Lexico-syntactic features of ab initio pilots' and controllers' aeronautical English: A corpus linguistic investigation of aviation communication in the Philippine airspace

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Abstract

An exponential increase in aviation English (AE) linguistic studies has shown that language(s) used in the skies takes a crucial position that affects global aviation communication, where safety is the ultimate priority. However, there has been a lack of investigation on pilot-control communication, and the gap in AE studies in the Philippines is wide, necessitating further investigation as this area has been underexplored in the Philippine linguistic ecology. Using a corpus-based approach and transformational-generative framework analysis adapted from Philps' (1991), this study provides a linguistic maiden study on AE used for aviation communication among ab initio pilots and controllers in the Philippine air space. The Aviation Corpus of English-Philippines (ACE-PHI) sub-corpus of communication between pilots and controllers is used, and ab initio pilots' solo flights in routine situations are the chosen communicative event. This reports the lexical features of AE in various categories owing to the lexical density of noun categories and cardinals and the syntactic patterns at the sentential level, which resemble essential transformations afforded in naturalistic English utterances. Conceding to the generic T-rule, however, AE is generally marked by elliptical construction where a systematic deletion is not devoid of other syntactic structures.

1 Introduction

The aviation industry is a multicultural niche where multilingual speakers come into contact. Language is essential in aviation, as it primarily plays a crucial role in air navigation and safety. However, given the scale and complexity of the sector, it is remarkable and possibly even alarming that studies into aviation's language are still comparatively sparse despite the industry's transition toward English-based communications (Taylor & Udell, 2020). Studies on how language facilitates smooth interaction between and among aviation personnel to establish effective communication, which is a precursor to flight safety, have been explored by linguists to a limited extent. Global aviation-reported catastrophic accidents, such as Tenerife airport disaster (1997), PSA Flight 182 (1978), Avianca Flight 52 (19990), American Airlines Flight 965 (1990), Charkhi Dadri mid-air collision (1996), Garuda Indonesia Airlines Flight 152 (1997) have confirmed that language (mis)communication as one of the reasons (Krasnicka, 2016) and that inadequate English language proficiency was a contributory or latent factor (Friginal et al., 2019) causing tragedy. This has prompted the implementation of the International Civil Aviation Organization's (ICAO) Language Proficiency Requirements (LPRs). One contributing factor to miscommunication is the wrong interpretation of instructions (Ferrer et al., 2017). Pilots and controllers must comply with the ICAO LPRs to ensure they are proficient in aviation communication, aiming to provide "maximum clarity, brevity, and unambiguity" for safe and expeditious flights.

Over the past 20 years, most studies on language and aviation have focused on the analysis of (mis)communication between pilots and controllers, describing AE that is used in interaction (see Cushing, 1994; Barshi, 1997; Barshi & Healy, 1998), attributing the nativeness and non-nativeness of language users (Wu et al., 2018; Estival et al, 2016; Molesworth & Estival, 2015; Bowles, 2014; Kim & Elder, 2009; Jang, et al., 2014) to plain language choice over standard

phraseology (Bieswanger, 2016), analyzing linguistic markers from syntactic structures and standard lexemes of phraseology (Borowska, 2017), its aspects such as word interrogatives (Hinrich, 2008), differences between standard and plain aeronautical English (Prado & Tosqui-lucks, 2017; Ferrer et al., 2017) frequency (Moder & Halleck, 2009), pragmatics (Howard, 2008; Linde, 1988), pronunciation (Sullivan & Girginer, 2002), prosody (Trippe, 2018; Trippe & Baese-Berk (2019), workload and language production (Corradini & Cacciari, 2002), discourse analysis (Tiewtrakul & Fletcher, 2010; Friginal et al., 2021), English language proficiency (Prinzo, Hendrix, & Hendrix, 2008), speech acts (Prinzo, Hendrix, Britton, 1995), and speech functions (Zhao, 2023). These studies have shown the global significance of language in international communication, as pilots and controllers, whether native or non-native, are prone and equated to errors and miscommunication.

English has been emphasized as the language of the skies in these studies about language in aviation. One of the final requirements of the ICAO, which made English its official language in 1951, was that all radio transmissions use standard terminology. The ICAO introduced LPRs more than ten years ago to improve aeronautical radiotelephony communication and, thereby, the safety of international flights. ICAO LPRs cover not only non-native speakers' abilities to communicate smoothly but also native speakers' linguistic behavior, which should be adjusted to aeronautical communication needs (Borowska, 2017).

As global aviation continues to rise and increase operational capacities, there has also been an increase in accident rate (Hsu, Li & Chen, 2010) despite the conformity of member states to the established Standards and Recommended Practices (SARPS) of ICAO in supporting global air transportation safety and efficiency. In recent years, the percentage of accidents has been attributed to human factors (Colangelo, 2021). Human errors have caused most aviation disasters, and one of the most common forms is miscommunication, which can potentially lead to catastrophic repercussions (Ferrer et al., 2017).

Cushing's (1994) extensive studies on language factors in aviation, particularly air-ground verbal communication, have highlighted issues related to aviation safety, communication problems, social/cognitive mismatch, error-resistant linguistic protocol, and fatal words in aviation communication. These studies highlight the importance of language as a human factor in aviation communication but loosely define AE as a specific register using phraseology.

