M. (eds.) (2020a), *The ESPecialist Special Edition:* Aviation English, 41 (3). Available at: https://revistas.pucsp.br/index.php/esp/article/view/51059/33401

Tosqui-Lucks, P. & Prado, M. (eds.) (2020b), *The ESPecialist Special Edition:* Aviation English, 41 (4). Available at: https://revistas.pucsp.br/index.php/esp/article/view/51059/33401

Tosqui-Lucks, P. & Santana J. C. (eds.) (2023) *GEIA 10 years - Commemorative Bilingual Issue.* São José dos Campos, ICEA Publication. Available at: https://geia.icea.decea.mil.br/seminar_atti/inicial.php.

Tosqui-Lucks, P. & Santana, J. C. (eds.) (2022), *Aviation English – a global perspective.* Analysis, teaching, assessment. São Paulo: Bookerfield Press.

Tosqui-Lucks, P. & Silva, A. L. B. de C. (2020), Aeronautical English: Investigating the nature of this specific language in search of new heights, *The ESPecialist* Special Edition:

Aviation English, 41 (4). Available at: https://revistas.pucsp.br/index.php/esp/article/view/51059/33401

Tosqui-Lucks, P. Santana J. C. & Silva, A. L. B. de C. (2024). ‘10 years of the Brazilian Aeronautical English Research Group and its contributions to the field’. In: Friginal, E. Roberts, J. & Prado, M. *Aviation English Worldwide:* Applications for Assessment and Pedagogy. Bloomsbury, 2024 (in press).

FULL PAPERS

Reflections on raising communication awareness in pilot language training: Bridging gaps based on real-life occurrences from a LHUFT perspective

ALINE PACHECO[19]
Pontifical Catholic University of Rio Grande do Sul (PUCRS)
aline.pacheco@pucrs.br

Abstract
Aviation communication is a key component in the safety of operations of the aeronautical industry. It is complex in nature and encompasses a wide array of resources, from technological elements to individuals with different expertise and distinct cultural backgrounds. Such features must be accounted for in formal language training for pilots and air traffic controllers. Language proficiency in Aviation English is pivotal to ensuring that communication is effective, and it goes beyond what is traditionally covered in the skills regulated by the ICAO Language Proficiency Requirements. Prior to using the language, all participants should understand that they are part of a collaborative communication dynamic in which they must engage regardless of their status as native or non-native speakers of English. This article addresses some of the elementary communication skills that must be highlighted in pilot training in order to raise their metalinguistic awareness and provide them with tools for dealing with possible miscommunication problems. The main objective is to reflect on language used in real-life events, factors that should be accounted for when analyzing such events, and on training as an alternative for mitigating miscommunication in aviation. Activities using real-life miscommunication episodes analyzed through a Language as a Human Factor (LHUFT) perspective could be helpful and effective for that purpose.

Introduction

In March 2023, a flight featured a miscommunication event as it was being instructed to taxi towards the gate after landing at JFK airport in New York City, USA, from São Paulo, Brazil. The pilots demonstrated limited language proficiency: they did not understand orientations, did not read back instructions correctly, and consequently failed to comply. They seemed to be completely lost while taxiing in the airport and were repeatedly questioned by the controller about their procedures. At no moment did they linguistically signal that they did not understand instructions. The controller was clearly irritated with the pilots' attitude and did not

[19] Aline Pacheco is an Associate Professor at the Pontifical Catholic University (PUCRS), in Brazil. She holds a PhD and a Master's Degree in Linguistics and has been teaching English since 1993. Her main research interests are Aviation English, Language as a Human Factor, English for Specific Purposes and Corpus Linguistics.

facilitate communication, making use of informal language and non-standard phraseology in a passive-aggressive tone.

From a training perspective, this event can be used as an example of a number of factors that should be accounted for when preparing pilots and air traffic controllers to use language in aeronautical communication. Such factors should include lack of language proficiency and lack of situation awareness regarding cultural differences. Bearing in mind that all the players ultimately maintain a common objective, namely safety, communication must be understood as a shared responsibility (Stevens, 2023). However, as communication is hugely involved in the performance of practically all aeronautical activities, it is taken for granted that all the players must master communication skills regardless of whether they are native or non-native speakers of English and of the fact that they have different cultural backgrounds.

Since 2011, the International Civil Aviation Organization (ICAO) has mandated that all pilots and Air Traffic Control Officers (ATCOs) involved in international airspace operations must hold a proficiency certificate (minimum level 4) to be able to manage their activities. The Manual of Language Proficiency Requirements — ICAO Document 9835 (ICAO, 2010) — is the reference document issued by the Organization to guide communications in the sector along with recommendations for training and testing, which must be complied with by all Member States, regarding Aviation English (AE), the specialized language used in aviation (Tosqui-Lucks & Silva, 2020; Borowska, 2017; Pacheco, 2019). Given the complexity of aviation processes, it is not easy for stakeholders involved to cope with the challenges posed by conflicting interests. More recently, ICAO DOC 10197 (2024) as well as EUR DOC 46 (2023) are attempts to harmonize criteria for testing and assessing language proficiency in aviation worldwide.

Despite efforts to comply with ICAO guidance, tests can differ widely in how tasks are designed to assess the necessary communicative skills. It is not difficult for most pilots and ATCOs who are non-native speakers of English worldwide to receive a language proficiency endorsement on their license as they apply for tests. As for native speakers, professionals from Member States where English is spoken as a native language, such as the United States, can have their language proficiency documented in ways other than by a formal test procedure (Valdes, 2018). Some airlines require an English language proficiency assessment for all pilots and air traffic controllers in their flight training academy[20].

Whereas mandatory testing is intended to ensure that professionals involved in aeronautical operations demonstrate minimum language proficiency in order to perform their activities, training can also be thought of as a powerful tool to prepare these professionals to communicate as safely as possible in aviation (Dingee, 2018; Neville, 2004). In addition, pilots and ATCOs must undergo recurring training related to specific practices such as flight training or simulators, which supposedly involve communication However, specific training aimed at optimizing communication practices through better language use does not appear to be part of airline programs. For example, even pilots holding a flight license, when recruited by an airline, they still must go through tests and training. Yet, if they hold a language proficiency certificate or have an interview with the airline to be certified, it is assumed that they are linguistically prepared. Mandatory training on skills that focused on communications and language use could be an option to mitigate miscommunication issues.

This article addresses some of the elementary communication skills that could be improved in specific pilot language training to mitigate the effects of miscommunication. We revisit some of

[20] https://www.emiratesflighttrainingacademy.com/media/z1an2wdo/english_language_proficiency_english.pdf

the fundamental concepts of communication that are considered most relevant to this article as well as basic assumptions encompassed in the Language as a Human Factor (LHUFT) perspective. Next, a real life event is analyzed, based on the exact language used and on the interpretation of possible communication problems. The analysis shows that training should be used as a tool for enhancing communication strategies in order to mitigate miscommunication.

Fundamental concepts of communication

This section is devoted to revising some essential conceptions of communication that are usually taken for granted in communication dynamics but should be acknowledged and understood in professional interactions within complex systems. In a preliminary analysis of communications in the oil and gas industry, Pacheco (2023) observed the lack of standardized language structures and procedures, just as observed in aviation phraseology. However, although standard phraseology has long been used in aviation (Bocorny, 2008; Borowska, 2017), it poses risks either because it does not cover all the necessary communication functions for operations or because it is not widely used or followed (Molesworth & Estival, 2015). Bringing these essential concepts of communication to a metalinguistic level in language training will be a helpful tool in bridging this gap as language users become more aware of the communicative dynamics they are participating in.

The term “communication” is intrinsically associated with transmitting, sharing, and making something common (Pearson & Nelson, 2000). In a chapter devoted solely to communication, Flin et al. (2008) define it as “the exchange of information, feedback or response, ideas and feelings” (p. 69) and analyze the skills employed to communicate in the workplace, most particularly in aviation, oil and gas industry, and medical contexts. They

highlight that communication behavior is “a skill that can be structured by organizational policy (e.g., standard operating procedures) and can be shaped by training” (p. 69). Based on a two-way communication model, they illustrate the basic elements of a typical communication via radio transmission as seen in Figure 1 below.

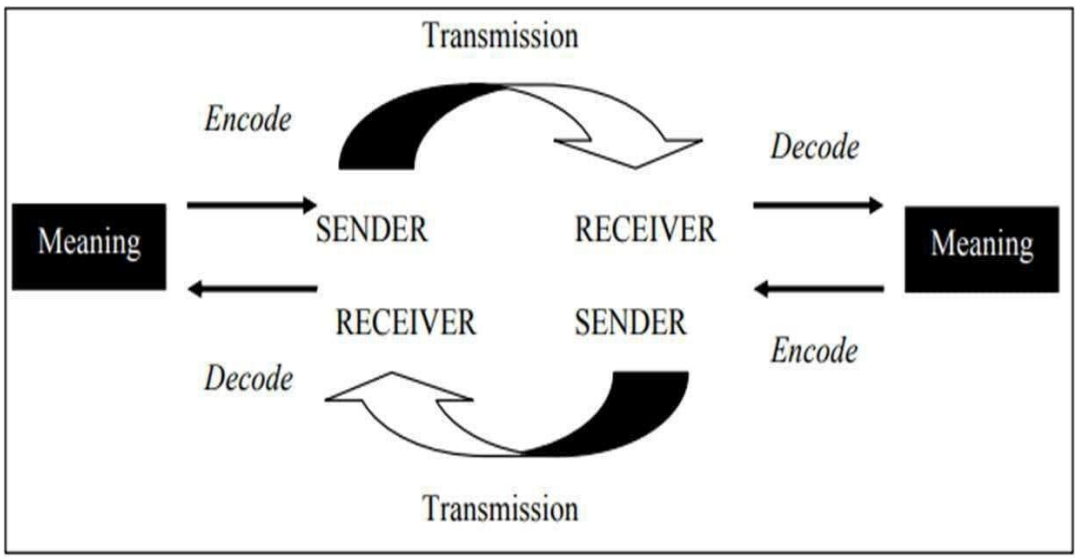


Figure 1: Simplified model of two-way communication

According to this schematic representation, the sender transmits information to the receiver, who must respond, then becomes the sender, thus forming a feedback loop. The process includes pivotal elements such as transmission, encoding, decoding, sender, receiver, and meaning.

Kanki and Palmer (1993) add that communication focuses attention on the task at hand and also functions as a management tool, dividing it into four components: what (the information itself), how (the means), why (the reason), and who (the persons).

In his foundational text entitled “Login and Conversation,” Paul Grice (1975) argues that conversations are cooperative efforts in which participants recognize a common purpose and a mutual direction, an inherent rule he calls the Cooperative Principle, which could be formulated

as “Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged” (p. 45). This principle rests upon four maxims: Quantity (be informative), Quality (be truthful), Relation (be relevant), and Manner (be clear). The first three refer more closely to what is being informed, whereas the latter refers to how the information is being transmitted. According to this framework, unsuccessful communication can be accounted for as a violation of one or more of these maxims: when one of the participants fails to follow one of these “rules,” for example by providing too little or too much information, the maxim of quantity is violated.

The understanding that communication is a collaborative process is key — it is implicit that communication will be successful if we do our best to help our interlocutor to comprehend what we mean. Although this notion may seem over-simplistic, even obvious at times, it is not. When we reflect about the industry itself — its dynamics, actors, and ultimately its training activities, which target practical solutions — we must bear in mind that elementary concepts must be fully comprehended at the metalinguistic level. In other words, the aforementioned concepts involved in communication can be considered too basic or even dated, but they feature key components that need to be perceived by all the players who communicate in aeronautical operations. The acknowledgement and understanding that the communication context has a sender, a receiver, a message, a means, a code, could probably lead to the deployment of strategies to facilitate the dynamics.

In-depth reflections on the communicative dynamics performed in aeronautical operations are likely to trigger variables that need to be accounted for in this complex context (Sexton & Helmreich 2000, Dietrich & Meltzer, 2002). Variables linked to procedural aspects include correct confirmation by the receiver of information originating with the sender, or in

aviation terms, “readback.” Other variables such as perceived differences in power between captains and first officers, pilots and ATCOs, and native and non-native speakers of English could be related to cultural factors (Zhu, 2011). Specific language problems will also be better analyzed once we have a clearer framework to account for them without disregarding the context in which they occur. With this in mind, Mathews et al (2023) offer a taxonomy of communication and language factors, which will be presented in the next section.

Language as a Human Factor (LHUFT) in Aviation

Communications can be a complex matter to analyze. The Language as a Human Factor in Aviation (LHUFT) perspective (Mathews et al., 2019, 2023) advocates for the inclusion of specific language factors in the range of aspects that should be considered highly impactful in operations. Originally presented in Mathews (2013), it is based on information extracted from investigations of accidents and incidents in aviation whose contributing or main causes were associated with communication. In accident investigations and human factors texts, language was frequently enclosed in the broader category of “communication”. The central claim is that language analysis should carry equal importance in the investigation of these kinds of events and that this is only possible if we explore specific language issues without missing out on closely associated factors. This model is understood as a first attempt to look at specific language factors in aviation communication within a spectrum that encompasses other factors that are not solely linguistic, but which are closely associated. Models such as the ICAO CAST Taxonomy (ICAO, 2012) and the Human Factors Analysis and Classification System (HFACS) (Wiegmann & Shappell, 2003) do not consider language factors specifically.

In Mathews et al. (2023), there are four kinds of communication factors: i) Procedural factors such as readback or hearback errors or omission of a call sign; ii) Technical factors that

may hinder communication, such as equipment failure; ii) iii) Cultural factors such as national, organizational, or individual practices, which may encompass aspects such as power distance, a safety culture, Crew Resource Management (CRM) training, lack of situational awareness regarding language or cultural differences; and (iv) Language factors, that refer to linguistic issues specific to the use of English in aviation. For example, the identification of language factors such as incorrect phraseology, the use of slang, or inadequate language proficiency can clarify crucial language problems arising in aeronautical communication, either by reinforcing good language behavior or by revealing structures that should be avoided. Situating language factors within the context of Communications more broadly helps clarify that language, while a fundamental aspect of communication, is not the same and that language factors merit their own consideration. In their contribution, Mathews et al (2023) focus the investigation of language investigation on four pillars corresponding to the four classical communicative skills in an attempt to allow for a closer look into the language problems featured in aviation accidents or incidents, as seen in Figure 2 below:

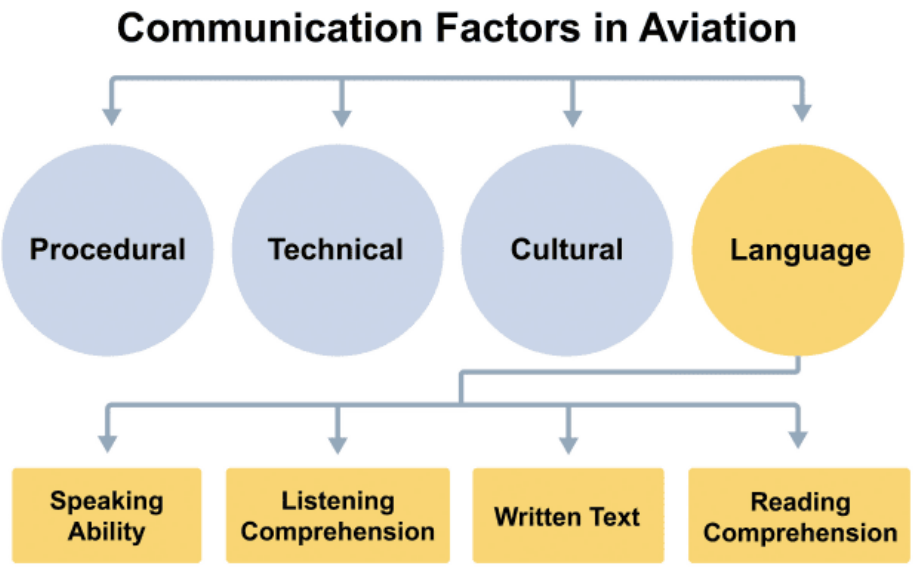


Figure 2. Communication factors in aviation

This model is presented in Language as a factor in the third edition of *Language as a Factor in Aviation Accidents and Serious Incidents: A Handbook for Accident Investigators* (Mathews et al., 2023, page 9), a resource manual that provides investigators with a wide range of detailed tools to better understand the use of language in aviation. Appendix A features this model and an extensive list of examples of elements of each factor and how they can affect communication. For instance, speaking ability is discussed as fluency problems, which includes speech rate too fast and speaker's language level not appropriate for varying levels of listeners (Mathews et al, 2023, p.17). Similarly, failure to perform instructed actions or performance of inappropriate actions are shown as examples of listening comprehension.

