

**A THESIS**

**HOMONYMOUS WORDS IN AIR TRAFFIC CONTROL  
PHRASEOLOGY**



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NASYA PUTRI RAHMANIANTI

## **ABSTRACT**

**NASYA PUTRI RAHMANIANTI.** Homonymous Word in Air Traffic Control Phraseology. (Supervised by Hamzah A. Machmoed and Harlinah Sahib).

This research aims to understand about homonyms in air traffic control phraseology. this research also aims to provide solution in order to solve communication problem regarding homonymous words in air traffic control phraseology. Air traffic control phraseology has an important role in air-ground communication. In giving air traffic service, ambiguous message is one of the causes which may lead miscommunication. Miscommunication in air traffic control communication may result a serious incident or accident in aviation. A clear and precisely message is one way to keep a flight safety.

The method of this research is qualitative method. Data were collected by recording air-ground communication between air traffic controller - pilot in 5 units in Makassar Air Traffic Service Center and by interviewing an informant whom has expertise in air traffic control for more than 20 years.

This research finds that there are lack of awareness regarding homonymous words in air traffic control phraseology. There are some factors that may cause ambiguous message such similar phrase and the stress of a homonym word.

The research had provided suggestions to some organizations which have an authority regarding air – ground communication. The research suggested to the next researcher to do some study regarding linguistics in aviation to gain more knowledge regarding aviation English.

*Keyword: Air Ground communication, Air Traffic Control Phraseology, Linguistics, Aviation English.*

## ABSTRACT

**NASYA PUTRI RAHMANIANTI.** *Kata-kata Homonim dalam Fraseologi Pemanduan Lalu Lintas Udara.* (Dibimbing oleh Hamzah A. Machmoed dan Harlinah Sahib).

Penelitian ini bertujuan untuk mengetahui homonim dalam fraseologi pengaturan lalu lintas udara dan memberikan solusi untuk mengatasi masalah komunikasi mengenai kata-kata homonim dalam fraseologi pengaturan lalu lintas udara.

Metode penelitian yang digunakan adalah metode kualitatif. Pengumpulan data dilakukan dengan merekam komunikasi udara darat antara pengawas lalu lintas udara dan pilot di lima unit di Balai Pelayanan Lalu Lintas Udara Makassar. Selain itu, digunakan pula metode wawancara, yakni dengan mewawancarai narasumber yang kompeten di bidang pengendalian lalu lintas udara selama lebih dari dua puluh tahun.

Hasil menunjukkan bahwa kurangnya pemahaman mengenai kata-kata homonim dalam fraseologi pengaturan lalu lintas udara dapat menimbulkan kesalahan pemaknaan suatu pesan (sering terjadi keambiguan). Factor yang dapat menyebabkan terjadinya pesan yang ambigu adalah adanya frase yang memiliki kemiripan bentuk dan makna serta adanya perbedaan penekanan pada kata yang berhomonim.

*Kata Kunci: Komunikasi Udara – Darat, fraseologi pemanduan lalu lintas udara, Linguistik, Bahasa Inggris Penerbangan.*

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## LIST OF ABBREVIATION

1. ACC	Area Control Center
2. APP	Approach Control Unit
3. ATC	Air Traffic Control
4. ATCO	Air Traffic Control Officer
5. ATS	Air Traffic Service
6. CVR	Cockpit Voice Recorder
7. DGCA	Directorate General of Civil Aviation
8. FDR	Flight Data Recorder
9. FL	Flight Level
10. ICAO	International Civil Aviation Organization
11. MATSC	Makassar Air Traffic Service Center
12. NM	Nautical Mile (1 NM equal to 1.852 Meter)
13. TMA	Terminal Control Area
14. TWR	Aerodrome Control Tower
15. UBLI	Upper Bali
16. UMKS	Upper Makassar
17. USBY	Upper Surabaya

# **CHAPTER I**

## **INTRODUCTION**

This chapter consists of several subchapters which are going to be explained. Those subchapters are as follows: (1) Background of the research, (2) Statement of the problem, (3) The objective of study, and (4) Significance of study.

### **A. Background of The Research**

Linguistic is the scientific study of language. One of the most interesting languages to be learned is English. English is an international language that is used as a means of human communication. English has its own criteria in various sector in accordance with their respective goals or commonly known as English for specific purpose (ESP). For example, people who work in the hospitality sector must master Hospitality English. People who work in the maritime sector must master maritime English. Engineering students should master engineering English. In this research, the researcher will investigate the use of linguistic related to aviation, which is different from general English.

Based on Aviation Constitution 2009 subsection 1 verse 1, aviation is a united system that consists of utilization of airspace, aircraft, aerodrome, air transport, air navigation, safety and security of living environment, supporting facilitation and other facilitation. As we know that aviation is performed by aviation personnel such: pilot, air traffic controller (ATC), engineer, etc. Aviation Personnel is a licensed or certified person whom assigned and responsible on aviation scope (Aviation Constitution 2009 subsection 1 verse 12).

There are many people that assigned and responsible on aviation, for example is air traffic controller. Air traffic controller (ATC) is air navigation person who has a main role of air safety performance. In their task, air traffic controller has to be able to have a good English proficiency.

