COMMUNICATION IN A MULTICULTURAL FLIGHT DECK ENVIRONMENT: THE INFLUENCE OF CULTURE DIMENSIONS IN COMMUNICATIVE FUNCTIONS

Comunicação em um ambiente de cabine de comando multicultural: A influência das dimensões culturais em funções comunicativas

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RESUMO: *Interações multiculturais entre pilotos tornaram-se mais comuns à medida que empresas aéreas precisaram recorrer à mão de obra de diversos países. Consequentemente, problemas relacionados à comunicação manifestam-se. Por meio de um estudo qualitativo e descritivo, este artigo tem como objetivo identificar quais funções comunicativas podem ser afetadas na comunicação de pilotos com nacionalidades diferentes, a partir da compreensão da influência de dimensões culturais. Através de uma revisão bibliográfica, propõe-se uma discussão sobre como a cultura nacional afeta a comunicação de pilotos. A partir de associações entre funções comunicativas - estabelecidas no DOC 9835 (ICAO 2010), e as dimensões culturais apontadas por Hofstede (1997), pode-se observar que a forma como pilotos expressam determinadas classes de funções comunicativas são afetadas pela cultura nacional. Sugere-se que os requerimentos de proficiência linguística observem tais aspectos, bem como treinamento linguístico que aborde essas questões e mais pesquisas considerando cultura, segurança de voo e comunicação.*

PALAVRAS CHAVE: Dimensões culturais; Funções comunicativas; Comunicação; Interação multicultural

ABSTRACT: *Multicultural interactions among pilots have become more common as airlines had to resort to manpower from several countries. Consequently, problems related to communication arise. Through a qualitative and descriptive study, this article aims to identify the communicative functions that can be affected in the communication of pilots from different nationalities by better understanding the influence of cultural dimensions in these interactions. Through a literature review, we propose a discussion on how national culture affects the communication of pilots. Based on associations between communicative functions - established in DOC 9835 (ICAO 2010), and the cultural dimensions pointed out by Hofstede (1997), it can be observed that the way in which pilots express certain communicative functions is affected by national culture. It is suggested that language proficiency requirements observe such aspects, as well as language training that addresses these issues and further research considering culture, flight safety and communication.*

1. Introduction

During an accelerated evolution process, aviation equipment and aircraft have become more reliable, resulting in fewer accidents caused by material factors. On the other hand, human and organizational factors had to be improved in order to enhance aviation safety levels. This way, the abilities expected from a pilot were modified, in a manner that today this professional must manage a flight using not only technical, but also non-technical skills (FLIN et al., 2008). One of these non-technical skills is communication.

With improvement and intensification of flights, aviation may experience a pilot shortage in the current airline industry scenery all over the world, thus, forcing airline companies to resort to labor of pilots from various countries (TURNEY and MAXANT 2004). Therefore, the multicultural flight-deck context arose. A context where pilots (non-native and/or native speakers) must communicate in English.[1]

Taking in consideration these two scenarios, it is possible to say that communication has become an essential tool for pilots to perform the flight. However, it can also cause problems. This happens since in a multicultural cockpit, a peculiar way that a pilot may use to talk with his/her co-worker can lead to miscommunication, misunderstanding and perhaps disagreement, accounting for a degraded flight efficiency.

Limiting the scope of the discussion to the pilot-pilot communication loop, the theme was chosen having in mind that pilots from different countries have different cultural dimensions, as proposed by Hofstede (1997), which affect their communication performance. Pilots with a low-power distance culture may encounter difficulties when trying to request an action from his/her colleague with a high-power distance culture without some misunderstanding, especially if he or she is not a native speaker.

In order to shed light on this problem, this article will focus on analyzing the communication between pilots by trying to identify the communicative functions proposed by ICAO (International Civil Aviation Organization) that can cause difficulties when pilots with different culture dimensions interact. In order to do this, the article starts by reviewing concepts involving culture and how multicultural interaction can occur. Next, it approaches Communicative Functions in the aeronautical context, based on ICAO's Doc. 9835. We then try to link some selected communicative functions to certain cultural frameworks in a way to feature how they could be affected in different environments.

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[1] We refer the reader to Bocorny (2008) for further historical information about English as the language of aviation.

2. Literature Review

This chapter consists in a short theorical review of concepts involving culture, multicultural interaction and communicative functions. It starts by defining culture dimensions, along with notions about cultural relativism and multicultural interaction, which will help the reader to understand the characteristics of pilots from different cultures. Following that, we present a brief definition of communicative functions, for the reader to better comprehend the interference of culture in pilot communication.

2.1 Culture

Culture is a multi-meaning concept. According to Hofstede (1997) culture is a mental programming process, in which a person constructs patterns of thinking, feeling and acting during their lifetime. A considerable part of this mental programming process is built according to the social environment where the person grew up. As culture depends on the individual mental programming and social environment, Hofstede implies that culture is learned and not inherited.

However, individuals have more than one social environment in which their mental programming is created and lies on. Therefore, it is possible to say that there is more than one level of mental programming and more than one level of culture. This implies the use of cultures' layers. Some examples of these layers are national, professional, religious and organizational culture (HOFSTEDE, 1997).

Similar collective characteristics and perspectives can be found in the citizens of a country. Thus, the national culture layer will be used in this study. Furthermore, another reason that makes the concept of national culture feasible for this study is because it tries to understand the communication among pilots from different nations working together.

When studying the influence of national culture in pilot's communication, it is important to make use of Cultural Dimensions proposed by Hofstede (1997), so there is no violation of the culture relativism theory[2].

"Cultural dimensions" is the concept that all nations have similar problems, but the way they respond to them differs. Thus, it is possible to measure and compare one culture (relative) to another. Although there are six dimensions, not all of them are relevant to analyze the communication between pilots. The ones that are going to be used in this article are the same used by Engle (2000) Helmreich et al. (2000) and

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[2] According to Oxford Reference (2019), cultural relativism is: *"The position that there is no universal standard to measure cultures by, and that all cultures are equally valid and must be understood in their own terms."* Jones (1996 *apud* ENGLE, 2000) says that: *"when a person tries to interpret another culture using the rules of their own culture, they find it strange, irrational, uncontrollable and unpredictable"*.

Helmreich and Merritt (1998): Power Distance, Collectivism vs Individualism and Uncertainty Avoidance.

