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Review Article

A Systematic Review of Aviation English Communication in Emergency Situations

*[1]Ma. Theresa Dumdumaya

About Article

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About Author

[1] National Aviation Academy of the Philippines (formerly Philippine State College of Aeronautics), Philippines

Contact @ Ma. Theresa Dumdumaya
terecomoda25@gmail.com

ABSTRACT

Communication in aviation emergencies requires sustained accuracy, but clarity can deteriorate when people resort to standardized phraseology that may need to change under pressure. This paper outlines recent literature examining how pilots, air traffic controllers, and other aviation professionals use the English language within emergent and non-routine communication. Following the PRISMA 2020 guidelines, a systematic search identified 63 studies, of which 18 were assessed in full text, and 9 core empirical studies, supplemented by 9 foundational studies, were included in the final synthesis. The synthesis suggests that many of the problems encountered in communication are not merely a function of English ability but involve a mixture of language competence, professional knowledge, and cultural understanding. Both native and non-native speakers or operators can face problems when their language ability is not coordinated with their technical operational knowledge and situational response. This paper highlights the need for language training that focuses not only on technical skills but also on pragmatic and adaptive competencies in high-stakes communication. Achieving this balance is essential to improve preparedness, clarity, and safety in aviation emergency communications.

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1. INTRODUCTION

In aviation emergency scenarios, communication faces problems related to deviation from standard phraseology, the complexity of the messages, and the high levels of workload of pilots and air traffic controllers (ICAO, 2006; Estival & Molesworth, 2020; Douglas, 2014). The International Civil Aviation Organization (ICAO) prescribes the use of standard radiotelephony phraseology to help avoid issues with communication, therefore maximizing the probability of clear and concise communication (ICAO, 2006; Estival & Molesworth, 2020; Douglas, 2014). However, the organization acknowledges that there are operational realities that may cause a lapse of the use of phraseology (ICAO, 2006; Estival & Molesworth, 2020; Douglas, 2014). In the more extreme situations, high-stress situations, or during times of urgency, strict adherence to prescribed phraseology is often strained and the speaker may be likely to improvise, or return to plain English, to carry the intention of expressing urgency or clarifying meaning (Estival & Molesworth, 2020; Douglas, 2014). With informal communications, the possibility of misunderstandings and ambiguities of meaning is likely to increase, Similar to other none co-operative environments; principals in aviation are subject to diverse accents, speaking fast due to stress or urgency, or multiple transmissions at the similar point in time. Research has found that up to 23% of emergency communications contain errors including incorrect readbacks, omissions, and misinterpretations that can undermine situational safety and contribute to incidents related to human factors (Prinzo et al., 2008; Estival & Molesworth, 2020).

Communication challenges in these contexts are not limited to non-native speakers of English. Even native English-speaking pilots and controllers, who are highly proficient linguistically, can, by accident, introduce ambiguity by using idiomatic expressions, needless verbosity, or phraseology outside of the familiar lexicon (Drayton & Coxhead, 2022; Tiewtrakul & Fletcher, 2010). In an emergency situation, non-native speakers face difficulties in intelligibility concerning accent, in fluently producing the spoken text, and pragmatic knowledge concerning how to process or respond (Kim & Elder, 2009; Coertze, Conradie et al., 2014). Sirikanjanawong and Wasanasomsithi (2018) found that while English proficiency tests are useful, they do not correlate to doing the job well, showing a gap between language certification and communication efficacy. Thus, miscommunication does not happen merely with regard to a high or low level of proficiency but as an issue related to the interaction of linguistic, operational, and intercultural issues that shape the meaning and interpretation of events during an emergency (Angela, 2023; Wen, 2022).

2. LITERATURE REVIEW

The reviewed studies consistently emphasize that effective communication in aviation emergencies depends on a combination of linguistic skill, situational awareness, and domain-specific expertise. Failure to communicate can take place when speakers are not capable of appropriate adaptations in language use relevant for that operational context. For example, pilots and air traffic controllers must slow speech rate, simplify complicated instructions and/or explicitly negotiate meaning in order to avoid misunderstandings (Ishihara & Prado, 2021; Kale et al., 2021). However, when operating under time pressure and limited opportunity to clarify, professional knowledge and shared situational models become more important. Kim (2018) showed how a Russian pilot, who had weak English proficiency, was still able to communicate using adaptive strategies and situational cues, whereas a Korean controller with much stronger English proficiency was unable to adapt and manage information effectively because he had incorrectly applied his professional knowledge. Likewise, Alharasees et al. (2022) found that misunderstanding rates in aviation communication were higher when linguistic competence and professional expertise were not aligned; this emphasizes the importance for both domains to be prepared as integrated training.