English is a preferred language in aviation industry, because it is used as a default communication between pilot and air traffic controller.

United nation agency that regulates the development of international air transport has formally endorsed English as default communication in aviation in 1944. It means that pilots and air traffic controller from different nationality and proficiency level interact with specialized aviation English or termed by “phraseology” and “plain language”.

International civil aviation organization (ICAO) has endorsed levels of English proficiency of ATC and pilot that have to be maintained in specific time. There are a few points in aviation English that be a safeguard to protect against communication error such: standard phraseology(e.g. the word “Yes” will be transmitted as “Affirm”, the word “No” will be transmitted as “Negative”, etc.), international phonetic alphabet (e.g. alpha, bravo, Charlie, etc.), prescribed pronunciation of letters and number (e.g. “nin-er” for “nine”, “fo-wer” for “four”). This protection is implemented in order to improve aviation safety and reduce of ambiguity and vague pronunciation such homonymous words, which may lead to misinterpretation to the pilot and ATC.

ICAO phraseology works to eliminate the majority of homonyms in aviation radiotelephony or phraseology. It is impossible that homophony will ever be fully eliminated in pilot / controller communication. Based on research report by civil aviation authority (an independent research report by CAA, 2017) there are 44 reports where some evidences of homonyms occurred. Which analyze that numbers spoken in non-native accented English can create homonyms. There are several conditions which may create homonyms, such noisy flight deck environment and poor quality radio frequency can cause homophony, air traffic controller or pilot stress and fatigue which may cause unfocused pilot which lead to mishearing or misunderstanding. The majority of the event involved the similar sounds number, similar sounding of waypoint, altitude and heading deviation.

There were many cases involved homonyms that led to ambiguous phraseology during flight. For example accident involving an aircraft type Boeing747 on final approach to Subang Airport, in Kuala Lumpur, Malaysia, in February 1989. The crew misperceived ATC’s clearance of “descend two

four zero zero” (descend to 2,400 feet) as “to four zero zero” (descend to 400 feet).

The next incident involved flight Learjet 31. After clearing a Learjet to “climb and maintain 14,000 feet,” the controller issued instructions to “fly heading two zero zero.” The pilot had misinterpretation between altitude and heading instruction. The instruction was read back as “two zero zero”. Which finally proceeded as climbing to FL200 (20,000 feet).

Another incident was involving a Boeing 747 on an approach into Nairobi, Kenya. The controller instructed the pilot to “descend seven five zero zero feet” (7,500 feet), both pilots believed they had heard “five zero zero zero feet” (5,000 feet) without confirming the instruction and set their altitude alert accordingly. However, the altitude of 5,000 feet was 327 feet below the airport height. Fortunately, the aircraft broke out of the clouds in time for the crew to see the terrain and enter a climb before finally hitting the ground.

One of the biggest accidents in Indonesia which caused death to 224 passengers was the accident of Garuda with flight number GA 152. In this occurrence, miscommunication between air traffic controller and pilot was one of the contributing factors which led to the accident. This accident categorized as controlled flight into terrain (CFT). CFT occurs when an airworthy aircraft under the complete control of the pilot is inadvertently flown into terrain, water, or an obstacle.

On 26 September 1997 the Garuda Indonesia Flight GA 152, PK-GAI Airbus A300-B4 departed from the Jakarta Soekarno-Hatta International Airport at 04:41 UTC. The aircraft was on a regular scheduled passengers flight to Polonia International Airport of Medan, North Sumatera with estimated time of arrival 06:41 UTC. Flight GA 152 was flying under Instrument Flight Rules during daylight.

The flight data and cockpit voice recorders indicated that the aircraft was in controlled flight until it struck trees at the ridge. Consequently, this accident may be categorized as a Controlled Flight Into Terrain (CFIT). CFIT, usually pronounced as *cee-fit* is an accident in which an airworthy

aircraft, under pilot control, is unintentionally flown into the ground, a mountain, a body of water or an obstacle.

The recorder showed that there was distraction that caused by similar aircraft call sign which led to incorrect call sign that transmitted by air traffic controller. There was a Merpati 152 flight earlier in the morning that day and a Merpati 153 and Indonesia 152 flights within 30 minutes prior to the accident in the same ATS route.

In this occurrence the recorder showed that the air traffic controller intended to transmit to “Indonesia 152”, but using call sign “Merpati 152”.

ATC (*“Merpati one-five two you turn left heading two-four-zero vectoring for ILS runway zero-five from the right side. Traffic now about rolling..”*),

PILOT ...

This transmission was not recognized by GIA 152. Because the call sign was transmitted as “Merpati 152”. After a few seconds, the atc confirmed pilot GIA 152 whether they copied the instruction or not.

ATC *“Indonesia one-five-two do you read?”*

PILOT *“Indonesia one five two, Say again?”*

ATC *“Ok. Turn left heading two-four-zero err.. two – three - five now, vectoring for ILS runway zero-five.”*

PILOT *“Roger left heading two three five Indonesia One five two”*

The Co-pilot apparently expected that the approach controller would vector the GA152 overhead the MDN-VOR first, before vectoring the flight to capture the localizer. The PIC seemed to agree.