Power distance is defined by Hofstede (1997, p. 28) as: "*The extent to which the less powerful members of institutions and organizations within a country expect and accept the power is distributed unequally*". So, when analyzing how superior and subordinate relationships are perceived and accepted in a nation, the power distance concept is being used. The Power distance index (PDI) was created as a measure to reflect this issue in different cultures. It goes from zero (less power distance) up to scores above a hundred (more power distance). The following chart illustrates how power distance is perceived in different countries.

Figure 1: PDI
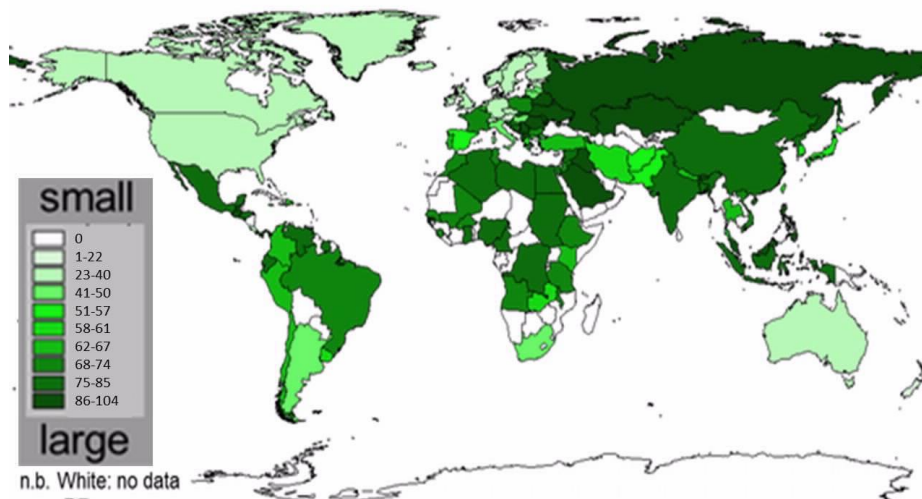
Source: Hofstede ([2010])[3]

When applying this dimension to a multicultural cockpit, a high-power distance context gives the perception that captains should not be questioned. Copilots are likely to be loyal and do not disagree with the captain's decision - they will face difficulties in giving inputs and expressing opinions, preferring a top-down communication with the leader saying, for example, what the subordinates should do in emergency situations. On the other hand, in low power distance cultures, captains are expected to be consultative rather than authoritarian. Even in emergency situations the crew members expect to contribute in the decision-making process (MERRITT and HELMREICH 1996; HELMREICH et al., 2000; FISCHER, ORASANU and DAVISON, 1997).

The individualism versus collectivism dimension is defined by Hofstede (1997) as:

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[3] https://geerthofstede.com/culture-geert-hofstede-gert-jan-hofstede/6d-model-of-national-culture/ We emphasize that the images' publication year used in this study is not clear. We used 2010 because it is said in Hofstede's website that other 2 dimensions were added in his 2010 book.

As defined before, collectivist societies have a "we" identity -people see themselves and others as part of a group. So, when dealing with a task, the group comes first. In other words, the group relationship is more important than the task. There is also the perception of harmony inside the group in a way that, even if people disagree, they should not confront, but maintain harmony, so it will not weaken the group.

On the other hand, in individualist societies people often have an "I "identity which means that people see others as individuals. In other words, when dealing with a task, for example, a problem in the cockpit, people prioritize the task rather than the relationship between the individuals. So, unlike collectivism, an individualist culture features that confrontations are not harmful for individuals' relations- they can sometimes be healthy.

There is, also, an Index through which the individualism versus collectivism dimension can be measured - the Individualism Index (IDV), where, similarly to the PDI, the scores go from zero up to one hundred. But, in this case, the closer to zero the score is, the more collectivist the nation is. The following figure shows the IDV according to the country.

Figure 2 - IDV map
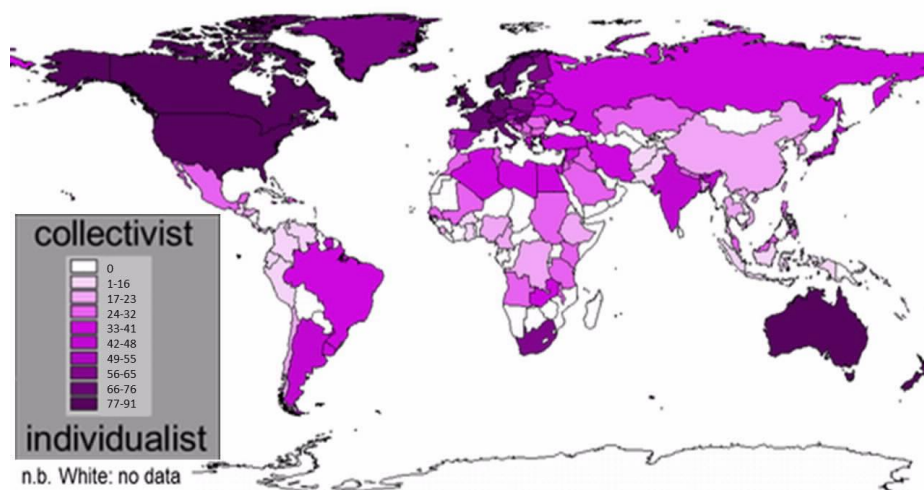
Source: Hofstede [(2010)]

According to Hofstede (1997), it is possible to infer that the power distance and individualism versus collectivism are inversely correlated. The nations that have more

power distance also have more collectivist characteristics, whereas low power distance nations tend to be more individualists. However, it is important to emphasize that there are exceptions like Latin countries in Europe, which have medium power distance combined with high individualism, while in some countries like Austria and Israel, there is a small power distance with a medium collectivism.

Because there is a correlation between these two dimensions, pilots who have an individualistic culture tend to be more assertive with communication. However, workload and stress are perceived as an individual problem, so the interdependence between crew members is likely to be low. Collectivist countries, on the other hand, have a group identity which originates from a social support that can reduce the impact of stressors in a group situation (MERRIT and HELMREICH, 1996).

