Implications Of Misunderstandings In Radiotelephony Aeronautical Communication Between Pilots And Atc Towards Flight Safety: An Aerolinguistic Study

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ABSTRACT

It is crucial for all parties involved in aviation, including pilots, ATC, and APP, to communicateclearly and follow established procedures to ensure flight safety. Missunderstanding of in communication and instruction implementation can have fatal consequences, and therefore must be avoided with utmost seriousness.

Therefore, in translating and understanding speech acts in aeronautical radiotelephony conversations, researchers must discuss them with pilot informants or aeronautical experts, especially those who understand radiotelephony. Aeronautical terminology is well understoodby pilots, ATC personnel, individuals involved in the aviation field, or those who have studied and practiced radiotelephony directly. Another interesting and crucial aspect of aeronautical radiotelephony conversations is the pilot's obligation to perform readbacks for every imperative statement from ATC. Additionally, speech acts in aeronautical radiotelephony conversations always seek feedback in the form of perlocution from the conversation partners. If speech actsin aeronautical radiotelephony conversations do not adhere to the regulations set by ICAO Annex 10, misunderstandings can occur, potentially leading to fatal aircraft accidents.

Data from (www.planecrashinfo.com) shows statistics of accidents involving all types of commercial aircraft worldwide from the 1950s to the 2000s. On average, pilot error accounts for 50% of accidents, followed by mechanical failure at 22%, weather at 12%, sabotage at 9%,other human factors at 7%, and other factors at 1%.

Similarly, in national aviation, it is suspected that the high frequency of incidents and airplane accidents is related to factors involving human error.

Key Word: Missunderstanding, Radiotelepony, Aeronautical, Aerolinguistics

INTRODUCTION

Radiotelephony conversations are speech events between pilots and ATC conducted using VHFradio from the context of starting the engine of the aircraft 'start engine' then the context of flying 'flight' to the context of landing 'landing'. Radiotelephony conversations begin with the pilot's speech calling and greeting ATC, then ATC answers the pilot's call and greeting and invites the pilot to convey his speech in the form of information about the flight destination, number of passengers, aircraft altitude level, and so on.

The communication process in radiotelephony aeronautical conversations is an interaction communication process because the speech of the speech participants will ask for feedback from other speech participants. That is, after the pilot speaks he asks for feedback from ATC and likewise after ATC speaks he asks for feedback from the pilot. The interaction communication process is a two-way communication from the communicator or speaker to the communicant or speech partner and from the communicant or speech partner to the communicator or speaker. Thus, both pilots and ATC participants can be both speakers and speech partners.

Every time the pilot will perform an action or activity to run the aircraft, he must report, ask for permission, and also ask for instructions or orders from ATC as an air traffic controller. Likewise, ATC must provide clear, informative, effective, efficient, and unambiguous speechto the pilot so that it is easily understood so that there is no misunderstanding. The language used in radiotelephony aeronautical conversations is English. Radiotelephony aeronautical conversations must refer to the conventions used in the world of aeronautics, namely the International Civil Aviation Organization (ICAO) Annex 10 volume II on Aeronautical Telecommunications-Communication

Procedures including those with PANS status, sixth Edition, July 20141; ICAO Manual of Radiotelephony fourth Edition, 20072; and ICAO Doc 4444 Air Traffic Management sixteenth Edition, 20163. The most important thing in the speechact of radiotelephony aeronautical conversations is the use of readback that must be done by the pilot. The following are examples of readback speech in the radiotelephony conversationsof Lion 960 pilots against the imperative speech of ATC Menara Husein.

Example

Explicature

(1) T: "LNI 960 clear to Surabaya via W165 W45 flight level 270
Cirebon ondeparture squawk number 7177!"
L N I 9 6 0 clear to
Surabaya via'L' 'N' 'I' 'nine 'six' 'zero'
'clear' 'to' 'Surabaya' 'via' W 1 6
5 W 4 5 flight level
'W' 'one' 'six' 'five' 'W' 'four' 'five'
'flying' 'level'
2 7 0 Cirebon on departure
squawk number'two' 'seven' 'zero' 'Cirebon' 'on'
'flight' 'squawk' 'number'
7 1 7 7
'seven' 'one' 'one' 'seven'
'LNI nine six zero authorized to Surabaya via W one six five W four five flying at an altitude of two seven thousand thousand feet Cirebonon squawk flight number seven one seven seven!'
(MHSA-6)