Furthermore, the aviation workforce now is comprised of multiple nationalities and the cultural and language diversity brings an added layer of complexity when people communicate in an emergent and high-stake situation. While Aviation English is considered a lingua franca, people from different languages or cultures are communicating more often, and may carry different pragmatic assumptions about communication (Kim & Elder, 2009; Ishihara & Prado, 2021). Research has shown that even when participants speak proficiency level English, minor differences in pronunciation or phraseology can be problematic, with significant misunderstandings occurring when cultural or common assumptions about communicating have been violated (Coertze et al., 2014; Tiewtrakul & Fletcher, 2010). There clearly is a need for continued corpus-based studies and true simulation studies that observe communication patterns and errors occurring in the real-world working (aviation) contexts.

Taking into account these repeated challenges and fragmented prior research, this systematic review will bring together and analyze empirical studies about aviation English communication during emergency or non-routine situations. While some studies have looked at specific focal areas of phraseology or proficiency, very few have synthesized independently or in an integrated way through linguistic, operational, or intercultural frames. Hence, through a comprehensive review of literature, this review offers an important summary of the critical factors that enable success or failure in communication, the features or patterns that often appear in styles and themes, and provides a more evidence-based updated to phraseology documentation and to framework, programs, and assessments (Douglas, 2014; Drayton, 2024; Herasymenko et al., 2021). In the end, the contribution to linguistic and operational readiness becomes the ability of aviation professionals to communicate effectively, efficiently, and safely in urgent and life-threatening emergency situations.

3. METHODOLOGY

3.1. Paper Search

A thorough examination of peer-reviewed research on aviation English communication in emergency contexts was performed. The search was conducted using a number of well-regarded academic databases (i.e., ScienceDirect, JSTOR, Directory of Open Access Journals (DOAJ), Web of Science, and Scopus) from years 2000-2025. Additional peer-reviewed journals such as the Journal of Air Transport Management, Journal of International

Journal of Aviation Psychology, Language Testing, Aircraft Engineering and Aerospace Technology were also checked for pilot-controller communication in aviation English to ensure aspects of identified studies.

The search strategy incorporated keywords and Boolean terms in a systematic approach to yield relevant literature. The main search string used across all database searches was: ("Aviation English" OR "Aeronautical English" OR "Radiotelephony communication" OR "Pilot-controller communication") AND ("Emergency communication" OR "Non-routine situation" OR "Abnormal situation" OR "High-stakes communication" OR "In-flight emergency") AND ("Language proficiency" OR "Miscommunication" OR "Phraseology" OR "Plain language" OR "Intercultural communication"). These search terms were meant to present studies focused on English in aviation contexts, particularly in emergency or high-stakes situations that support the linguistic, operational, and intercultural context of aviation communication.

Database-specific syntax adjustments were made when necessary for instance, using quotation marks for exact phrases and truncation symbols to include spelling variants. Filters were also applied to restrict results to peer-reviewed journal articles, conference papers, and empirical studies published in English. Database-specific syntax adjustments were made when necessary, for instance, using quotation marks for exact phrases and truncation symbols to include spelling variants. Filters were also applied to restrict results to peer-reviewed journal articles, conference papers, and empirical studies published in English.

3.2. Study Selection and PRISMA Process

The process of study selection was completed in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines for a transparent, rigorous, and replicable screening process. After duplicates were screened out, a two-stage screening process was undertaken. During the first step, titles and abstracts were screened based on the criteria for inclusion that required the studies' sample to include aviation personnel, such as pilots, air traffic controllers, cabin and ground staff, or students, that English language communication was the focus of the study, and that the studies focused on emergency or non-routine aviation settings. The second stage involved a full-text eligibility assessment, during which studies were excluded if they did not meet our inclusion criteria due to aviation irrelevance, insufficient consideration of emergency communication, or the absence of empirical data (Page et al., 2021).

Next, a flowchart or diagram was created to show how many records were identified, screened, assessed for eligibility, excluded with reasons, and included before the final qualitative synthesis, a PRISMA 2020 flow diagram was created.

3.3. Data Extraction

Data extraction was performed systematically using a structured framework encompassing several categories:

- Contextual information: Aviation sector, participant roles, geographic regions, data collection methods, and participant demographics.
- Characteristics of emergency scenarios: Types and severity of emergency scenarios; real and simulated scenarios; and definitions of what constitutes an emergency.
- Language profiles: Native vs. non-native English speakers; levels of proficiency (levels of fluency); accents; levels of grammatical instruction.
- Communication issues: Types and frequencies of communication errors, examples of miscommunication, connections to safety incidents, and patterns such as omissions or mistakes.
- Assessment methods: Identification of tools, protocols, and technologies used for evaluating communication effectiveness.
- Contributory factors: Workload, rate of speech, complexity of the message, radio quality, cultural/linguistic differences and stress, to adhere to phraseology.
- Key outcomes: Results in terms of communication occurring successfully or unsuccessfully; differences in success for native vs. non-native speakers; recommended communication strategies; practical instructor or policy recommendations for enhancing communication.