The third and last dimension explained in this study, uncertainty avoidance, is defined as "*The extent to which the members of a culture feel threatened by uncertain or unknown situations*" (Hofstede, 1997). Briefly this dimension in its general concept analyses how citizens of a nation feel threatened by ambiguous and unknown situations. There can be two different types of societies: the ones that avoid the uncertainty, that are called the "uncertainty avoiding societies" and the ones that accept uncertainty which are called "uncertainty accepting societies".

The uncertainty avoiding societies do not like or accept a situation where the scenario is uncertain, which leads to anxiety and stress. In these societies, the organizations and relationships must be clearly interpretable and predictable.

The uncertainty accepting societies take uncertainty more easily and feel less uncomfortable with the situation than the uncertainty avoiding ones, thus in an uncertainty scenario these people feel less stress and anxiety.

This dimension is indicated by the Uncertainty Avoidance Index (UAI), in which the closer to zero the more easily the society accepts the uncertainty, and the closer to one hundred the stronger the uncertainty avoidance is. Figure 3 shows UAI in the countries.

Figure 3 - UAI map
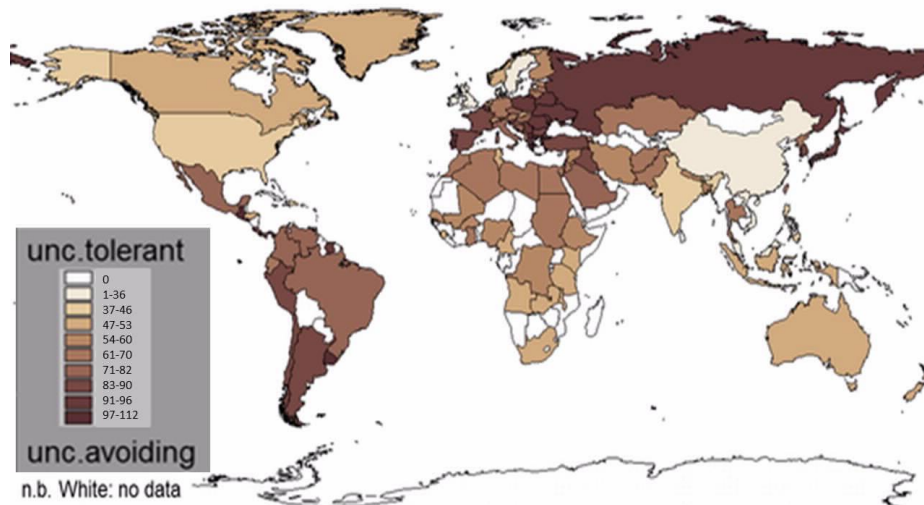
Source: Hofstede [(2010)]

An example of how this dimension affects aviation could be the scenario where the pilots notice that there is something wrong with the engine indications, but they do not know yet what the problem is. For an uncertainty avoiding society pilot, this scenario is stressful and perhaps he or she may feel very apprehensive. While for a pilot within an uncertainty accepting society, the situation can be easier to deal with.

Once that Culture dimensions are explained, it is possible to start understanding the multicultural Flight Deck Environment.

Multiculturalism itself is a modern phenomenon. According to Bjellos (2012) until the 1980s there were fewer multicultural cockpits. This phenomenon started to occur due to the aviation globalization and it played an important role for companies to adapt CRM[4] techniques for pilots with differences in cultural interaction, professional expectations and language. Going in accordance to Rosado (1996) and Oxford Reference[5], the multicultural flight deck can be understood in this article as the

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[4] CRM stands for Crew Resource Management. According to Engle (2000), it helps enhance personal interactions among crewmembers, so safety and efficiency are increased. McAllister (1997) says CRM's primary purpose is to improve flight safety through the management of human factors in flight operations. He also says that pilots already have technical flying skills and therefore the CRM training focus is not about teaching flying skills. Instead, he says that it encourages the pilots to manage group (multicrew) decision making, relationship, leadership and communication. These cognitive, social and personal resource skills that complement the technical skills and contribute to a safer and efficient task performance, are called by Flin, O'connor and Crichton (2008) as "Non-technical skills".

[5] Rosado (1996) defines Multiculturalism as a system composed by beliefs and behaviors which recognizes and respects all the diverse groups in an organization and society. It acknowledges and valorizes their socio-cultural differences, encouraging them to show their beliefs and contributions to the society. Going into accordance with Rosado (1996), Oxford Reference (2019) (an online dictionary) defines multiculturalism as a term used to represent the coexistence of people with different cultures in a common state, society or community.

interaction and coexistence among pilots with socio-cultural differences in the cockpit, where their cultural characteristics are respected. [6]

Having defined the concepts involving culture, it is necessary to briefly explain the ICAO's Doc 9835, so the reader can understand the communicative functions analyzed in this article and where they originate.

2. 2 Communicative Functions

With the aeronautical activity intensifying, aeronautical accidents motivated by lack of language proficiency started to be more increasingly observed. ICAO decided to mandate their contracting states to take steps in order to ensure that controllers and flight crews which were operating in airspaces were proficient in the use of English language (ICAO,2010). The Agency developed DOC 9835 - the "Manual on the Implementation of ICAO Language Proficiency Requirements". This document helps to understand language proficiency and describes linguistic requirements in aviation, providing guidance on how to comply with those requirements. It is organized in seven chapters and six appendixes. One of them is Appendix B - LANGUAGE OF AERONAUTICAL RADIOTELEPHONY COMMUNICATIONS, which features the communicative language functions that controllers and pilots must conform to. These functions are separated in categories according to a specific aviation task, for instance, Request and Offer Act, Advice, Permission/approval, and other eleven categories.[7]

A communicative language function, by definition, has the purpose to communicate something. It corresponds to the speaker's intention passed with the message, and can be described as a verb of communication (ICAO, 2010). As proposed by Jakobson (1995) functions are tasks that any message serves in a communicative situation - it reflects what an individual wants to do with his or her speech act. It is also important to clarify that speakers shall convey a communicative function through several language forms (ICAO, 2010). For example, a copilot trying to use the language function of "requesting an action" with the captain could express it in any of the following forms:

   a) I am seeing on the weather radar that we have severe precipitation ahead, maybe we should deviate"
   b) "Deviate to the right!"
   c) "How about we avoid passing through that precipitation?"
   d) "Let's go around the weather"
   e) "Do you want me to get a clearance to deviate from this weather?"

