Defining a grammar of radio telephony and emergencies

Definindo uma gramática de rádio telefonia e emergências

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ABSTRACT: *This paper will attempt to present the language of air-ground communication, particularly that intended to be used in emergency or urgency situations, as a distinct grammatical system from Standard English. It will not deal with phraseology as such but demonstrate the ways in which pilots and controllers can use simplification and other strategies as a means of overcoming the deficiencies in the air-ground communication environment. It will place the use of such language techniques firmly within the framework of maintaining situational awareness and will further address the need to adopt specific training strategies based on a proper corpus of research into language use in the domain of English as a lingua franca in international aviation.*

KEY WORDS: *communication; situational awarenes; grammar; training strategies.*

RESUMO: *No presente trabalho tentaremos apresentar a linguagem de comunicação ar-terra, em particular a destinada a ser utilizada em situações de emergência ou de urgência, como um sistema gramatical distinto do Inglês padrão. Este artigo não vai lidar com fraseologia como tal, mas pretende demonstrar situações onde pilotos e controladores podem usar simplificação e outras estratégias, como forma de superar as deficiências no ambiente de comunicação ar-terra. O artigo coloca o uso de tais técnicas de linguagem no âmbito da manutenção da consciência situacional e aborda também a necessidade de adotar estratégias de formação específica com base em um corpus adequado de pesquisa em uso da linguagem no domínio de Inglês como língua franca na aviação internacional.*

PALAVRAS-CHAVE: *comunicação; consciência situacional; gramática; estratégias de treinamento.*

1 Introduction

Since the coming into force of the ICAO language Proficiency Requirements in March 2005 the question has often been asked by teachers and academics, "What is the precise nature of the language whose proficiency we are being asked to test?".

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While the International Civil Aviation Organisation has produced several lengthy manuals detailing the requirements, curriculum detail and syllabus content of language training courses is absent.

The guidance given in the original ICAO Doc 9835 and subsequent publications largely avoids describing or categorising plain language used in radio telephony in all but the most general terms. The crucial definitions given in the the Holistic Descriptors are a good example of this.

> Holistic descriptors
> Proficient speakers shall:
> a) communicate effectively in voice-only (telephone/radio telephone) and in face-to-face situations;
> b) communicate on common, concrete and work-related topics with accuracy and clarity;
> c) use appropriate communicative strategies to exchange messages and to recognize and resolve misunderstandings (e.g. to check, confirm, or clarify information) in a general or work-related context; d) handle successfully and with relative ease the linguistic challenges presented by a
> complication or unexpected turn of events that occurs within the context of a routine work situation or communicative task with which they are otherwise familiar; and
> e) use a dialect or accent which is intelligible to the aeronautical community. (see: Manual on the Implementation of ICAO Language Proficiency Requirements Appendix A2)

The 6 by 6 scale descriptors of language proficiency, which combined with the Holistic Descriptors make up the proficiency classifications, are short on practical examples of actual speech acts and confine themselves to broad-based general language faculties.

As the aim of the ICAO initiative is to curtail the possibility of accidents related to poor communication between air and ground stations, they require testers, and by extension, trainers to concentrate on possible communication strategies during emergency and urgency situations.

> d. Because of the infinite variety of possible emergency situations, specific procedures cannot be prescribed. However, <u>when you believe an emergency exists or is imminent, select and pursue a course of action which appears to be most appropriate under the circumstances and which most nearly conforms to the instructions in this manual</u>. (see Federal Aviation Agency, Pilot/Controller Glossary)

Teachers seeking guidelines to the language acquisition requirements of students preparing for the ICAO LPRs test would wish to concentrate on the underlined segment of paragraph d. above. However, it lacks the linguistic detail which would help them to elaborate a teaching curriculum. Teachers are obliged to extrapolate from the very general to the particular of classroom aims and objectives.

This paper looks at a series of possible approaches that teachers might follow in approaching the goal of preparing students to cope, in plain language terms, with emergency or

urgency situations. It is assumed, at all stages, that those acquiring these skills already possess pre-existing, operationally acceptable levels of proficiency in standard phraseology.

2 Situational Awareness

> Regardless of where or what you fly, pilots will probably find themselves involved in training geared at helping pilots achieve and maintain high-level situational awareness in the cockpit (Bovier, 1997 s/n).

There are close links between the discipline of Crew Resource Management (CRM) and language (or, at least, communication) skills. CRM and Human Factors studies frequently refer to 'information sharing and team cooperation' (see: Helmreich, R.L., Merritt, A.C., & Wilhelm, J.A., 1999).