It should be noted that the authors reinforce that "When using this taxonomy, it is important to remember that language skills, in particular, apply to both native and non-native English speakers. While a lack of English language proficiency may be, at times, more easily identifiable for non-native English speakers, the use of inappropriate language by native English speakers also contributes to communication problems" (p. 15). Thus, from this perspective, both native and non-native speakers can evidence inappropriate use of language. For example, incorrect phraseology is a specific language feature that can be linked to cultural factors such as lack of situational awareness regarding linguistic or cultural differences.

In other words, the LHUFT perspective allows for a more comprehensive understanding of the use of language in operational contexts in aviation as it clearly presents and interconnects factors. Moreover, it portrays language factors in a clearer and more facilitated way for human factors specialists or accident investigators. Reflecting about these factors and discussing them through carefully designed training activities offers an opportunity for pilots and ATCOs to keep

them more clearly in mind and eventually have more tools to deploy in communication challenges (Pacheco, in print).

Analysis of Real-life Episode

Professional training in aviation has always heavily relied on authentic situations to illustrate behaviors or attitudes that should be reinforced or discouraged (Dingee, 2018). In language training for pilots and ATCOs, this can be particularly relevant as real-life samples are a rich source of information. Research with real-language data through specific empirical methods such as Corpus Linguistics have proved to be a particularly useful source of material in Aviation English (Pacheco et al, 2023; Prado & Tosqui-Lucks, 2019). Unfortunately, access to such data can be limited due to a number of reasons, ranging from the inherent difficulty involved in collecting data to ethical factors (Pacheco et al, 2023).

The language samples analyzed in this section occurred in March 2023 at JFK airport and were featured by VASAVIATION,[21] currently one of the few sources of real-life communication in aviation freely available for researchers, trainers, and testers. A Boeing 777 from São Paulo (Brazil) had just landed and was being instructed to proceed to a gate. The episode starts with a text from the pilot who has to step in and help with the miscommunication, commenting, "*A really good example of Kennedy Ground tormenting foreign LATAM pilots trying to figure out if their gate was open and if they were cleared in.*"[22] This pilot adds the event was an "ordeal" and that it was similar to the widely-known Air China and JFK Ground episode in 2012.[23]

[21] https://www.youtube.com/watch?v=82G_xh9KJxk from https://www.youtube.com/@VASAviation
[22] https://www.youtube.com/watch?v=82G_xh9KJxk
[23] https://www.youtube.com/watch?v=rgwB0WqU60k

In all likelihood, communication was ineffective for reasons such as: (i) lack of language proficiency on behalf of the pilots, most especially regarding the communicative functions of triggering actions and answering questions, confirming, and readbacks (ICAO, 2010); (ii) lack of previous airport knowledge on behalf of the pilots as evidenced by the poor coordination of communication with Ramp Control and Ground Control; (iii) lack of collaborative skills regarding communication on the part of the controller, who did not seem collaborative and made excessive use of plain language spoken at a high rate of speech and in passive-aggressive, sarcastic tones at times.

The Flight 8180 exchange with the JFK Ground Controller is presented in Table 1 below[24],with additional remarks in the rightmost column addressing issues that should be considered when dealing with communication or language problems.

Speaker	***Exchange***	***Remarks***
JFK GND	TAM 8180 heavy, what's your gate? Is it – are you cleared in?	
JFK GND	TAM 8180.	
TAM 8180	Expecting the airbridge, TAM 8180 heavy.	
JFK GND	Are you cleared in?	
TAM 8180	[Negative]	
JFK GND	Okay, well, then left G, left turn on 4L, hold short of F.	Unnecessary use of plain language
TAM 8180	Via G and turning right-left, TAM 8180 heavy.	Incorrect readback
JFK GND	Jetblue 411, Kennedy Ground, runway 31L, taxi right A, hold short J.	

[24] The exchange has been integrally extracted from the original source (VASAVIATION).

TAM 8180	Turning left on G and then via A, TAM 8180 heavy.	Inappropriate readback, instructions not meant for the pilot.
JFK GND	TAM 8180, that's not for you, sir.	Clear indication of misunderstanding to the pilot
JFK GND	Jetblueu 411, taxi right A, hold short J. TAM 8180 heavy, are you cleared in?	
TAM 8180	[Negative]	
JFK GND	Okay, as instructed. Turn left at G, turn left 4L, hold short of F.	Repetition of instruction, high rate of speech
TAM 8180	Okay, via taxiway G and then left to B, TAM 8180 heavy.	Incorrect readback (lack of information)
JFK GND	No, that's not what I said. Turn left G, turn left on runway 4L, hold short of F, TAM 8180 heavy.	Clear indication of misunderstanding by the pilot
TAM 8180	Okay, left now via B and hold short G, TAM 8180 heavy.	Incorrect readback
JFK GND	TAM 8180, you're not even listening, sir. If you're talking to the ramp, stop talking. Turn left on G, turn left on runway 4L, hold short of F.	High rate of speech, excessive plain language, passive-aggressive tone
TAM 8180	G and then hold short of F, TAM 8180 heavy.	Incorrect readback
JFK GND	TAM 8180 heavy, turn left on runway 4L, hold short of F.	
TAM 8180	Hold short of F taxiway, TAM 8180 heavy.	Incorrect readback
JFK GND	TAM 8180, I told you to enter 4L. Why are you on B? TAM 8180 heavy.	Clear indication of misunderstanding by the pilot
TAM 8180	Ground, TAM 8180, confirm.	
JFK GND	TAM 8180 heavy, hold short of F, contact the ramp, and you did not do what I instructed.	Different instruction (regarding ramp contact)

TAM 8180	Hold short of F and contact the ramp. Kennedy Ground, TAM 8180 heavy, unable. Jetbridge is […] at the moment.	Lack of proficiency; failed to explain the situation
JFK GND	TAM 8180, I have no idea what you're saying, sir. Hold short of F.	Clear indication of misunderstanding by the pilot
TAM 8180	Hold short of F, TAM 8180 heavy.	
JFK GND	TAM 8180 heavy, contact the ramp.	
TAM 8180	Contact the ramp, TAM 8180 heavy.	
RPA5627	I think he's saying the jetbridge is unavailable.	
JFK GND	TAM 8180 heavy.	
TAM 8180	Kennedy Ground, TAM 8180.	
JFK GND	TAM 8180	
TAM 8180	The ramp confirmed that H is open but […]	Lack of proficiency; failed to explain the situation
JFK GND	TAM 8180 heavy, are you cleared into the ramp?	
TAM 8180	Are we cleared to the ramp, TAM 8180.	Lack of proficiency: did not understand it was a question
JFK GND	It's a question. Are you cleared in?	
TAM 8180	Negative, sir, negative.	
JFK GND	Okay, then you can't go to the ramp then.	Unnecessary use of plain language
TAM 8180	[...]but they confirmed just the taxiway H is open. That's it.	Lack of proficiency: did not manage to explain the situation.
JFK GND	I need to know though. When you get there, are you cleared in? There's aircraft blocking the alley. I want to know if your ramp and all is open, otherwise I can't take you there.	High rate of speech, excessive plain language, passive-aggressive tone

RPA5627	Ground, Bryckyard 5627. We're listening and the ramp cleared by H into the ramp.	
JFK GND	TAM 8180 heavy, turn left F, taxi left A.	
TAM 8180	Okay F, via A, turn 8180 heavy.	
JFK GND	Thank you for that.	
RPA5627	No worries.	

Table 1: Exchange between Flight 8180 and ATCO

Some of the communication and language problems seen above can be better understood in terms of the factors displayed in the Taxonomy (Mathews et al, 2023). Incorrect readback may derive from a lack of language comprehension skills associated with procedural factors: here, the pilots do not seem to be familiar with which control to contact, Ground or Ramp. Perhaps they are multi-tasking, talking to both at the same time and confusing instructions. A lack of language proficiency is clearly identified as the pilots fail to successfully explain their problem, lacking structural and lexical skills to formulate their statement and comply with the target communicative function. Incorrect interpretation of a question structure is also due to a lack of language proficiency, that is, a lack of elementary skills needed to identify the structure of a question in English based on the verb heading the question and on intonation.

The controller successfully marks misunderstandings by the pilot by using clear utterances such as "*that's not for you, sir*," "*that's not what I said*," "*as instructed*," and "*I have no idea what you're saying, sir*." However, at times, he seems irritated with the pilots and makes excessive use of plain language in a passive-aggressive, sarcastic tone, as in: "*You're not even listening, sir. If you're talking to the ramp, stop talking*," "*I told you to enter runway 4L, why are you on B*?" "*Ok, then you can't go to the ramp, then*.," and "*I need to know, though. When you*

get there, are you cleared in? There's aircraft blocking the alley. I want to know if your ramp and all that is open, otherwise I can't get you there." This last utterance is particularly complex and reflects a situation in which the pilot does not seem to recognize a simple interrogative structure. That is, if the pilot cannot demonstrate enough language proficiency to understand a question such as "*Are you cleared in*?" it is reasonable to assume that he would not have the proficiency needed to understand excessive use of plain language spoken in a high rate of speech and in a sarcastic tone in addition to words such as "*though*" and "*otherwise*."

In the description established in the ICAO Rating Scale (ICAO, 2010) a pilot or and ATCO can be granted a level 6 in interactions if he or she "Interacts with ease in nearly all situations. Is sensitive to verbal and non-verbal cues and responds to them appropriately." (ICAO, 2010, Appendix A, A-7). The controller did not demonstrate it. Neither did he manage the speaker/ listener relationship effectively, as required for level 5. Lack of situational awareness regarding cultural differences is displayed in the taxonomy (Mathews, 2013) and is a factor that can be linked to the issue of a high rate of speech delivered in a passive-aggressive tone making interlocutors nervous in some cultures, affecting cognitive processing and, consequently, worsening language skills, which were evidently poor already. In response, pilot and ATC training should not only reinforce ICAO language skills such as discourse structure, vocabulary, and listening and speaking but also metalanguage skills such as developing awareness of the interlocutor's communicative intent and indications so to accommodate these ICAO skills in an appropriate manner in order to establish successful communication (Assis & Pacheco, 2020).

The Cooperative Principle (Grice, 1975), a previously mentioned contribution from linguistics, can also be applied to this event as a helpful resource. This framework maintains that

communication is a cooperative effort and will not work if one or more of the four maxims (quality, quantity, relevance, and manner) is violated. Given the pilot's lack of language proficiency, the maxims of quantity and relevance are probably violated. The pilot is not informative (quantity; he does not offer sufficient information as he is unable to formulate discourse structures that would explain his situation or to make these relevant (relevance). He omits relevant information when reading back incorrectly and fails to elaborate appropriate utterances to respond to the situation. However, the controller also violates the maxim of quantity as he offers more information than is necessary in plain language. Furthermore, the maxim of manner is violated by the controller as he speaks at a high rate of delivery at crucial moments in the exchange and uses a passive-aggressive, sarcastic tone that probably fails to elicit an appropriate response from the pilot.

Rate of speech has long been an issue in aeronautical communications (Trippe, 2018; Farris & Barshi, 2013; Prinzo et al., 2010; Dissanayaka et al., 2022). More recently, Stevens (2023) presented the results of a survey of 785 respondents from 92 countries who were native speakers of 52 different languages. Among other objectives, the survey to learn about the ideal rate of speech for safe and efficient radiotelephony communications from the aviation community (64% pilots, 21% controllers, 7% language specialists, 8% others). While ICAO recommends 100 words per minute (ICAO, 2010), the results of the survey showed that 60% of respondents said that an average of 150 words per minute is ideal, with very little difference among them. They also mentioned other factors that hinder aeronautical communications, including accent, intonation, non-adherence to standard phraseology, and use of slang.

While only 65 of all respondents were native speakers of English, non-native speakers, who numbered 720 in this survey, seem to have easier perceptions of Aviation English as a

specialized language. It would seem reasonable to assume that regardless of variables such as age or formal instruction, people who have gone through a foreign language acquisition process have reflected more deeply about language use than people who have never experienced that process. In contrast, native speakers may tend to assume that other speakers are equally proficient in all aspects of the language, including syntax, pragmatics, and semantics, when they should be aware of the effort the interlocutor is making in trying to communicate. This is especially true as English is widely used internationally as a lingua franca (Jenkins, 2009). In this context, Stevens (2023) reports a comment offered by one of the respondents, who said that "the main problem is when a native English speaker is assuming that the other side 'knows' as much English as a native speaker, and when there is an abnormal situation, they start to speak really fast" (p. 13).

This attitude tends not to be helpful. On the contrary, it may impact the speaker's cognitive capacities and result in language problems in comprehension as well as production. As previously noted, this article is based on a presentation given at an international event held in Brazilian Air Force headquarters in 2023. Following the presentation, one of the participants (a former ATCO in the US) mentioned that this may in fact be the purpose. In other words, ATCOs may resort to a high rate of speech and an unpleasant tone so as to shake up the pilots and make it easier for them to follow the issued instructions. If that is the case, there is a need for reflection and investigation of the positive effects that may come out of this behavior. What is clear is the need to enhance training so that pilots are well aware of it as a strategy and learn how to successfully manage the situation.

Non-native speakers should be constantly challenged to improve their proficiency and specific language skills. Similarly, it is equally important that native speakers, who are said to

sometimes lack empathy, not sticking to standard Phraseology, speaking clearly, or pausing, be challenged to develop communication skills that will facilitate aeronautical communications, including not only the importance of adhering to ICAO phraseology and of speaking clearly, at an appropriate pace, but also of cultural and linguistic awareness (Pacheco & Silva, 2024; Borowska, 2016). Training could be considered a key piece in this puzzle. Adding tasks that will foster both linguistic and metalinguistic awareness to activities already in use could be an alternative (Pacheco, in print). Tasks that approach accident or incident analysis based on language-related factors using the LHUFT perspective, the LHUFT taxonomy (Mathews et al., 2023), and the handbook for accident investigations (Mathews et al., 2023) could provide pilots and ATCOs with more and better information and strategies leading to optimized communication practices. Both native and non-native speakers, together or separately, could greatly benefit from reflections and discussions that such training tasks could offer.

Conclusion

This article proposed a reflection on some elementary aspects of communication that should be clearly acknowledged by all players in aviation operations through the analysis of a real-life event that features miscommunication. The pilot's lack of language proficiency was evidenced as he failed to adequately explain his situation. Although the controller assigned instructions correctly, asking questions and marking misunderstandings in procedures, he was not collaborative in the communication dynamics, instead making excessive use of plain language, a high rate of speech, and a passive-aggressive tone. Regrettably, this is one of many similar cases commonly known to have occurred, mostly at JFK airport.

It should be emphasized that despite the fact that aeronautical communications are based on English, it is also acknowledged that the language that is used is highly specialized — Aviation English, with its very own set of rules within linguistic spheres. For example, it consists of specific technical vocabulary, discourse structures that differ from those of English used for general purposes (Pacheco, 2022), and peculiar pragmatic choices (Prado, 2021). It is hard to imagine that someone who is fluent in English as a native or near-native speaker would also be proficient in aeronautical communications without being exposed to the field. Native or non-native speakers of any language do not own it: they are all language users, who share that language for a common purpose.

This understanding should be made clear to all players in aeronautical communications regardless of their status as native or non-native speakers or professional position. Yet, it is taken for granted. It is assumed that pilots and ATCOs know that people come from different cultures and backgrounds, and they are aware that they should accommodate linguistically as well as pragmatically to fit the communication purpose. As seen in the event described in this article as well as in similar events, this does not appear to be the case. In response, the elementary notions of communication presented in this article should be reinforced in language training activities.

Much has been discussed about the use of English in aviation: the distinctive nature of Aviation and Aeronautical English, Aviation English as a Lingua Franca, the use of English in aviation by native and non-native speakers of English, and intercultural communicative competence, among others[25]. These are all relevant topics that need to be better understood and explored in greater depth through research to foster discussions on how to optimize aeronautical

[25] Such as research conducted by the International Civil Aviation English Association (ICAEA) and the GEIA (Grupo de Estudos de Inglês Aeronáutico), referred to in the following websites https://www.icaea.aero/ and https://geia.icea.decea.mil.br/geia/publicacoes.php.

communications. However, the basics of communication, understood here as being aware that as a language user in an aeronautical scenario, each stakeholder will need to be collaborative and to compromise with the purpose of getting the message through, should always be reinforced in training. Additionally to mandatory language testing, mandatory language training could be an alternative to bridge this gap in aeronautical communication. Whether incorporated or integrated in existing required training or part of specific mandatory language training, activities that foster linguistic and metalinguistic awareness should promote a broader mindset regarding strategies to deploy in aeronautical communications so as to preserve operational safety.

