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World Englishes, applied linguistics, and air traffic control communication

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Abstract

Air traffic control (ATC) communication in international aviation is conducted in a variety often referred to as Aviation English. Based on an analysis of the Standards and Recommended Practices (SARPs) defined by the International Civil Aviation Organization (ICAO), two specialized sub-registers of Aviation English are identified in previous research, namely, *standardized phraseology* for routine circumstances and *plain Aviation English* for unusual situations. A closer look at authentic routine ATC communication, however, shows that the reality is considerably more complex. The results of a discussion of standardization and variation in Aviation English, together with the findings of a case study on the use of non-prescribed greetings in routine ATC communication at two international airports, suggest that there are patterns of regional differences at various levels of language use and thus regional Aviation Englishes. This has a number of implications for World Englishes, English for Specific Purposes, Applied Linguistics, and their intersections.

1 | INTRODUCTION

Aviation is certainly one of the most international industries in the world, and English plays an important role in air traffic control (ATC) communication around the globe. More than 12 million of the over 38 million scheduled flights in 2019, that is, before travel restrictions due to the COVID-19 pandemic, were international services (ICAO, 2020). The International Civil Aviation Organization (ICAO) requires that "[t]he English language shall be available […]

at all stations on the ground serving designated routes and used by international air services" (ICAO, 2016a, 5-4) and has introduced so-called "language proficiency requirements," which demand that contracting states "ensure that air traffic control personnel and flight crews involved in flight operations in airspace where the use of the English language is required are proficient in conducting and comprehending radiotelephony communications in the English language" (ICAO, 2010, 1-3). ATC communication in English—frequently also referred to as "Aviation English" (Bieswanger, 2016; Moder, 2013), and both terms are used interchangeably in this article—is the lingua franca for pilots and air traffic controllers in international aviation today (Estival et al., 2016). The development of the elevated position of English in ATC communication in the 20th century is closely linked to a number of extra-linguistic factors, including the shift in global political power after World War II, the increasing and eventually "unprecedented use of English as a transnational lingua franca" (Seidlhofer et al., 2012, p. 1), and the growth of international aviation itself. However, it is also worth noting that

> [t]he official use of English as the language of international aircraft control did not emerge until after the Second World War. Allied leaders organized a conference in Chicago in 1944 at which they laid the foundation for the post-war global civil aviation system, creating the International Civil Aviation Organization. Seven years later they agreed that English should be the international language of aviation when pilots and controllers speak different languages. This would have been the obvious choice for a lingua franca. The leaders of the Allies were English-speaking; the major aircraft manufacturers were English speaking; and most of the post-war pilots in the West (largely ex-military personnel) were English-speaking. (Crystal, 2003, pp. 107–108)

It is thus a combination of aviation-related and non-aviation-related circumstances that has been responsible for making English the language of international ATC communication. The function of English in ATC around the globe is not only the result of "the fact that English is an international language, and that it has already won the race in this respect with linguistic rivals such as French, Russian or Esperanto, to name just two natural languages, and one artificial one" (Kachru, 1985, p. 13) but also contributes to solidifying its leading position.

Aviation English is different from many other uses of English, as it is supposed to be highly standardized, particularly for interaction in routine situations. In order to facilitate smooth and unambiguous communication, and reduce or ideally even completely prevent misunderstandings, the ICAO defines Standards and Recommended Practices (SARPs) for language use in ATC communication in a number of documents. These documents include the *Annexes to the convention on international civil aviation* (mainly ICAO, 2016a, 2018), ICAO Document 4444 *Procedures for air navigation services: Air traffic management* (ICAO, 2016b), ICAO Document 9432 *Manual of radiotelephony* (ICAO, 2007), and ICAO Document 9835 *Manual on the implementation of ICAO language proficiency requirements* (ICAO, 2010).

Despite the intended standardization, however, real-life ATC communication, even in routine circumstances, regularly contains non-prescribed elements such as politeness expressions (Bieswanger, 2024), although they are not part of the required specialized sub-register of Aviation English for such situations, that is, so-called standardized phraseology (see Bieswanger, 2016, for a discussion of the prescribed components of Aviation English). Due to the global nature of aviation, the participants in ATC communication come from each of the three concentric circles of English (Kachru, 1985, p. 12), and the variety of their regional, cultural, and linguistic backgrounds could hardly be broader. As a result, it can be expected that particularly the realization of politeness expressions as non-prescribed and non-standardized elements of Aviation English exhibits considerable variation. Early on, Kachru identified "the pragmatics of the new Englishes" (Kachru, 1981, p. 15) as an area that distinguishes them from what he later called Inner Circle varieties, because they are characterized by features that developed in different linguistic and cultural contexts. More recently, the calls have also become louder "for more attention to be paid to differences in pragmatics across varieties of English" (Haugh & Schneider, 2012, p. 1017). Pragmatic variation in Aviation English can thus be analyzed from a World Englishes perspective, focusing on variation between and within "varieties of English around the

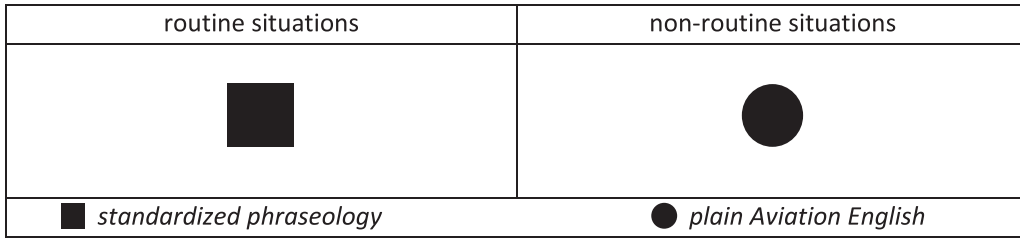

FIGURE 1 Separate specialized registers for routine and non-routine situations—prototypical distribution according to ICAO (Bieswanger, 2024, p. 59).

world" (Schreier et al., 2020, p. 1), since the field of World Englishes "encompasses the study of different approaches to varieties of English around the world" (Low & Pakir, 2018, p. 2).

