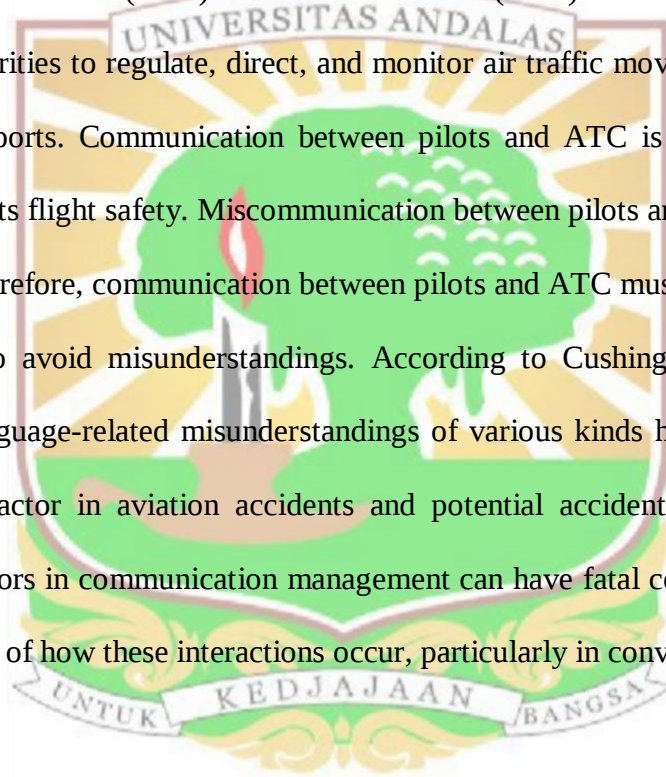


CHAPTER I

INTRODUCTION

1.1 Background of Research

Communication in aviation is a crucial aspect that determines flight safety. One of the most important forms of communication is the interaction between pilots and Air Traffic Controllers (ATC). Air Traffic Control (ATC) is a service provided by aviation authorities to regulate, direct, and monitor air traffic movements both in the air and at airports. Communication between pilots and ATC is crucial because it directly impacts flight safety. Miscommunication between pilots and ATC can lead to accidents. Therefore, communication between pilots and ATC must be clear, concise, and precise to avoid misunderstandings. According to Cushing (1994, p. 1), "In particular, language-related misunderstandings of various kinds have been a crucial contributing factor in aviation accidents and potential accidents." This statement shows that errors in communication management can have fatal consequences, so an in-depth study of how these interactions occur, particularly in conversational patterns, is necessary.



This can be seen from the plane crash in Japan that occurred in early 2024. The Japanese transportation safety authority suspected a communication error between the pilot and ATC at Haneda Airport on January 2, 2024. As a result, two planes collided and caught fire. This incident demonstrates the importance of effective communication between pilots and ATC in maintaining flight safety. One relevant approach to studying this phenomenon is Conversation Analysis, a method for studying the

organization of conversation in interactions (Sacks et al., 1974). The pilot and ATC as participants in the interaction remain individuals involved in a natural communication process, characterized by various conversational phenomena such as turn-taking, repair, and silence.

In communication between pilots and ATC, the implementation of a rapid turn-taking system is a primary requirement to ensure smooth and safe flight. Sacks et al. (1974, p. 696) stated that “The organization of taking turns to talk is fundamental to conversation.” Turn-taking ends in a Transition Relevance Place (TRP) where silence is inherently linked to this transition place. In this system, silence is one of the important phenomena that emerges in the interaction. In CA studies, silence is not seen as meaningless, but as part of an organized conversational structure. Silence in conversation is generally classified into three types: pause, gap, and lapse, which are distinguished based on their position in the turn-taking system.

A pause is a silence that occurs within a turn (within-turn), while a gap occurs between turns (between-turn). In the context of pilot and air traffic control communication, both types of silence frequently occur as part of the interaction process, while lapse is silent pause where no participant takes a turn after a speech is completed. Lapses are rare in this data because ATC and pilot communications require rapid responses, allowing for continuous conversation. Generally, a pause is often understood as a break or interruption in communication. However, in interactional linguistics, pauses have complex and meaningful functions. Pauses can serve as a signal that the speaker is still in the conversation, as time to plan their utterance, or as an indication of difficulty processing information.

