THE CONVERSATION ANALYSIS OF AVIATION ENGLISH FROM SYSTEMIC FUNCTIONAL LINGUISTICS PERSPECTIVES

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Abstract

Aviation English (AE) is a distinct register of English used by pilots and Air traffic controllers (ATCOs). As it is one of the contributing cause to aviation safety, ICAO and member state aviation authorities require the airspace users to have the proficiency in using AE effectively. In recent years, AE training and testing has been gained more attention, but little work has been done to describe its linguistic features. The study sets out to describe AE from the perspective of systemic functional linguistics with an aim to illustrate its features. The findings of this study reveal the AE feature in terms of speech function on basis of which the speech function structure of AE is constructed.

Keywords：Aviation English, speech function network, move analysis, conversation analysis

1. Introduction

Aviation English (AE) is not a conversational style, but a distinct register of English: a codified, abbreviated, jargon-filled register using numbers paired with descriptors to convey crucial information succinctly. It is the term used in the literature to describe voice radio communication between air traffic controllers (ATCOs) and pilots. With mechanical failures featuring less and less in flight operation, more attention has been focused in recent years on human factors contributing to aviation incidents and accidents. AE communication is one human factor that is receiving renewed attention due to the fact that it affect the safety of some three and a half million passengers daily.

Conversation analysis (CA) research emerged in the 1960s and 1970s. Researchers began to analyze AE in air-ground communication in the 1990s. Clark & Morrow (1990), Morrow & Lee (1993) focused on the description of routine AE conversation feature; Mell (1992) focused on AE communication in routine and non-routine circumstances; Cardosi (1993), Burki-Cohen (1995) conducted an analysis of pilot and controller oral communication. The above studies, however, primarily focused on examining pilot and controller language skills.

After the turn of the century, research on AE communication shifted to language proficiency,

training and testing. In 2004, the International Civil Aviation Organization (ICAO) issued Doc. 9835, which specifies the AE language proficiency levels, assessment criteria and related requirements for language testing. Several scholars produced significant study findings on aviation language instruction and assessment based on the AE Language Proficiency Scale and some noteworthy research findings have been published

Few studies, however, have explored the ontology of AE from a theoretical linguistics perspective. Chen (2016) studied preposition omission in AE from a cognitive linguistic perspective; Ishihara & Prado (2021) studied the pragmatic negotiation of meaning between two parties in AE. The ontological study of AE is helpful in improving ATCOs' and pilots' comprehension of AE. The current study attempts to explore the AE feature from systemic functional linguistics perspectives and construct an AE speech function structure.

2. Conversation Analysis Framework

Conversation has been the focus of linguists' attention since the inception of the notion of discourse analysis in the 1950s, and several schools of linguists have presented CA frameworks for studying conversation based on their own theoretical backgrounds. Halliday approaches interaction from a functional-semantic perspective, offering both a way of describing dialogic structure. He points out whenever someone uses language to interact, one of the things they are doing is establishing a relationship: between the person speaking now and the person who will probably speak next. Every time speakers take on a role, they assign to the listener a role as well. Halliday (1984) suggests that dialogue is a process of exchange involving two variables：

1.a commodity to be exchanged: either information or goods and services

2.roles associated with exchange relations: either giving or demanding.

The two sets of variables are combined to generate four basic speech functions: offer, command, statement and question. The appropriate replies are accept, compliance, acknowledgement and answer.This is the functional-semantic reinterpretaion of CA's notion of sequential implicativeness.

Eggins and Slade (1997) made further classification and developed the speech function network to build a fine-grained network of speech function systems (see Figure1).
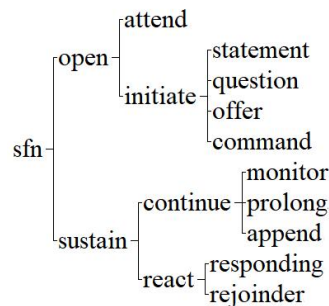

Figure 1. Speech function structure (Eggins & Slade,1997)

3. Speech Function Feature of Aviation English

Each speech function in the network is realized by a fundamental unit of conversation known as a move. Move is a clause which selects independently for mood. The discourse patterns of speech function are expressed by moves. In comparison to CE, AE's phrase sequence is fixed, and there are rarely coronals, auxiliary verbs, prepositions, or pronouns[11]. The usage of standard phraseology minimizes the complexity of syntax and tone, allowing formulaic statements to express information properly [12].