CO-PILOT *“Overhead dulu nih capt” (“overhead first, capt”)*

PILOT *“mungkin ya” (“perhaps”)*

Upon receiving the clearance to turn into heading 235 degrees, PIC wondered why the controller vectored the flight so far away (possibly from the expected approach pattern) by the approach controller.

PILOT *“Jauh amat” (“why so far”)*

The pilot showed his doubt about their position and confirmed the air traffic controller. The approach controller affirmed that they were clear and asked to continue left turn to heading 215 to make a tighter turn.

PILOT *“One-five-two heading two-three-five, confirm are we clear from the err...mountainous area?”*

ATC *“Affirm Sir. Continue turn left on heading two-one-five.”*

PILOT *“On heading two one five Indonesia One five two”*

ATC *“Indonesia one five two traffic clear. Descend to two thousand feet”*

PILOT *“Descend Two thousand feet Indonesia one five two”*

ATC *“Indonesia one five two turn right heading zero four six report established localizer”*

PILOT *“Turn right heading zero four zero Indonesia one five two check established”*

The Co-pilot observed that the aircraft was turning left instead of turning right and reminded the PIC to turn to the right.

CO-PILOT *“Turn... turn right”*

PILOT (Unsure of the turn direction)

Unsure of the turn direction, the PIC again took over the communication.

PILOT *“Indonesia one-five-two confirm turning left or turning right heading zero-four-six?”*

ATC *“turning right sir”*

PILOT *“roger one five two”*

Medan Approach requested confirmation of the direction of aircraft turn because, according to the controller during the interview, the radar return points on the display showed that the aircraft was turning to the left. The pilots were apparently preoccupied with the aircraft's horizontal position that they did not monitor the altitude of the aircraft and did not recognize that they were about to descend below the assigned altitude.

ATC *“One-five two confirm you are making turning left now?”*

PILOT *“Affirm”, (but this was not transmitted to Medan Approach.)*

PILOT *“We are errr..... turning right now”*

At the time, it was not quite clear what was meant with *“turning right now”*, whether it time-wise or space-wise. The controller apparently understood this phrase as time-wise, then gave another instruction to continue turn to the left 9 seconds later.

ATC *“One-five-two, OK continue left turn Sir”*

PILOT *“Err.. Confirm turning left? We are start turning right now”*



At the time, the Flight Data Recorder (FDR) data showed that the aircraft was turning to the right. So the Pilot answered that they were turning right. There was miscommunication between pilot and controller at the time which caused by misperception of the phrase "*turning right now*". The controller apparently starting to realize the developing situation.

ATC            "*Aduhh... ok ... ok*"

When the aircraft reply was "we are starting turning right now", the approach controller exclaimed "Aduh" (an Indonesian exclamation reflecting an unexpected shock or surprise). It was not until 18 seconds later that the controller gave another instruction to turn right heading zero one five. Based on the interview, the controller was suddenly aware that a dangerous situation was developing or has developed as the aircraft was flying outside of the localizer foot print. This next communication with the aircraft was not an immediate warning of the situation, but an instruction to turn right on heading zero one five.

ATC            "*Indonesia one five two cont....tinue turn right heading zero one five*".

PILOT        (Screaming from both pilots)

Based on final report of National Transportation Safety Committee(NTSC), the last transmission between ATC and Pilot of GIA152 is an instruction to turn right heading zero one five. Before finally the aircraft hit the trees.

Evidence indicated that the aircraft initially collided with a large tree on a ridge about 500-600 meters to the northeast of the impact site. The impact site was in a valley circa 100 meters below the initial impact. An operations group formed to investigate the final track of the aircraft found debris along a 220°M heading, before the aircraft finally came to rest on the main crash

site at the base of a ravine or valley in a lightly populated area of tropical rain forest.

This case may occur in every airspace since the pilots are not only native speakers, but also non-native speakers for example Indonesian airspace especially Makassar air Traffic Service Center.

Indonesia as an archipelago country consist of 2 flight information region (FIR), those are Jakarta FIR and Ujung Pandang FIR. Makassar air traffic service center (MATSC) is one of the largest air traffic service in Indonesia.

As a largest air traffic service provider, MATSC consist of 3 units:

1. Aerodrome control tower (TWR)
2. Approach control service (APP)
3. Area control center (ACC)

Air traffic control communication is the most important part in air traffic service. However, English phraseology has been set in such way, miscommunication cannot be completely avoided. Based on few cases have mentioned above, one of the cause which leads to miscommunication is homonymous words. For example, the use of the word “to” and “two” which sound similar in communication frequency. Those words are used in few instruction, mostly in change of flight level instruction. Another example based on case of GIA152 has contributed by the word “Right” which may refer to time-wise or direction-wise. Homonymous words may lead to misinterpretation between pilot and controller, and it leads to miscommunication.

Miscommunication can be one factor that contributes greatly to aircraft accidents and incidents. Therefore, it will be worthy to have a research about English phraseology especially homonyms in air-ground communication.