To date, three studies have explored aviation English in the Philippines: Ferrer et al. (2017) on standard and nonstandard lexicon, Ferrer & Flores (2019) on the acceptability level of non-standard phraseology among Filipino controllers, and Ferrer (in press) on language policy in Philippine aviation education. The peculiarity of the English language among Filipino aviation personnel may be attributed to their English varieties. Cited in the most recent studies (Prado, 2019; Friginal et al., 2019; Friginal et al., 2021; Schneider, 2022 in Tosqui-Lucks & Santana, 2022; Dinçer et al., 2023), Ferrer et al. (2017) found that the standard phraseology *go ahead* means giving permission to state a request but may mean moving forward, while *hold short* would mean not crossing or entering the runway mentioned but may mean proceeding or continuing. This suggests that the non-standard use of AE among Filipino pilots and controllers may have revealed the linguistic peculiarity of the English language variety used in the country.

Ferrer & Flores (2019) determined the acceptability level and potential risks of non-standard phraseology among Filipino pilots and controllers, hypothesizing significant variations in these factors based on their profile, such as rating. The study revealed that non-standard phraseology poses risks in operational communication, particularly in general operating procedures, landing/takeoff, taxiing, and in-flight. Filipino pilots and controllers revealed varying degrees of acceptability for non-standard phraseologies, such as the use of affirmative (m=2.81), which can lead to misunderstandings in RTF. This linguistic evidence demonstrates homophony and confusion-inducing phenomena, as different words or phrases sound exactly or nearly alike.

Moreover, Ferrer (in press) provides an overview of language policies in aviation Higher Education Institutions in the Philippines. The study used a corpus-based sociolinguistic approach to understand how *aviation* is represented by policymakers, teachers, and students, particularly pilots and controllers. The findings suggest that improving language policies can enhance the competence and competitiveness of aviation professionals in the global aviation industry.

This paper addresses the research gap on AE in Philippine aviation, highlighting the need for further investigation in the Philippine linguistic

ecology. It seeks to analyze the lexico-syntactic characteristics of aeronautical English in aviation communication in the Philippine airspace.

1.2 Research Questions:

1. What lexical features prevail in the aeronautical English used for aviation communication in the Philippine air space?
2. What constitutes the syntactic pattern of aeronautical English used for aviation communication in the Philippine air space?

1.3 Analytical Framework

As studies on AE have been purely descriptive linguistics in nature, a considerable number of investigations have established that lexical features of AE as a restricted register were contained in both standardized phraseology (SP) and plain aviation English (PAE) and can be characterized easily across genres and text types using the prescribed language provided for by the international and local regulatory bodies as standard references.

Nitayaphorn (2009) conducted a corpus-based conversation analysis of 556 messages from the International Civil Aviation Organization's Manual of Radiotelephony and actual language in air-ground communication from 1994-2004. Using AntConc software tool, this categorized lexical items into 11 conceptual groups based on aviation activities and flight profiles. These groups included facility (aircraft), weather (CAVOK), operational path (approach), system (ILS), area (aerodrome), parameter (altitude), unit of service (ACC), status (alert), process (altimeter setting), flight performance (abeam), and communication expression (acknowledge).

Lopez et al. (2013) analyzed a 60,864-word corpus of real air-ground communications from two French En-route control centers and one French major airport to analyze AE and PEL in communication between French controllers and pilots worldwide. They found major frequent grammatical categories in RefC and UseC, including the Noun category (47.2%), Interjection category (8 identical interjection forms), and Pronoun category (0.5%). The most used pronoun forms in RefC were *you* (65.52%), *I* (20.69%), *one* (8.62%), *me* (3.45%), and *what* (1.72%). The noun categories exhibited predominance in air traffic phraseology, even in Cada's (2016) corpus-based analysis of Czech aviation personnel's air traffic phraseology.

In contrast to Lopez et al.'s (2021) analysis of all types of air control, Drayton (2021) conducted a discourse-based corpus analysis of air control, focusing on tower control. The spoken corpus from Ghaf Aerodrome and Sandy Aerodrome was transcribed, while the written corpus was sourced from the UAE General Civil Aviation Authority, CAAP 69 UAE Radiotelephony Standards documents, and ICAO Document 9432 Manual of Radiotelephony. The corpus identified 10 proper noun categories, 19 number categories, and 29 aviation alphabet tags.

Drayton and Coxhead (2023) created a specialized technical vocabulary list for aviation radiotelephony, categorized into technical words (51.44%), numbers (12.13%), multiword units (3.20%), proper nouns (19.85%), and acronyms (2.27%). The most frequent technical words were *runway, to, request, tower, via, feet, right, report*, and *roger*. Cada's (2016) study found a lexical density of word classes, with frequent word classes including nouns related to geographical places, adjectives, verbs, adverbs, specialized terminology, and abbreviations.