So far, studies on the use of Aviation English in specific geographical contexts are rare and often tied to incidents or accidents in a certain location, differ in approach and scope, rely on different kinds of data and methodologies, and focus on a variety of aspects of Aviation English (for example, Wyss-Bühlmann, 2005, on variation and cooperative communication strategies at an airport in Switzerland; Paramasivam, 2011, on rapport management in Malaysia; Estival & Molesworth, 2012, on radio miscommunication in Australian general aviation; Coertze et al., 2013, on the use of Aviation English in South African airspace; and Garcia & Tosqui-Lucks, 2018, on the implementation of language proficiency requirements in Brazil). As a result, at the time of writing this article, there is a lack of systematic empirical studies, including research on pragmatic variation, comparing the use of English in ATC communication in different regional contexts. The investigation of such variation, however, is highly relevant from an applied linguistic perspective, reflecting the long-standing and close connection of World Englishes and Applied Linguistics, a "field of research and practice dealing with practical problems of language and communication" (AILA, 2025), since the early days of World Englishes research (Kachru, 1990; Bolton, 2020, p. 745).

Section 2 of this article addresses the situation concerning standardization and variation in ATC communication. Section 3 presents a case study on the use of politeness expressions in real-life Aviation English at airports in territories that would be assigned to different Kachruvian circles, including a discussion of the findings and their relevance for applied linguistic approaches to Aviation English. Section 4 is devoted to a conclusion, including suggestions for further research that benefits World Englishes, English for Specific Purposes (ESP), Applied Linguistics, and their intersections.

2 | STANDARDIZATION AND VARIATION IN ATC COMMUNICATION

Language use in ATC communication is characterized by a high degree of standardization, particularly in routine situations. The general rule is that "ICAO standardized phraseology shall be used in all situations for which it has been specified" (ICAO, 2016a, 5-1) and "[o]nly when standardized phraseology cannot serve an intended transmission, plain language shall be used" (ICAO, 2016a, 5-1). Bieswanger (2016) presents an analysis of the ICAO provisions for ATC communication and, making use of the parameters employed in register analyses in the sense of Biber and Conrad (2009), identifies two specialized registers of Aviation English, to be used in mutually exclusive situations, namely, *standardized phraseology* in routine circumstances and *plain Aviation English* in unusual situations (see Figure 1).

According to Burian and Barshi (2003), "[e]mergency and abnormal situations in flight operations are relatively rare," and it is safe to assume that the vast majority of the many millions of flights every year operate under routine circumstances. Still, empirical investigations of Aviation English have so far been predominantly based on emergency situations (Borowska, 2017, p. 19). Emergency and abnormal situations, however, are as unique as they are rare, which is precisely why there is no standardized phraseology for these circumstances. To shift the attention to the

overwhelming majority of conversations in Aviation English and enable a structured investigation of the language used, including ensuring comparability of the data analyzed in Section 3, the focus of this article is on ATC communication in routine situations. This section is thus devoted to the discussion of the relationship of standardization and variation in routine real-life Aviation English, paying particular attention to variation (see Bieswanger, 2016, pp. 74–77, for a more detailed treatment of standardization in ATC communication, and Bieswanger et al., 2020, pp. 7–8, for a discussion of what makes Aviation English different from most lingua franca uses of English).

In order to approach standardization and variation in a structured way, the levels of lexis, pronunciation, grammar, and pragmatics are distinguished below. Where appropriate, reference is made to the following example (Transcript 1) from John F. Kennedy International Airport in New York City, which is taken from the data underlying the analysis in Section 3. In line with the conventions in the relevant ICAO documents, messages are given in capital letters, and commas are inserted to improve readability:

(1) KJFK Tower: LUFTHANSA 410 HEAVY, KENNEDY TOWER, GOOD AFTERNOON, WIND 280 AT 14, RUNWAY 13 RIGHT, CLEARED TO LAND

The meaning of the individual parts of the message can be explained as follows:

LUFTHANSA 410 HEAVY:	The pilots of flight Lufthansa 410 between Munich, Germany, and New York, United States of America, are the addressees of this message. The addition HEAVY means that the flight is performed by a large aircraft over a certain weight, likely to cause considerable wake turbulence and thus making increased separation from following aircraft necessary (Federal Aviation Administration (FAA), 2024).
KENNEDY TOWER:	The originator, that is, sender, of the message is the tower air traffic controller at John F. Kennedy International Airport.
GOOD AFTERNOON:	Greeting.
WIND 280 AT 14:	WIND 280 refers to the current wind direction at the airport in degrees, ranging from 0 to 359. AT 14 means that the wind speed is 14 knots or nautical miles per hour.
RUNWAY 13 RIGHT:	John F. Kennedy International Airport has several runways and 13 RIGHT is the runway assigned to the approaching aircraft.
CLEARED TO LAND:	The tower air traffic controller authorizes the pilots to land their aircraft on the assigned runway.

2.1 | Standardization and variation concerning lexis

One of the best-known features of Aviation English is the prescription of certain lexical items, which is a defining feature of *standardized phraseology*. As opposed to most other Englishes, where polysemy is often the rule rather than the exception, Aviation English is characterized by a limited number of prescribed words and phrases with exactly one clearly specified meaning (ICAO, 2016a, chapter 5; ICAO, 2016b, chapter 12; ICAO, 2007). For example, the instruction *cleared* (Transcript 1) means "Authorized to proceed under the conditions specified" (ICAO, 2016a, 5-10) and only that. The avoidance of potentially dangerous miscommunication, even under less-than-ideal circumstances, including poor audio quality in radiotelephony, is the top priority. As a result, *standardized phraseology* "has evolved over time and has been carefully developed to provide maximum clarity and brevity in communications while ensuring that phrases are unambiguous" (Skybrary, 2010, p. 2). In addition to the lack of polysemy in Aviation English, the prescribed words and phrases are thus also carefully selected to prevent misunderstandings. Opposites are a case in point: for example, *negative* for "no" and *affirm* for "yes" differ not only by the number of syllables but are also phonetically dissimilar. The

use of *affirmative* is discouraged, as it "may, under certain low-readability circumstances, be confused with negative due to having the same ending" (Skybrary, 2025).