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[6] It is important to understand that cultural differences can be encountered in people from the same country. Yet, this work will focus exclusively on the interactivity of pilots from different nations.

[7] Appendix B is going to be analyzed in more depth in results.

We can see that a single function can be expressed in several ways, and its correct interpretation by a listener relies on the speaker's use of grammatical structures and additional cues, such as intonation and pausing (ICAO, 2010). Therefore, it is likely that when pilots use different structures and cues to express the same language function, problems in communication may come up especially when it occurs in a multicultural environment.

ICAO (2010) Appendix B presents a list of the dominant communicative functions associated with aviation. According to it, the functions compiled are based on research at the Direction Générale de l'Aviation Civile, France and are grouped into four categories concerning their role in carrying out ATC (Air traffic control) and piloting tasks. They are directed towards:

a) triggering actions;

b) sharing information;

c) managing the pilot-controller relationship[8];

d) managing the dialogue.

These four main prompts are broken down into themes – "nouns", and then into the communicative functions themselves, i.e. "verbs" that refer specifically to the purpose of the language use. For instance:

> 2. SHARING INFORMATION
> 2.1 Information concerning present facts
> — Request information (C/P) — Give information (C/P)
> (ICAO, 2010, p. B-2)

It is important to point out that the Communicative Functions listed in the document take into consideration the communication between pilots and controllers. An important remark is that, due to the different tasks associated with pilots' and controller's roles, some functions are used exclusively by one or the other, or by both of them. Taking this into consideration, ICAO Doc 9835 (2010) marked the functions with (P) pilots, or (C) controllers. Some specific methodological arrangements had to be made in order to adequate the full inventory of communicative functions to our study. The next section presents more details about it.

3. Methodology

This article consists of a bibliographical research that aims to understand how national culture influences the communication strategies used by pilots who work in a multicultural interaction environment. It also helps to identify problems that these strategies can cause when using specific communicative language functions.

Therefore, the article was based on qualitative applied research with a descriptive objective.[9] Our study focuses on describing the influences of national

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[8] This category is going to be adapted in this article as: "Managing pilot-pilot relationship", because, as we will see, we will not approach the interference of national culture in pilots-controllers communication.

culture in pilot's behavior, and establishing connections of these influences with communication strategies in order to find communicative functions that can be affected by them, which gives a descriptive[10] and applied[11] character to it.

Because this article focuses on the communication in multicultural cockpits, the unit of analysis will be the communicative functions proposed by ICAO (2010), restrained to pilot-pilot interaction, and three national cultural dimensions: power distance, individualism versus collectivism and uncertainty avoidance. In order to maintain the scope of our investigation, we had to narrow our units of analysis: we limited the communicative functions to the ones that are performed by pilots and, from those, we had to select the ones that could be especially more influenced by cultural matters. The selection was based on the technical and non-technical experience we have both as a pilot and as a language specialist. For example, we chose the **Announce non-compliance** function because**,** during jet training programs, CRM trainings and real flight situations, it is difficult to announce non-compliance with an order in a manner that does not disrespect a training colleague or flight instructor and still make your point as the copilot. It becomes even harder if you are new in a company and working with a captain who has been flying for years and has much more experience than you! Although it is your function as a copilot to maintain the flight safety, it does not mean it will be easy to not comply with him.

Functions like **Announce compliance** were not chosen because we assume it is not difficult for a copilot to comply with your captain's orders. In a scenario where the captain says, "we must start the descent otherwise we won't be able to reach the airport in the correct altitude", you as the copilot, will probably agree with what he said.

As for culture, we selected three dimensions out of the six we have previously presented because we understand that they are more closely related to the discussion we are proposing, due to the fact that most of the authors that study culture and aviation use them as relevant for CRM trainings. For instance, Eangle (2000), Helmreich and Merrit (1998), (Merrit and Helmreich 1996). Herlmreich et. al. (2000) even says that:

> "We took his survey of work attitudes as a benchmark and augmented his questions with a new set of items that were more directly relevant to the aviation environment (Helmreich & Merritt, 1998). Three of

[9]We understand that a more solid theoretical research was needed prior to a more practical research in order to review and analyze basic concepts comprehended in the scope of our investigation. It is our intention, in a future opportunity, to conduct a practical study with pilots who fly internationally.

[10] The descriptive studies are characterized by Gil (2008) as the ones that have the objective of studying and describing the characteristics of a given population and establishing correlation with variables.

[11]The applied studies are about generating knowledge for practical applications (CORDOVA; SILVEIRA, 2009). These authors say that qualitative studies do not focus on numeric data. Instead, they try understanding in more depth the peculiarities of phenomena. This fits well with the objectives of this study, given our objective to understand how the influences of cultural dimensions affect communicative functions used by pilots, and not to quantify it with numeric information.

> Hofstede's four dimensions replicated and proved to be conceptually relevant to team interactions in the cockpit." (HERLMREICH et. al, 2000, p.5)

The bibliographical research makes use of books and articles related to culture and pilot's communication - such as Helmreich et. al (2000), Helmreich and Merritt (1998), Flin, O'Connor and Crichton (2008), Hofstede (1997) etc., along with official documents such as ICAO publications - DOC 9835, Annex 1, Annex 10 and secondary documents associated with these three major ones. Additionally, we also consider final reports of accidents from the National Transportation Safety Board (NTSB) in order to illustrate real flight scenarios.

More specifically, the data analysis started with several readings about:

- Culture concepts: Helmreich & Merritt, 1998; Hofstede, 2997; Bjellos, 2012;
- Pilot communication: Linde, 1988; Fischer, Orasanu and Davison, 1997; Fischer and Orasanu 1999;
- CRM training: Mc Allister 1997; Flin, O'Connor 2008; Eangle 2000;
- Requirements for language proficiency in aviation: ICAO 2010;

Next, all the main theories and concepts explored were separated according to their categories in the theoretical background - Communicative Functions (pilot-pilot) and Culture Dimensions (power distance, individualism X collectivism and uncertainty avoidance).

Lastly, associations were established between these concepts, so it was possible to associate which communicative functions performed by pilots might be influenced by national culture.

4. Analysis and Discussion

This section aims to discuss the communicative functions that can suffer interference of the multicultural cockpit, taking into consideration the different aspects of cultural dimensions and studies about the communicative strategies that pilots use.