3.4. PRISMA Flowchart

The PRISMA 2020 flow diagram was utilized to convey the systematic review process. The flow diagram summarizes the number of records that were identified, screened, assessed for eligibility, excluded for reasons, and included for qualitative synthesis. Of the 63 studies identified through databases, duplicate sources were removed before screening. After screening the titles and abstracts, 46 records were removed for not meeting the inclusion criteria. Eighteen articles were reviewed in full-text assessment, and from that, nine core empirical studies and nine core studies were included in the study. This structured selection process described in this article provides the reader transparency and replicability, while remaining in accordance to PRISMA 2020 reporting (Page, 2021).

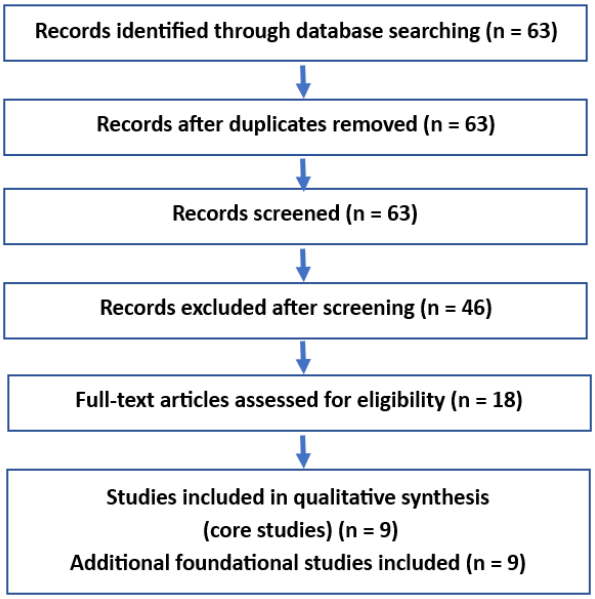

Figure 1. PRISMA Flowchart

4. RESULTS AND DISCUSSION

Table 1. Summary of Included Studies

Study	Study Design	Population	Communication Context	Primary Focus
Kim and Elder (2009)	Qualitative: real radiotelephony recordings, focus groups, interviews	8 Korean aviation experts (5 controllers, 3 pilots), 1 American pilot	Commercial aviation, Korea (Incheon Control Tower, Area Control Centre)	Communication problems in non-routine/ emergency situations; shared responsibility for miscommunication
Prinzo et al. (2010)	Narrative synthesis of pilot survey/ interview responses	U.S. pilots from major airlines (American, Continental, Delta, United)	International commercial aviation	Communication with non-native English-speaking controllers, especially in emergencies
Ishihara and Prado (2021)	Qualitative, corpus-informed discursive analysis	No mention found	Radiotelephony communications, global	Pragmatic strategies and negotiation of meaning in non-routine situations
Coertze et al. (2014)	Mixed-methods: questionnaire (n=263), real recordings	197 pilots, 66 air traffic controllers (South Africa; diverse language backgrounds)	Professional aviation, South African airspace	Perceptions and actual use of Aviation English; error analysis
Kim (2018)	Qualitative, discourse analysis with expert commentary	3 pilots, 3 air traffic controllers (commentators); Russian pilot, Korean air traffic controller (recorded)	Commercial/general aviation, international	Professional communication and miscommunication sources
Estival and Molesworth (2020)	Experimental, flight simulator	17 pilots (8 native English speakers, 9 non-native English speakers; Australia)	General aviation training, simulated flights	Error types (omissions/ mistakes), factors affecting communication accuracy
Kale et al. (2021)	Survey-based	212 pilots and air traffic controllers (no further details found)	Professional aviation, global/intercultural	Pragmatic failure and language-related risks in intercultural communication
Drayton and Coxhead (2022)	Qualitative, semi-structured interviews	9 licensed tower controllers (United Arab Emirates; 7 non-native English speakers, 1 native English speaker)	Air traffic control, United Arab Emirates, emergencies	Plain language use in emergencies; contradictions in International Civil Aviation Organization guidance
Prinzo et al. (2008)	Quantitative, analysis of 50 hours of transmissions	832 aircraft (74% U.S., 26% foreign); 4,816 pilot transmissions	U.S. commercial aviation (five Air Route Traffic Control Centers)	Prevalence and types of communication problems by language background
Tiewtrakul and Fletcher (2010)	Conversation analysis of approach phase recordings	No mention found; pilots and air traffic controllers at Bangkok International Airport	Commercial aviation, Thailand	Accent, complexity, and error rates in pilot–air traffic controller communication

4.1. Thematic Analysis

The table provides a brief summary of the selected studies regarding design, participants, context, and focus. To expand the table review, the following narratives provide a more comprehensive qualitative examination of patterns and findings across studies. Using a thematic analysis, the researcher interprets and organizes similar ideas, communicates issues, and contextual variation from the literature reviewed. The aim of the narratives is to provide meaning beyond the tabularized data, while also identifying shared themes, variation, and some findings that can be placed into broader conceptualizations of aviation English communication focused on emergency and non-routine situations.