The factors addressed by CRM are assumed, in the main, to involve speakers of the same mother tongue. The dilemma of the English as a Lingua Franca (ELF) speaker is often glossed over or is relegated to the area of 'cultural factors'. Besides, those who study CRM and human factors are not necessarily linguists and may not be trained to analyse language as a communication medium or to identify specific faults in the language element of communication. They may comment on deficiencies but rarely try to present solutions in terms of a syntax or grammar. In other words, they do not posit language solutions in a form which language teachers would necessarily recognise.

This paper will attempt to show that the choices we make at the moment of communication can influence the process towards more efficiency and less ambiguity, or the reverse. The paper will look among other things at the asking of questions as a key element in establishing and maintaining situational awareness. Loss of situational awareness is one of the most frequently cited causes of aviation accidents (see: Garland; Wise; Hopkin, 1999).

When emergencies occur they are, by definition, unexpected. This unexpectedness changes situational awareness dramatically away from the 'comfort zone' of 'the integrated picture' to the zone of partial or complete unawareness. There are many recorded examples of emergencies and their handling by flight crews. These range from successfully handled by the crew of the November 2010 A380 incident in Singapore to unsuccessfully handled in the case of the American Airlines 757 in Cali Columbia in December 1995 (see: Robinson, 2010; Simmon, 1998)

Candidates for the ICAO language proficiency test must demonstrate their capacity to handle communications with air traffic controllers or pilots in non-routine situations. This involves a very different dynamic to intra-cockpit communication; close proximity is lost and most non-verbal cues are absent. The criteria for air traffic controllers are recognised as being

slightly wider but in terms of communicating directly with aircraft are defined as follows in UK CAP 624 PART 17

> ELP1.1.1 Use a dialect or accent which is intelligible to the aeronautical community
> ELP1.1.2 Composition of messages is concise and unambiguous
> ELP1.1.3 Standard phraseology is employed in all communications
> ELP1.1.4 Natural English is used where standard phraseology cannot fully satisfy the objective of the transmission
> ELP1.1.5 Where standard phraseology is not employed the meaning is clear and unambiguous
> ELP1.1.6 Station identity is used correctly
> ELP1.1.7 Acknowledgements and readbacks are obtained and verified when required and, as appropriate, any corrections made
> ELP1.1.8 Abbreviated phraseology is used when appropriate
> ELP1.1.9 Natural English is used to communicate with aircraft in unusual circumstances
> (UKCAA - CAP624 PART 17 English Language Proficiency, Third issue, May 2009)

Significantly, the precise definition of 'natural English' is missing here and so are any concrete examples of what is meant by natural English. Even in the UK air traffic controllers' handbook "UK CAP 745 Aircraft Emergencies Considerations for Air Traffic Controllers" no concrete speech examples are given. Instead, the writers limit themselves to instructions on speech acts. e.g., "Ask the crew what type of approach they require".

It is the aim of this paper to turn such generalised characterisations of suggested speech acts or functions into actual samples of spoken language. It will be for operational experts to consider these samples as appropriate or not.

3 The Role of Grammar in Radio Telephony Communications

Questions are a means of obtaining information and information is the key to situational awareness. "What is the nature of your emergency?", is a standard often read in transcripts of emergency related conversations. It may, however, be judged inappropriate in the context of international aviation. The question could be simplified to 'What is your emergency?' or even "What is your problem?" or "What has happened?"without losing any of its essential meaning but improving the chances of it being understood by ELF speakers first time round.

This is a first example of how we can re-visit radio telephony spoken conventions (even outside the list of established phraseology terms) in an attempt to establish a guaranteed common communication threshold.

There is no specific corpus of emergency vocabulary or standard utterances and it falls, therefore, to teachers and trainers to establish a compendium of the most basic forms of phrases that a non-native speaker will be able to use and to understand in a crisis. Publications such as

UKCAP 745 can be very useful in demonstrating the range of potential emergency situations and their characteristics from which actual language samples can extrapolated.

It may even be concluded that it were better to use a command or imperative form rather than a question: "Describe your emergency." or "Tell me what your problem is." "Commands are the most direct form of request -- they leave little doubt about what action a speaker wants his addressee to perform". (Fischer, 1999)

Such an approach may even be justified from an over-arching human factors standpoint because it is generally recognised that pilots are reluctant to declare an emergency until the last possible moment. Sometimes until it's too late. (see: Craig, 1999, p. 79, also *msg42693). It may therefore be of practical help to the situation if the pilot is commanded rather than questioned.

The boundary between the human factors and the purely linguistic elements of communication is fuzzy at best but bears closer scrutiny in the aim of aviation safety. Controllers are trained to be as proactive a possible without overstepping the commander's right to choose his or her course of action. The following question is formally used in the UK whenever pilots report a serious difficulty: "Do you wish to declare an emergency?"