In the context of aviation communications, the occurrence of pauses cannot be separated from the cognitive load faced by pilots and ATC. Pilots, for example, must simultaneously handle various tasks, such as controlling the aircraft, monitoring instruments, and processing instructions from ATC. In such situations, pauses can occur as the time needed to comprehend instructions before responding accurately (Morrow & Rodvold, 1998). Thus, pauses are not always negative; they can contribute to flight safety.

However, silence in a conversation can also be an indicator of uncertainty, confusion, or potential misunderstanding. Pauses or gaps that occur at certain points in a conversation can signal a problem in the interaction that could potentially trigger repair mechanisms. In pilot-ATC communications, silence that is too long or occurs at an unexpected point can lead to negative interpretations, such as the perception that instructions were not understood or responded to, which can ultimately impact operational safety.

Furthermore, in-flight communication is also governed by international standards, such as Aviation English, established by the International Civil Aviation Organization (ICAO). ICAO emphasizes that aviation communications must be clear, concise, and unambiguous, using standard phraseology. Within this framework, silence is an interesting phenomenon to study because it often occurs when pilots and ATC process, interpret, or verify instructions. Thus, silence is not simply silence, but can reflect cognitive processes and potential communication difficulties.

Several previous studies have used the Conversation Analysis approach to examine various interaction phenomena. Pujarwanti (2019) examined the types of

repair in classroom interactions and found a predominance of self-repair. Handayani (2021) showed that teachers often use other-initiated repair to maintain smooth communication. Chairunnisa (2019) found that turn-taking in court hearings is strictly regulated by judges. Nopriani et al. (2023) demonstrated the dominance of talk show hosts through topic management. Meanwhile, Sari (2022) found that repair strategies in online communication differ from oral communication.

Although numerous studies have employed Conversation Analysis, studies specifically examining silence, particularly pauses and gaps, are limited. Most studies focus on turn-taking and repair, while silence is only discussed as an additional phenomenon. Furthermore, previous research has generally been conducted in classroom, media, or online contexts, leaving high-stakes professional communication such as interactions between pilots and ATC understudied. This highlights the need for a more in-depth study of silence in the context of aviation communication.

The Conversation Analysis approach offers a different perspective on understanding communication, viewing language as a social act organized through sequences of conversations and produced collaboratively by participants. Within this framework, silence is viewed as an interactional resource used to regulate turn-taking, demonstrate orientation toward conversational norms, and address potential understanding issues. By analyzing transcripts of conversations between pilots and air traffic controllers, researcher can identify patterns in the occurrence of silence, its duration, and the responses produced by participants.

Based on the description above, this study focuses on the analysis of silence, particularly pauses and gaps, in communication between pilots and Air Traffic

Controllers using the Conversation Analysis approach. Lapses are not used in this analysis because ATC-pilot communications follow standard rules that demand rapid and continuous responses, so there are no long silent pauses without continuation of the conversation. This study aims to reveal how silence arises in pilot-ATC interactions, how it relates to the turn-taking system, and its function in maintaining mutual understanding and the safety of flight communications.