The language used between pilots and air traffic controllers is ATC-English, which has a phraseology that differs from natural English and falls under the ESP (English for Specific Purposes) category in linguistics (Breul, 2013: 74). This language is used for a limited set of functions and has a prescribed phraseology with reduced syntax and vocabulary for routine actions. Notably, the seminal work of Philps (1991*),* drawn from a transformational-generative analytical framework, paved the way to characterize the (English) language used in air traffic control. Philps (1991) reports how the codified language of the phraseology differs from natural English on every major linguistic level. Looking closely at the lexico-syntactic analysis, Philps (1991) analyzed the air traffic control English sourced from the ICAO Official English-language version (in French airspace) elicited from a 541-utterance dataset (controlled-sourced-476; pilot-sourced-65) revealed predominant linguistic features of air traffic control English using phraseology in sentential level (*imperative*-42.5%*, followed by passive*-8.1%*, interrogative*-1.8%, and *negative*-1.7%) and phrase level (*determiner deletion in direct object*-26.2%*, noun phrase*-18.7%*, and adverbial phrase*-9.6%*, noun phrase deletion*-25.5%*, link verb deletion*-20.7%, and *deletion of preposition of place*-7.0% *and of direction*-4.1%).

A glimpse of the pioneering work on the linguistic features of phraseology (see Philps, 1991 for more details) revealed that *imperative utterances*, at the sentential level, are preponderant in ATC English, such as

(1) CONTINUE PRESENT HEADING; and
(2) TAXI TO HOLDING POINT,

Philps' (1991) syntactical analysis of linguistic features mainly characterized air traffic control English, as most utterances analyzed were controller-sourced only in a small corpus. However, it did not observe a proportionate number of utterances that included pilot-sourced, which the present study addressed by incorporating the utterances of ab initio pilots in the analysis because meaning is not inherent in individual linguistic forms but rather co-constructed through cooperative negotiation between pilots and controllers (Ishihara & Prado, 2021). Philps' (1991) description of AE phraseology as a distinct and restricted register is limited to ATC phraseological analysis.

The present study aims to establish a foundational linguistic investigation of aeronautical English used for aviation communication in the Philippine air space; hence, it employs Philps' seminal work (1991) as the main framework for the analysis.

2 Methodology

The current study is part of a larger corpus-based investigation that Ferrer (in press) is presently conducting, primarily a component in establishing a self-built corpus he termed the Aviation Corpus of English-Philippines (ACE-PHI). ACE-PHI covers two main subcorpora: (1) spoken data and (2) written data. The spoken data contains pilot-control communication from ab initio pilots' solo flights (controlled and uncontrolled) in selected communicative events such as routine and nonroutine situations. On the other hand, the written data consists of publicly available language policy-related and academic documents (e.g. curricula, etc.) from the Philippines' Civil Aviation Authority and the Philippine State College of Aeronautics. The written data were used as part of Ferrer's (in press) corpus-based sociolinguistic analysis of language policy in Philippine aviation education. However, as the building of the ACE-PHI is ongoing for a larger collection of the spoken data, the present study utilizes only the sub-corpus of communication between ab initio pilots and controllers only.

The datasets include matrices of the following:

1. Coded utterances: ab initio pilot-sourced and controller-sourced, of which utterances were coded using the following identifiers:
    1.1 Source Codes:
        SPS : Student Pilot-Sourced
        CS : Controller-Sourced
    1.2 Transformation Codes
        0001 : Imperative transformations
        0002 : Passive transformations
        0003 : Negative transformations
        0004 : Interrogative transformations
        0005 : Active [complex] transformations
        0006 : Exclamatory markers
2. Lexico-syntactic patterns per source: distribution which provides an overall view of the syntactic modification.
3. Patterns across syntactic modifications per source: distribution of lexico-syntactic patterns across transformations per source.

0001-0004 codes signify the initial transformations from Philps' (1991). However, when SPS data where included in the manual analysis, it showed different moods and voices in the utterances, leading to the addition of the active (complex) transformations, which were mostly SPS sourced, and exclamatory markers. The exclamatory markers were termed as a single category, which occurs in various forms and which meanings can be similarly explained in the studies of Bieswanger (2016, forthcoming on non-aviation and aviation-related English language), Estival et al. (2016), Friginal et al. (2019), Friginal et al. (2021), and Schneider (2022).

This study analyzed lexico-syntactic patterns of aeronautical English in Philippine airspace using Philps' (1991) framework. The data was analyzed with the help of a retired controller for 30 years and a private pilot, both of whom have served PhilSCA for less than ten years, to ensure inter-coding reliability. However, not all syntactic modifications were used in the analysis, as the data showed minimal occurrences of other modifications due to various reasons:

1. the communicative context in the sub-corpus sets out ab initio pilots' solo flights only;
2. the primary syntactical analyses focus on the macro function of patterns in the sentential level only to amplify the mood, logic, or voice of an utterance since dealing with micro functions in the phrasal level analysis would be too delimiting; and

3. although the analysis of syntactic patterns at the sentential level was mainly done to account for the relationship between the mood and illocutionary acts of the phraseological utterances used for meaning negotiation between ab initio pilots and controllers, a peripheral analysis of the phrasal level was marginally included and found helpful in determining the overall mood and voice of the utterances.