While this may be conventionally acceptable in the milieu of predominantly L1 speaker operations, it pushes the limits of internationally, guaranteed first time intelligibility of ELF speakers. "Are you declaring an emergency?" or even "Do you want to declare an emergency" might be better options for an ELF speaking pilot.

An emergency is defined as "a situation when there is imminent danger to the aircraft". The pilot is probably in the best position to know this in cases of fire or explosions. Other cases such as fuel exhaustion are often more subtle and always not suspected as being as serious as they are.

"What is your approximate endurance?", is the conventional question format when enquiring about fuel remaining. If the response obtained refers to 'minutes' rather than 'hours', then it is sure to trigger alarm bells but, if the words 'fuel emergency' are not used the controller's options are limited.

Notably, this failed to occur in the case of Avianca flight AVA052 near New York on 25 January 1990. (see: National Transportation Safety Board, 1991)

In that case the crew failed to convey the urgency of the fuel shortage to the controller and the controller failed to probe sufficiently for specific times or quantities. He passed vectors to the aircraft which would take it miles from the airport and confirmed the crew's consent with the words, "....Is that OK with you and your fuel...?". The crew, although aware of the gravity of the situation (as shown by cockpit voice recordings), failed to convey it adequately to the controller. The controller was not pro-active or assertive enough in

questioning the ELF crew about their status. The aircraft ran out of fuel and crashed with considerable loss of life. The crew's poor English language skills were a factor in the accident but proper pro-activity on the part of those concerned on the ground could have mitigated the circumstances. That notwithstanding, it is doubtful, given the level of English competence displayed by the crew, that they would have understood the question, "What is your approximate endurance?"

Further investigation is needed into the types of questions that could be asked in cases similar to those described above and to illustrate, by example, what a proactive controller might do in reinforcing the situational awareness of a pilot in suspected cases of fuel and other emergencies. In cases of suspected fuel exhaustion, asking the pilot to confirm that the airport is reachable would be a sensible approach.

"The distance to (the airfield) from your present position is 25 miles which at your present speed is approximately 8 minutes. Have you got enough fuel to arrive at the airfield (or airport name, e.g., Kennedy?)"

Obviously, if the answer is 'negative', an alternative solution must be found. At least the seriousness of the true situation is now known to all concerned. But we need to be very selective about which plain language forms to use.

"Can you reach the field?", another fairly conventional way of asking whether it is possible for the aircraft to arrive safely at the aerodrome, may not be understood by some ELF hearers. Such language forms need to be scrutinised, even in the case of well used and standard plain language phrases used by L1 controllers and pilots and, if necessary, altered, so that universal intelligibility can be ensured. We cannot assume that conventional phrases current among L1 speakers will be intelligible to even the more sophisticated ELF speaker. A simple format for checking a pilot's endurance or range might be as follows: "The distance to the airport is 25 miles. Have you got enough fuel for 25 miles (range)?" or, "Have you got fuel for 10 minutes flight (endurance)?

4 Assertiveness and Cooperation

Human factors research demonstrates that co-operative attitudes achieve better results than autocratic ones. This is well documented for intra crew flight deck conversations (see: Fischer; Orasanu, 2003) In the same way, congeniality makes for a better atmosphere than sternness or steely formality. In times of crisis, injecting *affective* elements of cooperativeness or congeniality into a conversation provide a form of much-needed reassurance. This applies particularly in radio telephony where eye contact and other non-verbal cues are missing. If a

controller senses a reluctance on the part of a pilot to commit to an emergency there is nothing to be lost by making a suggestion and framing it in a reassuring way: "You are free to declare an emergency if you wish." "You will receive full priority." Alternatively, at an earlier stage the controller can say: "(Callsign) do you wish to declare an emergency. There is no problem. You may reduce to a 'pan' call later if the situation improves."

Some good examples of this approach are evident in the video and transcript of the bird strike incident on April 29, 2007, involving a Thomsonfly Boeing 757 departing from Manchester Airport in the UK (see Mc Grath also Flight Safety Foundation 2004)

The questions below have been presented in two columns to indicate a more conventional and formal version on the left and an alternative, more internationally intelligible version on the right.

Is the aircraft fully controllable?	Are your controls such as rudder and ailerons working?
Have you got full hydraulics?	Are all your hydraulic systems working?
Will you have full braking capacity?	Do you think your brakes will work?
Is your navigation equipment fully functional?"	Is your navigation equipment working correctly?
Do you require a priority landing?	Do you need to land urgently?
Do you you require vectors to land?	Would you like me to guide you to the runway?
What assistance you require?	How can I help you?
What is your POB?	How many passengers and crew are on the aircraft?
How many souls on board?	How many passengers and crew are on the aircraft?
Do you require emergency vehicles standing by?	Do you need emergency vehicles?