1.2 Research Questions

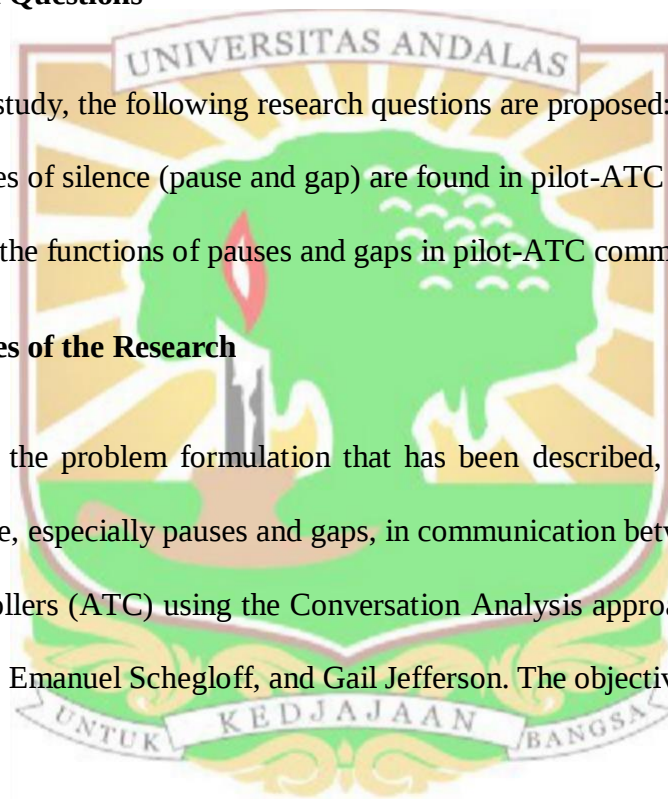
To guide this study, the following research questions are proposed:

- a. What types of silence (pause and gap) are found in pilot-ATC communication?
- b. What are the functions of pauses and gaps in pilot-ATC communication?

1.3 Objectives of the Research

Based on the problem formulation that has been described, this study aims to analyze silence, especially pauses and gaps, in communication between pilots and Air Traffic Controllers (ATC) using the Conversation Analysis approach as proposed by Harvey Sacks, Emanuel Schegloff, and Gail Jefferson. The objectives of this study are as follows:

- a. Identify the types of silence, especially pauses and gaps, that occur in communications between pilots and ATC.
- b. Explain the function of pauses and gaps in communication between pilots and ATC.



1.4 Focus of the Research

This research focuses on the analysis of silence, specifically pauses and gaps, in communication between pilots and Air Traffic Controllers (ATC) using a Conversation Analysis approach. The main focus of this research is to examine how pauses and gaps appear in pilot-ATC interactions, including their occurrence in the conversation flow as part of the turn-taking system. Pauses and gaps are seen as interactional phenomena that arise in the context of aviation communication that demands a high level of accuracy and clarity.

Furthermore, this study focuses on how silences emerge within conversational sequences and how participants respond to the occurrence of pauses and gaps in interactions. By analyzing transcripts of radio communications between pilots and air traffic control, this study aims to identify patterns of pauses and gaps, the duration of silences, and their role in maintaining shared understanding and supporting flight safety.

Therefore, this research focuses on two main aspects: (1) Identify the types of silence, especially pauses and gaps, in communication between pilots and ATC, and (2) explain the function of pauses and gaps in communication between pilots and ATC.

1.5 Methods of the Research

This study uses a Conversation Analysis approach with qualitative as the primary method. According to Cresswell (2018), qualitative research focuses on collecting data in the form of words or text to deeply understand phenomena in their natural context. This study is descriptive in nature because it does not manipulate variables,

but rather aims to describe and analyze how communication occurs naturally in the context of interactions between pilots and Air Traffic Controllers (ATC).

The theory used in this research is Conversation Analysis proposed by Emanuel Schegloff, Gail Jefferson, and Harvey Sacks (1974, 1977), specifically related to the turn-taking system and the phenomenon of silence. This method is used to analyze the types of silence, namely pauses and gaps, how they are realized in the turn-taking system, and the function they have in communication between pilots and ATC.

1.5.1 Data Collection

The data in this study were obtained from audio recordings of communications between pilots and air traffic controllers in AirNav Indonesia Perum LPPNPI Cabang Pembantu Padang located in Bandara International Minangkabau (BIM). The source of the data is the live communication on the ATC Tower. The data collected in this study is presented in excerpt form. Each excerpt represents a piece of data used as analysis material.

The excerpts were selected based on several criteria. First, the recordings must contain conversations between pilots and air traffic controllers that allow for the observation of silence phenomena, particularly pauses and gaps. Second, the audio quality must be clear enough to accurately identify the type and duration of silence. Third, the selected interactions must demonstrate the occurrence of pauses and gaps in the conversational flow, allowing for analysis of how these silences manifest in the turn-taking system.