The standardization of ATC communication in routine situations leaves, at least in theory, very little room for variation. Still, some variation of different kinds can be identified. With very few exceptions, the message in Transcript 1 consists only of the standardized elements of such a transmission and adheres to the prescribed wording (ICAO, 2007, 4-13). However, the constituents "GOOD AFTERNOON" and "WIND 280 AT 14" require some comment. "GOOD AFTERNOON" is a politeness expression not included in the ICAO SARPs and this not part of *standardized phraseology*. The occurrence of such elements in real-life ATC communication is addressed in more detail in Sections 2.2 and 2.4, as they are connected to several aspects of variation in Aviation English at the level of grammar and pragmatics. The constituent "WIND 280 AT 14" is a good example of systematic variation in Aviation English. The wording according to ICAO (2007, 4–13; 2016a, 5-6) could be expected to be "WIND 280 DEGREES 14 KNOTS," but occasionally national civil aviation authorities, such as the FAA, responsible for the United States, do not follow ICAO SARPs, but prescribe or permit different phraseologies. According to the section on *Differences from ICAO Standards, Recommended Practices and Procedures* in the official FAA *Aeronautical Information Publication*, "[t]he United States issues surface wind using the word 'wind' followed by the separate digits of the indicated wind direction to the nearest 10-degree multiple, the word 'at' and the separate digits of the indicated velocity in knots, to include any gusts" (FAA, 2023, GEN 1.7). Similarly, the same document also states that "[t]he United States issues the separate digits of a frequency, inserting the word 'point' where the decimal point occurs" (FAA, 2023, GEN 1.7), that is, it partially sides with the ICAO SARPs, which state that numbers in most cases "shall be transmitted by pronouncing each digit separately" (ICAO, 2016a, 5-6), and partially differs by prescribing the word *point* as opposed to the ICAO SARPs, which demand an indication of the decimal point "in appropriate sequence […] by the word DECIMAL" (ICAO, 2016a, 5-7). Such differences, albeit fairly limited in number and different in origin, are akin to lexical differences between World Englishes and can lead to confusion and miscommunication in ATC communication.

2.2 | Standardization and variation concerning grammar

Routine ATC communication is characterized not only by the prescription of individual lexical items and their meaning but also by far-reaching standardization of grammatical aspects. Bieswanger (2016, pp. 76–77) identified two particularly striking features based on an analysis of the ICAO SARPs: First, verbs are generally prescribed in their imperative form, and second, the order of the individual elements of a message is essentially fixed.

Verbs such as *confirm* meaning "I request verification of: (clearance, instruction, action, information)," *contact* meaning "establish contact with," *report* meaning "pass me the following information", and many others on the list can only be used as imperatives (ICAO, 2016a, 5-10). The preference for imperatives in ATC communication is meant to make the interaction between pilots and controllers more efficient. However, the prescription of imperatives is not unproblematic from a cross-cultural pragmatics point of view, as politeness norms with respect to the use of imperatives differ considerably across cultures (Ogiermann, 2009), and Aviation English is regularly used by participants with a wide variety of regional, linguistic, and cultural backgrounds. For example, in a message analyzed in Bieswanger (2024, p. 60), the tower controller at Zurich airport replaces the prescribed instruction *VACATE RUNWAY* (ICAO, 2016b, 12-23) with "YOU MAY VACATE RUNWAY AT CONVENIENCE," that is, making an indirect request of the kind Leech (2014, p. 149) categorizes as "[a]bility/possibility statement," which is similar to what Barron (2017, p. 337) identifies as an offer of the "[s]tate permission" type, instead of using an imperative. Varying cultural norms may very well lead to variation concerning the use of imperatives in ATC communication (see also Sections 2.4 and 3 on the use of non-prescribed greetings in Aviation English).

ICAO SARPs prescribe a certain order of the individual elements of a message transmitted either from air traffic controller to pilot, or vice versa, consisting of a *call* "indicating the addressee and the originator" (ICAO, 2016a, 5-11) and then the *text* that "shall be as short as practicable to convey the necessary information" and make "full use […]

of ICAO phraseologies" (ICAO, 2016a, 5-12). A more precise way of representing the standardized order of elements would be *addressee—originator—text*. Politeness expressions, such as the greeting "GOOD AFTERNOON" in Transcript 1, are not included in *standardized phraseology* and thus not represented in the prescribed order of elements of a message. This is hardly surprising, since, in fact, ICAO (2007, 3-1) explicitly states in the introduction to the chapter on phraseology that "[t]he use of courtesies should be avoided." However, they are nevertheless not uncommon in real-life Aviation English (see also Section 2.4 on standardization and variation concerning pragmatics, and Section 3 on a case study on the use of greetings in ATC communication). To account for the presence of a non-prescribed politeness expression in Transcript 1, the real-life combination of the prescribed elements and the additional greeting could be depicted as follows (adding *m* for "modified"):

(1m)

addressee: LUFTHANSA 410 HEAVY
originator: KENNEDY TOWER
greeting: GOOD AFTERNOON
text: WIND 280 AT 14
RUNWAY 13 RIGHT
CLEARED TO LAND

The example illustrates that even in routine situations, which call for the use of *standardized phraseology* only, additional elements can be identified. In the sense of Bieswanger (2024), focusing on a discussion of code-switching between different specialized sub-registers of Aviation English, the greeting belongs to a component of Aviation English he refers to as "plain English in radiotelephony." As a result, the alternation of prescribed elements—namely, addressee, originator, and text—and non-prescribed elements—such as politeness expressions—can be described as code-switching between *standardized phraseology* and *plain English in radiotelephony*. Bieswanger (2024) shows that there is variation concerning the position where additional elements are inserted into the prescribed sequence and analyzes an authentic message—*TOWER* [addressee], *GOOD DAY* [greeting], *IBERIA 34AY* [originator], *ILS RUNWAY 14* [text]—where the order of the elements is *addressee—greeting—originator—text* and thus differs from the sequence *addressee—originator—greeting—text* in Transcript 1. Variation of this kind is of particular relevance to this article.