According to Eggins and Slade's (1997) network of speech functions, move are divided into open move, which initiates a talk around a proposition, and sustain move, which prepare the ground for interaction by securing the attention of the intended interlocutor. There are two types of open move: attend and initiate. Attend move establishes the context for an exchange and draws the attention of the participants, whereas an initiation establishes a suggestion or proposal for further exchanges.

3.1 Open move

The open move is the primary resource used to establish the conversation sequence, and its function is to commence the conversation around the topic, which is divide into two subsystems: attend and initiate.

3.1.1 Attend move

The attend move sets the conversation context, including greetings, salutations and calls, and prepare the ground for interaction by securing the attention of the intended interlocutor. The attend move in AE tend to be the callsign of aeronautical station and aircraft. According to ICAO Document 9432, When establishing communications, an aircraft should use the full callsign of both the aircraft and the aeronautical station. The callsign can be identified as attend move that prepares the ground for interaction and exchange by securing the attention of pilot or ATCO.

(1) ATCO: *CCA981, Wuhan control*

　　Pilot: *Wuhan control, CCA981*

For each call after the initial call, the controller uses the structure of "aircraft callsign + content"; the pilot uses the structure of "aeronautical station + aircraft callsign + content" to draw the other party's attention to the complete callsign and establish contact.

(2) ATCO: *CSN551*, remain this frequency

(3) Pilot: *Wuhan control, CSN171,* request start up and push back.

When a ground station or an aircraft wants to broadcast information to the surrounding aircraft, "All

station" is added in front of the information.

(4) ATCO: *All stations*, the latest information is A, if received, squawk ident.

When the caller's callsign is uncertain, use "Station calling XXX, say again your callsign." If the ATCOs transmit to the pilot of a designated flight, he will start the call with the other pilot's callsign to get the other pilot's attention and establish contact.

3.1.2 Initiate move

Attending moves set a scene for an interaction, and initiate moves get the interaction under way. Initiate move covers the basic opposition between giving and demanding, goods and services and information. Both parties in AE exchange mainly safety-related information, such as start up, push back, taxi, takeoff, route and heading change, landing and time of overflight of the position reporting point, flight altitude, flight conditions, runway in use, wind direction and strength, visibility, temperature, dew point, QNH. Initiate move can achieve four functions: statement, question, offer and command. In AE, the following functions are performed: making a request, approving a request, giving instruction/commands, asking for information, sharing or providing information, issuing clearance, describing an action on progress, describing the ongoing and upcoming actions, requesting and giving confirmation, etc. [13]. Table 1 exemplifies some of the initiate move and the speech function realized.

Table 1 Speech function of AE initiate move

Speech function	Initiate move
Making request	P: Request start up and push back
Approving request	C: Push back approved
Giving instructions/commands	C: Maintain 400 knots or less
Asking for information	P: Request departure runway
	C: Say your position
Sharing or providing information	P: Heading 230
	C: PAPI light is unserviceable
Giving clearance	C: Cleared to land/ Cleared for takeoff
Describing a state	P: Airborne/ Established
	C: Unable to issue
Describing ongoing action	P: Maintaining 210 knots
Describing an upcoming action	C:Will shortly lose identification

		P: Will advise when able to resume operation
	Asking for or giving confirmation	C: Confirm FL130
		P: Negative squawk ident

As the provider of air traffic control services, ATCO's primary role determines the move in his call is to realize the functions such as giving clearance, issuing instructions and approving requests. In addition, the ATCO's duties also include providing flight information services, real-time monitoring and tracking of aircraft information. Therefore, some moves are also used to realize flight information providing, asking for information, describing status and requesting confirmation. Pilots are the clients of air traffic control services and need to request permission and instructions from controllers at different phases of flight. Therefore, the move mainly realize the conversation function of making requests. In addition, the pilot has to provide the necessary information to the controller during the flight and obtain safety-related information. Therefore, some moves perform the functions of providing information, asking for information, describing the status and giving confirmation.

3.2 Sustain move

Sustain move keeps negotiating the same proposition. Sustain may be achieved either by the speaker who has just been talking (continuing speech functions), or by other speaker taking a turn (reacting speech functions). sustain move is divided into continue and react[10].

3.2.1 continue move

Sustain move are usually achieved by omitting the previous move. By means of a continue move, the speaker can perform speech functions such as monitor, prolong and append [10].