To obtain the recording excerpt, the researcher requested application for research permit to English Department. Once the letter was approved and issued,

it was then submitted to AirNav Indonesia Perum LPPNPI Cabang Pembantu Padang located in Bandara International Minangkabau (BIM), as a requirement to gain access to the pilot-air traffic controller communication data. The researcher was permitted to collect the excerpt within 2 weeks, in October 13 to 26, 2025.

The audio recordings were then transcribed using a transcription system developed by Gail Jefferson. This system is used because it can represent conversational interactions in detail and systematically with a high degree of accuracy, particularly in marking silences such as pauses and gaps, including their duration and position within the utterance. This is crucial in the Conversation Analysis approach because it allows for in-depth analysis of interactional phenomena in communication.

The collected excerpt amounted to approximately five hours of recordings. The researcher divided the excerpt into conversations containing pauses and gaps. A total of 79 recordings were analyzed in this study, each lasting approximately 30 to 50 seconds. Each recording was then processed using the ELAN 6.1 application to assist with transcription and symbol tagging. During the transcription process, each recording was replayed 15 to 20 times to ensure the accuracy and capture the full details of the conversation.

Table 1. Jeffersonian Transcription Symbols

[]	The square brackets indicate the occurrence of overlapping speech
=	Equal signs indicate immediate welcome of an utterance (one at the end of a line and another at the start or shortly thereafter)

::	Colons are used to indicate the stretching of the sound or prolongation of an utterance
↑	The up arrow marks the rise of intonation/pitch
↓	The down arrow marks the fall of intonation/pitch
>...<	The “more than” and “less than” indicate the talk is rushed fast-paced
<...>	Used to indicate the stretch of talk is slowed
Hhh	It indicates hearable aspiration (e.g. laughter, breathing, etc.)
(hh)	It indicates an inhalation in between an utterance
{...}	Curly braces are used to indicate a breath duration or other sounds heard as a pause or gap of silence
(...)	Parentheses indicate uncertainty of an utterance (usually due to overlaps/other conversation hindrances)
((...))	Double parentheses are used to indicate transcriber’s descriptions if events such as ((cough)), ((whispered)), ((sniff)), etc.
√	Indicates an overlap resolution part

Source: Jefferson (2004, pp. 13-31)

1.5.2 Data Analysis

Data analysis in this study was conducted using a Conversation Analysis approach. The initial stage of analysis began by transcribing recorded radio communications between the pilot and Air Traffic Controller (ATC) into written text using transcription conventions developed by Gail Jefferson. This transcription aims to represent conversational phenomena in detail, particularly silences such as pauses and gaps, including their duration and position within the interaction.

After the transcription process was completed, the researcher identified all occurrences of pauses and gaps in the pilot-ATC communication transcripts. These silences were then classified by type, with pauses being silence within a turn (within-turn) and gaps being silence between turns (between-turn). This process was carried out to address the types of silences that appeared in the excerpt.

The next step is to analyze how pauses and gaps are realized in the turn-taking system. This analysis includes the context in which silences occur within the conversational flow and how participants respond to them. This allows for a deeper understanding of the patterns of pauses and gaps in interactions. Next, researcher analyzed the function of pauses and gaps in communication between pilots and ATC. This analysis aimed to identify the role of silence in interactions, such as as a form of speech planning, information processing, or an indication of potential misunderstandings.

After pauses and gaps were identified based on transcription, each silence occurrence was analyzed by considering the conversational context, namely the utterances preceding and following the silence, the type of instruction conveyed, and the response given by the interlocutor. This context analysis aims to determine the function of silence more accurately, because the meaning of a pause or gap is determined not only by its duration but also by the interactional context in which the silence occurs. This approach aligns with recent research on context-aware turn-taking, which shows that the decision to speak or remain silent depends on the conversational context, not solely on the presence of a pause.

In this study, the results of the data analysis are presented descriptively and qualitatively. The excerpt, consisting of transcripts of conversations between pilots and Air Traffic Controllers (ATC), are presented a transcription system developed by Gail Jefferson. 20 selected excerpt are analyzed and described in detail to demonstrate the occurrence, type, and function of silence, particularly pauses and gaps, in conversational interactions.