The study analyzed aeronautical English (AE) data in various features and statistical data from Sketch Engine and Microsoft Excel to determine its lexico-syntactic characteristics. The data was then manually analyzed to understand the communication contexts in the Philippine airspace, focusing on the use of aeronautical English in aviation.

3 Results and Discussion

The ab initio pilots' and controllers' AE reveals the lexical features and syntactic patterns afforded in the naturalistic English utterances but constitutes systematic sentential transformations, conceding to the generic T-rule (Radford, 1997), which shows a specific instance of syntactic movement rules, reflecting how elements in a sentence can change their positions to fulfill different syntactic functions.

We first present the most frequent lexical items, KWIC, collocations, visualization, 3-grams, 4-grams, and 5-grams in ACE-PHI ab initio pilot sub-corpus.

3.1 Lexical features in aeronautical English used for aviation communication in the Philippine air space

From the ACE-PHI sub-corpus of ab initio pilots' solo flights, Table 1 lists the top 100 most frequent words, with lexical words highlighted, although many function words like prepositions (e.g., *for, to, at, up, via*) conjunction (e.g., *and*), and determiners (e.g., *the, a*) top frequency lists in the corpus which implies a great diversity in distribution.

The most frequent lexical items in AE are in the nominal category, including *rpc, runway, report, base, tower*, and cardinal numbers (e.g., *zero, one, two, three*) as can also be gleaned in Figure 1. This reports significant patterns as *rpc* indicating aircraft callsigns tops the word list (Lopez et al, 2013; Nitayaphorn, 2009; Drayton, 2021). While aircraft call signs constitute alphanumeric codes, transmitted by pronouncing each digit separately (ICAO Doc 9432, p.2-3, it could be construed that *rpc* co-occurs with cardinal numbers as in RPC 8370 transmitted as *RPC eight three seven zero.* Hence, it is more interesting to determine the collocates of *runway* – the second topmost lexicon.

Looking closely at the discrete linguistic elements and their common components as they appear before or after each single word to form a consistent pattern in the discourse (Firth, 1957) is crucial especially in interpreting discourse characteristics of AE that may be unique to the aviation domain (Zhang, 2019). Using KWIC feature of Sketch Engine, Table 2 enumerates only the top 15 collocates of *runway,* to observe brevity in presentation.

We shall now turn to the lexical item *clear* which appears interestingly in two categories: verb (181) and adjective (52). Precisely, it needs to be confirmed in visualization and concordance lines to check the POS category and its actual functions.

On the one hand, Figure 2 shows that *clear* primarily is a verb collating with *runway* as its objects in (3), which is in the interrogative construction. However, the transformation of *clear* into *cleared* is blocked by the presence of prepositions *to* (67 tokens) and *for* (92 tokens) that occur in passivized construction, as shown in (4a) and (5a) as opposed to the naturalistic utterances in (4b) and (4b). Passive transformation, along with systematic deletions (e.g., subject-pronoun and determiner deletions), as discussed later, is seen as a significant feature in the lexico-syntactic pattern of AE in aeronautical communication.

[1](3) / Can you forward to *clear* the runway?
(4a) <s> Code Runway zero five *cleared* for take-off, RPC 416 //
(4b) (You are) *cleared* for take-off
(5a) 0002 copy ma'am *cleared* to land Runway two three 7988 //
(5b) (I am) *cleared* to land (via) Runway two three 7988

While *cleared for take-off* and *cleared to land* occur frequently in the corpus, which follows the standard phraseology for giving clearances alike (ICAO Doc 9835), a considerable number of

[1] This is considered a non-standard phraseology for clearing the runway. A more appropriate phraseology to use is *vacate (specific point of runway reference or intersection).*

occurrences of *cleared for touch and go* (30 tokens) deserves attention because the systematic deletion of preposition *for* shall be observed if we base it on the Manual of Radiotelephony (ICAO 9432), yet it is found in the corpus illustrated in (6a) against the naturalistic utterance in (6b).

(6a) *cleared for touch and go* Runway two three RPC 349 //
(6b) (I am) cleared for touch and go (via) Runway two three RPC 349

On the other hand, Figure 3 visualizes the collocates of *clear* in the adjective category, which modification in utterances usually takes place in situations or procedures that involve giving traffic information in general or making turns in particular and describing short field take-off procedures, runway take-off roll, start of the climb, visual reference for traffic pattern turn, and reporting established downwind, as shown in (7a), where a systematic deletion of linking verb *is* occurs as opposed to the naturalistic utterance in (7b).

(7a) // left clear, front clear, right clear // three hundred feet
(7b) (My) left (is) clear, front (is) clear, (and) right (is) clear

Likewise, this study reveals that AE features personal pronouns such as *you* and *we,* which resemble the same patterns, being the topmost pronouns in Prado (2010), Moder and Halleck (2012), and Pacheco (2021). Although using personal pronouns is not encouraged in aeronautical communication (Pacheco, 2021), its significance cannot be underestimated, as Neville (2004) assumed it to be significant in assigning identities.

Moreover, this presents the most frequent multi-word units (MWU) in the ACE-PHI. MWUs are expanded collocations frequently occurring as linear strings, similar to prefabricated chunks of language (Zhang, 2019). Table 3 presents the N-grams used to measure the occurrences of MWU.