The communicative language functions that will be analysed in this study are: Firstly, Communicative functions towards triggering actions: a) Orders: Announce non-compliance with an order; b) Requests and offers to act: Request action by another, State reluctance/unwillingness to act, Offer to act; c) Advice: Suggest a course of action, Suggest a solution to a problem, Suggest alternative courses of action; d) Agree to undertaking/decision. Secondly, Sharing information: a) Information concerning present facts: Give information; Ask about needs/wishes; State needs/wishes; State preferences; Request reasons; Announce a problem; b) Information concerning the future: Ask about the expected moment/duration of an event; Ask about intentions; c) Necessity: Ask about necessity; State necessity. Thirdly, Management of the pilot-pilot relation: Complain; Express dissatisfaction; Express concern/apprehension. Lastly, Management of the dialogue, Declare non-understanding.

4.1 Communicative Functions toward Triggering Actions

On July 6th, 2013 a Boeing 777-200ER operating as Asiana Flight 214 was on final approach runway 28L when it struck a seawall at San Francisco International Airport (SFO). The airplane was destroyed by the impact and a post-crash fire. The final report states that one of the contributing factors was nonstandard communication and coordination between the pilot flying and the pilot monitoring. (NTSB, 2014).

Although cultural interference is not mentioned as a contributing factor, the final report shows that there is a complex interaction in crew's relationship. The flight crew were all Korean. Both pilots were relatively inexperienced in their roles and the report says that each one believed that the authority for calling a go around was on the other (NTSB, 2014). Helmreich et al. (2000) shows that Korean culture has a high-power distance which means that pilots avoid questioning directly their superiors. So, it is possible that, due to an authority identification problem influenced by culture, none of the pilots called the go around (WEFERLMAN, 2015).

Asiana 214 is a good example that helps understanding the importance of pilot's proficiency in performing communicative functions. Not using functions to trigger actions such as a go around for example, can have a great impact on flight operations.

Cheng (2014) states that first officers that possess high-power-distance-cultures, will attach a great importance in loyalty to their superiors, making it more difficult for them to express opinions against captains' actions or orders. He states that this point impacts directly on flight safety where the copilots should point out their concerns during the operations in order to avoid accidents. Fischer and Orasanu (1999) say that captains tend to be more direct in their speech acts, issuing more commands and expressing their intentions more forcefully, and therefore there is a stronger obligation to first officers to comply with captains. Using this perspective, it is possible to conclude that power distance being more present in pilot's culture can make them afraid and perhaps fail in expressing the **Non-compliance with an order** and **State reluctance/unwillingness to act** functions.

Impacts of power distance dimensions can also be seen when pilots are dealing with the **Request action by another** function, because in more power distance-oriented cultures, first officers tend to use more indirect speech in order to communicate with captains, so there is a politeness strategy in communication to respect the hierarchy. The problem is that first officers may not be taken seriously (LINDE, 1988). From another perspective, imagining the situation where a copilot with low power distance culture request an action from the captain in a more direct way, the captain that has a high-power distance culture may feel he is not given the respect that he deserves due to his status in the hierarchy (FISCHER, ORASANU and DAVISON, 1997).

Moving towards the **Offer to act** function, Fischer and Orasanu (1999) concluded that US copilots could offer to act more easily than captains, who almost always used self-directive speech, acts such as "I will call ATC and ask if they want us on this heading". If we understand that US culture is a high individualistic culture, it

makes sense that captains are more self-directive, but if we add the multicultural factor, it might be possible that flying with a collectivist-culture-copilot, self-directive strategies cannot be seen well, given that, according to Helmreich et al. (2000), collectivist cultures prefer a team-oriented communication.

By studying the influence of culture in the way that pilots give advice, it is possible to perceive that there is a link between these functions and a decision-making process[12]. Cheng (2014) found out that when the subject comes to a decision-making process, some Chinese copilots are reluctant to raise up their suggestions. In reality, they leave the decision for captains and prefer not to suggest a course of action. Crossing this information with Fischer and Orasanu (1999), it is possible to reinforce their statements that pilots from Anglo cultures tend to prefer leaders who are consultative rather than authoritarian, whereas non-anglo culture pilots prefer authoritarian leaders that tell crew members what to do. This way, the communicative functions concerning advice, namely, **Suggest a course of action**, **Suggest a solution to a problem** and **Suggest alternative courses of action**, can be better performed by more individualistic-oriented cultures, once that, according to Hofstede (1997) they are usually more open to the discussions of opinions, whereas collectivist countries, like China for example, prefer not to engage in a discussion process to not weaken the group.

Engle (2000) says that individualistic cultures have characteristics that fit well into the CRM concepts of questioning the decisions made by superiors, while on the other side, even if collectivist cultures have good group cohesiveness, they will almost avoid questioning the decision of their superiors. So, when talking about the **Agree undertaking a decision** function, individualistic cultures will tend to have difficulties if they do not agree, while collectivist cultures will have more facility in accepting a superior's decision. However, it is important to emphasize that accepting a captain's decision blindly, without thinking or questioning its consequences, can be harmful to the safety of the flight. Therefore, even if this function is not present in the Appendix B of Doc 9835 it would be good for pilots to be proficient in performing a "non-undertaking a decision" function.

4.2 Sharing Information

On January 13th, 1982 a Boeing 737-222 performing Air Florida flight 90 was scheduled to fly from Washington to Fort Lauderdale. The flight was delayed due to heavy snowfall. While the aircraft was taxiing toward runway 36, snow and ice were adhered to it. Sadly, after the takeoff the plane crashed into a bridge and plunged into

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[12] The decision-making process consists in reaching judgments and choosing courses of actions to meet the needs for a given situation. It is especially critical in the aviation domain, where individuals are working under time pressure, task demands, feasibility of options and stress (FLIN; O'CONNOR; CRICHTON, 2008).

the ice-covered Potomac river. Just four passengers and one crew member survived (NTSB, 1982).

On the transcription of the CVR (cockpit voice recorder) It is possible to see that the first officer is aware of an abnormality in engine instruments reading after thrust was set. He tries to communicate with the captain and shows his concern that something is not right (NTSB, 1982). After the first time the copilot's statements were neglected by the captain, he gives up his insistence: *"Naw, I don't think that's right*; *Ah, maybe it is; I don't know"*. For some reason the message sent by the copilot did not reach the captain and therefore a two-way communication[13] was not established. Maybe the accident could have been avoided if the copilot communicated in a more assertive and confident way (CHENG, 2014).