5 A Case Study: Emergency Descent

Emergency descents occasioned by an explosive decompression of the pressure hull of an aircraft are usually sudden and unexpected. The priority of ensuring a safe pressure altitude to avoid hypoxia among passengers and crew requires an immediate descent to a lower level before the crew has had time to alert air traffic control.

In this type of emergency things happen so quickly that the participants have trouble keeping up with events and soon become overloaded. Standard Operating Procedures often call for a series of trouble-shooting checks which are slow and intricate to perform and which have to take place at the same time as radio calls are being made. It is an event in which a proactive approach on the part of a controller can ease the tension and relieve a crew of some of their anxiety. Keeping to a simple syntax and following a logical flow of communication elements - paragraphing and clear linking expressions - is a good route to a successful outcome.

In an emergency descent the en-route radar controller will often be aware of the plight of the aircraft before the crew have had time to make an emergency call. The readout from the secondary surveillance radar return will show a rapid decrease in altitude and probably a deviation away from the previous course. This gives a controller an opportunity to be proactive in the emergency. The table below of a possible R/T scenario is for illustration of language purposes only and does not represent standard or recommended procedures.

Controller:	"G-WACD. Confirm you are in an emergency descent?"
	(aircraft responds affirmatively)
Controller:	"G-CD. Squawk emergency 7700"
	(aircraft squawks)
Controller:	"G-CD. There is no conflicting traffic below you. You are free to descend at your discretion."
	aircraft acknowledges
alternative scenario	
Controller:	"G-CD. Caution. You have traffic in you 12 o'clock opposite direction FL 290. Suggest you turn right 30 degrees."
	aircraft acknowledges and complies
Controller:	"G-CD. Be advised: minimum safety altitude is _____"
	aircraft acknowledges
Controller:	"G-CD. Caution you have high ground in the vicinity up to _____ feet. Minimum safety altitude is _____ feet. QNH 1004."
	aircraft acknowledges
Controller:	"G-CD. Vectors to avoid high ground are available to you if required."
	aircraft requests vectors
Controller:	"G-CD. For terrain avoidance turn left heading _____

Keeping your syntax simple is a good basis for successful communication.

6 Focussing and Targeting in Emergency Messaging: Analysing Language Content

Cockpit voice recorder (CVR) transcripts often appear chaotic and disjointed to the non-professional observer due to the level of redundancy in the interactions and the lack of visual, contextual cues. Typically, one would be looking for complete statements, interrogations, commands, interjections, reiterations, requests for repetition or clarification, negations, etc. It is no easy task to analyse the content of such transcripts for essential verbs and functional phrases as very rarely are whole sentences in standard English observed.

The visual and spatial disconnect in the typical ATC pilot interchange gives rise to a higher number of 'surprise' or ‘unwarned’ utterances as compared to typical social speech. This impacts directly on the amount of situational awareness available to the speakers. In controlled airspace with sophisticated radar coverage, there is a relatively higher level of anticipation

possible when it comes to routine calls: position reports, requests for descent at fixed reporting points, requests for direct routings across doglegs in airways and so on. The technology helps to avoid surprises to some extent. In uncontrolled airspace at low level with poor radar coverage a much lower level of anticipation is possible. However, in the case of non-routine, emergency events no anticipation is possible, by definition.

The level of possible contextualisation of a conversation is greatest when the level of anticipation is highest. The amount of possible redundancy increases as the level of contextualisation of a radio telephony exchange increases. Conversation content can therefore be differentiated along a spline of contextualisation from highly contextualised to highly non-contextualised. To exemplify what contextualisation means if might be as well to give an analogy:

If we imagine two pilots discussing the weather forecast for their destination aerodrome. It happens to be an airport into which they have flown as a crew hundreds of times in different weather conditions. They will be communicating within a highly contextualised environment, there will be virtually no unknowns in the context and much can remain unsaid without leaving an information gap.

On the other hand, a pilot diverting with a medical emergency to an en-route airport at which he or she has never previously landed will communicate with ATC in a much less contextualised environment. It seems reasonable to envisage more verbose speech patterns in the less contextualised environment. What these differences are and how they affect the quality of the information transfer and the maintenance of situational awareness are very relevant to air ground conversations and their outcomes.