## **B. Research Questions**

1. What is the effect of homonymous words in Air Traffic Control Phraseology?
2. How do homonymous words affect Air Traffic Control Phraseology?

3. How does air traffic control phraseology reduce homonymous words in air traffic control communication?

### **C. The Objective of Study**

1. To analyze the effect of homonymous words in air traffic control phraseology.
2. To find out the effect of homonymous words in air traffic control phraseology.
3. To explain the process of reducing homonyms in air traffic control phraseology.

### **D. Significance of Study**

This research may contribute to linguistic especially English aviation study in Indonesia Aviation, significantly to:

1. Air Traffic Controller, as an interactive speaker whom has a duty to communicate with various native pilot. This study hopefully may gain the knowledge for ATCO about the importance of language understanding during air-ground communication.
2. English Aviation training provider, as an institute which has authority to train and test English proficiency of ATCO. This institute may develop the theory of aviation English to gain more knowledge about aviation English for ATCO.
3. Aviation training provider, as the institute which has authority to train pilot and ATCO may modify the training syllabus to have a more knowledgeable pilot and ATCO student.
4. English student of Hasanuddin University, as a language learner will have more knowledge about the use of linguistic in aviation.
5. Theoretically, the next researcher will have benefit to have a reference study for further linguistic study in aviation.

## **CHAPTER II**

### **REVIEW OF LITERATURE**

This chapter consists of several subchapters which are going to be explained. Those subchapters are as follows: (1) Previous Studies, (2) Theoretical Background, (3) Conceptual Framework

#### **A. Previous Studies**

The study about aviation linguistic is limited. But it is good to find out there are available topics for aviation linguistics researcher. The studies below have conducted by Khairunnisa Batubara, Julia Trippe and Melisa Baese-Berk, Atsushi Tajima, Qiong Wu, Brett R. C. Molesworth and Dominique Estival. Their studies have given a good perspective for researcher to study about air traffic control communication.

Firstly, study of phraseology by Khairunnisa Batubara (2015). This study was held in Kualanamu International Airport Medan. The purpose of this research was to find out how ATC phraseology works in ATCO's – Pilot communication, focused on finding types of ATC phraseology and the pattern of ATC phraseology. This study was designed with a qualitative research by analyzing the air-ground communication between ATCOs' and Pilot. It was found that ATC phraseology in Kualanamu International Airport consist of 5 types, those are General Phraseology (GP), Area Control Phraseology (Area CP), Aerodrome Control Phraseology (Aerodrome CP), Radar Control Phraseology (RCP), Approach Control Phraseology (App CP) as standard phraseology, and even non- standard phraseology. The other finding stated that ATC phraseology has no significant pattern between standard and non-standard phraseology. It means that no specific pattern on communication between ATCOs' and Pilot. It depends on what kind of situation occurs at the moment. This study focused on Aviation phraseology, but she did not mention homonym phraseology. While air traffic increases year by year,

homonym phraseology seems to have a potential lead to miscommunication of air-ground communication. Therefore, it is worth to find out how to reduce this potential miscommunication caused by homonym phraseology.

Next, Julia Trippe and Melissa Baese-Berk (2018), they designed their study with a corpora method to compare American English and aviation English. The data consisted of recorded aviation radio transmissions from three international airports in the US (Washington National, Boston Logan, and Dallas/Fort Worth). It includes ATCOs' interacting with native and non-native English speaking pilots using Aviation English. From these data, only native American English ATCOs' Standard Phraseology was examined. This study purposed to add to their literature by describing the prosodic profile, or rhythm and intonation, of American Aviation English as compared to Standard American English. Hence, it demonstrated that the prosody of Aviation English is quantifiably different than the prosody of Standard American English. Differences in the structure and environment of Aviation English have produced a register with a more restricted pitch range, faster articulation rate, more uniform vowel intervals and more variable consonant intervals than Standard American English. Vowel and consonant variability in Aviation English appear to be driven by an interaction between articulation rate and English phonotactic constraints as well as vowel reduction differences between the corpora. The combination of these rhythmic factor differences and differences in intonation and articulation rate make the prosody of Aviation English distinct from that of Standard English. These findings have implications for language segmentation and comprehension, and therefore acquisition, training and testing. For example; the word "*Four*" will be transmitted as "*fo-wer*" and the word "*nine*" will be transmitted as "*ni-ner*". This study principally compared between American English and Aviation English, but it did not mention homonym ATC

phraseology. The study focused on rhythm and intonation between American English and Aviation English. Therefore, it will be worthy to investigate how the homonym phraseology may be affect communication between ATCO's and pilot.