The Air Florida accident reflects again how communication affects flight operations and how it is important as a human factor in aviation. Furthermore, it also reflects the importance of using correctly communicative functions for sharing information.

As it is discussed in the literature review, when exposed to uncertain scenarios, the uncertainty avoidance cultures may feel anxiety and stress. On the other hand, the uncertainty accepting ones handle these situations more easily. Gudykunst and Nishida (2001, p. 1) point out the theory of anxiety/uncertainty management. They say that: *"anxiety/uncertainty management directly influences the effectiveness of communication in interpersonal and intergroup encounters"*. According to him when anxiety and uncertainty are very high, individuals rely on simplistic information processing and cannot communicate effectively. Therefore, it is possible to conclude that the ability to manage uncertainty and anxiety affects one's communication effectiveness. Linking this theory to the **Give information** and **Announce a problem** functions, it might be possible that pilots who have an uncertainty avoidance culture may face more difficulties to communicate effectively when dealing with indecisive scenarios. It is important that when announcing a problem, a pilot should be assertive[14]. So, cultures that have high power distance index may also face difficulties when announcing problems once that copilots use more indirect speech strategies (FISCHER; ORASANU, 1999; LINDE, 1988).

When dealing with situations that require taking decisions that are not described in procedures or regulations, pilots need to state their preferences, thus making use of **State needs and wishes** and **State preferences** functions. Helmreich et al. (2000) explains that cultures that score high on uncertainty avoidance believe that written procedures are needed for all situations and that companies' rules should never be broken. This way they are less likely to deviate from procedures but may be less

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[13] A communication based on a closed-feedback loop. It is reliable because it allows checking and correcting details. The sender and receiver establish mutual understanding. (FLIN O'CCONOR AND CRICHTON 2008).

[14] NTSB (1979) says that assertiveness training should be given to flight crew in the cockpit as part of flight deck resource management.

creative when dealing with unexpected situations, being more difficult for captains for example to express these functions. The ones with low uncertainty avoidance may deal easily with new situations not covered by procedures, but they may be more prone to violation of procedures.

Power distance again influences copilot's performance in **Request reasons** functions, , once that cultures that score high in PD are more apprehensive in questioning captains' decisions, as said by Helmreich et.al (2000, p.4) "*In high PD cultures, safety may suffer from the fact that followers are unwilling to make inputs regarding leaders actions or decisions*". Here is a captain's report about Chinese co-pilots where it is possible to perceive the influence of uncertainty avoidance and power distance in the functions discussed in the two last paragraphs:

> So if there is a decision to be made, the first officers will say: we have a big delay because of military exercise, what is your decision? And I said: what do you mean my decision. This is a crew decision what we are going to do. So then I naturally go back to the first officer: what do you think we should do? You have all information. What would you do? And they will say: it is your decision, captain, your decision. For them it is always the captain. (CHENG, 2014, p. 72)

It is possible to see that the captain had the intention to include the copilot in the decision-making process because the company didn't have a specific procedure for the situation. In spite of saying his intentions or stating his preferences, the Chinese copilot, whose culture has a high-power distance, couldn't perform a communicative function. Instead, he said that the decision is up to the captain.

In a study with 33 airlines in 22 countries Helmreich and Merrit (1998, p. 67) found out that there are some behaviors with high levels of agreement between pilots from different nations. One of them is: *"the pilot flying the aircraft should always verbalize plans for procedures/maneuvers and should be sure that information is understood and acknowledged by all the crew members."* However, Helmreich and Merrit (1998) do not investigate what pilots would do if this information is not verbalized or is not clearly understood by the crewmembers. In these situations, having proficiency in performing communicative such as **Ask about the expected moment/duration of an event** and **Ask about intentions** can have a good impact on the coordination of crew activities. A good example of their importance is given in the following situation:

> I was the copilot on a flight from JFK to BOS. The captain was flying. Departure turned us over to Center and we were given FL210 which was our flight plan altitude. I noted we had reached FL2 10 and were continuing through it, but was reluctant to say anything. As we climbed through 21,300 ft, I mentioned it to the captain, but not forcefully enough, and he did not hear me. I mentioned it again and pointed to the altimeter. We were at 21,600 ft when the climb was stopped and we descended back to 2 1,000. As we started our descent, Center called and told us to maintain FL210. The captain said he had misread his altimeter and thought he was 1,000 ft lower than he was. I

The nationality of the pilots is not given in this report, yet we can see that the copilot was reluctant in correcting the captain. He could have asked him about his intentions, but he did not do it properly at the first time. This report reinforces one more time that even with captains that encourage open channels of communication the influence of power distance can make their subordinates reluctant in asking or point out problems, especially if they are new and inexperienced in the company.

Fischer and Orasanu (1999) say that the communication of pilots can vary in explicitness and directness. They say that copilots use requests or speaker-centered strategies like "Do you want me to ask ATC if they still want us on this heading?". By doing so, it is possible that copilots can **Ask about necessity** more easily regardless of the speech acts they use (more direct or indirect). The problem is that captains have more difficulty in asking copilots' necessity. Instead of asking, Fischer and Orasanu (1999) specify that captains more often use self-directiveness strategies such as "I will call ATC and find out if they still want us in this heading" or issuing commands. Power distance and individualism versus collectivism are present in these scenarios, we can say that due to power distance copilots will probably have an indirect approach in communication through the use of request and speaker centered strategies making it easier to ask about captains' necessity. However, captains may and **State necessity** more easily than first officers. When considering individualism, it is likely that copilots who have high individualistic cultures will state their necessities with more facility than the collectivist ones.

4.3 Management of the Pilot-Pilot Relation

According to NTSB (2000), on August 6th, 1972 a Boeing 747 performing Korean air flight 801 was in an instrument approach at Guam international airport, the meteorological conditions were not good. During the final approach the plane descended bellow the minimums and the first officer and the flight engineer showed signs of apprehension. The first officer stated, *"let's make a missed approach?"*. One second later the flight engineer also tries to warn the captain: *"Not in sight."* the copilot reinforces with *"not in sight, missed approach."* The flight engineer says one more time *"Go around".* The captain started a go around 1 second later saying *" Go around"* but they could not do it. Unfortunately, the plane crashed with high terrain at Nimitz Hill about 660 hundred feet, 3.3 nautical miles from the threshold. Only 26 of the 237 people on board survived (NTSB, 2000).