7 Triggers and Responses

Utterances are invariably triggered (prompted) in response to some speech act by an interlocutor such as a question, an acknowledgement or a command. Alternatively, they can be generated by an internal reflection within the speaker or by an external non-verbal cue. Impromptu statements are triggered by internal reflection or by observation of external factors: "I think it's time we asked for the latest weather."

The context of the remark is clear to the speaker but not necessarily to the hearer.

The obverse situation is one in which the statement (often a response) is triggered by something that an interlocutor has said or done. The latter is usually easier to process cognitively as it is contextualised by the utterance or the action which prompted it. In addition the task of responding is eased because the syntax and vocabulary of the response are partly supplied by the prompt.

An utterance not triggered by a verbal cue is more difficult for a hearer to process because it is 'unwarned' and the context may be obvious only to the speaker. Theoretically, a greater risk of error exists in responses to non-contextualised utterances than to highly contextualised ones.

Significantly, the ‘surprise’ speech act may contain critical information in the form of warnings or instructions which require instant and accurate reactions. The speaker (prompter) needs to take care to give the hearer the best chance of processing the utterance correctly first time. This often means simplification of the syntax as a first gambit.

8 Simplification

Simplification is an obvious approach to ensuring a quicker uptake of the meaning of an utterance but we need to be clear what simplification means and what its limits are. Oversimplification may be as dangerous a fault as overcomplexity. (see Grice, 1989)

Apart from single word commands such as, 'STOP!', the simplest and most direct speech communication chunk in English is the "copula". This is a basic joining of a complement with another complement or a descriptive (adjectival/adverbial) clause by the verb BE: "That man is a captain." or "We are two miles from touchdown."

In the basic copula in English the verb BE is used as the joining verb.

This form is used in statements (affirmations): “The wind is westerly” (noun clause + copula + adjective)

It is used in negations: “Your speed is not high enough” (noun phrase +copula + negative marker + adjectival phrase)

“Our destination is not Paris” (Noun phrase + copula + negative marker + proper noun)

It is used in basic interrogations: “Is your speed high enough?” (copula + noun phrase + adjectival phrase) “Is Paris your destination?” (copula + proper noun + noun phrase)

The Copula can also be extended to more complex interrogations.

When the identity of one of the complements is not known it can be replaced by an interrogative word: “Who is that man?” (interrogation + copula + noun clause)

Other examples are: “What is your speed?”, “Where is the airport?” “How far is the airport?” “How many passengers are on board?"

Although used to create simple copulas the verb BE should not be considered a simple, unsophisticated verb. BE can exist in multiple forms or numbers (singular or plural) or tenses (past, present) or aspects (continuous, perfect). It is possible to construct sentences using the

copula across a wide range of variations. Many of these variations are not readily accessible to lower level L2 speakers, especially if modality is involved.

"The aircraft has been overdue for 40 minutes."

"The ambulance will be here in 20 minutes."

"We were 20 minutes late.""Why had you been 20 minutes late?"

It is theoretically possible to cover a wide range of communication requirements with the copula form alone. The following examples give an indication of the breadth of contexts which are possible using a present tense version of the copula in air ground communications.

Quantity
How much fuel is on board?
How many passengers are on board?
Localisation
Where is the airport?
Where are we in relation to the airport?
How far from the reporting point is the airport?
Direction
What heading are you on?
Which course is best to avoid high ground?
Time
When will you be ready?
How much time is required to complete your checks?
Quality
How good is the visibility?
How easy is the visual approach to TIP?

9 Imperatives used in Radio Telephony Conversations

The imperative, used to give commands and instructions, is an important element of English speech.

Studies in the format of air ground conversations (see Mell; Godmet, 2002; Prinzo, 1998) draw attention to the proportion of speech content from air traffic controllers to pilots which consists of commands and instructions. In simulated ATC exercises fully 43% of utterances were classified as 'instructions' by Prinzo.

The imperative is a grammatically uncomplicated form with few exceptions in everyday use. It is an easy form for most learners to dominate in a short time because it uses a 'reduced' form of the lexical verb without tense or number markers and it does not require a subject.

The captain of an airliner does not have to say "First officer, lower the landing gear" since the the first officer, being the only other person present, is obviously being addressed.

On an open channel, simplex radio telephony frequency the controller is (usually) addressing only one aircraft at a time and the pilot is addressing only one control station at a time. For a controller it is crucial to make clear which aircraft he or she is addressing and ensure that commands are not mistakenly carried out by any other aircraft. For this reason it is common for controllers and pilots to place an identifying subject before the imperative in a way quite different from normal English: "N15Y. Turn right heading 230 degrees". "Speedbird 940. Descend flight level 230."