In summary, the lexical features of AE in the ACE-PHI sub-corpus of communication between ab initio pilots and controllers are characterized by the lexical density of noun category, with aircraft callsigns as the most frequent. Cardinals, verbs, prepositions, adjectives, conjunctions, adverbs, and pronouns follow the list.

3.2 Syntactic patterns in aeronautical English used for aviation communication in the Philippine air space

AE patterns reveal a unique yet systematic transformation when following the generic T-rule that shows instances of syntactic movement. One major feature that accounts for these transformations is using ellipsis (Philps, 1991). Ellipsis is when certain words or phrases are omitted from a sentence because they are either understood from the context or are unnecessary for conveying the intended meaning, which helps to avoid redundancy and makes communication more efficient.

The syntactic pattern in AE shows that various modifications occur in pilot-control communication. Table 4 shows a contradictory result in Philps (1991) positing imperatives to be preponderant in ATC English since most of the utterances in his study were controller-sourced (476) rather than pilot-sourced (65). It must be noted that Philps (1991) focused on ATC English phraseology that appears in ICAO phraseology, while the present study analyzed actual utterances of pilots and controllers, as this aimed to observe proportionate representativeness in the exchange of communication between them. Although the controller-sourced utterances (58.96%) were more than ab initio pilot-sourced (41.04), the present study data revealed the preponderance of active transformations, which were produced mainly by ab initio pilots, followed by imperatives more frequently produced by controllers, passive, exclamatory, and a few instances of interrogative and negative transformations. The following show the transformations in the corpus:

(8a) Bicol to RPC 349 / Request taxi instructions to the active //
(8b) (I) request (for) taxi instructions to the active (runway)
(9a) RPC 349 / taxi and line up / Runway two three //
(9b) (I would like you to) taxi and line up via Runway two three //

In (8a), the ab initio pilot's phraseology *request taxi instructions to the active* has been transformed from its naturalistic English utterance as in (8b) in the active construction. In this transformation, the T-rule generates the same terminal string in the phraseology as in natural English. However, the active transformation shows virtually a systematic deletion of subject-pronoun *I* as this is already determined in part of

the extralinguistic context, and further intralinguistic detemination is redundant. This further explains why pronouns are not frequently used in AE despite their marginal significance in assigning identities.

In (9a), the controller's response to the ab initio pilot using the phraseology *RPC 349 taxi and line up Runway two three* has been transformed from its naturalistic English utterance as in (9b) in the imperative construction. The imperative T-rule in this transformation also yields the same terminal string in the phraseology as in natural English; however, it essentially replaces all other syntactic structures in natural English to convey the illocutionary force in inciting the ab initio pilot to take action using a modal. Philps (1991) reported that the use of the imperative is closely, but not exclusively, related to scenarios involving changes (of heading, level, etc.) or movement (crossing, passing, etc.).

The preponderance of active transformations in ab initio pilots' utterances and imperative transformations in controllers' utterances have shown the significance of a controlled, equal, and coordinated flow of AE in operational aviation communication. This implies the significance of coordinated communication between ab initio pilots and controllers, which is realized through adherence to radiotelephony protocols such as readback, i.e., to "repeat all, or the specified part, of this message back to me exactly as received," (ICAO Doc 9432, p.2-7).

As controllers perform their role by giving instructions for various purposes, ab initio pilots must ensure they receive and understand these instructions clearly. The crucial interplay between ab initio pilots' and controllers' utterances is realized mainly through active and imperative transformations, and the rest of the syntactic modifications in AE used for aviation communication can be gleaned in Figure 4.

The figure above shows that the SPS group has a slightly higher median than the CS group, indicating a higher central tendency of the SPS data. Likewise, the SPS group shows a wider spread in the data, as indicated by a larger interquartile range and longer whiskers, suggesting more variability in the student pilot-sourced data compared to the controller-sourced data. Furthermore, the plot shows a slight upward trend from CS to SPS, as indicated by the line connecting the medians of both groups.

However, a closer look at Figure 5 shows how AE utterances are widely distributed between SPS and CS across syntactic modifications. CS values tend to be higher in imperative transformations, negative transformations, and active transformations while the SPS values are generally lower than CS values, except in passive transformations and interrogative transformations. Likewise, there is noticeable variability in the data as indicated by the size of the error bars.

This implies that although ab initio pilots tend to produce slightly higher numbers of utterances, such utterances must observe succinctness and accuracy to provide "maximum clarity, brevity, and unambiguity" (ICAO 9432, p. 3-2). As the purpose of phraseologies is to provide clear, concise, unambiguous language to communicate messages of a routine nature (ICAO 9835, p. 7-2), both ab initio pilots and controllers must ensure that their utterances, realized by active and imperative transformations in AE, despite the number of utterance production, conform or adhere to the prescribed standard radiotelephony.