In this accident it is possible to see the important role of the functions used in the pilot-pilot relation. Originally, Doc 9835 presented these functions as being used for the

management of pilot-controller relation, but they were selected for this analysis thinking about the management of pilot-pilot relation.

Although NTSB (2000) says in the conclusions that the first officer properly called for a go around, it is possible to perceive that the flight engineer and the copilot used at a first moment an indirect speech. Later with the risks increasing they started to be more assertive issuing orders to the captain. In general situations, copilots tend to use more mitigated and indirect speech acts, but, consequently, they cannot be taken seriously by the captains (LINDE, 1988). Fischer and Orasanu (1999) explain that communication strategies used by pilots' changes as the risk level increases, first officers specially, increased almost in four times the use of crew obligation statements as the risk increased. Even though this study was made with US and European pilots, a similar behavior can be seen with the copilot and the flight engineer of Korean 801. Therefore, it is possible to say that when dealing with **Complain**, **Express dissatisfaction** and **Express concern/apprehension** functions, pilots with low and high-power distance cultures are likely to be more direct as the risk in operations increases. However, it might be more difficult for high power distance cultures to do so.

4.4 Management of Dialogue

These functions, can help pilots avoid communication errors. Cheng (2014) identified cases where the language became a barrier in a multicultural interaction (being the pilots non-native or native English speakers). Reports collected by him showed that there are situations where, instead of making use of a **Declare Non-understanding** function copilots pretended they understood:

> …It' might be the Chinese culture, they are very, let's say, //mhm//, respectful to the, to the leader. So even if they don't understand, they pretend they understand. So there can be some communication problems. They say yes and they smile. You think they understand. But it happens they don't. Let's say. It would be disrespect to say no. (CHENG, 2014, p. 61)

> …I may say, I may provide the first officers with instructions. And the first officer may say: ok, oh, ok. But actually he doesn't understand what I'm saying, because he's afraid of making any problems. He's afraid I will angry or upset or whatever. He's afraid something bad will happen or whatever. Again, in American culture, we like people to say: I don't know what you are talking about. This is very...again, it's not...we don't get angry...we try to fix problem. Here the first officers who are not sufficient with English...they will pretend. So, for example, I have a first officer, and I say to him…(CHENG, 2014, p. 61)

It is possible to see in these reports that the copilots are not following the Declare Non-understanding function, in part because there are cultural influences such as power distance that, as described, prevent first officers from saying anything even if

the captain is open to communication. However, the point is that, not only national culture is a negative factor in these cases. The copilots do not actually understand the captain, and this is due to lack of proficiency in English. Pretending they understood the conversation is a consequence of the influences of the national culture.

Therefore, it is possible to say that the lack of language proficiency associated with national culture can have impacts towards flight safety. Even though Cheng (2014) only identifies these problems associated with the multicultural interaction in China, it does not necessarily mean that other cross-cultural interactions are free from the problem as well. To confirm this hypothesis more studies and reports could be made in order to seek if this is a common problem to other cultures.

5. Final Considerations

Having in mind a scenario in which aviation is increasingly growing, the need for pilots will lead to a rise of multicultural interactions on the flight deck, as a consequence of companies resorting labor from different countries. Consequently, considering that pilots make use of non-technical skills such as communication, it is important to study how it is affected by cultural factors in this scenario.

The focus of the study was to better understand and analyze how national culture influences pilot communication and how it interferes with the use of communicative functions, through the use of a descriptive method along with a qualitative applied analysis. After a bibliographical review it was possible to point out specific characteristics of pilots from different countries and establish logical connections between them and some communicative functions featured in Doc 9835 (ICAO, 2010).

We are aware that communication strategies used by pilots are not affected only by their nationality, and this is one of the limitations of the study. Additionally, ICAO DOC9835 identifies functions regularly used in the pilot-controller communication and does not clearly show the functions used by the pilot-pilot interaction. Also, some functions proposed by the document- such as "agree to undertaking decision" does not necessarily consider "disagree to undertaking a decision", which would be valid for specific language training purposes, since it is a reference material. We believe that cultural issues can and have to be made aware through language training.

This study recognizes that there is not only one level of culture. In other words, the national culture does not interfere in communication as an isolated factor. Other culture-levels like professional and organizational can also influence a pilot's behavior. Hence, we suggest further analysis concerning these and other layers of culture that can have a great potential in finding influences in pilots communication and maybe helping adapt Crew Resource Management training for specific companies.

Aviation is always improving its safety levels and companies all over the world share this concern. This is why it is possible to say that, even if there are several

cultures sharing a cockpit, there is one culture that permeates them all: aviation safety culture.

References

BJELLOS, D. M. 2012. Multicultural CRM. Flight Safety Foundation, Alexandria, VA. Disponível em: https://flightsafety.org/asw-article/multicultural-crm/. Retrieved on 1 set. 2019.

BOCORNY, A. E. P. 2008. Descrição das unidades especializadas poliléxicas nominais no âmbito da aviação : subsídios para o ensino de inglês para fins específicos (ESP). Tese de Doutorado. Universidade Federal do Rio Grande do Sul, UFRGS.

CHENG, Z. 2014. Intercultural Communication Difficulties and their Effects on Flight Safety. Tese (Doutorado) University Of Jyväskylä, Jyväskylä. Available at https://jyx.jyu.fi/handle/123456789/46429. Retrieved on 10 nov. 2018.

ENGLE, M. 2000. Culture in the Cockpit – CRM in a Multicultural World, Houston. *Journal of Air Transportation World Wide*, Omaha, NE, v. 5, n. **1**, p. 107-114.

FISCHER, U.; J. ORASANU. 1999. Cultural Diversity and Crew Communication. In: ASTRONAUTICAL CONGRESS, 50th, 1999, Amsterdam. Congress Proceedings […]. Amsterdam: American Institute of Astronautics and Astronautics.