What is often lacking in the classroom is a meaningful context to help learners to get a better 'feel' for the imperative form. The reality of air ground communications provides a rich environment for the practice of the imperative form and should provide teachers and learners with well adapted learning opportunities. The incorporation of Total Physical Response techniques springs to mind (see: Asher, 1969). Other common verbs used as imperatives in radio telephony conversations are: 'hold', 'hold position', 'maintain', 'stand by', 'read back', 'acknowledge', 'continue'.

10 Negative Imperatives and Refusals

Commands to act in a certain manner are a vital part of the language of radio telephony. It is an essential component of controller speech to be able to forcefully warn others not to do something in very unequivocal terms. To a lesser extent, this applies to pilots. It is an area in which the language of radio telephony has adopted different conventions and norms to everyday speech and this begs some sort of explanation.

We are all too familiar with negative imperatives used in standard English to announce prohibitions such as: Do not walk on the grass! While this form of the negative imperative is available to controllers and pilots, it is only rarely used in routine RT conversations.

One possibility why this is the case is that the use of "do" as an auxiliary verb is considered to be a complicating factor in language. The requirement to simplify language for basic communication leaves auxiliary verbs sidelined. A correct interpretation of negative auxiliaries requires a more elevated knowledge of language than can be guaranteed in a basic ELF speaker. This form is therefore replaced by less challenging constructions as in the following examples:

G-CA: "Descend and maintain flight level 170."

G-CD: "CD is descending flight level 170."

Controller: "CD, negative! Maintain flight level 230! Acknowledge."

G-CD: "CD is maintaining flight level 230."

The controller could have said "CA, do not descend" but would rarely do so. It is considered safer to use "negative" as a strong denial of permission or refusal than the negative imperative. It should be noted that the expression, “negative” is part of the official phraseology of radio telephony and is not regarded as plain language.

“Tower, CA is requesting right turn out to the TRN.”

“CA, negative. Continue straight ahead to DME 15 before turning right.”

The idea of saying "Do not turn right" does not fit the convention. It is also possible that, due to the internationalisation of the phraseology, the word ‘negative’ has become a universally accepted jargon word for issuing prohibitions.

A more practical explanation for these deviations from normal English usage is provided by the nature of 'simplex' radio transmissions. In this rather primitive form of radio communication, all stations are on the same channel and, therefore, while one person is speaking the others on that channel are effectively blocked from speaking, although not from hearing. Occasionally, by accident, two speakers broadcast simultaneously and this has the effect of blocking the transmission of one of them and creating a loud screech on the channel. If a transmission is blocked in this way one of the pilots may only hear the final part of "Do not turn right!" might be perceived as "(screech....) turn right." This phenomenon has led to accidents in the past and is considered a dangerous shortcoming in the use of radio telephony in aviation. Standard phraseology, such as “negative” and other conventions of radio communication have evolved with this problem in mind.

Similarly, the use of the auxiliary form DO or DID in interrogations, common in everyday English, is usually avoided in Radio Telephony."Do you require assistance?" There is an increasing tendency for this to be replaced by, for example, "Confirm you require assistance"

Similarly, "Do you need ...?" is replaced by "Confirm you are requesting.....?" or something similar. “AJM39, confirm able immediate departure?”

The standard official list of approved forms of phraseology includes the word “confirm” to be used to precede requests for flight data such as speed, altitude and destination. Nonetheless, conventions observed by most professional pilots and air traffic controllers, as reinforced by usage and experience, appear to have extended the use of “confirm” as a means of avoiding auxiliary ARE or DO questions.

The general tendency seems to be to substitute the interrogative form for the imperative form.

"What do you want to do?" becomes “State your intentions .....”

“What do you need?” becomes “State your requirements.....”

“Where do you wish to go?” becomes “Confirm your destination...”

“How much fuel do you require?”, becomes, “Confirm (or state) quantity of fuel required.”

“How long do you want to hold for?” might be stated as “State your intentions for the hold.”

To reiterate, the explanation for this avoidance of the auxiliary verb by L1 and ELF speakers alike can presumably be explained by the fact that the auxiliary verb structure is considered to be a difficult area of English to master. What people find difficult to say, they prefer to avoid. Utterances, which mother tongue speakers know to be frequently misunderstood, they learn not to use.

11 Attenuated Imperatives

In everyday UK English the imperative is often attenuated or softened by framing the command in the form of a conditional statement. This corresponds to the linguistic label, 'affectivité' and covers the emotional impact created by certain forms of speech. In general, the Anglo-Saxon world favours forms of speech which are perceived as non-aggressive. Attenuating the imperative by the use of certain modals satisfies this requirement.

