Transmission of Distress and Urgency Calls – Aeronautical English in Use

Anna Borowska, University of Warsaw, Poland

The European Conference on Language Learning
Official Conference Proceedings

Abstract
With ongoing challenges to the accuracy of aeronautical communications, distress and urgency calls need to be brought into sharper focus. They are the only possible ways pilots can obtain assistance in non-routine and emergency situations. Radiotelephony communication is not an after-the-fact activity: "You need to know what you're going to say before an event occurs" (Tavlin, 2019). Otherwise a minor event can be turned into a major disaster. Since research on aeronautical discourse is a relatively new research area, we face a significant gap here. The presentation aims to explore the current status of distress and urgency calls and check whether their recommended structure works well in an emergency context. In order to understand these types of messages, it is mandatory to be familiarised not only with the aeronautical context, but especially with the mechanism of radiotelephony communication as well as the linguistic code supported by plain (general) English. Moreover, the emphasis should be particularly on saying the correct message at the proper time, so that no one involved is confused. The radiotelephony language variety also has to be learned by operational personnel who are native speakers of English because its specific coded nature may impede comprehension by general users of the aviation community. The debate about whether the use of distress and urgency calls by native speakers of English and non-native speakers is similar or different will follow.

Keywords: Aeronautical English, Specialised Communication, Distress Calls, Urgency Calls, MAYDAY Calls, PAN PAN Calls, Emergency Calls

Introduction

Applied linguistics research faces new challenges nowadays. It seems that safety-critical industries covered by complex regulatory requirements where communication is paramount need support from specialised context linguists. They can offer up-to-date solutions to professional miscommunication issues after conducting deep case studies. One of the examples that strongly requires similar support is aviation communication. That is why avialinguistics, a specialised interdisciplinary branch of linguistics, was designed to systematise the current knowledge base (Borowska, 2017). In addition, Tavlin (2019, p. 4) emphasises the fundamental nature of communication by citing an example of the tragic disappearance of Malaysia Airlines Flight MH370 in March 2014:

To date, no actual plane has been found. There is no known nor confirmed crash (except for several aircraft parts), no regulatory actions, or anything else. Yet here is a company and a country that were discredited in the eyes of the world. What did they do that was so wrong? It was their communication that proved to be fundamental. Communication is not the icing on the cake. It *is* the cake.

Furthermore, Mattenberger[1] (2013, pp. 126–128) underlines that there are a number of regulations that aim at covering, or avoiding all possible emergency situations. A crucial point here is communication, especially communication between the flight crew and ground-based controllers because, in addition to the technical aspects interfering with the quality of communication, there are also certain 'human factors'. These contribute to an even greater extent to the problems in aviation communication such as pilots' distraction, strong accents (both native and non-native speakers of English), stress, fatigue, discipline and many more.

In this study, I will present a selected aspect of aviation communication, namely aeronautical English discourse, in emergency situations. After the presentation of the aeronautical interaction mechanism, including Aeronautical English features, as well as distress and urgency calls requirements, I will move on to the analysis of the transmission of calls in question in the professional context. Moreover, I aim to answer the following research questions:

- What is the current condition of distress and urgency calls in the real life environment?
- How to improve emergency calls?

Two important comments have to be made at this point. First, throughout this paper I will use the term *Aeronautical English* not *Aviation English* in order to refer to pilot – air traffic controller radiotelephony language and to differentiate the term from Aviation English, which is a more general concept. Second, I will focus on the aeronautical interaction mechanism and binding regulations in this context. All of this should support the comprehension of the selected research aspect for all general linguists. This paper aims at the linguistic analysis of aeronautical emergency calls – not common in this context.

Narrowing the Scope of the Analysis

In order to understand the object of presented analysis, it is crucial to become familiarised with the linguistic context in aviation. Graham Braithwaite emphasises that in an increasingly connected world where the threat of service disruption can come from many sources – safety, security, extreme weather, natural disasters, power or communication outages, and so on – the

[1] Marcel Mattenberger was working as an instructor and a pilot (over 13,000 flight hours).

demand for effective and timely communication is growing (in Tavlin, 2019, p. xiii). The cause of communication failures is either the wrong strategy, a bad strategy, or no strategy. Communication is an issue that requires skills for every employee who deals with any audience (ibid, p. 1).