Thirdly the research was conducted by Atsushi Tajima (2019). This research examines various communication breakdowns in aircraft operation and focused on aviation English and, especially, on English being used in ATC. In the beginning, it conceptualizes ATC as a communicative context that involves numerous participants who must contend with a wide variety of Englishes, in terms of both proficiency and local influences (e.g., the influence of a non-English native language), and briefly reviewed the nature of ATC communication, including the role of ATC, how English matters in ATC communication, and an overview of miscommunication in aviation. After conceptualizing ATC as a communicative context, in its citing of several significant fatal accidents in which the failure of communication was a contributing factor, the paper analyzed how those communication breakdowns occurred and how various Englishes (from those that involve very insufficient proficiency to those that rely on a usage that is too colloquial) account for these accidents. In the end of this research, while citing previous reports, documents, research, and people who had served in the field, the paper discussed some attempts to avoid miscommunication, the limitations of these attempts, and further suggestions for future improvements in this area. According to this research, voice communication is the best way to communicate between ATC and pilot regardless distance between them. Cushing (1989: 4) insightfully notes, "While voice has a natural appeal as the preferred means of communication both among humans themselves and between humans and machines – as the form of communication that people find most convenient – the complexity and flexibility of natural language are problematic, because of the confusions and

misunderstandings that can arise as a result of ambiguity, unclear reference, intonation peculiarities, implicit inference, and presupposition.” It was mentioned in the research that pilots and controllers whose native language is not English are indeed some of the most seriously task-oriented second-language speakers around. It is important to notice that the ultimate goal is “not to improve their English proficiency itself,” but “to avoid fatal accidents due to miscommunication.” Therefore, an error-resistant and mistake-free language environment should be created. The research also mentioned that many controllers and pilots with high English proficiency still use improper English which may lead to miscommunication. In this case, both ATC and pilot suggested to be fully trained with English phraseology. In this regard, linguistics and language educators can greatly contribute to this researched area.

Research by Atsushi Tajima focused on aviation English that used by ATC, how communication breakdown occurred and how various English affect accident. Hence, it is worthy to investigate how homonymous may lead to miscommunication in aviation phraseology.

Lastly, the research written by Qiong Wu, Brett R. C. Molesworth and Dominique Estival (2019). They investigated the communication performance of both native English sounding pilots and accented commercial pilots in two different phase of flight, the approach phase and departure phase. The study took eighteen hours of air-ground communications at Kingsford Smith International Airport, Sydney, Australia to be analyzed. Error-free communication in aviation remains an elusive goal. The results from this study showed that accented pilots made more overall errors in their transmissions than native English sounding pilots. Type of error made by both pilot were different: accented pilots made mistakes, while native English sounding pilots only made omissions, and accented pilots made more errors with words than native English

sounding pilots, while both groups made similar numbers of numerical errors. Phase of flight and the reported higher levels of workload during the approach and landing phase, did not trigger a higher number of errors compared to the departure phase. It means Communication performance was similar in the approach and departure phases of flight regardless of language background.

The study above focused on error communication between native pilot and accented pilot in two phases of flight. it is worthy to be focused on homonymous words in aviation phraseology.

## **B. Theoretical Background**

This part will explain the theoretical background of the study which is related to homonyms and air traffic control phraseology.

### **1. Semantics**

A systematic branch of language that investigates meaning is semantics. Another definition of Semantics is the technical term used to refer to the study of meaning, and since meaning is part of language, semantics is a linguistics (Palmer, 1981). Homby (1972 :789) has defined semantics is a branch of linguistics concerned with studying the meaning of words and sentences. Lyons (1977: 1) states that semantics is generally defined as the study of meaning.

Jerrold J. Katz defined semantics as “the study of linguistics meaning. It is concerned with that sentences and other linguistic objects express, not with the arrangement of their syntactic parts or with their pronunciation” (Katz, 1972 : 1).

C.K .OGDEN and RICHARD list twenty \_two definition of the word meaning. Some of the definition are quoted by Leech (1974:1) as:

- a. An intrinsic property
- b. The other words annexed to a word in the dictionary
- c. The connotation of a word



- d. The place of anything in a system
- e. The practical consequences of a thing in our future experience
- f. That to which the user of a system actually refers
- g. That to which the user of a symbol ought to be referring
- h. That to which the user of the symbol believe himself to be referring - that to which the interpreter of a symbol:
  - 1) Refers
  - 2) Believes himself to be referring
  - 3) Believes the user to be referring

## 2. Lexical and Grammatical Meaning

Lexical meaning is the sense of a speaker attaches to linguistic elements as symbol of actual objects and events. Thus words such as boy, book, pen, have lexical meaning, which may be found in dictionary. Grammatical meaning is the relationship that may be said to exist between linguistic elements such as the words within the sentence. Those two definitions which are taken from *dictionary of language and linguistics* (Hartmann, 1973 : 138), of which the former contains the word sense.

## 3. Type of Meaning

Semantics defined as a study of meanings. Meaning comprise not one, but some kinds of meaning. Leech divides meaning into seven, they are called seven types of meanings, namely:

- a. Conceptual meaning
- b. Connotative meaning
- c. Social meaning
- d. Affective meaning
- e. Reflective meaning
- f. Collocative meaning
- g. Thematic meaning

## 4. Homonyms

Homonyms is two words or units of speech in a same form with different meaning because each words are different word or

different form of speech (Abdul chaer,2007). Semantically, homonym defined as a relation between two (or more) words, in such way so that has a same form but different meaning (Verhaar, 2006).