2.3 | Standardization and variation concerning pronunciation

Unlike many other Englishes, Aviation English is also characterized by prescriptions concerning pronunciation, which can be assumed to apply to all of its sub-registers. Well-known examples of standardization are the required use of the radiotelephony spelling alphabet—demanding the use of *ALPHA* for the letter "a," *BRAVO* for "b," and so on (ICAO, 2016a, 5-5)—and prescribed pronunciations of numbers, partially differing from common pronunciations in many other Englishes—for example, *TREE* for '3,' *NIN-er* for '9,' and *TOU-SAND* for 'thousand' (ICAO, 2016a, 5-8). It is interesting to note that (inter)dental fricatives, which are rather rare in the languages of the world, are absent from the radiotelephony spelling alphabet and substituted in the prescribed pronunciation of numbers. Such a practice is in keeping with Jenkins's (2002, p. 96) suggestions for excluding these sounds from the so-called Lingua Franca Core, as they are difficult for many speakers and not essential to intelligibility. Despite the clear standardization of the spelling alphabet and the pronunciation of numbers, variation with respect to these items is not unusual in real-life ATC communication. For instance, prescribed pronunciations, such as *TREE* for '3,' are "often not adopted by native speakers of English" (Moder, 2013, p. 229), and the numbers are pronounced "in the usual plain English way" (Moder, 2013, p. 230). The analysis of the audio underlying Transcript 1—uttered by an air traffic controller who is most likely a "native" speaker of English and works at an airport located in an Inner Circle territory—provides another example for Moder's claim, as the "3" in "13 RIGHT" is pronounced with an initial voiceless interdental fricative instead of the prescribed

voiceless alveolar stop. In contrast, the pilot flying for an airline based in the Expanding Circle pronounces the "3" in "13 RIGHT" as *TREE* during the required repetition of the clearance, the so-called *readback*, and thus follows the ICAO standard.

Intelligibility across World Englishes has long been a hot topic in research on varieties of English. Smith and Nelson (2020, p. 431) ask: "In international situations where people wish to communicate with one another in English, how intelligible are speakers of different national varieties?" Since Inner, Outer, and Expanding Circle speakers constantly interact in ATC communication, the question of accents and intelligibility is addressed in the ICAO SARPs on Aviation English. ICAO (2010, 5-6) demands "that all speakers, both native and non-native, must take care to acquire an internationally understood accent." That this is relevant for speakers from all circles of English is impressively illustrated by the following example, in which a pilot flying for a British airline, most likely a "native" speaker of English, complains at John F. Kennedy International Airport to an American controller, who later in the conversation says that he is from Brooklyn, that he cannot understand him: "I'M SORRY, I'M VERY NEW, AND YOU SAY IT SO QUICKLY, AND IN SUCH A STRANGE ACCENT, I JUST DON'T UNDERSTAND" (liveatc.net, 2003). For a lack of better alternatives, the ICAO (2010, 5-6) document states that in training "good judgement has been used in determining the appropriate accent." Given the mix of speakers from various World Englishes backgrounds in international ATC communication and the complexity of deciding what an internationally understood accent actually is (Smith & Nelson, 2020), the requirement is fairly vague. In Aviation English, as in World Englishes generally, accent variation is thus the rule rather than the exception.

The complaint in the example in the last paragraph that the instructions are given "SO QUICKLY" confirms another issue relating to standardization and variation concerning pronunciation, namely, the speed of delivery of messages. Unlike for many other varieties of English, the provisions concerning the pronunciation of Aviation English are characterized by a "speed limit" defined as a maximum number of words per minute. To ensure "the highest possible intelligibility" (ICAO, 2016a, 5-8), participants in ATC communication are urged to "maintain an even rate of speech not exceeding 100 words per minute" (ICAO, 2016a, 5-9). The transmission in Transcript 1, which does not appear to be unusually fast, consists of 22 words delivered in 7.5 seconds, that is, the speech rate can be calculated as 176 words per minute. Similar and higher speeds seem to be common, for example, Bieswanger (2013, p. 17) measured a routine transmission by a tower air traffic controller at John F. Kennedy International Airport as 200 words per minute, Trippe and Baese-Berk (2019, p. 42) conclude that Aviation English has a "faster articulation rate […] than Standard American English," and Cauldwell (2007, p. 13) reports an average of 170 words per minute found in a recording of ATC communication at Frankfurt International Airport. Additionally, studies show that there are general differences in speech rates between varieties of English (Robb & Gillon, 2007, p. 1). Combining Robb and Gillon's (2007, p. 1) observations with the fact that the speed limit of 100 words per minute is regularly ignored in ATC communication, it can be expected that there is considerable variation with respect to speech rate in Aviation English in different constellations, despite the attempted standardization.

2.4 | Standardization and variation concerning pragmatics

Explicit standardization of Aviation English is for the most part limited to the traditional levels at which languages and language varieties differ from each other (Sections 2.1, 2.2 and 2.3). Prescription concerning the level of pragmatics is overall rather limited and often linked to the other levels. The most concrete pragmatics-related demand in the whole chapter on voice-based ATC communication in ICAO (2016a, 5-18) is that "communications shall be concise and unambiguous." This resembles some of the most basic features of Grice's (1975, pp. 45–47) cooperative principle and its associated maxims, but remains a very general statement and simply emphasizes that the main aims of Aviation English are efficiency and effectiveness.

One of the striking characteristics of Aviation English that is mentioned in the section on grammar (2.2), but also relevant from a pragmatics perspective, is the fact that the prescribed composition of messages is dominated by the

imperative. Requests of this kind are frequently interpreted as face-threatening acts (Brown & Levinson, 1987) and may require additional linguistic expressions to mitigate directness. Research in cross-cultural pragmatics shows that directness and indirectness are valued differently across cultures. For instance, Ogiermann (2009, p. 193) reports that "[w]hile English and German show a strong preference for conventional indirectness, literature available on Polish and Russian requests assigns a more central role to direct requests, especially those taking the form of imperative constructions." When speakers of these and many other backgrounds communicate using Aviation English, differing underlying politeness norms and expectations concerning appropriate language behavior determine how comfortable participants in ATC communication are using the prescribed imperative. This can also influence the likelihood of mitigation and thus deviation from *standardized phraseology*. The addition "YOU MAY" to the prescribed instruction "VACATE RUNWAY" in the example discussed in Section 2.2 might well be linked to the cultural background of the Swiss air traffic controller.