Firstly, English has become the language of aviation since 1951 (ICAO, 2007) and is recommended to be used in global aeronautical routine and non-routine situations, including exchanges between operational personnel of the same nationality at international airports. Aviation English is a special language for all aviation purposes realised in different forms of sublanguages or language tools. By *a language tool* I refer to an unnatural linguistic code, created by people for better and simplified communication (Borowska, 2017, p. 71).

One of the examples of such sublanguages is the Aeronautical English used for radiotelephony communications between pilot – controller, pilot – pilot, pilot/controller – ground services. However, Aeronautical English is partly expressed in a prescribed language or a linguistic tool which is essential for the safety and efficiency of each commercial international flight. Being a linguistic code, theoretically, Aeronautical English can be classified as a construct outside the boundaries of general English due to the occurrence of phonetic, morphological and syntactic forms not found in general English (more in Borowska, 2017, pp. 75–80). Users of English outside the aviation context, while listening to the aeronautical discourse, can classify what they hear as the English language due to familiar sounds and words, however, they are not able to figure out all the simplified grammatical structures used there, let alone the meaning of the utterances. To be more precise, Aeronautical English is composed of two elements: 1) a coded tool called standard phraseology used in routine situations (e.g. start-up, pushback, taxiing etc.) that is characterised by fixed phrases, a strict order, a closed lexicon, and the lack of productive possibilities common for natural languages; 2) plain Aeronautical English used in non-routine situations, so also in distress and urgency contexts. This element functions as a language and is similar to general English, however, it includes standard phraseology units for faster and more efficient communication.

Being familiar now with the nature of the language/English used in the aeronautical context, it is important to understand another aspect of aeronautical discourse, namely the aeronautical interaction mechanism. The way operational personnel communicate is also strictly regulated. First of all, after receiving an instruction from an air traffic controller, a pilot must read it back. It means that the pilot is obliged to repeat the controller's message. Then the controller must hear the readback and correct it, if necessary (*Eurocontrol*, 2006).

Narrowing the scope of research to the distress and urgency calls in aeronautical communication, which are also elements of Aeronautical English, will allow us to compare more reliably the requirements provided by the authorised bodies with the real-life practices. The paper does not cover aeronautical procedures in case of radio failure (see ICAO, 2007, Doc. 9432, 9.5).

Distress and Urgency Calls in Aviation

Every aspect of communication seems to be regulated in aviation. It is especially important that operational personnel know emergency procedures. In this case, there are usually calls for help and a message transmitted correctly can save lives. Additionally, it is essential that in an emergency, the message is clear, concise and correct. According to accepted aviation rules, a pilot must follow the order of priority: aviate – navigate – communicate when performing their

tasks. The more natural and efficient a call for help is, the more of the pilot's capacity is freed up to deal with an emergency situation (Hughes and Pooley, 2014).

Declaring an emergency obligates controllers – under procedures of the International Civil Aviation Organization (ICAO), Federal Aviation Authority (FAA) and other civil aviation authorities, to give maximum assistance and priority handling to aircraft in distress. Specific terms for declaring an emergency and for telling a controller about aircraft in an urgency condition were designed to be simple but unmistakable signals taught during the basic training of pilots and air traffic controllers worldwide (*Flight Safety Foundation*, 2000, p. 2).

There are two types of emergency calls – distress and urgency calls. ICAO (2007, Doc. 9432) provides the difference between them and defines 'distress' as "a condition of being threatened by serious and/or imminent danger and of requiring immediate assistance", e.g. fire, depressurisation, electrical failure. 'Urgency' is defined as "a condition concerning the safety of an aircraft or other vehicle, or of some person on board or within sight, but which does not require immediate assistance" such as health problems, bird ingestion, fuel endurance, bomb scare. It looks like in case of urgency messages crews have more time to tackle the situation. These messages are sent in a situation that requires increased attention, but does not present an imminent danger. However, when the situation deteriorates further, a crew can upgrade the status of an urgency call into a distress call. It is worth remembering that distress messages have priority over all other transmissions, and urgency messages have priority over all transmissions except distress messages. Moreover, pilots making distress or urgency calls should attempt to speak slowly and distinctly so as to avoid any unnecessary repetition (ICAO 2007, Doc. 9432).