However, in radio telephony exchanges and on the flight deck this requirement to be overtly polite is generally waived. Most experts discourage the use of conditions and modals:

Not, “Would you select flaps fifteen degrees”, but, “Select flaps fifteen degrees”, or simply “.. flaps fifteen..”. Not, “Can you activate the airbrakes please”, but, “airbrakes please”.

12 Qualified Imperatives

Putting qualifying words before the imperative verb in a command and mixing a straight command with affective comments is likely to increase the cognitive workload on the non-mother tongue hearer. The command: “Gently, increase the power, if you would”, will be challenging for a ELF hearer due to the inclusion of the non-pertinent, affective words, 'if you would'. In addition, the rhetorical device of placing the adverb in the initial position may cause problems. There are contrary arguments to this which say that the adverb 'gently' must proceed the command so that the adverbial message is processed before the command verb, the argument being that the 'gently' concept must be incorporated in the 'increase' concept at an initial stage of the action. This effect would need to be tested empirically in simulated conditions in order for a definitive answer to be obtained.

13 Phrasal Verbs

In the same way, unless habit and convention dictate otherwise, we should avoid phrasal verbs unless they already embedded in aviation vocabulary. A good example of embedding is the phrasal verb 'pull up'. It would not be appropriate to ban the use of the phrasal verb 'pull up' because it is such a standardised way of saying 'Raise the nose and increase height'.

> Since lingua franca speakers come from different socio-cultural backgrounds and represent different cultures the mutual knowledge they may share is the knowledge of the linguistic code. Consequently, semantic analyzability plays a decisive role in ELF speech production. This assumption is supported by the fact that the most frequently used formulaic expressions are the fixed semantic units and phrasal verbs in which there is semantic transparency to a much greater extent than in idioms. (see: István Kecskés, Laurence R. Horn, 2007, p. 200)

It will be the task of a good aviation English corpus to point out which phrasal verbs are part of standard aviation vocabulary, and so need to be learned and practised, and which are associated more with idiomatic or jargon usage and are best avoided. The goal should be 'semantic transparency'

14 Modal Verbs in Radio Telephony Conversations

The use of the modal as an affective device has already been mentioned. However, The main role of modal verbs, as their name suggests, is in altering certain modes of other lexical verbs in terms of time, probability, advisability, authority, etcetera.

Modal verbs are often employed in basic copula sentences which makes their inclusion in a language simplification programme relatively easy.

“You will be number two in traffic.” “You may be holding for some time."

(pro)noun + modal verb + copula + noun, adjective or present participle :

Nevertheless, it should be recognised that modals always add a level of complexity to statements because they interfere with the simple concrete facts and present shifts of time or feasibility. In particular, the hypothetical forms of modals “could”, “would” and “should” can cause confusion to the unskilled hearer.

"You can descend to FL 230": indicates full capability or authority (permission) whereas, "You could descend to FL 230": indicates a suggestion or dependency on some other factor (a hypothetical condition)

As a very minimum condition, for ease of communication the interlocutors would need to have dominated the following forms of modal verbs and their equivalents:

modals of permission or authority:	can, may
modals of obligation:	must, will, (shall - especially in written regulations) "Aircrew shall inform the operations department of any defects encountered during flight."
modals of ability:	can, cannot, [able to, unable to: semi-modals])
modals of certainty and uncertainty:	will , may
modals of requirement:	shall, need not
modals of prohibition:	shall not, must not, must on no account

15 The Perfective Aspect of Verbs

The perfect aspect in English is employed to establish a chronology in events by which we establish whether actions or activities have been actioned or completed.

In a present time frame the tense is usually referred to as the 'present perfect' but it could be re-named the 'present completed' or 'present pertinent' without much chance of confusion: "The aircraft has landed." (The flight is completed). "The rain has stopped." (The rain is over = we can take off)

This type of announcement is common in day-to-day aviation activities in which careful sequencing of events and situational awareness of the progress of activities is important.

In other cases, the present perfect or the past perfect can be used to highlight a shift from one set of circumstances or conditions to another. "Our left engine has just exploded!" may be taken simply as the announcement of an event but in air-ground communication terms it is much more than that. It is the trigger for a shift in conditions which will have far reaching consequences for both pilots, controllers and emergency services.

What is also clear is that the use of auxiliary verbs to create perfect tense groups present two major challenges to the ELF speaker. The verb is composed of two parts: the verb HAVE as an auxiliary and the past participle of the lexical or meaning verb. This raises the level of complexity because the auxiliary verb requires tense and person markers. Since many of the past participles of common English verbs are not regular, learners struggle with the concept of shifting the tense and number markers to the auxiliary verb. This is not intuitive and is the cause of lasting frustrations and errors. The familiarisation with irregular verbs in general and past participles in particular is an enduring challenge for learners. However, because of the usefulness of the present perfect form in helping maintain basic situational awareness we cannot but teach our students to use it actively rather than just being able to recognise its meaning passively.