References

Assis, L. & Pacheco, A. (2020). Communication in a multicultural flight deck environment: The influence of culture dimensions in communicative functions. *Revista CBTecLE*, 2(1): 441–462.

Bocorny, A. (2008). Descrição das unidades especializadas poliléxicas nominais no âmbito da aviação: Subsídios para o ensino de inglês para fins específicos [*Description of noun phrases in aviation: Subsidies for English for Specific Purposes*]. Doctoral dissertation, Universidade Federal do Rio Grande do Sul. http://hdl.handle.net/10183/15548

Borowska, A. P. (2016). *Do expert speakers need to practice a language?* Institute of Specialist and Intercultural Communication, University of Warsaw.

Borowska, A. P. (2017). *Avialinguistics: The study of language for aviation purposes*. Berlin: Peter Lang.

Dietrich, R., & Meltzer, T. (2002). *Communication in high-risk environments*. Hamburg: Linguistiche Berichte.

Dingee, A. (2018). *Delivering the right stuff: How the airlines' evolution in human factors delivered safety and operational excellence*. Lulu Publishing. Kindle Edition.

Dissanayaka, C. Y., Molesworth, B. R. C., & Estival, D. (2022). Miscommunication in commercial aviation: The role of accent, speech rate, information density, and politeness markers. *International Journal of Aerospace Psychology*, 33(1), 79–97.

EUR Doc 046 (2023). ICAO - International Civil Aviation Organization. European and North Atlantic Office. Guidance on the Harmonized Implementation of Language Proficiency Requirements and its Oversight.

Farris, M. C., & Barshi, I. (2013). *Misunderstandings in ATCO communication: Language, cognition, and experimental methodology*. Aldershot, UK: Ashgate.

Flin, R., O'Connor, P., & Crichton, M. (2008). *Safety at the sharp end: A guide to non-technical skills*. Aldershot, UK: Ashgate.

Grice, H. P. (1975) Logic and conversation. In P. Cole, & J. L. Morgan (Eds.), *Syntax and Semantics: Speech Acts (pp. 41–58).* New York: Academic Press.

Jenkins, J. (2009). English as a lingua franca: Interpretations and attitudes. *World Englishes*, 28(2), 200–207. https://doi.org/10.1111/j.1467-971X.2009

ICAO - International Civil Aviation Organization Commercial Aviation Safety Team (CAST). (2012). Human Factors, Common Taxonomy Team, Definitions and Usage Notes. Montreal, QC.

ICAO – International Civil Aviation Organization. (2010). *Manual on the implementation of ICAO language proficiency requirements* (2nd edition). Montreal, QC.

ICAO - International Civil Aviation Organization (2024) DOC 10197 “Test Design Guidelines - Handbook on the Design of Tests for the ICAO Language Proficiency Requirements. Montreal, QC. To be made available.

Kanki, B. G., & Palmer, M. T. (1993). Communication and crew resource management. In E. L. Wiener, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 99–136). Cambridge, MA: Academic Press.

Mathews, E. J. (2013). The taxonomy of communication and language factors in aviation: LHUFT Resource Center. *Embry-riddle Aeronautical University.* Available at: https://www.lhuft.org/taxonomy-of-communications-in-aviation

Mathews, E., J. Carson, S. Singleton, E. Valdes, & David, E. (2023), *Language as a Factor in Investigating language as a human factor in aviation*: A handbook for accident investigators (3rd. edition). Daytona Beach, FL: Embry-Riddle Scholarly Commons.

Mathews, E. J., Pacheco, A., & Albritton, A. (2019). Language as a human factor in aviation. In E. Friginal, E. Mathews, & J. Roberts (Eds.), *English in global aviation*: Context, research, and perspectives (pp. 55–78). London: Bloomsbury.

Mathews, E., J. Carson, S. Singleton, E. Valdes, and E. David (2023), *Investigating Language as a Human Factor in Aviation*: A Handbook for Accident Investigators, 3rd edition. Embry-Riddle Scholarly Commons.

Molesworth, B., & Estival, D. (2015). Miscommunication in general aviation: The influence of external factors on communication errors. *Safety Science*, 73, 73–79. https://doi.org/10.1016/j.ssci.2014.11.004

Neville, M. (2004). *Beyond the black box*: Talk-in-interaction in the airline cockpit. Aldershot, UK: Ashgate.

Pacheco, A. (2019). *English for aviation*: Guidelines for teaching and introductory research. São Paolo: EdiPUCRS.

Pacheco, A. (2022). Reported speech in aviation English: An analysis through two specific corpora. In M. A. A. Marques (Ed.), *Aviation English—A global perspective: Analysis, teaching, assessment* (pp. 55–70). São Paulo: Bookerfield.

Pacheco, A. (2023). Comunicação na indústria de óleo e gás: Contribuições da linguística aplicada e do Inglês para aviação. *Letras De Hoje*, *58*(1), e44471. https://doi.org/10.15448/1984-7726.2023.1.44471

Pacheco, A. (in print). Teaching practices and challenges for language as a human factor in aviation. In E. Friginal, J. Roberts, & M. Prado (Eds.), *Teaching and Assessment in Global Aviation English*. London: Bloomsbury

Pacheco, A., & Silva, T. F. (2024). The challenges of pilot language training for effective aeronautical communications in multicultural contexts. *Journal of Aviation/Aerospace Education & Research, 33*(2). https://doi.org/10.58940/2329-258X.2011

Pearson, J., & Nelson, P. (2000). *An introduction to human communication:* Understanding and sharing. Boston, MA: McGraw-Hill.

Prado, M. C. (2021). The pragmatics of aeronautical English: An investigation through corpus linguistics. *Revista de Estudos da Linguagem*, 29(2), 1381–1414. https://doi.org/10.17851/2237-2083.29.2.1381-1414

Prado, M. C., & Tosqui-Lucks, P. (2019). Designing the Radiotelephony Plain English Corpus (RTPEC): A specialized spoken English language corpus towards a description of

aeronautical communications in non-routine situations. *Research in Corpus Linguistics*, 7, 113–128. https://doi.org/10.32714/ricl.07.06

Prinzo, O. V., Campbell, A., Hendrix, A. M., & Hendrix, R. (2010). US airline transport pilot international flight language experiences, Report no. 3: *Language experiences in non-native English-speaking airspace/airports* (DOT/FAA/AM10/9). Washington, DC: Federal Aviation Administration, Office of Aerospace Medicine.

Sexton, B., & Helmreich, R. (2000). Analyzing cockpit communications: The link between language, performance, error, and workload. *Journal of Human Performance in Extreme Environments*, 5(1), 63–68. https://doi.org/10.7771/2327-2937.1007

Stevens, P. (2023). *What is the best rate of speech for safe, efficient R/T communication?* Independent Research Study. Available at: https://aviation-english.com/rate_of_speech.pdf

Trippe, J. (2018). *Aviation English is distinct from conversational English: Evidence from prosodic analysis and listening performance*. Doctoral dissertation, University of Oregon.

Valdes, R. (2018). A review and discussion: FAA English Language Standard for an FAA License. International Civil Aviation English Association ICAEA Workshop 2018: *Building on the ICAO LPRs – Communication as a Human Factor*. Daytona Beach, FL: Embry-Riddle Scholarly Commons. Available at: https://commons.erau.edu/cgi/viewcontent.cgi?article=1080&context=icaea-workshop

Wiegmann, D., & S. Shappell. (2003). *A human error approach to aviation accident analysis*: The human factors analysis and classification systems. Aldershot, UK: Ashgate.

Zhu, H. (2011). From intercultural awareness to intercultural empathy. *English Language Teaching*, 4(1), 116–119. https://doi.org/10.5539/elt.v4n1p116

Writing multiple-choice items for aeronautical English tests: Principles and practices

ANA LÍGIA BARBOSA DE CARVALHO E SILVA[26]
UFSCAr – Universidade Federal de São Carlos
albcsilva@ufscar.br

ANGELA CAROLINA DE MORAES GARCIA[27]
ANAC – National Civil Aviation Agency - Brazil
angela.garcia@anac.gov.br

DOUGLAS ALTAMIRO CONSOLO[28]
UNESP - Sao Paulo State University
douglas.consolo@unesp.br

Abstract
This article presents and discusses the main characteristics of multiple-choice test tasks and guidelines on how to write efficient multiple-choice test items that can be used in aeronautical English testing contexts. It originates from a workshop given at the 10th GEIA Seminar in Brazil, in October 2023. The purpose of the workshop was to not only present some important theoretical principles that aeronautical English test designers need to take into consideration when using multiple-choice tasks, but also to allow participants to create meaningful multiple-choice test items by using audio recording transcripts from real aeronautical communications. Three examples of test tasks are provided to illustrate how multiple-choice tasks can be used in the aeronautical English testing context. It is expected that the theory and practical examples shared in this article can help test item writers create relevant tasks, and can also contribute to more meaningful testing practices in such a high-stakes context as this professional one.

Introduction

Pilots and air traffic controllers (ATCOs) use the radiotelephone to communicate. These communications usually happen in English, especially in the case of international operations. Therefore, pilots and ATCOs need to speak and understand English. Although most of the

[26] Ana Lígia Silva is a temporary lecturer at the Department of Languages, at the Federal University of São Carlos (UFSCar). Lígia holds an M.A. and a Ph.D. in Applied Linguistics (Unicamp), with a Post-Doc in Linguistic Studies (UNESP- Columbia University). Her research interests include language assessment and English for pilots.

[27] Angela Garcia has been with the Aeronautical English test for Brazilian pilots at ANAC, Brazil, since 2008. She completed her master's degree in Language Testing from Lancaster University, UK, in 2015. In 2023, she finished her Ph.D. in Applied Linguistics and Discourse Studies from Carleton University, Canada.

[28] Douglas Altamiro Consolo holds a B.A. in Linguistics and an M.A. in Applied Linguistics from UNICAMP, Brazil, and a Ph.D. in Applied Linguistics from the University of Reading, UK. He conducted postdoctoral work at UNICAMP, at the University of Melbourne, and at UNAM. He is a Senior Professor at UNESP.

communication follows a prescribed set of standard phrases, called phraseology, they also need to resort to plain language, whenever phraseology does not suffice. Since 2011, pilots and ATCOs need to demonstrate through language assessment their ability to speak and understand the language used in radiotelephony communications following the International Civil Aviation Organization (ICAO) policies. Thus, ICAO Doc 9835 (International Civil Aviation Organization, 2010) presents some recommended practices for aeronautical English training and assessment. Recently, ICAO – with support from the International Civil Aviation English Organization (ICAEA) – has published Doc 10197 (International Civil Aviation Organization, 2022), which includes additional test design guidelines and aims to reduce the recurrent misinterpretations of certain aspects of Doc 9835.

In testing language proficiency, it is very important to use a range of different tasks, especially the ones that simulate, as much as possible, the authentic real-world language use situation. Therefore, aeronautical English assessments must include tasks that allow test takers to speak and interact in a similar way they would in their work environment (such as role plays). Nevertheless, multiple-choice items can be complementary used, given their advantages related to practicality and reliability.

This article presents the theoretical basis for the use of multiple-choice items, or questions (henceforth MCQs) in aeronautical English assessing instruments, followed by practical examples of how to use these tasks in the process of test design. It originates from a workshop presented by the three authors of this article at the international seminar called the 10th GEIA Seminar, which was held in São José dos Campos, São Paulo, Brazil, in October of 2023, promoted by the Aeronautical English Research Group (GEIA), from the Institute of Air Space Control (ICEA).

The workshop lasted one hour and thirty minutes and took place twice on the same day. Its audience consisted of Aeronautical English teachers, students, researchers, material designers, test developers, pilots and ATCOs with little or no previous knowledge of test-task design to guide the audience, step–by–step, in preparing MCQs to be used in aeronautical English tests. We now share our experience as aeronautical English and/or language assessment researchers, willing to bridge the gap between research and practice.

In the first part of the workshop, theoretical bases of language assessment by means of MCQs, and guidelines and procedures on how to design MCQs, were presented, together with a few examples of MCQs. All the information and the examples were discussed with the workshop participants. In the second part of the workshop, a "hands-on" activity was conducted in small groups. The participants were given a handout with the transcript from an audio excerpt containing a pilot-ATCO communication including an emergency situation. They were asked to write a MCQ based on the language sample. In the last part, the MCQs prepared by the participants were presented to the whole group and discussed.

We continue by providing a theoretical background on aeronautical English assessment, followed by guidelines principles and guidelines on how to produce adequate MCQs. Then examples of test tasks discussed in the workshop at the 10th GEIA Seminar are provided. A brief conclusion ends the article.

Theoretical Background

First of all, we would like to point out a terminological difference between *aviation English* and *aeronautical English*, as we adopt the latter in this study. The English designations for aviation and aeronautical English have been used, with some frequency, with similar

meanings. However, authors such as Borowska (2017), Scaramucci, Tosqui-Lucks & Damião (2018), Silva (2019); Tosqui-Lucks & Silva (2020a; 2020b) and Silva (2016; 2022) defend the existence of a significant distinction, namely: aviation English is the name given to the English language for communications between various aviation professionals, for example, engineers, mechanics, among others. Aeronautical English, in turn, is a subset of aviation English, i.e. the language of pilots and international air traffic controllers, comprising two linguistic registers, *aeronautical phraseology* and *plain aeronautical English* (Borowska, 2017).

Lately, a few studies (Monteiro, 2019; Silva, 2022, Garcia 2023) have focused on particular aspects of language test design and test tasks, for pilots and air traffic controllers (ATCOs). Authors agree that using only one assessment instrument, or type of test task, does not suffice to collect enough evidence of the test-takers' communication abilities. In this regard, the recently published ICAO document *Doc 10197* (International Civil Aviation Organization, 2024), item 4.2.4, clearly states that "A test instrument which does not contain a sufficient range of task types designed to assess a specific language knowledge and skills is likely to be ineffective in its ability to adequately represent the required range and complexity of language for assessment purposes and will therefore have lower validity (i.e. allow less valid interpretations to be made on the basis of test results)" (International Civil Aviation Organization, 2024, p. 4-3).

In the literature on Language for Specific Purposes, more precisely in the field of aeronautical English, it is known that language proficiency should, as much as possible, be directly assessed through a performance test, in which the tasks simulate authentic real-world language use situations (Douglas, 2000; Knoch & Mcqueen, 2020; Silva, 2022; Garcia 2023). Nevertheless, in certain circumstances, for example, when a specific language macro-skill, such

as listening, or when a separate point of knowledge, such as grammar, technical vocabulary, or pronunciation, needs to be assessed, multiple-choice items can be used as test tasks, given their advantages related to practicality, reliability, and validity. In that sense, Doc 10197, suggesting the test design Criteria # 4, advocates that "Test instruments need to comprise distinct sections with a range of appropriate test task types". The same document, ICAO (2024, p. 4-4), item 4.4.1, emphasizes that "A variety of task types, items, communication contexts and content need to be included throughout the test instrument to ensure the domain and range of language proficiency levels are effectively sampled for assessment purposes".

A previous version of the TDGs (ICAEA, 2019) portrays a keen definition of "test instrument", that is worth bringing to our discussion in this article: "A test instrument is made up of sets of test tasks and test items (questions) constructed and assembled in a meaningful way and linked to test content and stimuli (recordings, videos, and picture prompts) so that the language level(s), language knowledge and language skills the test is designed to measure, occur in a predetermined and controlled way" (International Civil Aviation English Association, 2019, p. 8). With that in mind, it is possible to assume that an appropriate test instrument, with different types of tasks and questions, can contribute to the reliability of the inferences stakeholders ought to make from test results. In other words, since reliability is one type of validity evidence, it is strongly recommended that a variety of tasks be included in the test design.

MCQs tend to be very practical and objective, in the choice of one correct answer only. Because they are "cheap, fast, and simple to administer" (Polat, 2020, p. 77), their results allow for answer standardization. Once the correct alternatives have been defined, MCQs are less time-consuming in correction and scoring. In terms of reliability, it is well known that results of

MCQs can be displayed in absolute numbers and/or in percentages, allowing for relatively clear comparisons with other similar tests, with a positive impact on validity.

As for their main purpose, multiple-choice questions are frequently used for the assessment of receptive skills, for example, listening and reading comprehension. Designing multiple-choice test items, however, is not that simple. It is supposed to follow several principles and guidelines to produce unambiguous questions and challenging alternatives and, as a result, valid assessing instruments.