According to the ICAO recommendations presented in Doc. 9432, Chapter 9, distress messages should consist of the following elements provided in the correct order and should be signified by the word *MAYDAY*:

1. the coded expression: MAYDAY, MAYDAY, MAYDAY[2] repeated three times (no other words or phrases acceptable) so that the message does not disappear during transmission as a part of it might be 'sucked' by background noises;
2. the name of a ground station or the message: ALL STATIONS, ALL STATIONS in case a pilot is unsure which station is able to provide the assistance immediately;
3. the aircraft identification number;
4. the short and exact description of the emergency;
5. the intention(s) of the pilot;
6. position, level and heading;
7. other information if necessary.

An example of a model distress call is as follows (ICAO 2007, Doc. 9432):
MAYDAY MAYDAY MAYDAY
WALDEN TOWER
G-ABCD
ENGINE ON FIRE
MAKING FORCED LANDING
20 MILES SOUTH OF WALDEN.
PASSING 3 000 FEET
HEADING 360

[2] MAYDAY – a coded expression, originally from French *m'aidez svp* that means *help me please*

Analogically, urgency messages should include the same elements, with the word *MAYDAY* replaced by a phrase *PAN PAN / PAN PAN / PAN PAN*[3], again repeated three times for the same reasons as above (no other words or phrases acceptable):

1. PAN PAN / PAN PAN / PAN PAN
2. 2–7 as above.

An example of a model urgency call is as follows (ICAO 2007, Doc. 9432):
PAN PAN, PAN PAN, PAN PAN
WALDEN TOWER
G-ABCD C172
2 000 FEET HEADING 190
ABOVE CLOUD UNSURE OF MY POSITION
REQUEST HEADING TO WALDEN

Controllers are very sensitive to pilot transmissions which indicate urgency as they are related to a situation where a pilot needs assistance. One of them says: "When we hear these types of transmissions, there is almost a shifting of gears to the point where a considerable amount of our attention is directed toward that pilot and aircraft" (Stewart, 1989, pp. 46–47). Flight crews should expect air traffic controllers to take the following actions in the case of a declared emergency:

- Acknowledge immediately the crew's distress message;
- Take control of the communications or clearly transfer that responsibility to another controller (and notify the flight crew);
- Take immediate action to inform other ATC facilities (and aircraft operator as soon as possible);
- Warn other ATC facilities to prevent the transfer of non-related communications to the frequency in use for distress communication;
- Possibly impose radio silence on that frequency for either all stations of the mobile service (that is, all aircraft and ground facilities) in the area or for any station that interferes with the distress traffic; and,
- Announce the termination of distress communication and of radio silence, if imposed. (ICAO, 2007, *Annex* 10).

All the above mentioned recommendations have been created in order to simplify and shorten the transmission of emergency messages. They also aim at more efficient communication between all nationalities and all language accents all over the world.

However, based on submitted reports, it seems like not all pilots adapt to the rules. For example, the NTSB report that describes an accident said that the accident flight crew did not adequately communicate its increasingly critical fuel situation to the controllers who handled the flight; that the first officer (who made all recorded transmissions to U.S. controllers) incorrectly assumed that his request for priority handling by the controller had been understood as a request for emergency handling; that the captain experienced difficulties in monitoring communications between the first officer and the controller; and that the first officer did not use the appropriate phraseology to communicate to the controller the aircraft's minimum fuel status (*Flight Safety Foundation*, 2000, p. 5). The captain advised the first officer to tell the controller they were in an emergency. However, the first officer acknowledged an ATC altitude and heading instruction to the JFK tower controller, adding "we're running out of fuel." He did

[3] PAN PAN – a coded expression, originally from French *en panne* that means *breakdown*

not use the world *emergency* nor *MAYDAY* or *PAN PAN*, as instructed by the captain, and therefore did not communicate the urgency of the situation (ibid).

The question arises at this point: is it possible to follow the prescribed order in a life threatening situation or does the 'human factor' reverse the prescribed order due to other reasons? The answer is given in the following paragraphs based on conducted research in this context.

Method

Three distress transmissions and three urgency transmissions were selected at random from *www.ATClive* and *YouTube* real-life recordings in order to analyse their linguistic contents. Additionally, the selection includes both native speakers and non-native speakers of English emergency transmissions in order to compare the ICAO recommendations with the actual calls in both cases. In this way, it can be observed if there are any communication tendencies for either of the two groups. Thus, participants of this study are only pilots who experienced an emergency situation at work and had to transmit a distress or urgency call to a controller. The paper will take you through the discourse techniques used in aeronautical communication in the context of emergency.