We shall now turn to the third type of modification at the sentential level: passive transformation. Philps (1991) reported that in the passive transformation, the terminal string found in natural English never materializes in the phraseology, owing to various T-rule deletions, as found in the corpus shown in (10a) and (11a) against the naturalistic utterances in (10b) and (11b):

(10a) RPC 416 / wind zero six zero at ten knots Runway zero five / cleared to land //

(10b) (You are) cleared to land (with a) wind (direction of) zero six zero (and wind speed) at ten knots (on) Runway zero five

(11a) RPC 8730 / roger / wind two two zero at twelve knots / Runway two three / cleared for touch and go

(11b) [(I have received all of your last transmissions. (You are)] cleared (for) touch and go (at) wind two two zero at twelve knots on Runway two three

As for the passive transformations, various systematic deletions occur, such as subject-pronoun deletion, preposition of purpose, and preposition of location or position. The subject-pronoun deletion is common in natural English utterances (e.g., went back to the airport today) but is systematic in passive construction as ab initio pilots and controllers are preidentified and require no further overt determination (Philps, 1991).

Furthermore, it can be construed that although the subject-pronoun is systematically deleted, it is replaced by the presence of the aircraft callsign as representative of the station being called.

However, it is important for both ab initio pilots and controllers always to follow the form of communication and structure of phraseology not only when establishing initial contact with the controller but throughout the communication or until termination and final instruction, as an omission of aircraft callsigns has been observed in a few instances in the corpus.

Meanwhile, in Philps (1991), negative and interrogative patterns barely occur similarly in the corpus. It must be noted that the only instance of AE pattern that denotes a negation is apparent in the use of the phraseology *negative* as in (13) when the controller inquired about the visual of another aircraft in (12). However, instances like in (14) show an interrogative pattern found in the corpus.

(12) Roger / RPC 840 / confirm visual with the Cessna 152 / proceeding North of Doljo
(13) Negative / sir / uh still on the lookout / RPC 840 //
[2](14) / Can you forward to clear the runway?

Finally, the last category found in AE used for aviation communication has been controversial and marginal yet apparent in almost all types of communication, even in routine situations. While calling it temporarily exclamatory pattern, as this never occurs in any of the aviation manuals for radiotelephony, a considerable number of studies have demonstrated the use of exclamation. An exclamation is an utterance expressing strong emotion, surprise, or other affective states. Due to its unique grammatical properties and communicative functions, it is often classified as a distinct syntactic and pragmatic category. While the phraseology *Mayday! Mayday!* identifies a distress message, and *Pan Pan!* identifies an urgency message as what could be considered the only, if not found, exclamatory markers in the manuals, there have been other markers used in ab initio pilots and controllers' actual utterances, such as *thank you, congratulations, have a good day, good day, congrats, good morning, good afternoon, sir,* and *ma'am,* which are all found in the corpus shown below:

(15) Bicol Tower RPC 8730 vacated the active runway and … closing flight plan *good day* and *thank you* //
(16) RPC 349 uhh *congratulations* on your first solo //
(17) Binalonan Radio RPC 896 / *Good Morning* Number 1 holding 17 / request for full length departure for normal full stop / 17 RPC 896 //
(18) RPC 840 / Panglao tower / *good afternoon* / Go ahead
(19) Copy *Ma'am* / cleared to land Runway two three / 7988
(20) RPC 840 / *sir* / departed Dumaguete / destination Panglao / approximately 20 miles Southwest of your station / 2500 / and estimate to your station is 0620Z

These exclamatory markers identified for this study as politeness markers (as described in Linde, 1988) have appeared in recent studies on AE (Bieswanger, 2016; Friginal et al., 2019; Friginal et al. 2021, Dissanayaka et al., 2022; Estival et al., 2023). Politeness markers are often added even though they are not mentioned in the regulations (Lopez, 2013; Moder, 2013) because these can be considered a common type of deviation from phraseology (Estival et al. 2023). Nevertheless, these markers are argued to be helpful in general conversation, as they help smooth interactions by creating better interpersonal relations between the interlocutors. For example, Friginal et al. (2021) reported that these are positive AE features, including politeness and respect markers (e.g., *thanks, please, ma'am*, and *sir*). The same was observed in AE utterances used for aviation communication among Filipino ab initio pilots and controllers in the Philippine air space.

In summary, the lexico-syntactic pattern of AE is generally marked by elliptical construction where a systematic deletion is not devoid for other syntactic structures. Specifically, there is a higher frequency of active transformations and imperative transformations in relation to other formulations, and there is a specific T-rule deletion in relation to natural English. These systematic deletions clearly demonstrate that the phraseological utterances are governed by syntactic rules whose function is to restrict the

[2] This is considered a non-standard phraseology for clearing the runway. A more appropriate phraseology to use is *vacate (specific point of runway reference or intersection).*

linguistic content to the logico-semantic data, the onus being on the receiver to recover the suppressed morphosyntactic constituents (Philps, 1991)

4 Conclusion and Recommendation

This study provides a general picture of the AE used for aviation communication among ab initio pilots and controllers in the Philippine setting. Using a corpus-based approach, the study shows that AE constitutes various lexico-syntactic patterns in the ACE-PHI sub-corpus of communication between ab initio pilots and controllers.

On the one hand, it can be concluded that AE used for aviation communication is generally characterized by the lexical density of noun category, with aircraft callsigns as the most frequent, followed by cardinals, verbs, prepositions, adjectives, conjunctions, adverbs, and pronouns.