(2) P: "Clear to Surabaya via W165 W45 flight level 270
Cirebon ondeparture squawk number 7177 LNI
960."
clear to Surabaya via W 1 6 5 W'clear' 'to'

'flight' 'squawk' 'number' 'seven' 'one' 'one' 'seven' L N I 9 6 0 'L' 'N' 'I' 'nine 'six' 'zero' 'Allowed to Surabaya via W one six five W four five flying at an altitude of two seven thousand thousand feet Cirebon on squawk flight number sevenone seven seven LNI nine six zero!' (LNI 960-7)
Context: (S): The conversation occurred when the pilot of LNI 960 and ATC Menara Husein had a conversation on Friday, January 12, 2018 at Husein Sastranegara Airport; (P): The participants were the pilot of LNI 960 and ATC Menara Husein; (E): Aeronautical conversations, namely radiotelephony in the context of air borne 'take-off' with the aim of stating; (A): The message channel in the communication is running smoothly. Mt (ATC Menara Husein) is very attentive to the speech of P (pilot LNI 960); (K); normal/flat intonation; (I): Aeronautical language, namely English (N); Radiotelephony language in accordance with aeronautical references, namely ICAO Annex; (G): Conversation.

MISUNDERSTANDINGS IN RADIOTELEPHONY AERONAUTICALCOMMUNICATION

This research is supported by several linguistic theories used eclectically. The application of theories eclectically is done with the consideration that experts' views are highly diverse, thus requiring appropriate and complementary theories (Djajasudarma: 1986). The referenced theories concern Leech (1983). According to Leech, pragmatics is the study of utterance meaning in specific situations. Discussions about context should not be disregarded because this study is always related to issues of language usage behavior in context, and its data analysis is inseparable from the context of data emergence. According to Levinson (1983), pragmatics examines the relationship of speech acts with the context of place, time, the speaker's condition, and the meaning relationship within various speech situations. The speech act theory used to investigate speech acts in aeronautical conversations is Searle's speech act theory (1983). Searle divides speech acts into locution, illocution, and perlocution.

The theory used for the context is Hymes (1974), which describes the context using the acronym S.P.E.A.K.I.N.G. The components are as follows:

Setting (S): Refers to the time and place background.
Participant (P): Involves the participants in the speech act.
Ends (E): Concerns the intentions and purposes behind the communication.
Act Sequence (A): Involves the message structure, grammar, content, codes, and language variety used.
Key (K): Relates to the tone, manner, or style of communication.
Instrumentalities (I): Refers to the channels or means of communication.
Norms (N): Involves the social norms and rules governing the communication.
Genre (G): Relates to the type of speech act, such as a lecture or conversation.

Grice's cooperative principle (1975) is used to analyze the implementation and violation of cooperative maxims in aeronautical radiotelephony conversations related to quantity, quality, relevance, and manner. The types and strategies of speech acts in aeronautical radiotelephony

conversations use Wijana's theory (2018). The aeronautical radiotelephony conversations are governed by ICAO Annex Aeronautical Telecommunications (2014) Radiotelephony ICAO (International Civil Aviation Organization) Annex concerning Aeronautical Telecommunications.

In ICAO Annex 10 point 4.5.7.5, it is stated that the flight crew must read back safety-related parts of ATC clearances and instructions transmitted by voice. The readback is essential to ensure the safety of the flight, as it helps the flight crew confirm that they have understood the instructions correctly. The items that should always be read back include requests for clearancesand instructions from ATC. By doing so, the flight crew maintains effective communication with ATC and ensures that the correct actions are taken.

For example, when ATC instructs the pilot to make a left turn, the pilot is required to repeat theinstruction back to ATC. After receiving ATC's permission to make the left turn, the pilot performs the readback of the clearance, confirming the instructions and then carries out the leftturn maneuver as directed by ATC. The pilot must repeat ATC's instructions, and this processis called "readback."

The readback ensures that there is no miscommunication between the flight crew and ATC, reducing the risk of errors and enhancing safety during flight operations. Additionally, the flightcrew is responsible for providing reports to ATC whenever they execute the instructed actions or

maneuvers.