FISCHER, U.; J. ORASANU; J. DAVISON. 1997.Cross-Cultural Barriers to Effective Communication in Aviation. In: S. OSKAMP; C. GRANROSE. (eds.). Cross-Cultural Work Groups: The Claremont Symposium on Applied Social Psychology. Thousand Oaks, CA: Sage Publications, p. 134-157

FLIN, R.; P. O'CONNOR; M. CRICHTON. 2008. *Safety at the Sharp End: a Guide to non-technical Skills.* Surrey: Crc Press.

GIL, A. C.2008. *Métodos e Técnicas de Pesquisa Social*. 6. ed. São Paulo: Atlas.

GUDYKUNST, W. B.; NISHIDA, T. 2001.Anxiety, uncertainty, and perceived effectiveness of communication across relationships and cultures. *International Journal of Intercultural Relations*, Keaau, HI, v. 25, n. 1, p. 55-71. Available at https://www.sciencedirect.com/science/article/abs/pii/S0147176700000420. Retrieved on 10 nov. 2019.

HELMREICH, R. L; J. R. KLINEC; J. A. WILHELM. 1999. Models of threat, error, and CRM in flight operations. In: INTERNATIONAL SYMPOSIUM ON AVIATION PSICHOLOGY, 10th. Proceedings […]. Columbus, OH: The Ohio State University 1999. p. 677-682. Available at https://flightsafety.org/files/models_of_threat_error.pdf. Retrieved on 8 nov. 2019.

HELMREICH, R. L.; A. C. MERRITT. 1998.National Culture. *In*: R. L HELMREICH; A. C. MERRITT. *Culture at Work in Aviation and Medicine: National, Organizational and Professional Influences.* Aldershot: Ashgate.

HELMREICH, R. L.; J.A WILHELM; J. R. KLINECT; A. C. MERRITT. 2000. Culture, Error, and Crew Resource Management. In: E. SALAS; C. A. BOWERS; E.

EDENS. (eds.). *Applying Resource Management in Organizations: A Guide for Professionals*. Hillsdale, NJ: Erlbaum,. Available at https://pdfs.semanticscholar.org/4774/aa3e3ef2283638ff41a96cb864115e1f94bf.pdf. Retrieved on 23 jun. 2019.

HOFSTEDE, G. 1997. *Cultures and Organizations: Software of the Mind.* London: McGraw Hill.

HOFSTEDE, G. [2010?]. The 6-D model of national culture. Available at https://geerthofstede.com/culture-geert-hofstede-gert-jan-hofstede/6d-model-of-national-culture/. Retrieved on 20 may. 2019.

INTERNATIONAL CIVIL AVIATION ORGANIZATION. 2010. Manual on the implementation of ICAO language proficiency requirements. 2. ed. Montreal: ICAO,. Doc 9835. Available at https://www.skybrary.aero/bookshelf/books/2497.pdf. Retrieved on 5 abr. 2019.

JAKOBSON, R.; WAUGH, R. L.; MONVILLE-BURSTON, M. 1990. *On Language*. London: Harvard University Press.

LINDE, C. 1988. The Quantitative Study of Communicative Success: Politeness and Accidents in Aviation Discourse. *Language in Society*, New York, NY, v. 17, n. 3, p. 375-399. Available at https://www.jstor.org/stable/4167952?seq=1#page_scan_tab_contents. Retrieved on 8 nov. 2019.

McALLISTER, B. 1997. *Crew Resource Management: Awareness, Cockpit Efficiency & Safety.* Shrewsbury: Airlife.

MERRIT, A. C.; R. L. HELMREICH. 1996. Human Factors on the Flight Deck: The Influence of National Culture. *Journal of Cross-Cultural Psychology, Western Washington university,* v. 27, n.1, p. 5-24.

NATIONAL TRANSPORTATION SAFETY BOARD. 1982. Air Florida, Inc. Boeing 737-222, N62AF, Collision with 14TH Street Bridge, Near Washington National Airport, Washington, D.C. Report no. AAR-82-8. Washington. Available at https://www.ntsb.gov/investigations/AccidentReports/Pages/AAR8208.aspx. Retrieved on 10 nov. 2019.

NATIONAL TRANSPORTATION SAFETY BOARD. 2000. Controlled Flight into Terrain, Korean Air Flight 801, Boeing 747-300, HL7468 Nimitz Hill, Guam . Report no. AAR-00/01. Washington,. Available at https://www.ntsb.gov/investigations/AccidentReports/Reports/AAR0001.pdf. Retrieved on 12 nov.2019.

NATIONAL TRANSPORTATION SAFETY BOARD. 2014. Descent Below Visual Glidepath and Impact With Seawall, Asiana Airlines Flight 214, Boeing 777-200ER, HL7742 San Francisco, California July 6, 2013: Report no. AAR-14/0. Washington. Available at https://www.ntsb.gov/investigations/AccidentReports/Reports/AAR1401.pdf. Retrieved on 7 nov. 2019.

NATIONAL TRANSPORTATION SAFETY BOARD. 1979. United Airlines, INC. McDonnell-Douglas, DC-8-61, N8082U Portland, Oregon December 28, 1978: Report no.AAR-79-7. Available at https://www.ntsb.gov/investigations/AccidentReports/Reports/AAR7907.pdf. Retrieved on 10 nov. 2019.

OXFORD REFERENCE LIBRARY. Entry: Cultural Relativism. Oxford, UK: Oxford University Press, 2019. Available at https://www.oxfordreference.com/view/10.1093/oi/authority.20110803095652905. Retrieved on 13 jun. 2019.

ROSADO, C. 1996.Toward a Definition of Multiculturalism. [S. l.]: Change in Human Systems,. Available at https://www.academia.edu/777187/Toward_a_Definition_of_Multiculturalism. Retrieved on 24 set. 2019.

TURNEY, M. A.; R. F. MAXANT. 2004.Tapping Diverse Talent: A Must for the New Century. In: TURNEY, M. A. *Tapping Diverse Talent in Aviation*. Aldershot: Ashgate, p. 3-10.

WELFERMAN, L. 2015. Crossing Cultures: National Norms and Customs Play a Role in Defining Aircraft Operators' Safety Cultures. *Flight Safety Foundation*, Alexandria, VA. Available at https://flightsafety.org/asw-article/crossing-cultures/. Retrieved on 7 nov. 2019.