On the other hand, significant modifications are happening in AE in relation to natural English utterances, which the generic T-rule can explain. While ab initio pilots and controllers produced a relatively proportionate number of utterances that signal coordinated communication as realized by the dynamic interplay of active transformations and imperative transformations, occurrences of passive transformations likewise show such coordinated message, but caution must be emphasized on consistently following the basic phraseological structure in operational radiotelephonic communication, such as stating the station calling and the station being called throughout the communication.

Finally, it is worth mentioning that this study has some limitations that can be used to offer recommendations for future studies in the Philippines. First, the sub-corpus used for this study situates ab initio pilots' solo flights only as the chosen communicative event. ACE-PHI is currently being built, and more data from commercial flights can be added for a comparative analysis. Second, the ab initio pilots' solo flights focus on routine situations only. Exploring the density of lexical categories in non-routine situations would be interesting. Last, as the syntactic analysis focuses on the sentential level, marginally accounting for phrasal level analysis, a more detailed analysis of phrasal levels in a larger corpus is worth investigating.

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Appendix A: Tabular and Graphical Presentations

Table 1. Top 100 Most Frequent Words in ACE-PHI Pilot-Control Sub-corpus

Rank	Word	Freq	Rank	Word	Freq
1	rpc	595	51	four	35
2	runway	334	52	you	33
3	zero	256	53	traffic	32
4	for	256	54	day	31
5	clear	233	55	nine	29
6	one	225	56	taxiway	28
7	two	200	57	continue	26
8	three	186	58	now	24
9	and	185	59	hold	24
10	five	175	60	short	23
11	report	161	61	charlie	23
12	to	147	62	hitone	22
13	base	137	63	left	22
14	tower	135	64	roger	21
15	go	133	65	hundred	21
16	touch	116	66	active	21
17	land	113	67	binalonan	20
18	take-off	94	68	airspeed	20
19	wind	88	69	final	20
20	on	88	70	thousand	20
21	downwind	87	71	sir	19
22	bicol	87	72	eight	19
23	knot	85	73	of	18
24	at	80	74	advise	17
25	up	75	75	head	17
26	taxi	71	76	climb	17
27	line	68	77	sixty	17
28	will	68	78	instruction	17
29	be	65	79	flap	17
30	may	64	80	copy	17
31	right	64	81	cebu	16
32	leave	61	82	airphil	16
33	turn	60	83	fifty	16
34	full	57	84	ma'am	16
35	airborne	56	85	a	16
36	the	52	86	make	16
37	seven	51	87	when	16
38	ready	49	88	rotate	16
39	uhh	47	89	we	15
40	via	46	90	maintain	15
41	good	46	91	ramp	14
42	request	45	92	bravo	14
43	stop	42	93	delta	14
44	six	42	94	romeo	14
45	departure	41	95	south	13
46	approach	41	96	alive	13
47	radio	40	97	morning	12
48	power	38	98	thank	12
49	center	35	99	eighty	12
50	vacate	35	100	flight	12

Table 2. Top 15 Collocates of *runway*

Rank	Freq	1-Left	1-Right	Coll. freq.	Collocates
1	159	0	159	251	zero
2	102	0	103	187	two
3	41	0	41	214	one
4	30	30	0	75	up
5	30	30	0	85	knots
6	18	18	0	43	airborne
7	18	18	0	94	take-off
8	13	13	0	95	land
9	12	12	0	120	go
10	11	11	0	85	downwind
11	9	9	0	52	the
12	7	7	0	19	final
13	9	9	0	132	base
14	7	7	0	32	approach
15	6	6	0	21	active

Table 3. Top 5 Most Frequent MWUs

Rank	3-grams		4-grams		5-grams	
1	*runway zero five*	122	*for touch and go*	72	*clear for touch and go*	29
2	*touch and go*	107	*touch and go RPC*	30	*for touch and go RPC*	25
3	*runway two three*	102	*clear for touch and*	29	*line up runway zero five*	15
4	*for touch and*	72	*runway zero five clear*	23	*runway zero five clear for*	13
5	*clear to land*	65	*line up runway zero*	19	*five for touch and go*	12

Table 4. Syntactic Modifications of AE in Sentential Level

Code	Label	No. of Occurrences	Percentage
0001	*Imperative transformations*	204	27.09
0002	*Passive transformations*	168	22.31
0003	*Negative transformations*	1	0.13
0004	*Interrogative transformations*	2	0.27
0005	*Active [complex] transformations*	360	47.81
0006	*Exclamatory pattern*	18	2.39
	Total	753	100