Given the aforementioned advantages of including multiple-choice questions in language tests, mainly justified by practical reasons, this type of question has been frequently used . A study developed by Souza (2024, in press) shows that multiple-choice questions, although rather traditional, are quite often used in aeronautical English assessments during aeronautical English courses. The aforementioned study, which included a questionnaire answered by 38 participants, aimed to inform the development of a teacher training program for aeronautical English teachers in terms of urgent areas that need to be prioritized according to the specificities of the local educational practices.

Partial results of Souza's study, above mentioned, were showcased, in 2023, at the SEMAPLE Conference, in Brazil (Table 1), demonstrating that MCQs are mostly used in aeronautical English tests designed by both categories of participants in her study, i.e. Specific Matter Experts (SMEs) and Language Experts (LEs), in comparison to other formats of test tasks, such as short answers, true or false, gap filling, ordering of events, individual/pair/group oral interviews, role-play, reading aloud, oral picture description, oral discussion, and presentations.

Table 1 - Assessment tasks/activities

	SME	LE
MULTIPLE CHOICE QUESTIONS*	4,16	4,92
Questions and written short answers	2,64	2,62
True or false questions	3,48	3,00
Fill in the blanks questions	3,28	3,54
Ordering events questions	2,92	3,08
Individual oral interview*	3,36	4,23
Pair or group oral interview	2,60	3,15
Role-play	3,68	4,00
Reading aloud*	2,75	3,85
Oral picture description	3,84	4,31
Oral discussion	3,76	3,85
Oral presentation	3,48	4,00
*Statistical significance ($p<0,05$) Size of effect $0,23>r<0,25$		

Source: Adapted from Souza (2023)

Given the frequent use of MCQs in aeronautical English for teaching and assessment purposes, as shown in Table 1, it is possible to infer the relevance of the discussion proposed in this article. Thus, in the next section, we revise the main aspects to be observed when designing adequate and high-quality MCQs. It is important to emphasize, however, that it is not our intention to present prescriptive and absolute rules on how to develop outstanding MCQs. Instead, our contribution seeks to provide a few reminders, or guidelines, so that crucial aspects related to the design of a test instrument, including MCQs, are not forgotten or left behind.

Designing multiple-choice test items

A multiple-choice test question (MCQ), also referred to as a discrete-point item, is one of the test techniques in language testing in which candidates are typically asked to respond by giving one correct answer from the available options (Hughes, 2003).

Although very flexible and practical to correct, creating effective multiple-choice items requires great skill – as well as careful editing, reviewing, and trialing (Green, 2014). Among other techniques to design test questions, multiple-choice items are frequently used for the assessment of receptive skills (reading and listening). It can also be used to assess the integration of ideas across texts as well as vocabulary and grammar in isolation.

Among the features of multiple-choice test items, the following positive aspects are worth mentioning: 1) they are relatively easy to answer since test-takers are simply expected to choose alternatives; 2) they make tests relatively less time-consuming to be taken; 3) their answers are easier to be scored – mainly because they can be machine-scored and their results: a) allow for answer standardization; b) can be easily displayed in percentages, and c) allow for relatively clear comparisons with other similar tests.

On the other hand, there are limitations to the use of multiple-choice test items, for example: 1) they provide test-takers with 'standard', previously prepared answers; such questions usually do allow for additional ideas to be included in the answers, or for creativity on the part of test-takers; 2) they may be predictable. Test-takers can try and guess the best answer to be chosen, or decide to choose, for example, the same alternative to answer all the questions in a test, which may guarantee a score different from null; 3) they usually do not test how much

knowledge test takers have about a given content, but they indicate what test takers (probably) know about what is included in the question and in the correct alternative.

According to Allanson & Notar (2019, p.2), "A major disadvantage with MCQs is that very few educators are trained or possess skills in writing quality MCQs despite guidelines in numerous publications". Such premise is corroborated by Souza (2014), who emphasizes the need for more efforts towards a deeper Language Assessment Literacy (LAL) among teachers and instructors of aeronautical English, who need to become more knowledgeable of the nuances in writing high-quality MCQs in aeronautical English tests.

Format of multiple-choice test tasks

Regarding the MCQ format, it is usually constituted of a stem – a question or the first part of a sentence, and two or more alternatives. The alternatives include the correct answer and (a) distractor(s), which is/are the incorrect alternative(s). For example:

STEM: Which statement below indicates good practice in writing multiple-choice items?

ALTERNATIVES:

a. Always use complex multiple-choice format (e.g., A and D, D and C, all the above, none of the above, A, B and C). (DISTRACTOR)

b. The text in the alternatives should be approximately the same size. (CORRECT ANSWER)

c. Ensure there is at least one half-correct answer and one fully-correct answer. (DISTRACTOR)

(d) Include items based on opinions. (DISTRACTOR)

Allanson & Notar (2019, p. 3) enumerate a few different types of MCQs, such as: "Single Correct Answer: Only one alternative option is correct where the remaining options are incorrect

or distractors. According to Vacc, Loesch, and Lubik, 2001, this is the most commonly used variety of MCQs. Best Answer: Similar to single correct answer format with the exception that one answer is clearly more correct than the other options, and students are directed to identify or select the ―best answer. Negative: The opposite of single correct answer variety where one option is incorrect and the remaining options correct. Combined Response: One or more alternative options are correct and identified by selecting sets of letters or numbers (i.e.: 1, 2, and 3; a and b only)."

Guidelines to write multiple-choice test items

A taxonomy of multiple-choice item-writing rules, presented by Haladyna & Downing (1989), adapted in Table 2, suggests a few procedures and content-related aspects that should be considered in the process of a multiple-choice test task design:

Table 2 Aspects to be considered in multiple-choice question design

PROCEDURAL	**CONTENT**
Use either the best answer or the correct answer format.	Base each item on an educational or instructional objective.
Avoid the complex multiple-choice (Type K) format. (e.g., A and D, A and C, All the above, None of the Above, A, B and C, etc.)	Focus on a single problem.
Format the item vertically, not horizontally.	Keep the vocabulary consistent with the examinees' level of understanding.
Allow time for editing and other types of item revisions.	Avoid cueing one item with another; keep items independent of one another.
Use good grammar, punctuation, and spelling consistently.	Use the author's examples as a basis for developing your items.
Minimize examinee reading time in phrasing each item.	Avoid over-specific knowledge when developing the item.

Avoid trick items, those which mislead or deceive examinees into answering incorrectly.	Avoid textbook, and verbatim phrasing when developing the item.
	Avoid items based on opinions.
	Use multiple-choice to measure higher-level thinking.
	Test for significant material; avoid trivial material.

Source: Adapted from Haladyna & Downing (1989)

Frary (1999) also presents a few recommendations to guide the design of MCQs. As for the content, MCQs should ask for more than simple knowledge of facts. For example, all the alternatives should contain elements of correctness, making the choice for the better one more challenging. He also suggests that superfluous information should be avoided at the introduction of the question and in the alternatives. Thus, objectiveness should be the rule. As for the alternatives, Fray (1999) recommends caution with typos and grammatical inconsistencies between the stem and the options. He also suggests not to use determiners, such as *all* or *never;* also to be avoided is the phrase *all of the above* because the recognition of one or two wrong answers would give away the response, even if the answer to the other options is completely unknown to the test taker.

Alternatives (i.e. the correct answer and the distractors), in MCQs may be based on students' common linguistic mistakes in grammar and vocabulary, for example. In the English language, common grammatical mistakes can be in the areas of prepositions, verb forms and tenses, and word order. Distractors can then include these inadequate/wrong uses of

grammatical items. In aeronautical English, differences in pronunciation, numbers, and operational knowledge-related words can also be included in the alternatives as distractors.

Another important point to be considered in the design of multiple-choice tasks is that comprehension questions in listening or reading passages must not contain grammatical mistakes in distractors. Better yet, alternatives should contain right or wrong *textual* information only.

When producing a set of MCQs for a test, the correct alternatives and the distractors should be organized in sequences that are not "predictable", and the correct alternatives should be listed in different positions (different alternatives) distributed in the questions so that the test contains approximately the same number of correct alternatives for each position. For example, in a test with ten multiple-choice questions, each question with four alternatives (a, b, c, d), in three questions the correct alternative is "a"; in two questions the correct alternative is "b"; in three questions the correct alternative is "c", and in two questions the correct alternative is "d", and all of them randomly distributed in the test. It is also strongly recommended to avoid using the adverbs *never* or *always* when phrasing the alternatives.

One more thing to be considered is that sentences or phrases in correct alternatives and the distractors should be of approximately the same length; sentences or phrases that are too short or much longer than the other alternatives may stand out and give the impression of being the correct answer.

Practical Application: Examples of Test Tasks

In this section, we aim to illustrate how multiple-choice questions can be used in teaching and testing aeronautical English. With that in mind, we refer back to the second part of our

workshop at the 10th GEIA Seminar, when we allowed participants to apply what they had learned in the first part of the workshop. We asked them to create multiple-choice listening tasks based on a recorded interaction between a pilot and an ATCO.

Participants were told to consider the following:

- If the purpose of the test was to assess pilots' or ATCOs' language proficiency, according to DOC 10197 (ICAO, 2024), "separate test instruments need to be designed for pilots and controllers" (p. 2-1);
- The level of proficiency of potential test takers (e.g., whether it would be a test to assess up to level 5, according to the ICAO Rating Scale (ICAO, 2022), or a test to assess level 6;
- The level of difficulty of the test item (very easy, easy, medium, difficult, or very difficult). This would be pre-determined by the item writers based on their experience, for the trialing, but later reviewed, based on actual data from test-takers' performances;
- The construct that the item was addressing based on Figure 1 below. Participants were explained that test items could address one or more items of the construct.

Operations (can do)	Conditions (under what circumstances)
• Recognize common, concrete, aviation-related words and expressions (understanding numbers and what they refer to is crucial), • Understand uncommon, unfamiliar words and expressions (including nuanced vocabulary, idioms, and collocations) • Understand both plain English and phraseology • Understand main ideas • Extract specific meaning • Understand basic and complex grammar • Understand messages that differ from what was expected • Identify misunderstandings • Use strategies in order to understand (e.g., ask for clarification when comprehension fails) • Understand cultural subtleties / recognize ATCOs' attitude and intentions (e.g., politeness markers, sarcasm, professionalism, anger)	• Speech at different rates of delivery (from 100 to 220 words per minute) • Different accents and registers (including when pronunciation, stress, rhythm or intonation interfere with ease of understanding) • Short and long transmissions (including transmissions with more than three items) • Transmissions with lack of orality features (e.g., redundancy, inappropriate phrasing and pausing, slowness, with many fillers, without appropriate discourse markers or connectors) • With background noise • During increased workload • In congested radio frequencies • Transmissions with low quality

Figure 1 Definition of the construct of aeronautical English listening test for pilots Reprinted from Garcia (2023, p. 180).

The radiotelephony communication between a pilot and an ATCO used in the workshop is shown in Figure 2. Two subject-matter experts (SMEs) assisted the authors in transcribing the recording, which was taken from the page *Interesting Recordings* available at the website liveatc.net (https://www.liveatc.net/recordings.php). Participants were asked to first listen to the dialogue without looking at the script, and then listen to it again while reading the script

projected on the screen. Then, they should create multiple-choice test items with four options using Mentimeter (https://www.mentimeter.com/pt-BR), a software that helps to create interactive presentations. Participants were encouraged to follow the recommendations and best practices in creating multiple-choice test items discussed earlier.

ATCO 1: Air Canada 447, turn left 090, and intercept localizer, cleared ILS approach 05.

PILOT: Turn left 090, ah…, say (again to) … 447.

ATCO 1: Intercept the localizer, cleared ILS runway 5.

PILOT: Ok, cleared ILS approach runway 5, Air Canada 447.

PILOT: And Mayday, Mayday Mayday, Air Canada 447, we're getting ah…smoke fumes in the cockpit.

ATCO 1: Canada 447, are you ok to do the approach?

PILOT: Yes we need ah… the approach and no delays, please.

ATCO 1: Canada 447, I just need something from you, I need souls on… souls on board, and fuel remaining.

PILOT (lower volume): Ok, we have ah… we have 117 souls on board and we have…3,700 (litters of) fuel.

ATCO 1: (Again) for fuel.

PILOT: 3,700.

ATCO 1: Canada 447, speed at discretion, the Tower knows what's going on, call them now 118.7.

[unintelligible]

ATCO2: Canada 447, Toronto Tower.

PILOT: Go ahead, 447, Air Canada 447, good.

ATCO 2: Canada 447, you are cleared to land runway 05, wind 130, 5.

PILOT: Cleared to land 05, Air Canada 447.

PILOT: And just confirm for Air Canada 447, do you know we are stopping on the runway, you have an emergency vehicle for us?

ATCO 2: Canada 447, is affirmative.

PILOT: Roger.

ATCO 2: Canada 447 contact 122.67, you can talk to the emergency vehicles on that frequency.

PILOT: Sorry, I stepped on you, what's the frequency again please for 447?

ATCO 2: Air Canada 447, 122.67.

PILOT: 22.67. Air Canada 447.

PILOT (a lot of background noise): Hey guys, there is a delay here, we have any smoke or engine fire, or anything that you can see?

PILOT (a lot of background noise): Ok, we have smoke in the flight deck starting to dissipate, but we have smoke in the cabin as well, we lost control of our heat and the cabin temperature is just going over 30 degrees Celsius. Ah…we're gonna do what we can here to try and ah… fix that, but nonetheless bear with me for a couple of minutes, and keep monitoring and let us know if you see any smoke, please.

Figure 2 Dialogue between pilot and ATCO shown in the workshop

As the duration of this pilot/ATCO communication was quite long (121 seconds), participants were instructed to choose an excerpt for the multiple-choice item that they would create. Figure 3 provides an example of a listening multiple-choice item that could be used in either a pilot or an ATCO test.

Item stem

You are going to listen to an excerpt of a communication between a pilot and an air traffic controller. What problem is the pilot facing?

Excerpt taken from the dialogue shown in Figure 2 (not shown to the test taker)

ATCO 1: Air Canada 447, turn left 090, and intercept localizer, cleared ILS approach 05.

PILOT: Turn left 090, ah…, say (again to) … 447.

ATCO 1: Intercept the localizer, cleared ILS runway 5.

PILOT: Ok, cleared ILS approach runway 5, Air Canada 447.

PILOT: And Mayday, Mayday Mayday, Air Canada 447, we're getting ah…smoke fumes in the cockpit.

ATCO 1: Canada 447, are you ok to do the approach?

PILOT: Yes we need ah… the approach and no delays, please.

ATCO 1: Canada 447, I just need something from you, I need souls on… souls on board, and fuel remaining.

PILOT (lower volume): Ok, we have ah… we have 117 souls on board and we have…3,700 (litters of) fuel.

ATCO 1: (Again) for fuel.

PILOT: 3,700.

Alternatives

A) Shortage of fuel.

B) Engine fire

C) Instrument malfunction

D) Smoke onboard **(correct answer)**

Figure 3 First example of a multiple-choice item that could be used based on the recording provided

We decided to use the word "onboard" instead of "cockpit", so that the alternatives use a different word from what test takers heard, although the former is less specific than the latter. All options should be attractive to some test takers, otherwise they will not discriminate between test takers. If no one chooses one of the options, that option is not working appropriately. For this reason, test item writers need to carefully think about possible options that could confuse test

takers who could not understand the recording well. Alternative a, for example, could be selected by those who understood the word “fuel”, which was said three times. Alternative B could be selected by the test takers who could understand smoke or fumes, but not exactly the position. Fire onboard would not be a good distractor, as test takers could consider it to be correct since “where there is smoke, there is fire.” Of course, when the item is trialed, test developers have the opportunity to reconsider the options before launching them. A statistical analysis of the test taker's performance in the trial would help to take actions to improve the distractors by, for example, changing an item that was not chosen by anyone. Test developers would also need to check whether test takers who performed better in the test overall got an easier item right, since, if they did not, this could be an indication that there might be something wrong with the item.

To define the construct to be measured by the item (as seen in Figure 1) and its level of difficulty, the item writers would need to consider the operations (what test takers can do) and the conditions (under what circumstances). In terms of operations, item writers could consider that test takers would be expected to understand, for example, both plain English and phraseology, to recognize common, concrete, aviation-related words and expressions, and to extract specific meanings. In terms of conditions, they would have to consider the speech rate (how many words per minute? Is it a slower pace? A faster pace?), the accents (how much does it interfere with the ease of understanding?), the amount of information (is it a short or a long transmission?), the background noise (how much does it interfere with ease of understanding), the quality of the transmission, the lack of orality features, etc.

Another example of an item that could be used in a listening test for pilots or ATCO is shown in Figure 4.

Item stem

You are going to listen to an excerpt of a communication between a pilot and an air traffic controller. What is happening in this situation?