Lyons (1982: 72; Oxford Word power 2000:366; Richards and Schmidt 2002:241; and Yule 2006:107) define 'homonyms' as a term used in semantics for lexical items that are identical in spelling and pronunciation but have different meanings. While Hartmann and Stork (1976:105; Atichison 1993:52; and Fromkin et al. 2003: 71) agree that homonyms are different words with the same pronunciation that may or may not be identical in spelling. Thus, they give them a definition that is partially similar to that of homophones.

Gramley and Pätzold (1992:13) and Wikipedia (2010: 2), define homonymy as "the existence of different lexemes that sound the same (homophones, e.g. days/daze) or are spelt the same (homographs, e.g. lead (guide)/lead (metal)) but have different meanings." In this way, they divide them into homophones and homographs.

Based on the definition mentioned above, researcher conclude homonym as words which have same spelling or pronunciation but semantically have different meaning. For example Right (direction) / Right (correct) ; Close (shut) / Close (near) ; Content (accept) / Content (things inside). There are 6 types of homonyms:

a. Complete (full, absolute)

Those are homonyms that have the same pronunciation and the same spelling i.e. the identity covers spoken and written forms. Classic examples are bank (embankment) and bank (place where money is kept). (Lyons 1982:72 and Allan 1986:150)

b. Partial Homonyms

They are those where the identity covers a single medium, as in homophony and homograph. Thus, homophones and homographs are considered partial homonyms (Cristal 2003:220). Watkins et al. (2001:269) differentiate between homonyms and what they call “near homonyms”. According to them homonyms are words that are ‘exactly’ alike in pronunciation but differ in spelling and meaning, e.g. morning and mourning; there and their, while near homonyms do not sound exactly alike, e.g. except and accept; loose and lose.

c. Word homonyms

These are homonyms where all the forms of a paradigm and its collocational possibilities are identical. Thus, one does not get any indication of their belonging to one word or the other. Such homonyms are generally found in words belonging to the same part of speech. Examples are seal and seals (plural of seal which is an animal) and seal and seals (plural of seal which is an impression placed on things to legalize them). In addition, the possessive forms of these words, i.e, seal’s are identical (Singh 1982: 24).

d. Homonyms of word forms

These are homonyms in which only few word forms are identical. Generally, the canonical forms in addition to some forms are alike and some others are not identical. For example lie that means not to tell the truth becomes lied in the past and past participle while lie, that means to rest one’s body, becomes lay in the past.

e. Lexical Homonyms

When the homonyms belong to the same part of speech, they are called lexical homonyms. The difference is only in their lexical meaning. They can be found under one entry in the dictionary (Singh 1982: 25). For example, trunk (part of an elephant) and trunk (a storage chest). (Abu-Humeid 2010: 965)

#### f. Grammatical Homonyms

When the difference between homonyms is not only confined to the lexical meaning but the grammatical types are also different, they are called grammatical homonyms. They are given separate entries in the dictionary. In these cases, the words have similar canonical form but different paradigms and structural patterns. Verbs occurring as transitive and intransitive or lexical units that occur as nouns, verbs, adjectives, etc. (e.g. cut (v.), cut (n.), cut (adj.)) are examples of such homonyms (Abu-Humeid 2010: 965).

#### 5. Homographs

Palmer (1984:101, Allan 1986:151; Gramley and Pätzold 1991:13; Richards and Schmidt 2002:241) believe that homographs are words that are written in the same way but are pronounced differently and have different meanings. Well-known examples of homographs are lead /lɛd/ (metal) and lead /li:d/ (guide). Sometimes, the term 'homograph' is used interchangeably with the term 'homonym' as indicated by Richards and Schmidt (2002:241). However, homographs and homophones are considered part of homonymy.

Another definition is that homography is a term used in semantic analysis to indicate lexemes that are written alike but may or may not be pronounced similarly and have different meanings (Pyles 1971:4 and Wikipedia 2010: 2).

Lyons (1982:71) and Crystal (2003:220) stated that homographs are words that have the same spelling but differ in meaning. For example, wind (blowing) and wind (verb- a clock). This definition ignores the element of pronunciation. Thus, problems of ambiguity may occur between homographs and polysemy.

In writing, homography is defined as one kind of writing system or spelling in which there is one-to-one correspondence

between graphic signs and speech sounds. Examples of such homographic systems are the phonetic transcription, or the alphabets of some languages that have a phonetic alphabet. As such, the opposite to the term 'homography' is 'heterography'. The spelling system of language such English or French are examples of heterographic writing systems (Hartmann and Stork 1976:105 and Crystal 2003:220).

#### 6. Homophones

Many linguists agree that homophones are two or more words that sound alike but are written differently and have different meanings. Examples of homophones are threw/through, sight/site, and rite/right/write/wright (Palmer 1984:101; Lass 1998:29; Richards and Schmidt 2002:241; and Crystal 2003:221). Thus, homophones are deemed to be part of homonymy, the other part being homographs. For example; Brake / Break; Two / to; Missed / Mist; Left/West.