Cross-cultural differences are also likely to play an important role with respect to a non-prescribed element identified in Transcript 1, namely, the greeting "GOOD AFTERNOON." The use of politeness expressions such as greetings in Aviation English is explicitly discouraged (ICAO, 2007, 3-1; see quotation in Section 2.2). "Courtesies" (ICAO, 2007, 3-1) are, as a result, neither part of the lexis of *standardized phraseology* (Section 2.1), nor are they included in the prescribed order of elements *addressee—originator—text* of a routine message (Section 2.2). However, as exemplified in Transcript 1 and discussed in Bieswanger (2024), greetings can be regularly observed in real-life Aviation English (Section 3 for an empirical analysis). Monteiro (2019, p. 295) also includes greetings on a list of non-prescribed items that are common in Aviation English, and according to Ishihara and Lee (2021, p. 104) "non-prescribed greetings, mitigation devices, expression of gratitude, and politeness markers are prevalent in R/T [=radiotelephony] communications, thus assisting in effectively conveying relational needs." It can be assumed that the use of non-prescribed greetings in Aviation English is related to the fact that greetings are ubiquitous in everyday communication and that "there is widespread evidence that greetings are an important part of the communicative competence necessary for being a member of any speech community" (Duranti, 1997, p. 63). Many cultures have verbal and non-verbal greetings, but since ATC communication is voice-based, this paper focuses on the verbal type. After a detailed analysis of universal and culture-specific properties of greetings, Duranti (1997, p. 89) concludes that "most speech communities do have verbal expressions that conform to the criteria [of greetings] I define in this article, although their use and frequency may vary both across and within communities." Such variation with respect to greetings is, for example, confirmed for World Englishes by Kachru (1991, pp. 301–302) and Bhatt (2001, p. 543); intralingual differences concerning speech acts within so-called national varieties of languages are included in the considerations of Schneider and Barron (2008, pp. 11–12) in the introduction to their seminal work on variational pragmatics, and Wolfram & Schilling (2016, p. 90) report that "greetings […] are sensitive to regional, ethnic, gender, age, and status differences in American society." Overall, taking the various backgrounds of the participants in ATC communication into account, the use of non-prescribed greetings in Aviation English can be expected to be subject to variation.

2.5 | Summary

Sections 2.1–2.4 on standardization and variation in ATC communication show that many efforts are made to ensure that routine aeronautical radiotelephony interaction is as concise, unambiguous, and uniform around the globe as possible. Unlike most other Englishes, Aviation English is supposed to be a global variety characterized by standardization at the levels of lexis, grammar, pronunciation, and pragmatics, prescribed by the ICAO SARPs.

However, at least partly related to the international nature of ATC communication and its users with a variety of regional, linguistic, and cultural backgrounds, there is also variation in real-life Aviation English, mainly caused by different interpretations of the ICAO SARPs, unclear prescription, and deviations from the prescribed standard. At the level of pronunciation, it shows that the participants in ATC communication are from all three circles of World Englishes; many different accents are used in Aviation English and reports indicate that there is a tendency for

Inner Circle users to ignore prescribed pronunciations that differ from the ones they grew up with. The other three levels have in common that the occurrence of non-prescribed politeness expressions—exemplified by the addition of the greeting "GOOD AFTERNOON" to a message otherwise entirely in *standardized phraseology* in Transcript 1, identified as a code-switch from *standardized phraseology* to *plain English in radiotelephony* in Bieswanger (2024, pp. 70–72)—constitutes a deviation from standardized usage concerning lexis, grammar, and pragmatics. Due to the lack of prescription regarding these elements and the breadth of backgrounds of the speakers of real-life Aviation English, variation concerning the frequency of politeness expressions, their realization, and their integration into the order of elements in radiotelephony messages is likely to exist. These non-prescribed elements are particularly interesting from the perspectives of World Englishes, focusing on variation, and Applied Linguistics, dealing with real-world problems of language and communication. Since variation is generally deemed undesirable in ATC communication and associated with potential miscommunication, the identification of patterns of variation in real-life Aviation English is a prerequisite for an applied linguistic approach to addressing these issues. In Section 3, we thus turn to a case study of the use of greetings in ATC communication.

3 | CASE STUDY: GREETINGS IN ATC COMMUNICATION

Politeness expressions such as greetings are not included in *standardized phraseology* for ATC communication and explicitly discouraged in ICAO (2007, 3-1; see also Section 2.2). In the authentic message in Transcript 1 (Section 2), however, the greeting "GOOD MORNING" is the only non-prescribed element and thus a code-switch from *standardized phraseology* to *plain English in radiotelephony* in the sense of Bieswanger (2024). Greetings are frequently claimed to commonly occur in real-life ATC communication (Section 2.4), but empirical evidence based on a systematic analysis of data from routine ATC communication, which makes up the vast majority of interactions in Aviation English and is supposed to consist of *standardized phraseology* only, is lacking. The case study presented in this section analyzes real-life routine Aviation English used in different speaker constellations and sheds light on how frequent greetings in ATC communication are, whether greetings are sequenced in a traditional *greeting—greeting* pair type (Schegloff, 2007, pp. 13–14), how they are realized and how much variation can be observed, and where they are inserted into the prescribed order of elements of a radiotelephony message when they occur.

3.1 | Data and methodology

Greetings are well-suited for an empirical investigation, as they typically occur at the beginning of conversations and tend to be "highly formulaic [as t]here are just a limited number of expressions that can be used to enact them" (Jucker, 2017, p. 40) in English. In the case of ATC communication, the position of a potential occurrence of greetings is right after the pilots of a plane have to switch to another frequency and talk to a new air traffic controller.

The analysis is based on two comparable datasets of routine ATC communication, specially compiled for this study. In order to be able to address all of the research questions formulated above, authentic Aviation English used at an airport located in an Inner Circle territory, namely, John F. Kennedy International Airport New York (KJFK, United States), and an airport in an Expanding Circle territory, namely, Zurich Airport (LSZH, Switzerland), was recorded from www.LiveATC.net, a website providing live ATC communication feeds from many airports around the world. Each dataset consists of a total of two hours of communication between pilots of planes approaching the respective airport and the air traffic controllers responsible for the tower station. To ensure that different air traffic controllers are represented in the data, the recordings were made on three different afternoons in late 2018 and early 2019, and then transcribed. This also means that the data are not affected by changes in air traffic patterns due to the COVID-19 pandemic. Full routine conversations from initial contact of the aircraft station with the tower station to the handover to the apron station, marking the end of the conversation with the tower controllers, are identified. In these

TABLE 1 Greetings in authentic Aviation English at KJFK.