Excerpt taken from the dialogue shown in Figure 2 (not shown to the test taker)

ATCO 2: Canada 447, you are cleared to land runway 05, wind 130, 5.

PILOT: Cleared to land 05, Air Canada 447.

PILOT: And just confirm for Air Canada 447, do you know we are stopping on the runway, you have an emergency vehicle for us?

ATCO 2: Canada 447, is affirmative.

PILOT: Roger.

ATCO 2: Canada 447 contact 122.67, you can talk to the emergency vehicles on that frequency.

Alternatives

A) The pilot is definitely having a problem, will stop on the runway, and emergency services will be provided. **(correct answer)**

B) The pilot might be having a problem, will likely stop on the runway, and might need to request emergency services.

C) The pilot is definitely having a problem, might overrun the runway, and is requesting emergency services.

D) The pilot is definitely having a problem, and needs to call frequency 122.67 to request emergency services.

Figure 4 Second example of a multiple-choice item that could be used based on the recording provided

The example provided in Figure 4 is possibly more challenging for test takers than the first example, as it requires the test taker to have a deeper understanding of what is going on. The item is also testing understanding of basic grammar in both listening to the simple present used for future action ("we are stopping on the runway") and in reading the options (the difference between, for example "is having" and "might be having". In addition to that, the item is assessing the understanding of what numbers refer to (in this case, the frequency given should be

used to talk directly to the emergency services). Item writers would again need to consider the conditions/circumstances, as discussed before.

A third example of a multiple-choice item that could be created based on the same dialogue is shown in Figure 5. In this example, the construct to be measured includes the ability to understand uncommon, unfamiliar words and expressions (including nuanced vocabulary, idioms, and collocations), and, perhaps, also the ability to understand messages that differ from what was expected, as the test taker would probably not expect that the pilot would ask for a repetition.

Item stem You are going to listen to an excerpt of a communication between a pilot and an air traffic controller. Why did the pilot ask the controller to repeat the frequency?
Excerpt taken from the dialogue shown in Figure 2 (not shown to the test taker) ***ATCO 2:*** Canada 447 contact 122.67, you can talk to the emergency vehicles on that frequency. ***PILOT:*** Sorry, I stepped on you, what's the frequency again please for 447? ***ATCO 2:*** Air Canada 447, 122.67. ***PILOT:*** 22.67. Air Canada 447.
Alternatives A) Because he was distracted and couldn't remember the numbers. B) Because he blocked the controller's communication. **(correct answer)** C) Because the controller didn't say all the frequency numbers. D) Because he wanted to make sure he hadn't misunderstood the frequency.

Figure 5 Third example of a multiple-choice item that could be used based on the recording provided

The pilot/ATCO communication excerpt used in this workshop could be useful to create a range of different tasks, not only multiple-choice questions but also different types of tasks, including tasks to assess speaking. Other multiple-choice items could be created using the same script, focusing on other parts of the construct, for example, vocabulary including numbers (heading, runway, Toronto Tower frequency, etc.), the understanding of other uncommon words and expressions (for example, “bear with me for a couple of minutes”), among other possibilities.

Conclusion

In this article, we discussed theoretical bases and guidelines for designing multiple-choice questions (MCQs) in aeronautical English language tests. We presented a review of the literature on assessment in aeronautical English and MCQs, and examples of test tasks used in a workshop offered at the 10th GEIA Seminar, in Brazil.

As part of the limitations of this article, it is important to note that we have not discussed some aspects of test design, such as the number of times test takers would be allowed to listen to the recording (Only once? Twice? Twice only if needed? If twice, would listening to it again impact scoring?, etc.) and item preview procedures (Would test takers be allowed to see the item and/or alternatives before listening to the recording? Would they be allowed to take notes? etc.). Additionally, the examples of test tasks provided have yet to be piloted in real situations of language assessment.

The discussion in this paper may not only be useful to test developers and item writers, but also to aeronautical English teachers and material developers. It is expected that our

experiences, shared here, can positively contribute to the practices of aeronautical English test designers, item writers, as well as language teachers.

References

Allanson, P. E., & Notar, C. E. (2019) Writing Multiple Choice Items that are Reliable and Valid. *American International Journal of Humanities and Social Science*, 5 (3), 1-9. https://ijehd.cgrd.org/images/vol5no3/1.pdf

Borowska, A. P. (2017). *Avianlinguistics:* The Study of Language for Aviation Purpose. Frankfurt: Peter Lang.

Douglas, D. (2000). *Assessing languages for specific purposes.* Cambridge, UK: Cambridge University Press.

Frary, R. B. (2019) More Multiple-Choice Item Writing Do's and Don'ts. Practical *Assessment, Research, and Evaluation*, v. 4, Article 11. https://scholarworks.umass.edu/pare/vol4/iss1/11.

Garcia, A. C. M. (2023). *Defining the construct of aeronautical English listening for pilots:* Insights from the literature, the ICAO rating scale, and key stakeholders' perceptions. Doctoral Dissertation, Carleton University. Carleton University Institutional Repository. https://repository.library.carleton.ca/concern/etds/1831cm22p?locale=en

Green, A. (2014) *Exploring Language Assessment and Testing: Language in Action*. London and New York: Routledge.

Haladyna, T.M., & Downing, S.M. (1989). A taxonomy of multiple-choice item-writing rules. *Applied Measurement in Education.* 37-50. https://www.tandfonline.com/doi/abs/10.1207/s15324818ame0201_3

Hughes, A. (2003) *Testing for Language Teachers*. Cambridge: Cambridge University Press.

International Civil Aviation Organization (2010). *Manual on the implementation of ICAO language proficiency requirements:* Doc 9835 AN/453. 2. ed. Montreal, 2010. https://skybrary.aero/bookshelf/books/2497.pdf

International Civil Aviation Organization (2022). *Annex 1 to the Convention on International Civil Aviation: Personnel Licensing* (14th edition). International Civil Aviation Organization.

International Civil Aviation Organization (2024). *Test Design Guidelines Handbook on the Design of Tests for the ICAO Language Proficiency Requirements*. Doc 10197. 1. ed. Montreal. https://lnkd.in/eK2NFjVC

Knoch, U., & Macqueen, S. (2020) *Assessing English for Professional Purposes*. New York: Routledge.

Monteiro, A. L. T. (2019). *Reconsidering the Measurement of Proficiency in Pilot and Air Traffic Controller Radiotelephony Communication*: From construct definition to task design. (Doctor of Philosophy) Carleton University, Ontario, Canadá. https://repository.library.carleton.ca/concern/etds/41687j29d

Polat, M. (2020) *Analysis of Multiple-choice versus Open-ended Questions in Language Tests According to Different Cognitive Domain Levels*. Novitas-ROYAL (Research on Youth and Language), 14(2), 76-96. Available at: https://files.eric.ed.gov/fulltext/EJ1272114.pdf Access: May 27, 2024.

Scaramucci, M. V. R., Tosqui-Lucks, P., & Damião, S. M. (2018). *Pesquisas sobre inglês aeronáutico no Brasil.* Campinas: Pontes Editores.

Silva, A. L. B. C. (2016). *Uma análise de necessidades de uso da língua inglesa para oficiais aviadores do Esquadrão de Demonstração Aérea da Força Aérea Brasileira (FAB).* M.A. Thesis Universidade Estadual de Campinas. Campinas https://repositorio.unicamp.br/acervo/detalhe/973844

Silva, A. L. B. C. (2019). *Aviation English:* considerações terminológicas e implicações para o ensino e o desenho de exames de proficiência no contexto de aviação. Oral presentation VI GEIA Seminar. Instituto de Controle do Espaço Aéreo (ICEA). São José dos Campos. https://geia.icea.decea.mil.br/geia/viseminariogeia/inicial.php

Silva, A. L. B. C. (2022) *Avaliação de proficiência em inglês para os pilotos da Esquadrilha da Fumaça*: da análise de necessidades ao desenho de um exame. (Doctor of Philosophy) Universidade Estadual de Campinas, Campinas. https://repositorio.unicamp.br/Acervo/Detalhe/1244211

Souza, P. R. (2023) Elaboração de um curso de letramento em avaliação de línguas para professores de inglês aeronáutico [Designing a course on language assessment literacy for aeronautical English teachers]. Paper presented at the *V SEMAPLE*. Book of abstract of the V Seminar of Proficiency Assessment in Foreign Languages, 15 – 16 October 2023, São José do Rio Preto, Brazil: UNESP.

Souza, P. R. (2024) O letramento em avaliação no ensino de inglês aeronáutico: relevância, necessidades e possibilidades. *Revista X*, Dossiê Temático, 19(1), (in press).

Tosqui-Lucks, P., & Silva, A. L. B. C. (2020a) Da elaboração de um glossário colaborativo à discussão sobre os termos “inglês para aviação” e “inglês aeronáutico”. *Estudos Linguísticos*, São Paulo, 1(49), 97-116. https://revistas.gel.org.br/estudoslinguisticos/article/view/2561

Tosqui-Lucks, P., & Silva, A. L. B. C. (2020b). Aeronautical English: Investigating the nature of this specific language in search of new heights. *The ESPecialist*, São Paulo, 41(3). https://revistas.pucsp.br/index.php/esp/article/view/47826

Site *Liveatc.net.* https://www.liveatc.net/

Site: Mentimeter – Interactive Presentation Software https://www.mentimeter.com/pt-BR

Exploring an Aviation English Corpus to Equip Professionals with Pedagogic and Lexicographic Skills

MALILA PRADO[29]
BNU-HKBU United International College
malilaprado@uic.edu.cn

Abstract
This workshop aimed to equip teachers and other professionals working in the aviation industry with the necessary skills to explore an aviation English corpus for pedagogic and lexicographic purposes. It first listed the basic components of an aviation English corpus, including the different types of documentation available and the language features specific to such documents. Participants were asked to identify their own as well as their students' needs so as to set the context in which the corpus can be employed. The workshop also covered strategies for incorporating authentic materials from the corpus into participants' practice so that they can create activities that reflect the language used in the aviation industry, making it easier for learners to practice their skills in real-world situations and for translators to examine possible translation choices. These activities could draw on either an English-only corpus or an English-Portuguese comparable corpus, that is, same-genre texts in both languages. Finally, participants discussed ways in which they could incorporate authentic materials from the corpus and use technology tools to enhance their students' learning. Such skills will help participants create meaningful and effective learning experiences for pre- as well as in-service language learners in the aviation industry.

Introduction

The importance of connecting aviation English with corpus linguistics lies in the need to investigate language patterns specific to aviation. This intersection goes beyond the common focus on radiotelephony communications by contrasting different genres, including manuals, checklists, and reports (Prado et al., 2023; Terenzi, 2021), examining relevant technical language and its use in different locations, and developing materials that inform teaching and test design (Pacheco et al., 2023). It also enables students to discover language structures and patterns independently, as suggested in Friginal and Roberts (2022) and Terenzi (in press).

[29] Malila Prado is an Assistant Professor at the Department of Languages and Cultures, BNU-HKBU United International College, in Zhuhai, China. She holds a PhD from the University of São Paulo, Brazil. Her areas of research interest include corpus linguistics, pragmatics, intercultural communication, ESP, and English as a Lingua Franca.

Aviation English teaching must be tailored to meet the needs of various target groups within the industry. Ground staff, maintenance personnel, and flight dispatchers require specialized language skills for reading and writing in technical and operational contexts. On the other hand, a commonly under-researched target group, that of corporate aviation pilots needs proficiency in both technical jargon and customer service language in order to manage flight operations such as overflight and landing permits. Air traffic controllers (Ground, Tower, Approach, Center, etc.) and aeronautical information services personnel as well as meteorologists must master precise and clear communication skills to coordinate and communicate with international traffic and relay critical information. Aviation college, aeronautical school, and flight school students at different stages of their professional training need foundational knowledge as well as operational language skills to prepare for their future careers. Each group has distinct language requirements that must be addressed through customized curricula that focus on their specific roles and responsibilities within the aviation field.

A typical case is textbooks for aircraft maintenance personnel. Few such materials are available, and they often do not cater for local needs. Previous studies have contrasted two different criteria: modal verbs (Sarmento, 2008), and noun phrases (Bocorny, 2008). Both Sarmento and Bocorny use Shawcross's (1992) English for Aircraft textbook as a reference to compare with their own research findings. In particular, Sarmento highlights that although modal verbs such as *can* and *could* are correctly described in Shawcross's textbook, the salient characteristics of their use in aircraft manuals are not fully represented. For example, *can* is introduced with affirmative sentences only, with two meanings: possibility, and capacity. As a result, examples and activities with a *can* focus merely on simple subjects or noun phrases and, more rarely, conditional sentences. Sarmento's findings not covered in Shawcross's textbook point to the pronoun *you* as

the most common collocate of modal verbs (used in 60% of all occurrences), high frequency of modal verbs in negative sentences, significant presence of modal verbs in warning and caution messages, and negative semantic prosody.

Bocorny (2008) analyzed the presentation of noun phrases in the same textbook, also observing that the information provided is indeed correct, for example when the textbook suggests that the key term in a noun phrase is the final word). Yet this may not be generalized and, more importantly, it needs to be complemented. In response, Bocorny stresses the need to teach students to isolate elements such as prepositions, verbs, and conjunctions so that students can understand – or even translate – the noun phrases effectively. In the process, sentences taken from aircraft manuals come to resemble a brick wall, as seen in Figure 1.

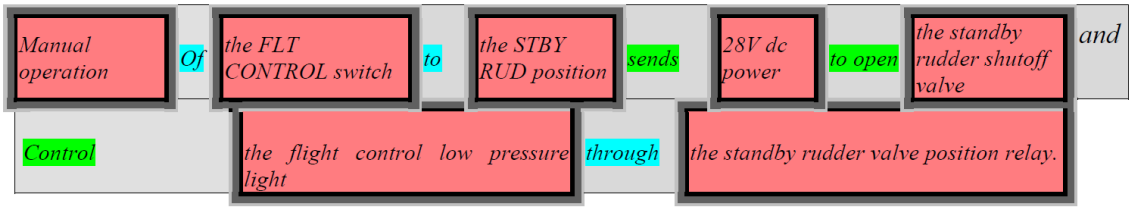


Figure 1. Specialized text as a brick wall (Bocorny, 2008, p. 203).

Terenzi (in press) addresses the educational needs of aircraft engineering students, who typically have no background in language studies. She integrates corpus-based methodologies into her classroom materials, teaching students how to utilize corpora for data-driven learning and the construction of glossaries. For example, she uses the words *power* and *energy*, both translated as *energia* in Portuguese. To help students understand the difference between these two terms in writing logbooks and aircraft maintenance reports, she provides a list of clusters, or N-grams (where N refers to the number of words within the sequence), or groups of words that commonly

occur together. Based on the words that combine with the words *power* and *energy*, students can draw inferences that can later be confirmed by the teacher.

These studies underscore the impact of research on instructional material design for aviation English, demonstrating how corpus linguistics can enhance learning by providing language resources that are both authentic and practical (Friginal & Roberts, 2022).

Despite the many initiatives aiming at enhancing the teaching of aviation English, finding suitable materials remains a challenge. Even though the importance of using a corpus to inform language teaching is frequently discussed, there is often a lack of accessible and comprehensive corpora specifically designed for aviation contexts (Tosqui-Lucks et al., 2024). This highlights the need for collaborative efforts to develop and disseminate corpus-based resources that can provide authentic language data and support the language needs of aviation professionals.