Since, for the most part, we use this aspect to talk about situations which have changed and we are considering the results of that change, we can teach it by using simulated sequences of events and illustrating these graphically. In this way we can provide a wide and varied range of work-based examples for practice purposes: "The aircraft has finished refuelling." "The captain has declared an emergency." "We have abandoned our takeoff." "Have you received your clearance?"

As regards the irregular past participles, there is no easy solution except memorisation and building familiarity through copious practice. A concordance list of verbs found in UK CAP 413 under the radar communications section shows that very few of the verbs are irregular. Of the rest, some would be used rarely in the present perfect tense, e.g., "(to) conflict". Just a handful will be regularly used in present perfect, e.g., "request", "inform", "issue" and these are perhaps open to being learned formulaically.

16 The Continuous Aspect in Radio Telephony Conversations

The decision of L1 speakers to use the present continuous form is based on choices not always appreciated by ELF speakers. In airline operations, it is frequently a matter of importance to signal that an event is 'in progress' as opposed to 'completed': "Shuttle 8Y, maintain flight level 170 until further advised."

"(We are) maintaining flight level 170 until further advised, Shuttle 8Y."

Although the words 'until further advised' are read back by this pilot they are, in fact, redundant as the use of the present continuous form itself conveys the meaning of, "the process is continuing and has not yet been completed".

To use the continuous aspect successfully one need only know the present participle form of the lexical verb. This is less challenging for the ELF speaker than the present perfect as even irregular verbs do not have irregular present participles.

Note the use of the progressive aspect in the following dialogue:

Aircraft:	Scottish. RN. We have been holding for twenty minutes. Can you give us an EAT for Glasgow?
Controller:	RN. Scottish. Roger. Glasgow are still clearing snow from the runway. Expect onward clearance in about 15 minutes. Edinburgh can accept you if you wish to divert.
Aircraft:	Scottish. RN. Roger we are diverting to Edinburgh.
Controller:	RN. Scottish. Understand you are diverting to Edinburgh. Leave the hold heading 040 degrees and call Edinburgh Approach on 120.85. Maintain flight level 090 until advised.
Aircraft:	Scottish. RN. Leaving the hold on a heading of 040 degrees, maintaining flight level 090 and contacting Edinburgh Approach on 121.85.

ATC Co-ordination:	Edinburgh approach: Scottish Centre: G-CERN has been holding at NGW for twenty minutes. He has decided to divert to Edinburgh. He is leaving NGW now on a heading of 040 at FL 090 and will be contacting you shortly.

Figure 1

Statements and questions framed in the present continuous sometimes carry a particular semantic sub-text.

The pictures in figure 1 above showing the state of refuelling of an aircraft portray two very different situations, not only from the point of view of the refuelling itself but also from the point of view of other background activities not directly connected with refuelling. For example, many airlines prohibit the boarding of passengers while refuelling is in progress. The announcement: "We are refuelling the aircraft", will contain within it the sub-text, "passengers cannot be boarded at this time". Similarly, when the announcement changes to, "We have finished refuelling the aircraft", this embeds the sub-text "passenger boarding can now commence".

The most important objective for learners is to understand and be able to apply the strong and consistent semantic contrast between the perfect and progressive aspect in statements, interrogations and negative forms.

These contrasts can be inculcated by using work-based simulation activities such as those demonstrated in the picture examples above. Elucidation of the grammar forms will help, provided it can be assimilated into the practical simulation-based training.

17 Conclusion

The grammar of radio telephony is not constrained by the normal rules of grammar. It has acquired forms peculiar to itself based on the special conditions of the environment of air traffic communication in the controlled language of phraseology and in the professional and plain language which complements it. These forms are focussed on ensuring a safe and expeditious control system and avoiding failures in the system which can have grave consequences. It is

therefore apt to examine the reality of the language of ATC and in particular the language used in emergency situations to ensure that these are both efficient and universal across a range of language groups and especially those L2 speakers who use English as the lingua franca of the skies. This paper though not exhaustive, has pointed out some of the principal areas where distinctive forms of phrasing can assist in ensuring a universality of comprehension and some of the training techniques which may foment the acquisition and use of these forms. The paper recognises that more research needs to be done in the area of applied linguistics in the domain of air-ground communications and it is hoped that it will, in some way help to excite such research.

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