#### 7. Stress

In a simple term, stress is an increase in the loudness of a word or a syllable (Ian R.A Mackay, 1978). Stress in words and sentences plays an important role in the overall phonetic quality of speech. It is to a great extent responsible for carrying meaning, and abnormal stress placement will render otherwise good speech completely unintelligible. Based on International Phonetic Alphabet, Stress divided to three levels:

- a. Primary: marked by " ' "
- b. Secondary: marked by " , "
- c. Weak: no mark

Stress has different function in English. In the first place is to give special emphasis to a word or to contrast one word with another. Another function of stress is to indicate the syntactic relationships between words or part of words. Stress also has a syntactic

function in distinguishing between a compound noun (Ladefoged, 1975).

Within English sentences, there are several words that carry heavier stress than others. Words that more heavily stressed than other words in a sentence (those containing the greatest semantics or meaningful information, usually nouns, verbs, adjectives, and adverbs) called content words. While articles, preposition, and so on, necessary for syntactic completeness, but usually low in meaning content called function words.

#### 8. Air Traffic Control

Aviation is the activity surrounding mechanical flight and aircraft industry. There are sectors related to aviation activity. In this research, researcher intend to have a study on linguistic related to aviation. Aviation sector that has a most related to linguistic is Air Traffic Service.

Air Traffic is all aircraft in flight or operating on the maneuvering area of an aerodrome (ICAO, 2016). The service that provided for aircraft during flight activity called air traffic service. Based on ICAO Document 4444 Air traffic service is a generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service, or aerodrome control service). Air Traffic control service is a service provided in purpose of; prevent collision between aircraft in maneuvering area obstruction on the area; expedite and maintaining an orderly flow of air traffic.

Person who performs duty of air traffic control service is Air Traffic Controller (ATC). ATC will guide the aircraft during the flight by air-ground communication between ATC and Pilot. The communication between ATC and pilot is performed in aviation English called aviation phraseology.

Air traffic control has 3 units, each units has a different control area and objective. Those are:

- a. Aerodrome Control Tower (TWR) is a unit established to provide air traffic control service to aerodrome traffic. Aerodrome control towers shall issue information and clearances to aircraft under their control to achieve a safe, orderly and expeditious flow of air traffic on and in the vicinity of an aerodrome with the object of preventing collision(s) between:
- 1) aircraft flying within the designated area of responsibility of the control tower, including the aerodrome traffic circuits;
  - 2) aircraft operating on the manoeuvring area;
  - 3) aircraft landing and taking off;
  - 4) aircraft and vehicles operating on the manoeuvring area;
  - 5) aircraft on the manoeuvring area and obstructions on that area.
- b. Approach Control Unit (APP) is a unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes. Approach controller will control the aircraft starting from the aircraft airborne up to FL245.
- c. Area control center (ACC) is a unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction. ACC controller will control the aircraft starting from FL245 up to FL600.

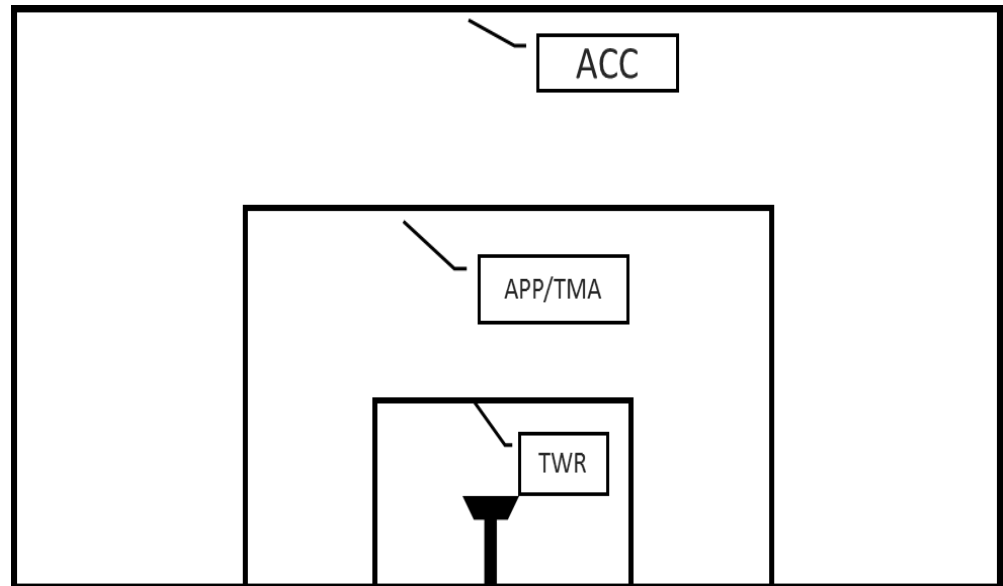


Figure 1. ATC Unit

### 9. Air Traffic Control Phraseology

Phraseology is the linguistic discipline that deals with the combination of words or the set of phraseological units or phrasemes of a certain specialized language. It means that phraseology defines as a group of phrase which combines word to word in building one meaning and become a new certain phrase ( Aguado de Cea, 2007). Based on Annex 10 Aeronautical Communication Volume II ICAO standardized phraseology shall be used in all situations for which it has been specified. Only when standardized phraseology cannot serve an intended transmission, plain language shall be used.