4.1.1. Communication Challenges in Emergency and Non-Routine Situations

Communication difficulties in emergency and non-routine procedures are evident across studies, largely regarded to

message complexity and/or workload and time pressure. Breakdowns occur with both native and non-native English users, but often stem from native users simply communicating in plain English, using idiomatic phrases, or long-winded communication; non-native users knowing simplify less English. Further communication difficulties occur when the communication took alternative paths to prescribed phraseology. In general, at least 23% of transmissions contained errors in communication, like discrepancies and omissions in readback items, and correction was often made quickly to reduce or minimize the impact of safety.

4.1. Language Proficiency versus Professional Competence

A crucial difference exists between having linguistic ability and having professional competency. The ICAO language proficiency requirements are meaningful as a baseline, but on their own will be insufficient for effective communication in emergencies. Knowledge of the profession, awareness of the situation, and interactive communicative competence are just as important. For instance, a Russian pilot who did not have a high-level proficiency of English was still able to gain meaning through the use of various adaptive communication strategies. A Korean controller had a high level of proficiency of English, but their professional knowledge and expertise did not make up for the absence of this language proficiency. These considerations speak to the need for assessment and training models to include criteria for assessment beyond a language measure.

4.2. Native and Non-Native Speaker Communication Dynamics

The interaction between native and non-native speakers of English is complicated. Non-native speakers are usually blamed for communication failures; however, native speakers also contribute to the problems through their use of 'simplified' language, use of slang, and reduced rate of speech as well. Accent and pronunciation differences create additional problems for comprehension, especially when engaging with two non-native speakers or working with complexity of numbers.

4.3. Communication Strategies and Adaptive Behaviors

Effective communication in an emergency requires many adaptive strategies other than phraseology. Examples include simplification, avoidance of redundancy, paraphrase, and negotiation of meaning. Controllers and pilots often adjust their speech rate, repeat critical information and/or strictly avoid any ambiguous exchanges. Skilled communication and interpretation depend heavily on adeptly switching between standard phraseology and plain English. Thus, the design of any communication should be careful not to overuse plain English because misunderstandings can happen when speaking with non-native English speakers. It is helpful to include training in pragmatic and interactional competence and cultural competency.

4.4. Implications for Training and Assessment

Suggestions from studies reviewed include expanding ICAO phraseology to encompass more emergency situations, including pragmatic competence in a curriculum, clarifying the purpose of using plain language, and creating assessment responses that are more context-sensitive and holistic that honor professional knowledge and adaptive strategies. Additionally, it is encouraged to include non-native English experts in policy development and continue developing an aviation English corpus.

4.5. Limitations

The evidence base is comprised of a considerable degree of heterogeneity in sample size, method and reporting quality. Many studies tested simulated scenarios instead of real-world emergencies; this limited the demographics of study samples, as well as limited the generalizability of findings across aviation context. Caution is therefore warranted when drawing conclusions about contexts across aviation.

5. CONCLUSION

Using aviation English is a complicated matter when it comes to communicating in emergency and non-routine contexts. Communicating is not only a linguistic affair, but also a profession. In this review, it is argued that effective communication come not only through the use of standard phraseology, but also through awareness, improvisation, and the negotiation of meaning in context. Breakdown of communication occurs in both native and non-native English speakers, so training should include professional skills and specific competencies associated with intercultural communication, not only language. An opportunity to review and enhance assessment of training curriculum is the next step in improved safety in communicating in emergency communications. While previous studies have had varying methodological approaches and mostly focus on simulated scenarios, previously collected studies provides evidence towards the support of need efforts to understand communication in aviation safety, and developing a practice in aviation communications.

The training must link language skills with functional skills through simulation training for or within situational contexts of emergency communication. These skills must be focused on developing proximal skills, intercultural competence, and pragmatic competence over more superficial repetition and memorization of phraseology. Assessment, such as the ICAO Language Proficiency Requirements, should also take into account one's adaptive capabilities in context and in situational decision making under pressure. Future research should take the form of longitudinal and cross-cultural studies of real or simulated emergency communication, the use of AI or Virtual simulations in training, and the development of a corpora for analysis of aviation English and evidence-based updates to phraseology and curriculum design.

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