By adhering to the readback procedures, pilots and ATC can maintain clear and accurate communication, contributing to the safe and efficient operation of air traffic.

(3) P: "We are now take off."
Translation: "Kami sekarang akan lepas landas."

In this communication, the pilot (P) states that they are currently taking off.

(4) ATC: "Ok, stand by for take-off. We will call you."
Translation: "Baik, tetap siaga untuk tinggal landas. Kami akan memanggilmu."

In this exchange, Air Traffic Control (ATC) informs the pilot to stand by for take-off andassures the pilot that they will be contacted when it's time for departure.

Note: It's important to clarify that there seems to be a misinterpretation in the translations provided. The original English statements are about "take-off," but the translations indicate "landing." The correct translations should refer to "take-off" as the action being discussed.

(S): The speech act takes place during a conversation between the pilot of KLM-4805 and ATC Menara Tenerife on Friday, January 12, 2018, at Tenerife Airport. (P): The participantsin the speech act are the pilot of KLM-4805 and ATC Menara Tenerife. (E): The aeronauticalconversation involves radiotelephony context, specifically requesting permission for take- off clearance. (A): The message channel in communication experiences miscommunication because the pilot of KLM-4805 misunderstands one of the imperative statements from ATC Menara Tenerife; the tone is normal/neutral. (I): The language used in aeronautics is English.
(N): The language used in radiotelephony follows the aeronautical reference, which is ICAOAnnex.
(G): The conversation type is aeronautical radiotelephony.

The speech act "Ok" uttered by ATC meant for the pilot of KLM-4805 to "stand by for take- off." However, the pilot misunderstood it as "Ok" for "clearance take off," and without repeating ATC's statement as "readback," the pilot proceeded with the "clearance take off" or "clear for take off" without confirming the instructions. This misunderstanding could have been avoided if ATC had directly responded with "stand by for take off." If ATC was not certain thatthe runway was clear, the pilot should have been asked to repeat "stand by for take off" to indicate understanding and confirmation that the runway was clear or safe for take-off.

Unfortunately, during that moment, the pilot of KLM-4805 released the brakes, and the Pan Am Flight 1736 was taxiing

back to the take-off point. ATC Tenerife did not adequately manageand direct the movements of both aircraft, KLM-4805 and Pan Am 1736. As a result, a catastrophic collision occurred, resulting in the death of all 248 passengers on board KLM- 4805 and 326 passengers and 9 crew members on Pan Am 1736. The total casualties from both aircraft were 583 people. The Tenerife disaster remains the deadliest accident in aviation history due to the large number of casualties.

Captain Jacob Veldhuyzen van Zanten, the pilot of KLM-4805, was an experienced and highly trained pilot, even serving as a trainer for other pilots in the Netherlands. The tragic event of Tenerife serves as a stark reminder of the importance of clear and precise communication between pilots and ATC, as well as the critical role of effective air traffic control in ensuring the safety of air travel.

Every pilot must pay close attention to each command or instruction given. Similarly, ATC andAPP must be focused and concentrated when providing instructions to many pilots who are in different situations, conditions, and routes. If a pilot fails to perform a proper "readback" of ATC or APP commands or instructions, the aeronautical radiotelephony conversation will not proceed smoothly. Consequently, actions that should have been taken may be incorrect or notin accordance with procedures, which can pose significant dangers to flight safety and aircraft movement, whether it be during the pilot's call and request for permission to start the aircraft engines to ATC, reporting to ATC when taxiing for departure or currently taking off, reportingto ATC when ascending or descending the aircraft's altitude or changing its course during flight,or when the pilot requests and reports to ATC when the aircraft is about to land, among other contexts.

According to the Federal Aviation Administration (FAA), there are three factors contributing to aviation accidents. Weather factors account for 13.2%, the aircraft fleet used accounts for 27.1%, and nearly 66% of all aviation accidents and incidents are caused by human factors errors in operating the aviation system itself (Susetyadi, et.al. 2008).