The corpus and tools for exploration

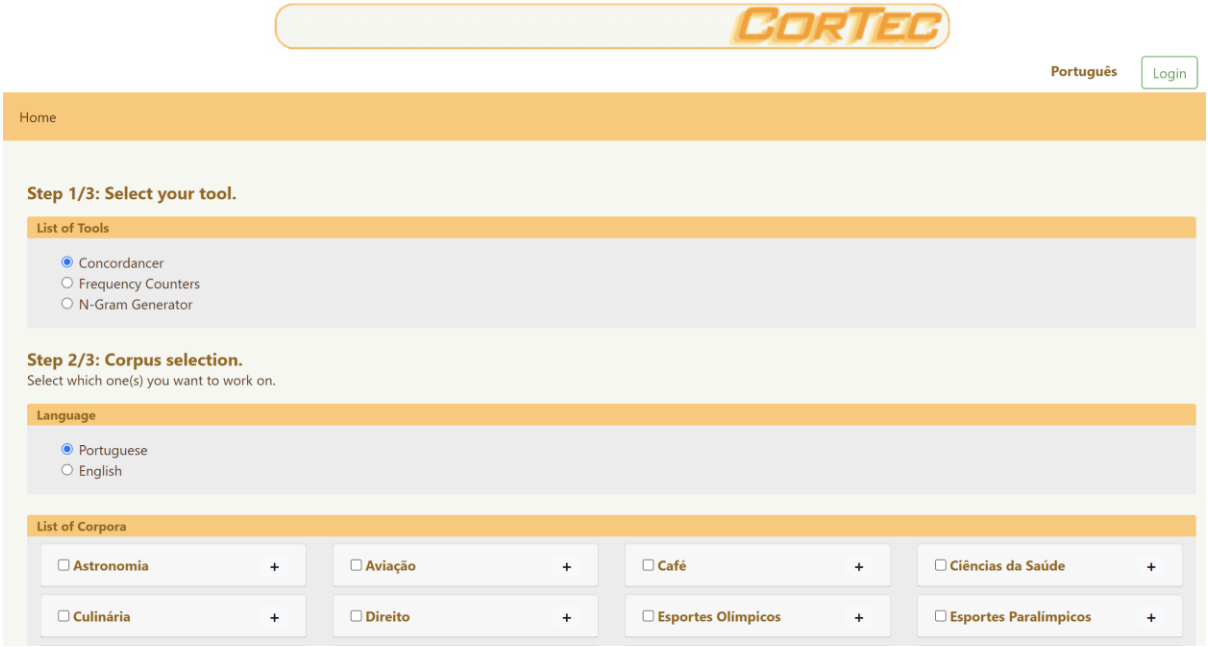
Studies providing support for this workshop employ corpus linguistics (Friginal, 2018) and critical genre analysis (Bhatia, 2017, 2022) to explore aviation reports and directives. Prado et al. (2023) compiled a corpus of around 50 million words in English, Chinese, and Portuguese, including aircraft maintenance manuals, aviation reports, flight operation manuals, airworthiness directives, and accident reports. In the workshop described here, we employed part of this corpus, namely a sub-corpus of airworthiness directives and accident reports compiled by the Centro de Investigação e Prevenção de Acidentes Aeronáuticos (CENIPA) and Agência Nacional de Aviação Civil (ANAC) for the Brazilian Portuguese texts and the National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) for the English texts. As these texts are all produced by governmental agencies, they are in the public domain.

The subcorpus compiled by Daniela Terenzi is hosted by the University of São Paulo (USP), Brazil, at https://cortec.fflch.usp.br/categorias/pt/47.

The interface where the subcorpus is housed is CORTEC, or Corpus Técnico-Científico, a Portuguese-English comparable corpus of different technical areas. It encompasses a variety of topics such as fashion, culinary arts, sports, coffee, health sciences, and now aviation reports. It is equipped with three tools: a concordancer, frequency counters (wordlist), and an N-gram generator. Through these tools, CORTEC users may explore technical areas of interest in both English and Portuguese.

The texts of all corpora in CORTEC are written in their original languages, thus forming a comparable corpus rather than translations and providing authentic linguistic data in both languages. This approach allows for an investigation of technical terminology and also of communication protocols (Peixoto, 2023). By employing these tools (see Figure 2), researchers and teachers can uncover language patterns and structures specific to each language, thus contributing to more effective and targeted aviation English teaching materials.

Figure 2. Homepage of CorTec



As Figure 2 shows, the user can select a tool in Step 1 and then choose the corpus and the language. I will now turn to a brief explanation of how these tools can be used.

The first tool is the concordancer, or concordance lines. The word *maintain* is being used here because it is an example of a much-needed comparison between Standard Phraseology in Portuguese and in English. In Portuguese, *maintain* may have the meaning of continuity, but also of *holding position* (as in *manter posição*). This is seen in the Brazilian aeronautical standard phraseology expression *alinhe e mantenha*, which corresponds to the English *line up and wait*. However, when switching from Portuguese to English, pilots and controllers commonly confuse the codes and end up translating the expressions as *line up and maintain*. The difficulty, as shown in Prado (2019) and Tosqui-Lucks and Prado (2021), is that the word *maintain* risks causing confusion in some interlocutors. A case in point is the communication between a Brazilian pilot whose aircraft had a nose gear steering problem on final approach to JFK requesting to stop on the runway by using the expression *maintain the runway*. After some negotiation with the controller, the pilots manage to convey their meaning. To help students understand the use of *maintain*, we may ask them to analyze concordance lines of the word along with its common collocates (Figure 3):

#	Occurrence
1	N47BA to climb and **maintain** FL 260. N47BA acknow
2	N47BA to climb and **maintain** FL 390. At 0927:18 E
3	aircraft typically **maintain** a consistent environ
4	on. 2. Engine RPM - **Maintain.** 3. IN NORMAL OUT DE
5	d) - As required to **maintain** satisfactory pressur
6	et in an attempt to **maintain** cabin pressure. Diff
7	on system would not **maintain** a full pressure diff
8	the flight crew to **maintain** consciousness and th
9	iation?s failure to **maintain** pilot discrepancy re
10	1340 to descend and **maintain** 24,000 feet. At 0928
11	the flight crew to **maintain** an airspeed of 170 k
12	the flight crew to **maintain** a proper pitch attit

Figure 3. Concordance lines with *maintain*

The students can analyze the surrounding of the word *maintain* and come up with rules regarding its use.

The second tool in CorTec is the frequency counter, which is a word list generator. This tool displays the most frequent words in the selected corpus along with their position and raw frequency (Figure 4):

Frequency Table

Download Table

Position	Word	Frequency
1	the	180169
2	and	60616
3	of	57473
4	to	51374
5	a	41736
6	that	34920
7	in	30689
8	cid	22861
9	was	20798
10	for	19961
11	on	18882
12	s	16079
13	flight	15290

Figure 4. 13 most frequent words in the CorTec aviation *corpus*

The importance of wordlists is highlighted in O'Keeffe et al. (2007), which suggests that English instruction should focus on the most common words or clusters found in a corpus. O'Keefe et al. argue that the higher the frequency of a word or cluster, the greater the chance that students will come across it in everyday situations. As regards clusters, Table 1 lists the 20 most frequent three-word clusters found in CorTec the aviation corpus:

Position	3-word cluster	Frequency
1	the first officer	445
2	the accident airplane	379
3	of this ad	369
4	of the accident	348
5	the airplane was	290
6	the flight crew	282
7	the safety board	254
8	according to the	237

Position	3-word cluster	Frequency
11	of the airplane	222
12	in accordance with	211
13	the accident flight	207
14	the time of	193
15	at the time	192
16	is issuing this	184
17	airplane cid s	182
18	the federal register	181

9	the faa is	235	19	indicated that the	177
10	the airplane s	232	20	at the faa	175

Table 1. 20 most frequent three-word clusters in the CorTec aviation *corpus*

As can be seen in Table 1, despite a high occurrence of items referring to the agencies themselves (*the safety board, the FAA is, at the FAA*), there are elements worth investigating in the classroom. For example, the cluster *the first officer* is the top three-word cluster. It would therefore be interesting to contrast it with *the captain* and have students observe the actions taken by *the flight crew* (6th position) to avoid the accident or attempt to identify in-flight communication problems. In investigating the cluster *the first officer* through concordance lines, we find instances such as "About 18:49:28, the captain asked **the first officer** whether he could see the highway, to which **the first officer** replied, "no it's clouds over here on this area I don't see it." Examples such as this can be used when teaching reported speech, complementing Pacheco's (2022) own suggestion.

These tools were demonstrated in the workshop so that participants could visualize ways in which they could explore the corpus and then discuss work they could implement with their students.

Hands-on activities

Following the demonstration of the CorTec corpus and available tools, participants were asked to work in groups of 5-6 and begin with a discussion of their own professional background (whether subject-matter experts such as controllers or pilots or language experts such as teachers and raters), their target students and test takers, and how they could employ the corpus that had just been demonstrated. The next step was to explore the corpus through a series of activities

(listed in the worksheet in Appendix 1). In particular, the worksheet briefly addresses the studies by Bocorny (2008) and Sarmento (2008), which identified noun phrases and modal verbs as high-frequency items in aircraft manuals. The objective of the workshop was to promote a structured analysis guided through the worksheet to determine whether similar trends occur in aviation reports.

Activity 1: Frequency Analysis

Participants were first asked to hypothesize whether the high frequency of noun phrases and modal verbs observed in aircraft manuals by Bocorny and Sarmento also appeared in aviation reports. To explore this question, participants used two key tools within CorTec: frequency counters (wordlist), and n-gram generators (clusters). Participants ran both tools while focusing on the top occurrences in each method. They were instructed to analyze these occurrences and to determine which method provided greater insights in answer to the initial question. Participants then considered why one method might be more revealing than the other.

Activity 2: Cross-Linguistic Analysis

Next, participants replicated these searches in Portuguese, again analyzing the top words or expressions. They identified equivalent words or expressions in Portuguese and compared these findings to the English results. This activity aimed to highlight cross-linguistic similarities and differences (as well as borrowings) in the use of key linguistic elements in aviation contexts.

Activity 3: Brainstorming Syllabus Design

Building on the findings of O'Keefe et al. (2007), who emphasize prioritizing the top words or clusters in language teaching as a clue to their frequency in real-life encounters,

participants analyzed the top words or clusters in their previous searches in order to consider which to teach first. Participants then grouped the identified words or clusters by function, grammar, or vocabulary, using concordance lines to assist in this classification. This enables teachers to determine the content of a syllabus to guide their work.

Activity 4: Designing a Pedagogical Activity

Still working in small groups, participants discussed how to design an activity for a specific group of students they themselves suggested, such as maintenance personnel or flight dispatchers. They outlined who the students were, what they needed to learn, the language tasks involved, and the structure of the activity. Each group then presented their designed activity, explaining its relevance and expected outcomes.

The worksheet was designed not only to familiarize participants with corpus linguistics tools but also to encourage practical applications of their findings in the creation of effective pedagogical materials for aviation English learners while considering their local or specific needs. As participants had different expertise (controllers, pilots, English raters, English training providers, aviation English teachers, etc.), the discussions were productive and, as commonly seen in corpus linguistics studies, revealed more language features than expected.

Conclusion

The integration of *corpus* linguistics into aviation English teaching offers advantages for both educators and learners by providing authentic language data and revealing linguistic patterns specific to aviation contexts. Though the challenges of compiling a comprehensive corpus are considerable, the benefits it brings to materials design and instructional practices are immense. As highlighted by Tosqui-Lucks et al. (2024), the collaborative efforts involved in

developing and sharing these resources, can mitigate the issues of materials availability and copyright concerns. This was the main reason behind the availability of a sub*corpus* through an existing interface hosted by the University of São Paulo.

This workshop emphasized the need for customized pedagogical materials that address the linguistic requirements of various target groups within the aviation industry, from ground staff and maintenance personnel to pilots and air traffic controllers. Supporting the workshop is the research of Bocorny (2008) and Sarmento (2008), which highlights the role of noun phrases and modal verbs in aircraft manuals, suggesting that similar trends might be observed in aviation reports that compose the corpus that was explored here. The findings from Terenzi's forthcoming work further buoy the integration of corpus-based methodologies in teaching non-language students by demonstrating the practical applications of data-driven learning and glossary construction.

By employing tools such as concordancers, frequency counters, and n-gram generators, students as well as researchers can explore both English and Portuguese corpora, providing a cross-linguistic perspective that enhances our understanding of technical terminology and communication protocols (Peixoto, 2023). The ability to uncover language patterns and structures through these tools contributes to the development of more effective and targeted aviation English teaching materials and to the enhancement of students' autonomy.

The hands-on activities designed for the workshop as described in the worksheet (Appendix 1) facilitated a practical understanding of how corpus linguistics can be applied in the classroom. By engaging in frequency analysis, cross-linguistic comparisons, syllabus design, and the creation of pedagogical activities, participants gained insights into how these methods can be

adapted to meet the specific needs of their students. The diverse expertise of participants, consisting of controllers, pilots, English raters, and aviation English teachers, enriched the discussions and highlighted the multifaceted nature of language use in aviation.

The incorporation of corpus linguistics into aviation English education enhances the learning experience by providing realistic language models and prepares students for the practical demands of their professional roles. This approach ensures that aviation professionals are equipped with the linguistic skills necessary for effective communication, thus contributing to safety in the industry.

References

Bhatia, V. K. (2017). *Critical genre analysis:* Investigating interdiscursive performance in professional practice. Routledge.

Bhatia, V. K. (2022). World Englishes for specific purposes: A multi-perspective view. *World Englishes, 41*(4), 584–595. https://doi.org/10.1111/weng.12602

Bocorny, A. (2008). *Descrição das unidades especializadas poliléxicas nominais no âmbito da aviação:* Subsídios para o ensino de inglês para fins específicos. Universidade Federal do Rio Grande do Sul. http://hdl.handle.net/10183/15548

Friginal, E. (2018). *Corpus linguistics for English teachers:* New tools, online resources, and classroom activities. Routledge.

Friginal, E. & Roberts, J. (2022). Corpora for materials design. In R. R. Jablonkai & E. Csomay (Eds.), *The Routledge Handbook of Corpora and English Language Teaching and Learning* (pp. 131–146). Routledge.

O'Keeffe, A.; McCarthy, M. & Carter, R. (2007). *From corpus to classroom:* Language use and language teaching. Cambridge University Press. https://doi.org/10.1017/CBO9780511497650

Pacheco, A. (2022). Reported speech in Aviation English: An analysis through two specific corpora. In: Tosqui-Lucks, P. & Santana, J. (Eds.), *Aviation English - A global perspective:* Analysis, teaching, assessment (pp. 55–70). Bookerfield Editora. https://doi.org/10.53268/BKF22080503

Pacheco, A., Garcia, A. C. D. M.; Monteiro, A. L. T.; Prado, M. C. D. A. & Tosqui-Lucks, P. (2023). Using corpus linguistics to create tasks for teaching and assessing aeronautical English. *Applied Corpus Linguistics*, 100075. https://doi.org/10.1016/j.acorp.2023.100075

Peixoto, R. A. J. R. (2023). The interface between specialized translation and institutional translation: A selection of candidate terms validated by aeronautical meteorology corpora. *Applied Corpus Linguistics*, 3(2), 100051. https://doi.org/10.1016/j.acorp.2023.100051

Prado, M. C. (2019). *A relevância da pragmática no ensino do inglês aeronáutico*: Um estudo baseado em corpora. Universidade de São Paulo. https://doi.org/10.11606/T.8.2019.tde-16122019-181408

Prado, M. C.; Terenzi, D.; Tosqui-Lucks, P. & Zhou, Z. (2023). Language of aircraft documentation: Using a multilingual corpus in collaborative work in lexicography and pedagogy. *Journal of Teaching English for Specific and Academic Purposes*, *11*(1), 41–56. https://doi.org/10.22190/JTESAP230103005C

Sarmento, S. (2008). *O uso dos verbos modais em manuais de aviação em inglês: Um estudo baseado em corpus*. Universidade Federal do Rio Grande do Sul.

Shawcross, P. (1992). *English for aircraft:* Documentation handbook 1. Belin Education.

Terenzi, D. (in press). Data-driven Learning: The use of corpora beyond concordance lines in the teaching of English for aviation maintenance. In E. Friginal, M. Prado, & J. Roberts (Eds). *Teaching and Assessment in Global Aviation English*. Bloomsbury.

Terenzi, D. (2021). Overcoming challenges in English for aviation maintenance: Technical publications selection for the construction of a corpus and its use to teach language aspects considering learners' needs. *Open Journal of Applied Sciences*, *11*(10), 1122–1134. https://doi.org/10.4236/ojapps.2021.1110084

Tosqui-Lucks, P. & Prado, M. C. (2021). Corpora de inglês aeronáutico: Desafios para o estudo da área e proposta de trabalho conjunto. *Tradterm*, *37*(1), 148–174. https://doi.org/10.11606/issn.2317-9511.v37p148-174

Tosqui-Lucks, P.; Prado, M.; Pacheco, A.; Garcia, A. C. D. M. & Monteiro, A. L. T. (2024). The challenges of compiling aeronautical English corpora and the proposal of the collaborative Aerocorpus. Presentation at the BAAL *Corpus Linguistics SIG Symposium* on Exploring the Use of Corpus Linguistics Research Methods (27 March 2024).

Appendix 1

Worksheet Exploring an Aviation English Corpus: Equipping Professionals with Pedagogic and Lexicographic Skills

For these activities, we will use the CorTec corpus. This is available at: https://cortec.fflch.usp.br

The studies by Bocorny (2008) and Sarmento (2008) investigated noun phrases and modal verbs in aircraft manuals. According to these researchers, those elements are very frequent in manuals.