The analysis covers the pilot's message structure, but also the level of communication efficiency measured by controllers' comprehension and the type of follow-up questions asked in order to receive the necessary information. All analysed calls come from the last decade, so the years 2012–2020. Firstly, they were listened to in full so as to judge how much efficient they had been. Secondly, a discourse analysis followed. Therefore, each transmission has been divided into chunks that correspond to the recommended parts of a given emergency call. Finally, the transmission structures by native speakers and non-native speakers have been compared in order to find out if English as a mother tongue influences the structure selection. These occurrences were categorised following the ICAO classification presented above.

Results

In order to answer the questions in the introduction, we have to compare a recommended communication model with the use of emergency calls in real, naturally occurring Aeronautical English. To carry out this comparison, we have to analyse the chunks of selected transmissions.

First, we can notice some inconsistencies with the accepted model in each of the randomly selected distress calls. Comments are provided in square brackets.

Example 1:
A pilot, native speaker (NS) of English, declares emergency: *MAYDAY MAYDAY MAYDAY* [proper order, repeated 3 times]*, Boston* [proper order]*, Virgin 138M* [proper order] *is maintaining FL280* [position, level or heading should be provided after the description of emergency]. *We have smoke in the cabin, stand by for further instructions* [*sic* the pilot should say 'intentions' as 'instructions' are only given by controllers] ... *requesting descent to Boston* [pilot's intention]*, please*.

The pilot adds the following message later when the situation allows him to do so: *We had a seat fire in the back. We will require fire service on landing, please*.

This message has been understood by a controller, a native speaker of English, though there are slight violations of the recommended order. Due to stress, even a NS can confuse some expressions, e.g. 'instructions' instead of 'intentions'.

Example 2:
A pilot, native speaker (NS) of English, declares emergency: *Speedbird* [aircraft identification should follow a distress call declaration]*, MAYDAY MAYDAY* [should be first, repeated only 2 times], [no name of ground station provided because the aircraft is on the ground, so it is not necessary].

Speedbird 2276, request fire services [the pilot does not provide any description of emergency as requesting fire services indicates a fire on board]. Being sure, the fire services are on their way, he adds later: *We are evacuating on the runway…*

It looks like in this case there was no time for emergency details due to the spreading fire aboard, so the pilot decided to order his emergency call according to his common sense as the situation was critical: who – problem – intention. Also in this case, the message was successful.

Example 3:
A pilot, non-native speaker (NNS) of English, declares emergency: *MAYDAY MAYDAY MAYDAY,* [the aircraft is on the ground, so no need for the name of station], *Air France 023 heavy* [proper order]*, we are on taxiway A, we have fumes on board, request fire services and we maintain position.*

In this case the pilot provides his position first and then describes the emergency and requests assistance, indicating his action as well. Though here we can talk about a slight violation of the required distress call order, we can admit that the provided message is logical and clear and includes all crucial elements of this type of call. A controller (NS) asks again for the pilot's request, probably due to the pilot's strong French accent, but this fact does not cause any miscommunication.

It looks like all the pilots transmitted the most crucial information first, bearing in mind at the same time the recommended order. All the distress calls presented above were short and to the point and did not impede the communication. However, native speakers tend to violate the requirements more than the non-native speaker, who was better at adapting to existing distress calls rules. The reason for such situations may be the fact that Aeronautical English is not natural for general English native users or the fact that NSs do not practise such linguistic behaviour on a regular basis.

Second, urgency calls presented below have been selected at random according to the same criteria as for the distress calls study. Again, we can notice some inconsistencies with the accepted model in each of the transmissions. Comments are also provided in square brackets.

Example 4:

A pilot, native speaker of English, declares emergency: *Edmonton* [a violated order, this information should be mentioned later]*, Air Canada 329, PAN PAN / PAN PAN / PAN PAN* [this phrase should be the first one as it gives a controller more time for understanding a non-routine situation], *we have lost our normal breaking, we still have alternate braking and we'll be landing on 30 shortly* [intention]*, we'd like trucks available on arrival* [request].