	Pilot (U.S.-based airline)	Air traffic controller (KJFK tower)
(a)–(i)	—	—
(j)	*good afternoon*	—
	Pilot (airline based in the Expanding Circle)	**Air traffic controller (KJFK tower)**
(k, l, t)	—	—
(m)	*good day*	*good afternoon*
(n)	*good evening*	*good evening*
(o)	*good afternoon*	—
(p)	*good afternoon*	—
(q)	*hello*	—
(r)	*good afternoon*	*buenas tardes*
(s)	*good evening*	—

conversations, the first turns of each interlocutor, with the pilots speaking first and the air traffic controllers second, are isolated for analysis. Transcripts (2) and (3) represent an example from KJFK, Transcripts (4) and (5) from LSZH:

(2) Alaska 628: TOWER, ALASKA 628, ON THE ILS 31 RIGHT
(3) KJFK Tower: ALASKA 628, KENNEDY TOWER, WIND 290 AT 13, RUNWAY 31 RIGHT, CLEARED TO LAND
(4) Iberia 34AY: TOWER, GOOD DAY, IBERIA 34AY, ILS RUNWAY 14
(5) LSZH Tower: IBERIA 34AY, TOWER, GOOD EVENING, NUMBER 2

In order to account for different regional, linguistic, and cultural backgrounds of the interlocutors and different speaker constellations—although there is, of course, no one-to-one correspondence between the country an airline is based in and the regional, linguistic, and cultural backgrounds of the pilots—a total of 40 conversations is systematically selected for comparison. In the data from KJFK, the first ten full conversations, each with pilots of an airline based in the United States and pilots flying for airlines based in Expanding Circle territories, are analyzed. In the data from LSZH, the first ten full conversations, each with pilots of an airline based in Switzerland and pilots for airlines not based in Switzerland, Germany, and Austria, that is, the European countries where German is the dominant language, are included in the investigation. Corresponding to the research questions, it is determined for each of the 80 initial turns in the data, whether a greeting occurs or not. Where greetings occur, the analysis also addresses whether the greetings are sequenced as adjacency pairs, how they are realized, and at which position they are inserted in the message.

3.2 | Results

Tables 1 and 2 give an overview of the occurrence of greetings at John F. Kennedy International Airport (KJFK) and Zurich Airport (LSZH), respectively.

At KJFK, eight of the first turns of pilots contain an expression that can be identified as a greeting, while only three of the first turns transmitted by air traffic controllers return the greeting. Whenever greetings are used by air traffic controllers in the data, however, the greetings are uttered in response to a greeting in the preceding turn by a pilot, that is, greetings by air traffic controllers clearly seem to be second pair parts triggered by first pair parts of an

TABLE 2 Greetings in authentic Aviation English at LSZH.

	Pilot (Switzerland-based airline)	Air traffic controller (LSZH tower)
(a)	*grüezi*	*grüezi*
(b)	*good day and buona sera*	*grüezi*
(c)	*grüezi*	*grüezi*
(d)	*grüezi*	*grüezi*
(e)	*Tag*	*grüezi*
(f)	*hallo*	*hello*
(g)	*hello*	*grüezi*
(h)	*grüezi*	*grüezi*
(i)	*grüezi*	*grüezi*
(j)	*hello*	*guten Abend*
	Pilot (airline not based in Switzerland, Germany, or Austria)	**Air traffic controller (LSZH tower)**
(k)	*good evening*	*hello*
(l)	*hello good evening*	*hello*
(m)	*bonjour*	*hello*
(n)	*good evening*	*hello*
(o)	*hello*	*hello*
(p)	*servus*	*hello*
(q)	—	*hello*
(r)	*schönen guten Tag*	*hello*
(s)	*good day*	*good evening*
(t)	—	*good evening*

adjacency pair of the *greeting—greeting* type. Comparing the interactions of KJFK tower controllers with pilots flying for U.S.-based airlines and pilots flying for airlines based in Expanding Circle territories, there are some striking differences. Greetings are virtually absent from ATC communication between KJFK tower controllers and pilots flying for U.S.-based airlines, with a total of one occurrence uttered by a pilot and none by air traffic controllers at all. In the communication between KJFK tower controllers and pilots flying for airlines based in Expanding Circle territories, however, greetings are the rule rather than the exception on the part of the pilots, leading to some greetings used by air traffic controllers as well. There is obviously a fundamental difference concerning the frequency of greetings between the two groups of pilots with different regional, cultural, and linguistic backgrounds.

The realizations of the greetings exhibit some variation, but all except for one belong to the list of formulaic expressions commonly used in English (Section 3.1). They can thus be characterized as code-switches between *standardized phraseology* and *plain English in radiotelephony* (Bieswanger, 2024). By analogy, the greeting *buenas tardes*, showing accommodation of the tower controller to a pilot flying for an Ecuadorian airline, means a code-switch from *standardized phraseology* in English to *plain language in radiotelephony*.

Concerning the frequency and sequencing of greetings in ATC communication at LSZH, Table 2 indicates that 38 out of 40 initial turns contain a greeting, and just two pilots flying for airlines not based in Switzerland, Germany, or Austria do not use a greeting. It is interesting to note that the LSZH tower controllers even include a greeting when the pilots in the preceding turn do not use one. This means that 100% of the initial turns by controllers at LSZH and pilots flying

for a Switzerland-based airline contain a greeting, which reflects the findings of Rash (2004, p. 70): "greeting is the minimum token of politeness that most Germanophone Swiss expect to give and receive at the beginning and end of a communicative act: greeting rituals are the heart of good manners and civilized behavior for men and women, young and old." Overall, it can be concluded for LSZH that greetings are generally very frequent in routine circumstances in both speaker constellations and that they are, with very few exceptions, organized in the *greeting—greeting* adjacency pair pattern common in general conversations.