According to data compiled by the National Transportation Safety Committee (Komite Nasional Keselamatan Transportasi, KNKT) of the Indonesian Ministry of Transportation, from 1988 to 2012 (as of August 2012),

there have been 914 incidents and civil/commercial aviation accidents in Indonesia. Among them, there were 414 accidents (serious incidents andaccidents), averaging about 17 accidents per year. When classifying airplane accidents based on their causes from 2007 to August 2012, it was found that human factors accounted for approximately 35.2% (45 cases), technical factors at 26.6% (34 cases), environmental factors
at 4% (5 cases), and unidentified factors at 34.4% (44 cases).

Based on the above descriptions, misunderstandings in speech acts during aeronautical radiotelephony conversations become crucial to study, as misunderstandings are one of the most significant human factors contributing to airplane accidents. Speech acts in aeronautical radiotelephony conversations have their own distinctive characteristics and uniqueness that arenot easily understood by individuals outside the aviation world. For example, from the way the

alphabet is pronounced, the pronunciation of numerical values, the use of specific terms in phraselogy such as the word "affirm," and other aspects. However, from the case of the KLM-4805 airplane accident, it was known that not all phraselogy was used, as ATC used the word "Ok," which is not a standard term in phraselogy.

Therefore, in translating and understanding speech acts in aeronautical radiotelephony conversations, researchers must discuss them with pilot informants or aeronautical experts, especially those who understand radiotelephony. Aeronautical terminology is well understoodby pilots, ATC personnel, individuals involved in the aviation field, or those who have studied and practiced radiotelephony directly. Another interesting and crucial aspect of aeronautical radiotelephony conversations is the pilot's obligation to perform readbacks for every imperative statement from ATC. Additionally, speech acts in aeronautical radiotelephony conversations always seek feedback in the form of perlocution from the conversation partners. If speech acts in aeronautical radiotelephony conversations do not adhere to the regulations set by ICAO Annex 10, misunderstandings can occur, potentially leading to fatal aircraft accidents.

Ekplikatur is an analysis or explanation regarding differences or variations in the use of language or speech acts. In examples (5) and (6), there are differences in ekplikatur as bothutterances convey the same message but use different wording.
(5) : ATC (T) states: "LNI 960 runway 29 clear for take off." In this example, ATC (T) mentions the flight number "LNI 960" followed by the instruction"runway 29 clear for take off." In the translation, the message is interpreted as "LNI 960 runway 29 is allowed to take off." (6) ATC (T) states: "LNI 960 runway 29 clear for take off." In this example, ATC (T) mentions the flight number "LNI 960" followed by the instruction"runway 29 clear for take off." In the translation, the message is interpreted as "LNI 960 runway 29 is allowed to take off."
The difference in ekplikatur shows that despite conveying the same message, both utterancesuse different word order and element placement. In the context of aviation communication, it is essential for all involved parties to understand these variations to avoid misunderstandings and ensure effective and clear communication.

The pilot's utterance (LNI 960-9) is a complete readback of the ATC's (MHSB-8) command inthe form of a declarative sentence with the illocutionary force of assertion, a direct and literal utterance aimed at providing a full readback. This full readback aims to demonstrate that the pilot (LNI 960-9) understands the ATC Tower Husein's command (MHSB-9) and follows the radiotelephony procedures as per the regulations in ICAO Annex 10 Aeronautical Telecommunication.

The context of the radiotelephony communication between the pilot (LNI 960) and Husein Tower is for take-off clearance. Pilot LNI 960 has received information from Husein Tower that runway 29 is clear and authorized for take-off. The situation on runway 29 is safe becausethe aircraft on the runway is in a safe condition, allowing for the implementation of context such as "start engine," "taxi clearance," and "take-off clearance."

In the context of "take-off clearance," the pilot's utterance (LNI 960-9) adheres to Grice's cooperative principle. It follows the maxim of quantity by providing informative content relevant to what needs to be communicated to Husein Tower. It adheres to the maxim of quality by conveying factual information. It complies with the maxim of relevance as the pilot's utterance (LNI 917-9) is relevant to the subject of the conversation, which is the full readback.

Lastly, it follows the maxim of manner as the pilot's

utterance is effective, efficient, and unambiguous, preventing any possible misinterpretation.

The placement or pronunciation of the pilot's call sign "LNI 917" in the ATC's utterance is spoken at the beginning of the sentence, while in the pilot's utterance, it is placed at the end ofthe sentence. This placement adheres to the maxim of manner and is in accordance with the rules in ICAO Annex 10 Aeronautical Telecommunication.

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