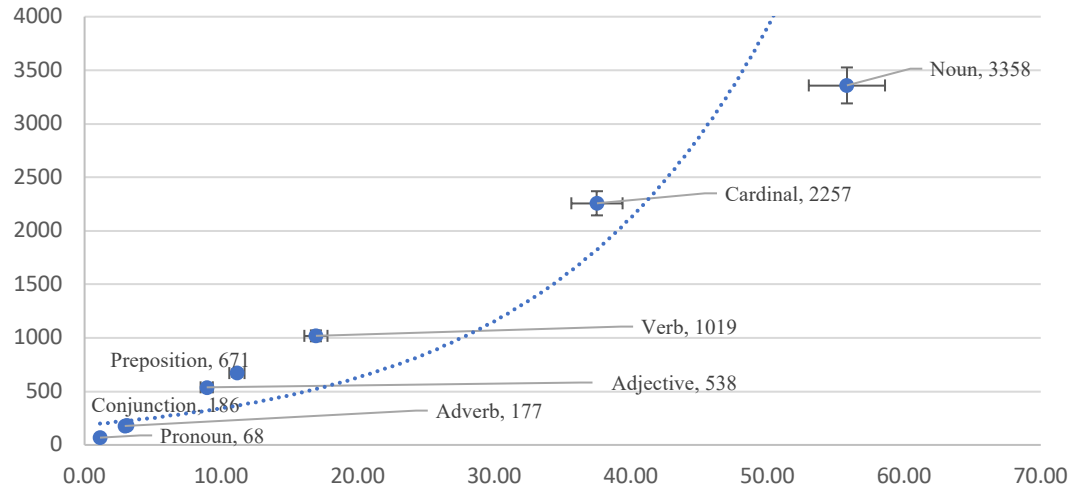


Figure 1. Lexical categories in the ACE-PHI Pilot-Control Sub-corpus

Figure 2. Visualization of *clear* collocates in the verb category

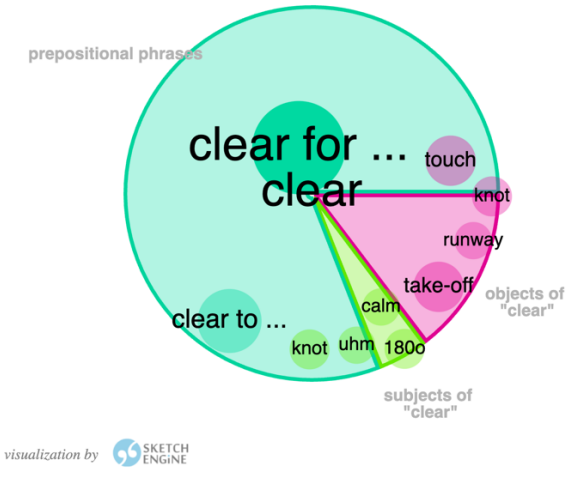
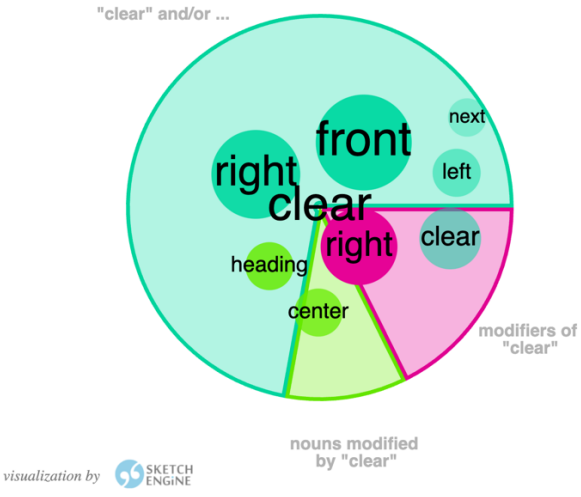


Figure 3. Visualization of *clear* collates in the adjective category.



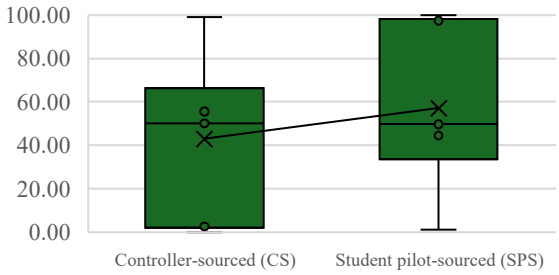


Figure 4. Lexico-syntactic Patterns per Source

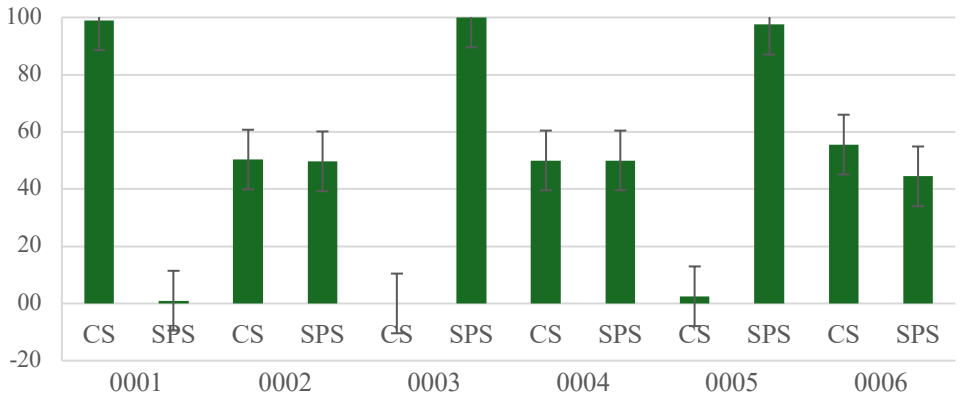


Figure 5. Distribution of Lexico-syntactic Patterns across Types of Modifications per Source