The message has been understood by the controller. He also asks follow-up questions. No problems with message comprehension.

Example 5:

A pilot, native speaker of English, declares emergency: *This is a PAN PAN / PAN PAN* [repeated twice]. *Qantas 7335 is descending to FL200* [the flight level information should go after the description of emergency].

Suddenly, the pilot changes the previous urgency call into a distress call as the situation requires a priority (we can also hear clearly that the pilot has problems with breathing)*: MAYDAY MAYDAY MAYDAY, Quantas 7335, we have emergency declared*. *We have a pressure issue. We're descending*.

The message is clear and short. A controller asks the pilot about further intentions. The pilot requests the altitude and medical services, but is not sure about his intentions at the moment of speaking and needs more time to think them over.

Example 6:

A pilot, non-native speaker of English, declares urgency: *PAN PAN PAN* [not a full message, but it does not impede the understanding], [no name of the station], *TAM8078 heavy, we need to go around due to a malfunction, we'll call you for a return* [no exact problem indicated, so a controller has to ask for it].

The pilot seems to be in a hurry, but actually she does not gain any time not specifying the nature of an emergency as the controller asks many follow-up questions because he wants to be sure if the emergency can be classified as an urgency call (priority over others!): *TAM8078 heavy, I'm sorry, say again…and state the nature of your problem.* The pilot answers: *…problem with the gear. Stand by*. Definitely, such tendencies are not welcome during the transmission of emergency calls.

The study shows that not only NS, but also NNS tend to shorten the urgency calls and they do not always follow the recommended order. The reason can be classified again as a human factor. Now, the first research question can be answered:
What is the current condition of distress and urgency calls in the real life environment?

Although the ICAO recommendations for the structure of distress and urgency calls are not always met, it seems that nowadays there are not numerous critical miscommunication issues and that the controllers (NS in our study) are able to figure out the proper meaning of phrases, asking for specific information in accordance with an aviation rule – ask when in doubt. Admittedly, NS should especially follow the best practices in order to meet the conditions of coded communication. After the study, it becomes clear that real-world, naturally occurring discourse is more densely packed with shortened messages rather than with the recommended ICAO model with its seven points not easy to refer to when facing a real emergency. This may simply reflect the likelihood that Aeronautical English used in emergency situations is not likely to include the exact order of an emergency call (e.g. because of a high influence of human factor).

The main aim of this study was also to provide some guidelines in the improvement of aeronautical communication in the aspect of distress and urgency calls transmission. Therefore, the other research question – *How to improve emergency calls?* can be answered now. Following the ICAO recommendations, we will discuss the observations made during the course of the presented study referring again to parameters suggested:

ICAO parameter	*research observations*
3x MAYDAY / 3x PAN PAN	OBLIGATORY. However, the study showed that repeating the coded phrases 3 times does not always work, but this fact does not impede communication. Therefore, we can assume that due to background noises and the nature of radiotelephony communication, it is not recommended to say the MAYDAY or PAN PAN only once, however, twice seems to be fine when a pilot is really pressed for time. No problems were observed in this context.
name of ground station or ALL STATIONS, ALL STATIONS	It is recommended only for airborne aircraft; when on the ground, no problems were observed when a pilot omitted this information.
aircraft identification	This is always OBLIGATORY, otherwise a pilot may lose time as a controller will ask about a callsign. It is better to say it before the description of an emergency.
description of the emergency	This is always OBLIGATORY, otherwise a pilot may lose time as a controller will ask about the nature of emergency. A controller must be sure before giving a priority to the aircraft.
intention(s) of the pilot	Some pilots do not specify their intentions in the first message as they may need more time for their decisions. A pilot should be ready to do so. A controller can always ask or remind a pilot about the intentions when in doubt.
position, level and heading	This is OBLIGATORY, but it can be provided earlier if it is important for a given emergency and a pilot should mention only the crucial data in a given situation (to save time).
other information	A pilot decides about any other useful information. A controller asks about it later if an emergency allows him to do so.

Table 1. Parameters of Emergency Calls in Real-Life.