Do you believe that the same trend will be found in aviation reports? There are two ways you can find out:

- Frequency counters (wordlist)
- N-gram generator (clusters)

1) Run both searches on CorTec. Analyze the top 20 occurrences. Which gives you more clues to answer the question above? Why do you think this is?.
2) Run the same searches in Portuguese. Analyze the top 20 words. What equivalent words or expressions did you find?

O'Keefe et al. (2007) propose that we prioritize the top words or clusters in a corpus when teaching English. They argue that the more frequent words or clusters are, the more likely it is for students to encounter them in real life.

3) Take a second look at the top words or clusters. Group them according to function, grammar, or vocabulary (choose one within your group). You may use concordances to do this. For example:

1	ions The airplane's **maintenance** records indicated t
2	perated a certified **maintenance** repair station, inc
3	ct Office principal **maintenance** inspector performed
4	f Sunjet Aviation's **maintenance** functions during th
5	to avoid hypoxia.32 **MAINTENANCE** The accident airpla

```
6    accident airplane's maintenance records, Sunjet Avi
7    n and Oxygen System Maintenance History The acciden
8    accident airplane's maintenance records revealed th
9     low altitudes. The maintenance clearing action not
10   nd on May 21, 1999, maintenance personnel complied
```

4)	Based on the output your group found most interesting, think of an activity you could design for a specific group of students. Be ready to report who the students are, what they need to know, what tasks they would need to perform with language, and what your activity is like.

Building an Intepretation and Use Argument for EPLIS: a validity study

NATALIA DE ANDRADE
DECEA – Department of Airspace Control, Rio de Janeiro, RJ, Brazil. Aviation English Project Manager;
natalianar@decea.mil.br[30]

Abstract
Aviation has emerged as one of the most widely used means of transportation around the world, attracting attention from the society, the media, and the language theorists. However, considering the high-stakes of the aviation testing context, there is a lack of research projects aimed at analyzing the validity of the tests made available after the publication of the language policy of the International Civil Aviation Organization (ICAO), (ALDERSON, 2008). Based on Kane`s argument-based approach to validation (2006; 2013), which indicates the need to analyze the claims made by the test developers with regards to the test use, this paper aims at presentingan Interpretation and Use Argument (IUA) for EPLIS, the aeronautical English proficiency test used to assess Brazilian air traffic controllers. An IUA indicates the proposed interpretations and uses of test results and serves as the first step in developing a validity argument. To build an IUA for EPLIS, a thorough document analysis has been carried out.

Introduction

Aviation has become a dominant mode of global transportation, attracting significant attention from society, the media, and language theorists (Alderson 2008, 2009; Douglas 2009, 2014; Knoch 2009; Kim & Elder 2009; Kim 2018; Scaramucci et al. 2010, Elder et al. 2017). Numerous studies have examined the International Civil Aviation Organization's (ICAO) criteria to determine their alignment with real-world aviation communication practices. However, despite the high-stakes nature of aviation testing, there remains a notable lack of research focused on the specific tests implemented following the release of ICAO's policy, as highlighted by Alderson (2008, p. 6).

[30] Natalia Andrade holds a master's degree in Applied Linguistics and is a PhD candidate in Applied Linguistics focused on language assessment at the University of Campinas. She has been a doctoral researcher at Iowa State University and at the University of Melbourne, and has won the British Council Assessment Research Award. She has been the Chair for the Aviation Language Assessment Special Interest Group within the International Language Testing Association for four years. She has worked for the Brazilian Air Force with aviation English training and assessment for 14 years and is currently the manager of the Aviation English Project at the Department of Airspace Control.

English language proficiency in aviation is a critical safety measure that mitigates the risk of incidents or accidents. In response to concerns regarding insufficient English proficiency among non-native English-speaking (NNES) pilots and air traffic controllers contributing to accidents or incidents, the International Civil Aviation Organization (ICAO) strengthened provisions related to English for radiotelephony communication. In 2004, ICAO published the first edition of the Manual of Implementation of the ICAO Language Proficiency Requirements (Doc 9835). This document emphasized the importance of providing aviation personnel with adequate English proficiency for radiotelephony communication and established training and testing measures for member states to implement.

The second edition of Doc 9835, published in 2010, mandates that aviation English proficiency exams focus on communication between pilots and air traffic controllers (ATCOs), utilizing plain English rather than exclusively relying on phraseology (ICAO, 2010, p. 3-2). The document introduces a six-level rating scale (1-pre-elementary to 6-expert) encompassing six assessment categories: pronunciation, structure, vocabulary, fluency, comprehension, and interaction. The minimum proficiency level for international traffic control licensing is level 4 (operational), requiring a minimum score of 4 in each category. ICAO emphasizes that underperformance in any category can compromise safety and thus necessitates this holistic approach. The ICAO rating scale allows for errors as long as they do not hinder clear communication.

As an ICAO Member State, Brazil has proactively implemented the Language Proficiency Requirements (LPRs), with the Department of Airspace Control (DECEA) developing the EPLIS proficiency assessment for Brazilian air traffic controllers. The SISCEAB Aviation English Proficiency Exam, EPLIS, consists of two papers. Paper 1 is a computer-based listening test, a

prerequisite for Paper 2, the oral proficiency interview. Test-takers must achieve a 70% score on Paper 1's 30 multiple-choice items to proceed to Paper 2. Paper 1 assesses listening comprehension, while Paper 2 evaluates both oral production and integrated listening comprehension using all six ICAO Rating Scale criteria. Based on Paper 2, test-takers are awarded level 4, 5, or "not to standard" (NS) for licensing. For operational and training purposes, NS test takers are assessed as levels 3, 2, or 1. Proficiency levels are determined by two examiners: the rater-observer, who uses the ICAO analytical scale, and the rater-interlocutor, who uses the EPLIS holistic scale. In cases of score disagreement, up to two additional examiners may re-assess the test.

In 2010 EPLIS underwent a year-long external validation research study conducted by Prof. Dr. Matilde Scaramucci, from the University of Campinas, Brazil, with statistical analysis run by Prof. Dr. Tim McNamara, from the University of Melbourne, Australia, both of whom are renowned in the field of language testing. In the final report, the validation team listed a set of changes that should be carried out to improve the exam. Since then, the test development team has been implementing their suggested changes and carrying out further studies. In addition, in 2014 EPLIS was submitted to the Aviation English Language Test Service (AELTS) process, and the test evaluators identified the need for the development and wide dissemination of validity studies in EPLIS. AELTS final report pointed out the fact that the validity studies initiated with the 2010 validation process were not continued as a non-compliance.

Given the critical importance of carefully analyzing exams used to assess aviation professionals' proficiency, and the potential negative consequences of using unsuitable instruments, as highlighted by Alderson (2008, p.15), this article aims to address two key objectives. First, it seeks to construct an Interpretative Use Argument for the EPLIS exam, drawing upon the

findings of the final EPLIS validation report (Scaramucci et al, 2010) and the final AELTS report (2014). Second, the article will identify and outline the specific data required to build a comprehensive Validity Argument for the EPLIS exam, ensuring its alignment with the unique demands and requirements of the aviation context.

As Kane (2013, p.48) emphasizes, the type and extent of evidence required for validation are directly proportional to the claims being made: more ambitious claims necessitate more robust evidence. In high-stakes assessment contexts like aviation, this is of paramount importance, as perceptions of the severity of consequences can vary widely among diverse stakeholders. Considering the critical nature of aviation safety, the EPLIS validation project holds significant relevance for a broad range of audiences and stakeholder groups, each with distinct perspectives and concerns.

The Interpretive Use Argument for EPLIS

Kane (2013, p.1) asserts that "to validate an interpretation or use of test scores is to evaluate the plausibility of the claims based on the test scores." This underscores the importance of analyzing the claims made by test developers regarding test use before embarking on a validation project. The type and extent of evidence required for validation directly correlate with the ambition of the claims: more ambitious claims necessitate more robust evidence.

An interpretive argument outlines the proposed interpretations and uses of test results, serving as the foundation for developing a comprehensive validity argument (Kane 2006, 2013). This argument elucidates the reasoning behind the proposed interpretations and uses, following a structured framework that links the foundational grounds to the final claims through logical

inference. As such, it provides a solid starting point for validating test score interpretations and uses.

Therefore, this section aims to present the following: (i) EPLIS's intended interpretations, uses, and potential consequences; (ii) the specific approach to validation employed in this project; and (iii) the detailed interpretive argument for EPLIS.

An overview of EPLIS intended interpretations, uses, and consequences

ICAO's policy delineates the consequences and uses for tests conducted in the aviation context, as illustrated in Table 1 below. While personnel licensing is not explicitly listed as a social function of a test in Messick's (1989) framework, Bachman and Palmer (2010, p.196) highlight the widespread use of language tests for certifying professionals, including air traffic controllers, underscoring the significance of language proficiency in this high-stakes field.

Uses	Consequences
U1- Personnel Licensing	C1- Ensure safety in the international air space

Table 1 – Test use and intended consequence according to ICAO's policy

Each ICAO Member State has adopted a unique approach to licensing aviation professionals. For instance, Korea developed its own aviation English test but deviated from ICAO policy by publicly disclosing all test forms, aiming to ensure all personnel could meet the minimum standard (Kim 2013, p. 103). This resulted in pilots and controllers being licensed at level 4 and continuing to work in international traffic.

In Brazil, the Aeronautical English Exam for Brazilian Air Traffic Controller, EPLIS, was developed to align with ICAO requirements, as outlined in the Aeronautical English

Proficiency Requirements Program (ICA 37-924). This P asserts that EPLIS scores predict the performance of Brazilian air traffic controllers in international traffic, enhancing radiotelephony communication efficiency and mitigating the risk of accidents and incidents (Brasil 2018, p. 35).

Primarily, EPLIS is used to license controllers who demonstrate the minimum required proficiency for international traffic. However, due to Brazil's vast airspace, the demand for controllers necessitates hiring professionals who may not initially meet the English proficiency standard. Consequently, controllers who achieve level 3 or below are licensed for domestic flights, while those at level 3 can control international flights under supervision.

Additionally, the Program outlines the aviation English training project for Brazilian air traffic controllers. In accordance with ICAO policy, ongoing training is provided for both controllers who achieve level 4 and those who do not, with EPLIS scores used to tailor training and placement in language courses. Table 2 below illustrates the uses and consequences of EPLIS scores, as per the ICA 37-924.

Uses	Consequences
U-1 Personnel Licensing	C-1 Ensuring safety in the Brazilian Air Space
U-2 Placement for air traffic shifts	C-2 Mitigation measures
U-3 Placement for aviation English courses	C-3 More focused training programs

Table 2 – Uses and their intended consequences of EPLIS

Kane (2013, p. 62) emphasizes that test developers are obligated to substantiate any claims regarding the intended uses of their tests. However, the ICA 37-924 lacks the necessary warrants and assumptions to fully support the inferences made about the uses and consequences of EPLIS scores. Notably, there is no empirical evidence presented to verify whether the scores

effectively contribute to ensuring safety in Brazilian airspace, as mandated by ICAO and as stated in one of the claims within ICA 37-924.

The Argument-based Approach to Validation

Cronbach (1988) introduced the concept of the "validity argument" to provide a comprehensive evaluation of the intended interpretations and uses of test scores. This involves collecting and analyzing evidence both for and against the proposed interpretation and use. Kane (2006, p.22) emphasizes the necessity of a clear and complete statement of the claims included in the interpretation and the goals of any proposed test use to effectively evaluate them.

Kane (2013, p.8) posits that the argument-based approach to validation was primarily developed to streamline the validation process and offer a more straightforward approach to validation efforts (Bachman & Palmer, 2010; Chapelle, Enright, & Jamieson, 2008). This approach involves outlining the claims made in a proposed interpretation or use (the Interpretive Use Argument, or IUA) and systematically evaluating these claims (the validity argument).

The IUA articulates the proposed interpretations and uses of test results by systematically mapping the network of inferences and assumptions from observed performance to conclusions and decisions based on test-takers' performance (Kane, 2006, p.23). It involves inferences leading from observed performances to claims based on these performances, with each inference representing an extension of the interpretation or a decision.

Kane's interpretive argument provides a valuable framework for understanding the reasoning behind proposed interpretations and uses. His structured approach, extending from the grounds to the claims through a chain of inferences, serves as a solid starting point for both test

developers and evaluators. However, it is crucial to recognize that the IUA is not a rigid checklist but rather a flexible framework that adapts to the specific context of each test (Kane 2013, p.10).

Kane (2013, p.12) draws upon Toulmin's (2003) approach to practical reasoning, which includes claims, data, warrants, backing, and rebuttals, as the basis for an interpretive argument. In this structure, the claim represents the conclusions drawn about test-takers based on observations of their performance (data). The data consists of empirical observations (e.g., test scores) on which the argument is built. Warrants link the data to claims, backing provides additional support for warrants, and rebuttals offer counterarguments to the claims.

A significant challenge in this validation project is mitigating potential confirmatory bias, as noted by Chapelle (2020), especially since the researcher is also a member of the EPLIS test development team. However, this project's potential to contribute to positive changes in both EPLIS and the international policy it adheres to necessitates a rigorous evaluation of the intended interpretations and uses of the test, including potential rebuttals. The researcher aims to approach this project as an academic analyst with in-depth knowledge of the test and extensive access to test data.

Kane (2013, p.13) emphasizes that the IUA is not an end in itself but a means to facilitate a rigorous evaluation of the proposed interpretation and use. It should be detailed enough to guide effective validation. With these considerations in mind, the subsequent section will outline the IUA for EPLIS.

The Interpretative Use Argument to EPLIS

This section elucidates the types of inferences that underpin EPLIS score interpretation and use by describing each inference in detail. Drawing primarily from Chapelle et al.'s (2008,

p.17) and Chapelle's (2020) frameworks, the interpretive argument encompasses seven inferences (Domain description, Evaluation, Generalization, Explanation, Extrapolation, Utilization, and Implication) and eight grounds/claims. This structured interpretive use argument, consisting of different types of inferences, provides a roadmap for the research needed to construct a robust Validity Argument for EPLIS.

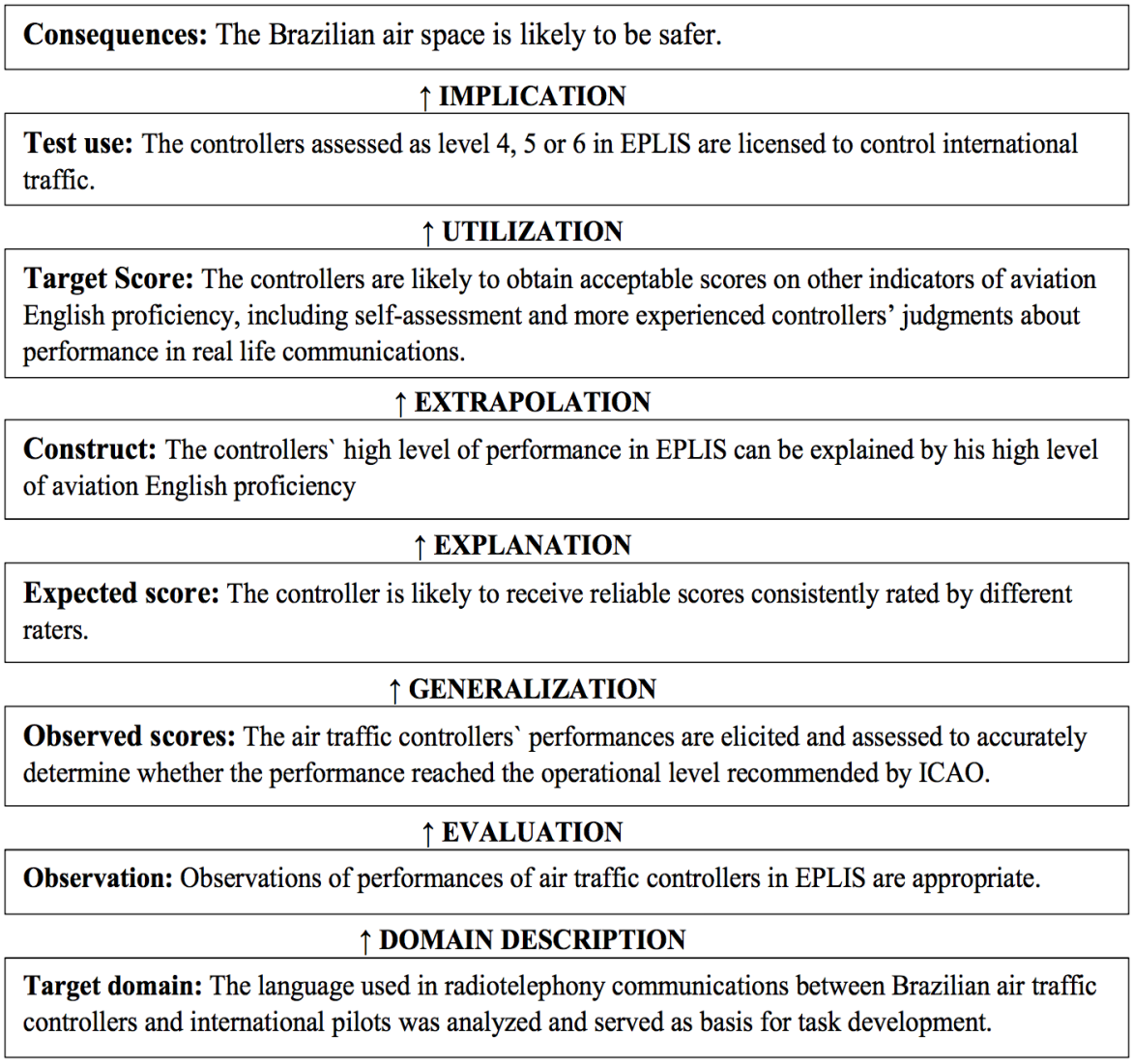


Figure 1. An illustration of inferences in the EPLIS interpretive argument.