However, despite the fact that the frequency of greetings is high in both constellations, substantial differences can be identified with respect to the realizations of the greetings. Seven of the ten pilots working for Switzerland-based airlines include a greeting in German in the first turn when establishing contact with the tower controllers, namely, *hallo* 'hello,' *Tag* "day" (short for *guten Tag* 'good day'), and five times the common Swiss greeting *grüezi*. Only three of the initial greetings of this group are in another language, specifically English *hello* twice, and the combination of English *good day* with Italian *buona sera* 'good evening' once. With the exception of one occurrence of English *hello*, the response of the tower controllers is almost invariably in German, namely, once *guten Abend* 'good evening' and eight times *grüezi*. The realizations of greetings in the conversations between the Zurich tower controllers and pilots of airlines not based in Switzerland, Germany, or Austria are fundamentally different from the other situation on both sides. Only two of the pilots use a greeting in German, *servus* 'hello' and *schönen guten Tag* 'good day,' the dominant language of the territory around the station on the ground, and one pilot uses the French greeting *bonjour* 'good day,' while five pilots use a greeting in English, namely, *good evening* twice, *good day*, *hello*, and the combination *hello good evening*. The difference concerning the use of greetings by the tower controllers is even more pronounced, as they exclusively use expressions in English, *hello* eight times and *good evening* twice. In sum, it can be observed that code-switches to plain language in radiotelephony, that is, to a language other than English, are extremely frequent in the interaction with pilots flying for Switzerland-based airlines, while switching to *plain English in radiotelephony* is by far the most common strategy in the communication between tower controller and pilots flying for airlines not based in Switzerland, Germany, or Austria, that is, settings in which English is required as a lingua franca. The analysis, particularly of the use of greetings by pilots, shows that variation exists not only between these groups but also within each group.

One more issue to be addressed here is the position of the insertion of non-prescribed greetings into the prescribed structure of radiotelephony messages, which is *addressee—originator—text* (Section 2.2). ICAO seems to consider this order of the different elements in radiotelephony messages important to ensure their intelligible and unambiguous composition, because ICAO (2016a, 5-11) explicitly demands that messages "shall comprise the following parts in the order stated" and thus clearly prescribes it as a mandatory standard (ICAO, 2016a, xi, on the use of the word *shall* in ICAO documents). However, Tables 3 and 4 illustrate that greetings are inserted in real-life messages in each of the possible positions at the beginning, the end, or inside the message.

Tables 3 and 4 also show that greetings occur particularly frequently after the addressee and before the originator, yielding the pattern *addressee—greeting—originator—text*, or after the originator and before the text, resulting in the pattern *addressee—originator—greeting—text*. However, greetings are also encountered in other positions, and occasionally one of the elements can be missing.

3.3 | Discussion

The results of the analysis presented in Section 3.2 are interesting both in the context of World Englishes research and from the perspective of Applied Linguistics. International ATC communication in routine situations is supposed to be conducted in a specialized sub-register of Aviation English, namely, *standardized phraseology* (Bieswanger, 2016), which is characterized by detailed prescription at many levels of language and conceptualized as a global variety of English (Section 2). Despite the standardization and an explicit ban on politeness expressions, it is frequently claimed that they are commonly used even in routine circumstances (Section 2.4). The results of the empirical analysis of real-life Aviation English data in Section 3.2 show that politeness expressions are indeed far from unusual in routine ATC

TABLE 3 Composition of real-life radiotelephony messages at KJFK.

Prescribed structure (ICAO, 2016, 5-11)				
addressee	**originator**	**text**		***frequency***
Pilot (U.S.-based airline)				
addressee	originator	text		8x
addressee	*greeting*	originator	text	1x
originator	text			1x
Air traffic controller (KJFK tower)				
addressee	originator	text		10x
Pilot (airline based in the Expanding Circle)				
addressee	*greeting*	originator	text	5x
addressee	originator	text		3x
addressee	originator	*greeting*	text	2x
Air traffic controller (KJFK tower)				
addressee	originator	text		7x
addressee	originator	*greeting*	text	2x
addressee	*greeting*	text		1x

TABLE 4 Composition of real-life radiotelephony messages at LSZH.

Prescribed structure (ICAO, 2016, 5-11)				
addressee	**originator**	**text**		***frequency***
Pilot (Switzerland-based airline)				
addressee	*greeting*	originator	text	9x
addressee	originator	text	*greeting*	1x
Air traffic controller (LSZH tower)				
addressee	originator	*greeting*	text	7x
addressee	*greeting*	text		3x
Pilot (airline not based in Switzerland, Germany, or Austria)				
addressee	*greeting*	originator	text	6x
addressee	originator	text		1x
addressee	originator	*greeting*	text	1x
originator	*greeting*	text		1x
originator	text			1x
Air traffic controller (LSZH tower)				
addressee	originator	*greeting*	text	6x
greeting	addressee	text		2x
greeting	addressee	originator	text	1x
addressee	*greeting*	text		1x

communication, and often the only switch from *standardized phraseology* to *plain English in radiotelephony* (Bieswanger, 2024), but also that there is considerable variation concerning frequency, realization, and position in the prescribed structure of messages. When comparing the findings on the use of greetings in ATC communication at the international airports KJFK in the United States, an airport in an Inner Circle territory, and LSZH in Switzerland, an airport in an Expanding Circle territory, some systematic differences can be observed. The analysis of 40 initial turns at each airport shows that only 11 greetings can be found in the data from KJFK, of which 7 are uttered by pilots flying for an airline based in the Expanding Circle, but 38 greetings are found in the material from LSZH. Similarly, the patterns of actual realizations of greetings differ considerably between the two airports represented in the investigation, for example, exhibiting a much higher proportion of greetings from languages other than English at LSZH. The difference in frequency is so pronounced that it cannot be due to chance but is no doubt linked to the regional, cultural, and linguistic backgrounds of the interlocutors. The same is true for the observed differences in realization. Considering the discussion of greetings as a speech act present in most if not all languages in Section 2.4, the fact that frequency and realization of greetings differ between World Englishes, and the breadth of backgrounds of the users of Aviation English, it is no surprise that the empirical analysis confirms distinct patterns of usage in different speaker constellations.