Additionally, it is worth recalling that best practices show that all participants of aeronautical discourse should use proper aviation terminology correctly articulated. The best method to communicate in the high-risk environment is to avoid inconsistencies, maintain radio silence when others transmit emergency calls and remember that there is only one language of aviation

– English. To this end, all the aeronautical discourse participants, regardless of their nationalities, will benefit from this situation. Improvements in question may be practically introduced by acts of teaching or building pilots' awareness among NNS as well as NS.

Conclusions

In this paper it has been analysed how transmissions of distress and urgency calls are dealt with in real-life aeronautical situations. The analysis was carried out with a view to estimating the chances of transmitting the distress and urgency calls according to a required model. We might speculate that all users of Aeronautical English may have developed a heightened awareness of the significance of a language/tool they use. In our context communication itself is a kind of linguistic behaviour because during radiotelephony communications controllers steer an aircraft only by the power of their words. That means that every piece of advice is a particular speech act (Sahliger & Renn, 2013, p.137).

The MAYDAY call means that pilots face an imminent danger. Given that a real situation will be stressful, it is unlikely that a call will be perfect. However, it is important that a pilot tries to include as much useful information as they can and for ease of understanding, in the correct order if time permits. Additionally, the more of the required items a pilot can pass to the controllers initially, the less likely they are to interrupt the pilot at an awkward moment to obtain the missing information (Hughes and Pooley, 2014).

Interestingly, Tavlin (2019, p. 6) compares the message to ammunition and adds that all the ammunition in the world will not help if one cannot aim and shoot. Everyone has a different level of communication skill strength, so it is a good idea to practice the delivery of any message.

The research shows that currently most aeronautical discourse participants follow the accepted standards in a more or less consistent manner that can avoid communication problems. The vast majority of encounters with the transmission of emergency calls in aviation that we have looked at are 'incidental', in the sense that their structures do not follow a very strict order, but rather the general aim of passing the emergency message in as short and clear a form as is possible. It is crucial to follow common sense when transmitting emergency calls, especially when there is a threat to life. The call must be understandable and it must include at least four obligatory elements recommended by this analysis in order to achieve an unambiguous conversation. Standard phraseology and all communications procedures indicated above may help to compensate for potential ambiguity of context inherent in pilot-controller radio communication even when English is used (*Flight Safety Foundation* 2000, p. 4).

References

Borowska, A. P. (2017). *Avialinguistics. The Study of Language for Aviation Purposes*. Frankfurt Am Main: Peter Lang.

Eurocontrol (2006). *European Action Plan for Air Ground Communications Safety*.

Flight Safety Foundation (2000). Use of Standard Phraseology by Flight Crews and Air Traffic Controllers Clarifies Aircraft Emergencies. *Airport Operations*, Vol. 26, No.3.

Hughes, H. and Pooley, S. (2014). *Pooleys Audio CDs, Radiotelephony Communications*, UK: Pooley's.

International Civil Aviation Organization (2007). Doc. 9432. *Manual of Radiotelephony*, 4th edition, Chapter 9, Montreal: ICAO.

International Civil Aviation Organization (2007). *Annex 10, Aeronautical Telecommunications*, Volume 2, 5.3.2.1 and 5.3.3.1, Montreal: ICAO.

Mattenberger, M. (2013). Declaring Emergency – A Pilot's View. In: *Aviation Communication. Between Theory and Practice*. S. Hansen-Schirra & K. Maksymski (eds.). Frankfurt am Main: Peter Lang, 125–130.

Tavlin, L. J. (2019). *Aviation Communication. Strategy and Messages for Ensuring Success and Preventing Failures*. London & New York: Routledge.

Sahliger, M. & Renn, O. (2013). Communication Needs in a High Risk Environment. [In] *Aviation Communication. Between Theory and Practice*. S. Hansen-Schirra & K. Maksymski (eds.). Frankfurt am Main: Peter Lang, 131–143.

Stewart, J. (1989). *Avoiding Common Pilot Errors. An Air Traffic Controller's View.* Blue Ridge Summit, PA: TAB/AERO Books.

YouTube.com (2012–2020) https://youtu.be/eO_y5gkL4oU, https://youtu.be/6pz5x6pl0uE, https://youtu.be/czcquBUTfbk, https://youtu.be/uCQE77K8GUw, https://youtu.be/PU5lvyC4clQ, https://youtu.be/ghsyfIK-H8w [accessed August 2021].

www.liveATC.net [accessed August 2021].

Contact email: a.borowska@uw.edu.pl