To complete the outline of the EPLIS IUA shown in Figure 1, the specific warrants and assumptions associated with each of the inferences were identified. The proposed warrants and assumptions entailed in the EPLIS IUA were shown in Table 3, which also provided an illustration of the type of analysis that could be used to provide backing for each assumption. The following subsections outlined the inferences, containing supporting warrants, assumptions, examples of backing for each assumption, and possible rebuttals.

Table 1: Summary of the Warrants, Assumptions, and Backing in the Interpretive Use Argument of EPLIS

Inference in the Interpretive Argument	Warrant Supporting the Inference	Assumptions Underlying the Warrant	Analysis to obtain Backing for Assumptions	Possible rebuttals
Domain Description	Observations of performance on the EPLIS tasks are representative of relevant knowledge, skills and abilities in situations representative of those in the target language use domain of radiotelephony communications between Brazilian air traffic controllers and international pilots.	1) Assessment tasks that are representative of the target language use domain can be identified; 2) Aviation English skills, knowledge, and processes needed for radiotelephony communications can be identified.	Domain analysis (subject matter expert consensus, document analysis) Domain analysis (subject matter expert consensus, document analysis)	Compliance with ICAO`s policy that recommends tasks that do not relate to the target domain
Evaluation	Observations of performances of air traffic controllers on EPLIS are evaluated to provide observed scores reflective of targeted language abilities.	3) Both analytic and holistic rubrics for scoring performance are appropriate for providing evidence of targeted language abilities. 4) Task administration conditions are appropriate for providing evidence of targeted aviation English performance.	Rubric analysis (document analysis, subject matter expert consensus) Audit of test administration conditions and document analysis	Strategic competence is taken for granted in the rating scale developed by ICAO Some Institutions are unable to comply with the test administration documentation

Generalization	Observed scores are estimates of expected scores over the relevant parallel versions of tasks and test forms and across raters.	5) A sufficient number of tasks are included on EPLIS. (6) Task specifications are well defined for parallel task creation. (7) Ratings of different raters are consistent.	Generalizability and reliability studies Systematic task specification analysis Inter-rater reliability	Lack of statistical analysis as pointed out by AELTS
Explanation	Expected scores are attributed to the construct of aviation English proficiency for Brazilian air traffic controllers.	(8) Performance on EPLIS relates to performance on other aviation English assessment. (9) Strategies engaged by EPLIS tasks are construct relevant.	Concurrent correlational studies Discourse analysis of test takers' think-aloud protocol	Other aviation English tests may not have the same construct.
Extrapolation	The construct of aviation English proficiency for Brazilian air traffic controllers accounts for the quality of the performance of Brazilian air traffic controllers in real ATC communications with international	(10) The aviation English for Brazilian air traffic controllers assessed by EPLIS tasks accounts for other indicators of communicative language ability in radiotelephony	Test takers' self-assessment of their own aviation English, observation of real-life communications, discourse analysis of incident investigation, more	Strategic competence and operational knowledge might be critical factors to succeed in real life

	pilots.	communications in English within the Brazilian Air Space.	experienced controllers` judgement	communications.
Utilization	Estimates of the quality of performance on EPLIS are useful for making decisions about controllers' licensing and follow-up ATC training.	(11) The meaning of the EPLIS scores is clearly interpretable by test users and test takers.	Score descriptors are provided to test takers and test users along with their test result. National Language Policy is developed based on EPLIS scores	
Implications/ Consequences	The consequences of using the EPLIS and the decisions that are made based on EPLIS scores are beneficial to the controllers and other stakeholders	(12) There hasn`t been an accident involving language since EPLIS has been implemented. (13) The test raises awareness of the importance of English proficiency for radiotelephony communication.	Analysis of accident/incident investigation reports. Washback studies (Expert interviews, follow-up questionnaires and interviews with controllers)	

Domain Description Inference

In the EPLIS interpretive use argument, the domain description inference is based on the warrant that observations of performance on EPLIS accurately represent the relevant knowledge, skills, and abilities required in radiotelephony communication between Brazilian air traffic controllers and international pilots. This warrant rests on two assumptions: a) assessment tasks representative of the target language use domain can be identified; b) aviation English skills, knowledge, and processes needed for effective radiotelephony communication can be identified.

These assumptions can be supported through domain analysis, investigating the language knowledge and strategic competence required in the target domain through questionnaires, expert consensus, and document analysis. Notably, the EPLIS development team comprises language assessment experts and highly experienced air traffic controllers proficient in English (level 6 on the ICAO rating scale). A questionnaire probing the test's relevance to the target domain within Brazilian airspace could be administered to test-takers.

However, a potential rebuttal to this inference is that EPLIS, in adhering to ICAO's policy, may include test tasks that do not directly reflect the target domain. For example, as per EPLIS specifications, Paper 2 includes open-ended questions delivered face-to-face. While recommended by ICAO (2010, p.345), this format does not mirror real-life radiotelephony communication between air traffic controllers and pilots.

Evaluation Inference

The second inference links the observation of performance on EPLIS to an observed score. This evaluation inference is based on the warrant that observations of performance on EPLIS are assessed using appropriate scoring rubrics to yield observed

scores that accurately reflect test-takers' targeted language abilities. This warrant rests on two assumptions: a) both analytic and holistic rubrics for scoring performance responses are suitable for providing evidence of targeted language abilities; and b) task administration conditions are conducive to eliciting evidence of the targeted aviation English abilities for Brazilian air traffic controllers.

The first assumption is supported by EPLIS documentation, which indicates that the ICAO rating scale has been thoroughly analyzed and interpreted by the test development team. This team has developed the EPLIS Rating Criteria guide for raters to use for analytic grading and the EPLIS Holistic Scale for holistic grading. Raters undergo ongoing training to minimize bias and ensure adherence to EPLIS rating rubrics.

However, a potential rebuttal to this first assumption stems from the construct definition of ICAO. The rating scale developed by ICAO, which member states must use, implicitly assumes the presence of strategic competence, a crucial component of language ability for air traffic controllers. Strategic competence acts as a mediator between test-takers' background knowledge and language skills, and the external context, controlling the interaction between them (Douglas, 2000). In aviation, strategic competence is essential for resolving linguistic complications that may arise in radiotelephony communications.

The second assumption is supported by the task administration audit outlined in ICA 37-924. Since EPLIS Paper 2 is administered throughout Brazil by different raters, the test administration conditions, including test delivery, room conditions, and test security, are regularly audited following the protocols established in the ICA 37-924..

However, a possible rebuttal to the second assumption is that some institutions where EPLIS is delivered may not be able to fully comply with the recommended test administration conditions due to limitations in resources such as available rooms, appropriate chairs, or adequate air conditioning systems.

Generalization Inference

The third inference involves generalizing test-takers' combined scores on EPLIS tasks to their overall proficiency in the entire domain of radiotelephony communication between Brazilian air traffic controllers and international pilots. This generalization inference is supported by the warrant that observed scores on EPLIS are reliable estimates of expected scores across different raters and test versions.

Three assumptions underpin this generalization inference: a) EPLIS includes a sufficient number of tasks to adequately sample the domain; b) task and rating specifications are clear and well-defined; c) ratings from different raters are consistent.

The first assumption can be supported by generalizability and reliability studies that demonstrate consistency across different test forms and tasks. Reliability should be routinely monitored by calculating the reliability for each section of EPLIS for each administration. The second assumption can be supported by expert consensus on the systematic development of task specifications. The third assumption can be justified through the analysis of inter-rater reliability.

According to the test documentation, EPLIS raters participate in bi-annual training sessions and must demonstrate 0.80 agreement before administering the test. Additionally, 30% of all ratings are audited by a group of experienced raters.

However, the AELTS certification process identified the lack of comprehensive statistical analysis as a drawback of EPLIS, serving as a potential rebuttal to the generalization inference. This suggests that further investigation into the statistical properties of EPLIS scores may be necessary to fully support the generalization claim.

Explanation Inference

The fourth inference connects the expected scores to the construct of aviation English ability for Brazilian air traffic controllers. This inference is based on the warrant that expected scores on EPLIS are attributed to this specific construct. Two assumptions underlie this warrant: a) performance on EPLIS correlates with performance on other aviation English assessments and b) strategies employed in EPLIS tasks are relevant to the construct.

The first assumption can be supported by concurrent correlational studies examining the relationship between EPLIS scores and those of other commercial aviation English tests. However, a potential rebuttal lies in the unique nature of each operational context and the diverse tasks ATCOs encounter in real-life scenarios. For instance, documentation indicates that ATCOs must use standard phraseology in Portuguese for domestic flights and a combination of standard phraseology and plain English for international flights within Brazilian airspace (BRASIL, 2018). This code-switching element of the EPLIS construct may not be present in other aviation English tests, which often focus on monolingual proficiency.

The second assumption can be supported through discourse analysis of test-takers' verbal protocols. This analysis can reveal whether the strategies employed during EPLIS tasks align with the intended construct of aviation English ability.

Extrapolation Inference

The fifth inference, extrapolation, connects the construct of aviation English proficiency for Brazilian air traffic controllers to their actual performance in real-world ATC communications with international pilots. This inference relies on the warrant that EPLIS assessments accurately reflect this construct.

The warrant is supported by the assumption that aviation English proficiency, as assessed by EPLIS, accounts for other indicators of communicative language ability in radiotelephony communications within Brazilian airspace. This assumption can be substantiated through a) examining the relationship between EPLIS performance and test-takers' self-assessments of their aviation English proficiency using questionnaires; b) conducting case studies to observe real-life interactions of air traffic controllers who achieved levels 3, 4, and 5 in ATC facilities in Brazil; c) analyzing discourse in incidents where language was a contributing factor; d) gathering judgments from more experienced controllers.

However, a potential rebuttal to this inference is that the construct of aviation English proficiency for Brazilian air traffic controllers encompasses not only language competence, but also strategic competence and operational knowledge. The ICAO rating scale, which member states are obliged to use, focuses solely on language competence. As Kim (2012, p.227) notes, radiotelephony communication is a complex construct, where professional knowledge can be as or more critical than language competence.

For instance, highly experienced air traffic controllers who achieve level 3, below the ICAO-recommended level for licensing, may still successfully manage international traffic in English. Conversely, a newly trained controller who scores level

4 might struggle when faced with their first abnormal situation due to a lack of operational experience.

Utilization Inference

The sixth inference, utilization, is based on evidence demonstrating that estimates of test-takers' performance on EPLIS are valuable for making informed decisions regarding air traffic controller licensing and subsequent training programs. The underlying assumption is that test scores provide both test users and test-takers with useful information about test-takers' aviation English communicative language ability, facilitated by a clear understanding of the meaning of the test scores.

Backing for this assumption will be obtained by investigating test-takers' and test users' perceived interpretability and usefulness of the exam documentation. Additionally, evidence can be gathered by analyzing the National Language Policy, which outlines specific decisions to be made based on EPLIS scores and the context (domestic vs. international traffic). This analysis will shed light on how EPLIS scores are utilized in practice and whether they effectively inform decision-making processes.

Implication Inference

The seventh inference, implication/consequence, links the use of EPLIS to its intended outcomes. The warrant supporting this inference is that the consequences of using EPLIS and the decisions based on its scores are beneficial to both controllers and other stakeholders.

This warrant is underpinned by two assumptions: a) there have been no accidents involving a lack of English proficiency since EPLIS scores were incorporated

into the licensing process for Brazilian air traffic controllers; b) the test raises awareness of the importance of English proficiency for radiotelephony communication.

The first assumption can be supported by analyzing accident/incident investigation reports to determine if any were attributed to language proficiency issues since the implementation of EPLIS. The second assumption can be investigated through washback studies, including interviews with experts, follow-up questionnaires for controllers, and interviews with controllers to gauge their perceptions of the test's impact on their awareness and motivation to improve English proficiency.

Conclusion

This paper aimed to outline the Interpretative Use Argument (IUA) for the SISCEAB Aviation English Proficiency Exam (EPLIS) and initiate discussions on how to gather data to inform the development of the exam's validity argument. As Kane (2013, p.17) suggests, once the IUA is established, the focus can shift to a more critical and objective evaluation of the proposed interpretation and use, particularly in high-stakes contexts like aviation.

Developing the IUA and considering each of the seven inferences has highlighted the extensive work needed to enhance both the assessment process for Brazilian air traffic controllers and the broader international assessment policy within aviation. This article represents a step forward in this endeavor, which will contribute to a more comprehensive understanding of EPLIS's validity and ultimately enhance its effectiveness in ensuring aviation safety through robust language proficiency assessment.

References

Bachman, L.F. (1990). *Fundamental considerations in language testing*. Oxford: Oxford University Press.

Bachman, L. F., & Palmer, A. S. (1996). *Language testing in practice*. Oxford: Oxford University Press.

BRASIL. Departamento de Controle do Espaço Aéreo. Publicações. *Programa de implementação dos requisitos de proficiência em inglês* (ICA 37-924) 2023.

Chapelle, C. A., Enright, M. E., & Jamieson, J. (Eds.) (2008). *Building a validity argument for the Test of English as a Foreign Language*. London: Routledge.

Chapelle, C. A. (2020). *Argument-based validation in testing and assessmen*t. Thousand Oaks, CA: Sage.

Cronbach, L. (1988). Five perspectives on validity argument. In H. Wainer & H. Braun (Eds.), *Test validity*, (pp. 3-17). Hillsdale, NJ: Lawrence Erlbaum.

Cronbach, L. J., and Meehl, P. E. (1955). Construct validity in psychological tests. Psychological Bulletin, 52,281-302.

Douglas, D. (2000). *Assessing languages for specific purposes*: Cambridge University Press.

Douglas, D. (2014). Nobody seems to speak English here today: Enhancing assessment and training in aviation English. *Iranian Journal of Language Teaching Research,* 2(2), 1-12.

ICAO. (2010). Manual on the Implementation of ICAO Language Proficiency Requirements (2nd ed.): International Civil Aviation Organization. International Civil Aviation Organization.

Kane, M. (2006). Validation. In R. Brennen, (Ed.), Educational Measurement (4th Edition), (pp 17-64). Westport, CT: Greenwood Publishing.

Kane, M. E. (2013). Validating the interpretations and uses of test scores. Journal of Educational Measurement 50 (1), 1-73.

Kim, H. (2012). Exploring the Construct of Aviation Communication: A Critique of the ICAO Language Proficiency Policy (Unpublished doctoral dissertation). University of Melbourne, Department of Linguistics and Applied Linguistics.

Kim, H., & Elder, C. (2009). Understanding aviation English as a lingua franca: Perceptions of Korean aviation personnel. Australian Review of Applied Linguistics, 32(3), 23.21-23.17.

KNOCH, U. Collaborating with ESP stakeholders in rating scale validation: The case of the ICAO rating scale. *Spaan Fellow Working Papers in Second or Foreign Language Assessment*, v. 7, p.21-46, 2009.

McNamara, T., & Roever, C. (2006). Language testing: The social dimension. Malden, MA: Blackwell Publishing.

McNamara, T. (1996). *Measuring second language performance.* London: Longman.

Messick, S. (1989). Validity. In R.L. Linn (Ed.) *Educational measurement.* (3rd ed.) pp. 13-103. NY: Macmillan Publishing Co.

Parks, M. (2015). Development and validation of virtual interactive tasks for an aviation English assessment (Unpublished doctoral dissertation). Iowa State University, Department of English.

Making the skies safer

Grupo de Estudos em Inglês Aeronáutico
Aeronautical English Research Group