The patterns identified in the analysis also have many implications for Applied Linguistics, particularly for Aviation English training and potential future revisions of the SARPs for ATC communication. Even the most detailed prescription at all levels of language use can obviously not ensure that there is no variation. In the case of politeness expressions such as greetings in Aviation English, the urge to take care of "relational needs" (Ishihara & Lee, 2021, p. 104) seems to frequently override standardization efforts, depending to a large extent on the regional, cultural, and linguistic backgrounds of the speakers. Across all speaker constellations investigated in Section 3.2, speakers based in Expanding Circle territories, both pilots and air traffic controllers, use considerably more greetings than the U.S.-based speakers in the data. Since ATC communication is supposed to be maximally efficient and effective, Laver's (1981, p. 295) statement that "the process of conversation displays a continual tension between two general communicative needs—the need to communicate as efficiently as possible and the need to be polite" certainly holds particularly true for Aviation English. The results of the case study demonstrate impressively that there is variation concerning the balance between these communicative needs, even in a standardized variety of English. The jury is still out on whether the use of politeness expressions in ATC communication has more positive or negative effects. Moder (2013, p. 238) concludes that "[t]he extent to which safety may be aided or impeded by features coding relational aspects of language, in particular markers of politeness and cooperation, remains an open question." Whatever the answer may be, it cannot be ignored that politeness markers are common in real-life Aviation English, even in routine situations. Applied Linguistics has to address this fact and prepare participants in ATC communication for the situation in which politeness expressions such as greetings do occur, take on different forms, and appear in all positions of a message. Interlocutors unaware of this reality and trained to expect only *standardized phraseology* in routine circumstances may be confused by additional elements such as greetings, which can affect the intelligibility of messages and the interlocutors' situational awareness (Bieswanger, 2024). Furthermore, the SARPs concerning ATC communication are a dynamic set of prescriptions for the use of Aviation English. Since the study shows that it is difficult to eliminate politeness expressions from ATC communication—most likely because they play a significant role in establishing and maintaining interactional relationships and are ubiquitous and deeply entrenched elements of everyday communication in many languages and cultures—and there is an industry-wide "controversy in relation to politeness in RT [= radiotelephony]" (Monteiro, 2019, p. 296), it may be beneficial to include and address their optional use in the SARPs. This would, for example, allow for a standardization of their position in the order of the parts of a message, which could help to maintain situational awareness by improving intelligibility and reducing confusion due to the appearance of an unexpected element somewhere in the prescribed sequence; this is particularly relevant, since politeness expressions are the only elements in the analyzed data that occur regularly as code-switches to languages other than English. The findings of the case study thus demonstrate impressively that research at the intersection of World Englishes and Applied Linguistics is

necessary to identify regional patterns in authentic language use and allow applied linguists to help solve language-related problems in the real world, in this case by improving ATC communication and making aviation safer.

4 | CONCLUSION

Both the discussion of standardization and variation in Section 2 and the case study in Section 3 show that ATC communication in English is characterized by prescription at all levels of language, but still not completely uniform, not even in routine situations. In some respects, the development of the standardization of Aviation English since it became the language of international ATC communication in the middle of the 20th century has not been dissimilar to standardization over the course of the history of the English language as a whole. There are quite a few parallels to Davis's (2021, p. 27) statement: "At the same time as forces of standardization came into focus and were brought to bear on the language, English entered on the world stage as explorers, fishermen, merchants, pirates, and settlers engaged in a worldwide economic, political, and cultural expansion." With aviation and Aviation English spreading around the world since the end of World War II, the need for and efforts toward standardization have been growing. At the same time, Aviation English has been increasingly used by speakers from the Outer and Expanding Circles, that is, by speakers with a breadth of regional, cultural, and linguistic backgrounds. This trend is likely to continue, as Boeing's *Pilot and technician outlook* for the next 20 years predicts that less than one fifth of the "649,000 new pilots […] needed to meet demand from commercial operators" (Boeing, 2023) around the world will be in North America, outnumbered by Eurasia and China as the largest markets for new cockpit crew. The ensuing contact influences Aviation English, just like the emergence of World Englishes is closely linked to "contact between communities and languages" (Lim, 2020, p. 72). The results of the case study on the use of greetings in ATC communication at airports in different circles of English show that there are considerable differences with respect to frequency and realization of these politeness expressions, despite the standardization efforts. Together with the differences in prescription of ATC communication between different countries (Section 2), variation brought about by the use of non-prescribed elements, such as politeness expressions, contributes to the development of what could be called Aviation Englishes.

This article demonstrates that empirical investigations of Aviation English(es) are crucial for a better understanding of the extent and regional distribution of variation in real-life ATC communication. Unfortunately, there are a number of challenges Applied Linguistics faces with regard to Aviation English(es), including a lack of corpora for general use and the fact that the collection of project-related data is rather complex and time-consuming. Among other things, it is illegal in some countries to listen to ATC communication, the audio quality of the accessible data is often poor, and the transcription requires a good deal of knowledge about aviation. However, despite the limitation that the case study is based on a carefully selected but fairly small corpus of language data, it clearly identifies different patterns of distribution of greetings in ATC communication in different locations and shows that the situation is much more complex than just stating that they are commonly used.

Further research on variation in ATC communication in English is relevant for World Englishes scholarship, and at the same time it provides applied linguists with a sound scientific basis for the training of aviation professionals and making recommendations for policymakers. For example, the empirical investigation of the use of greetings in other constellations than those analyzed in Section 3 and additional politeness expressions such as farewells would add to a more complete picture of the occurrence of these non-prescribed items in Aviation English(es), which has become "a debate in the whole industry" (Monteiro, 2019, p. 296). Furthermore, all areas of Aviation English(es) that are identified to exhibit variation despite far-reaching prescription in Section 2 would benefit from more detailed discussion and empirical investigation concerning patterns of use in real-life ATC communication and the effects of variation on its efficiency and effectiveness. Possible aspects for analysis include, to name just a few, lexical differences across countries, accents and speech rate, and issues in pragmatics such as the mitigation of prescribed imperatives. Since ATC communication in English is often considered a use of ESP (Moder, 2013), research of this kind would contribute to

scholarship of the hitherto under-researched combination of World Englishes and ESP, linked to the fact that Applied Linguistics is one of the most important "intersectional connections" (Bolton & Jenks, 2022, p. 508) of the two fields.

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