From the total data collected, I identified 79 excerpts containing the silence phenomenon. However, for in-depth analysis in Chapter III, I selected 20 excerpts using purposive sampling. The selection criteria were: (1) the excerpts contained a clear silence phenomenon, either in the form of pauses or gaps; (2) they represented all the functions of silence found in the study; (3) they had sufficient conversational context to allow for analysis using Conversation Analysis; and (4) they were selected to represent the variety of communication patterns between pilots and ATC, so that all research findings could be explained comprehensively without having to present all the excerpts.

Furthermore, the excerpt analysis is not presented by answering each problem statement separately in each excerpt. Instead, the analysis is conducted in an integrated manner, examining each excerpt based on two main aspects: the type of silence (pauses and gaps) that occurs and the function of that silence in communication. This approach is used to ensure a systematic and consistent presentation of the discussion across all analyzed excerpt.

The final stage of analysis is carried out by drawing conclusions based on the research findings and linking them to the research objectives and theoretical framework of Conversation Analysis.

1.5.3 Presenting Result

The research results are presented descriptively in accordance with the problem formulation and research objectives. The analyzed excerpt are first presented in the form of a frequency table to show the number of occurrences of each type of silence, namely pauses and gaps, in conversations between pilots and Air Traffic Controllers (ATC). Furthermore, these results are supported by excerpt of conversation transcripts analyzed using the Conversation Analysis approach to explain how silence occurs in the turn-taking process and identify the function of each silence found. Finally, the research results are interpreted by relating them to the characteristics of radio communication between pilots and ATC and relevant theories, so as to provide an understanding of the role of silence in supporting effective communication and flight safety.

The analysis begins with Excerpt 76 because the data presentation in this study does not follow the order of excerpt numbers, but rather follows the order of occurrence of the phenomena analyzed based on the function of silence (pause and gap). Excerpt 76 was chosen as the first data point because it is the most representative excerpt to demonstrate the phenomena discussed in that category. Therefore, the excerpt number does not indicate the order of analysis but rather serves as a data identification code.

1.6 Definition of Key Terms

The following definition of key terms are provided to establish precise core concepts and theories used in conversational analysis approach and to clarify operational definitions, explaining how the terms are applied in this research.

Conversation Analysis (CA) is an analytical approach used to study the structure and organization of conversation in social interactions. According to Harvey Sacks, Emanuel Schegloff, and Gail Jefferson (1974), conversation analysis focuses on how conversations are organized through turn-taking and how participants manage interactions sequentially.

Turn-taking is a system for organizing turns in conversation. Sacks, Schegloff, and Jefferson (1974, p. 696) state that:

“The organization of taking turns to talk is fundamental to conversation.”

This system regulates how speakers take, maintain, and cede turns in conversation during interactions.

Silence in Conversation Analysis refers to the absence of speech in a conversation that has interactional meaning. According to Sacks et al. (1974), silence in conversation can be classified based on its position in the turn-taking system.

Pause is a silence that occurs within a speaking turn (within-turn silence). A pause indicates that the speaker is still maintaining their turn, even though there is a pause in the delivery of the utterance (Sacks et al., 1974). Pauses are often used as time for planning speech or processing information.

Gap is a silence that occurs between turns of speech (between-turn silence). A gap occurs when there is a pause before the next speaker responds. In conversation analysis, a gap can indicate a delay in response or comprehension of the previous utterance (Sacks et al., 1974).

Air Traffic Controller (ATC) is a flight officer tasked with regulating, directing, and monitoring aircraft movements in the air and at airports. ICAO (2016) emphasizes that communication between ATC and pilots must be clear, concise, and unambiguous, using standard phraseology to ensure flight safety.

Pilot is the individual who operates the aircraft and is responsible for carrying out the instructions given by ATC. In aviation communications, the pilot functions as the responder, responding appropriately to ATC messages to ensure safe flight operations (Cushing, 1994)