In Document 4444 of ICAO, there are six types of phraseology used by ATC:

- a. General Phraseology (GP) used in general situations, wherever the operation of flight is running. Example <CONTACT>, <CONFIRM>, etc.
- b. Aerodrome Control Phraseology (AeroCP) used in the airport surroundings. Example CLEARED TO LAND, CLEARED TO TAKE OFF.



- c. Approach Control Phraseology (AppCP) used when flight operation is closer to the airport area. It is expected to use a navigation system such as ILS (Instrument Landing System), VOR (Very high Omni Range), and NDB (Non Directional Beacon) to getting closer even leaving out the airport.
- d. Area Control Phraseology (AreaCP) used in the area where the aircraft has been close or reached the certain position in airspace (cruising level). It is commonly more than 25000 ft. which called as flight level 250, shortened as FL 250.
- e. Radar Control Phraseology (RCP) used by using radar. This radar assists controllers to getting down the aircraft for landing, avoiding accident, and in the right way. The tools are used in Area Control Center (ACC) and also Approach Control Office (APP). Almost airport in the world use this facility and commonly international airport.
- f. Coordination Phraseology used by ground to ground station to coordinate the responsibility of air traffic controllers from one unit to another. Example of coordination among ACC and APP, APP and ADC (Aerodrome Control Tower), ACC and FSO (Flight Service Officer).

Air-ground communication has a standard phraseology based on document 9432 Manual of Radiotelephony. For examples are in tables below;

Table 1. ICAO Phonetic Alphabet

Letter	Word	Transmitted as
A	Alpha	AL FAH
B	Bravo	BRAH VOH
C	Charlie	CHAR LEE or SHAR LEE
D	Delta	DELL TAH

E	Echo	ECK OH
F	Foxrot	FOKS TROT
G	Golf	GOLF
H	Hotel	HO TELL
I	India	IN DEE AH
J	Juliet	JEW LEE ETT
K	Kilo	KEY LOH
L	Lima	LEE MAH
M	Mike	MIKE
N	November	NO VEM BER
O	Oscar	OSS CAH
P	Papa	PAH PAH
Q	Quebec	KEH BECK
R	Romeo	ROW ME OH
S	Sierra	SEE AIR RAH
T	Tango	TANG GO
U	Uniform	YOU NEE FORM or OO NEE FORM
V	Victor	VIK TAH
W	Whiskey	WISS KEY
X	X-ray	ECKS RAY
Y	Yankee	YANG KEY
Z	Zulu	ZOO LOO

Table 2. Numbering in ATC Phraseology

Numeral Element	Word	Transmitted as
0	Zero	ZE - RO
1	One	WUN
2	Two	TOO
3	Three	TREE

4	Four	FOW – ER
5	Five	FIFE
6	Six	SIX
7	Seven	SEV - EN
8	Eight	AIT
9	Nine	NIN-ER
Decimal		DAY – SEE - MAL
Hundred		HUN –DRED
Thousand		TOU – SAND

Table 3. The use of Numbering in Phraseology

Instruction / Information	Example	Transmitted as
Heading	Heading 240	Heading two four zero
Altitude	Descend to 4000 feet	Descend to four thousand feet
	Climb to FL240	Climb to flight level two four zero
Squawk / SSR code	Squawk number 2534	Squawk number two five three four
Visibility	Visibility 4 500	Visibility four thousand five hundred
	Visibility 700	Visibility seven Hundred
Wind direction and speed	210 degrees 25 knots	Wind two one zero degrees two five knots
	160 degrees 18 knots gusting 30 knots	Wind one six zero degrees one eight knots gusting three zero knots

Runway	16 Left	Runway one six left
	03	Runway zero three
Altimeter setting	QNH 1010	QNH one zero one zero
	QNH 1012	QNH one zero one two
	QNH 1000	QNH one zero zero zero
Channel	118.000	One one eight decimal zero
	118.005	One one eight decimal zero five
	118.100	One one eight decimal one

### C. Conceptual Framework

Based on the theory above, the researcher has designed the flow of air-ground communication. The conceptual framework below shows in which phase of air-ground communication that contribute to unsafe air traffic service.

The blue arrow shows the ideal process of air-ground communication. An ideal process will lead to safe and best result of communication. The conceptual framework below shows that an intelligible utterance may become a clear message which lead to safe communication, but it also potentially leads to unsafe communication if the message processed by unintelligible listener. The orange arrow shows the existence of potential abnormal process, the orange arrow may be repeated process which takes longer time, but the result can be as blue arrow as normal process or red arrow as abnormal process. The table shows that if intelligible message received unintelligibly by listener, there will be confirmation which takes longer time to have a clear and precise

message in order to reach safe air-ground communication. The red arrow shows an existence of abnormal process of air-ground communication. An abnormal process may lead to hazard and unsafe communication. The existence of a hazardous communication may be confirmed to have a clear message which lead to safe communication. But, if it is not confirmed, it will lead to misinterpretation of a listener which lead to unsafe communication. The full conceptual framework as following table:

Table 4. Conceptual Framework