The monitor move deploy moves in which the speaker focuses on the state of the interactive situation by checking that the audience is following, or by inviting another speaker to take the turn, in which case the invited response is set up as a supporting response[10]. In AE, the ATCOs perform the monitoring through the pilot's readback of safety-related instructions.

Under normal circumstances, pilots are obliged to repeat the safety-related portions of the ATC clearance and instructions in order to guarantee that instructions are transmitted appropriately. For example:

（5）ATCO: AMU007, descend to 2700 meters on QNH1,010.

Pilot: Descending to 2700 meters, AMU007.

ATCO: AMU007, please read back QNH.

Pilot：QNH1,010, AMU007.

When two way communication is difficult and transmissions are unclear, ATCOs and pilots frequently ask each other to speak twice (words twice) and repeat (say again) to ensure that the clearance or instruction has been accurately delivered, thereby fulfilling the monitoring function. The current speaker use both the prolong and append features to supplement what he or she is saying. The distinction is that the former adds to the same turn, but the latter logically extends the content of one's prior turn if it is returned after a brief loss [10]. If ATCOs and pilots believe that the entire or a portion of the message is incorrect, or that the other party may have problems receiving it, they can utilize "correction" and "I say again" respectively to supplement, emphasize and self-correction.

（6）ATCO: CCA981, Cleared for take off Runway 36L.

Pilot: Cleared for take off Runway 36L, CCA981.

ATCO：CCA981, hold position, cancel take-off, *I say again*, cancel take-off, due vehicle on the runway.

Pilot: hold position, CCA981.

3.2.2 React move

When a turn-taking occurs, the react has two options: response and rejoinder. The former comply with the expectation of exchange closure, whereas the latter set underway sequences of talk that interrupt, postpone, abort or suspend the initial speech function sequence[10].

After a turn-taking, the function of the response is to allow the speaker to support or oppose a proposition or proposal stated by the initial speaker. Supportive response include develop, engage, register and supportive reply. Confronting response range from either disengaging or by offering a confronting reply [10]. AE supportive and confronting response tend to be realized by "affirm" and "negative" respectively. For clearance and instructions that do not require readback, the supporting response is likewise accomplished by "Roger"or "Wilco".

（7）ATCO: CCA981, Are you ready for immediate departure?

Pilot: *Affirm*, CCA981.

（8）ATCO: CCA981, Work in progress near taxiway A, taxi with caution.

Pilot: *Roger*, CCA981.

（9）ATCO: CCA981, taxi slower, give way to B747 from left to right.

Pilot: *Wilco*, CCA981.

Rejoinder move negotiate what is already on the table, rejoinders either query it (demanding

further details) or reject it (offering alternative explanations). There are two main subclasses of rejoinders: tracking and challenging. These two subclasses correspond to the supporting and confronting alternatives available in the responding move classes[10].

Tracking moves are moves which check, confirm, clarify or probe the content of prior moves. The standard phraseology "confirm" is necessary in AE to confirm and verify specific instructions, clearance or information. The tracking function tend to be realized by declarative clause

（10）ATCO:CSN345, squawk 6411

    Pilot:6411, CSN345

    ATCO:CSN345, *confirm* squawk.

    Pilot:CSN345, squawk 6411.

    ATCO:CSN345, reset squawk 6441.

    Pilot:Resetting 6441, CSN345.

4 Speech function of AE structure

Figure 2 depicts the speech functional of AE structure and turns specified in ICAO Doc.9432 standards of establish, continuation, transfer, giving clearance and readback.

ATCO and pilot in a turn should establish a communication through the attend move and negotiate information through initiate move to offer and request flight information to describe the flight status, track the flight mission and handle in-flight conditions. If the information in initiation move needs to be read back, sustain move is necessitated to ensure message accuracy and the turn ends up if readback is correct (see 1 of Fig. 2). If the readback is incorrect, confronting reply is given (see 2 of Fig. 2) and negotiation proceeds (see 4 of Fig. 2) until the read back of the negotiated information is correct. If the information does not require readback, the turn ends with response in react move (see 3 of Fig. 2).
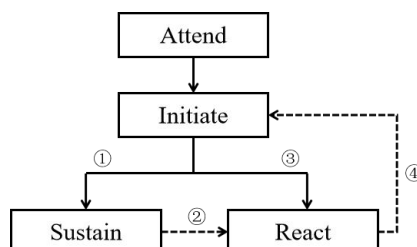

Figure 2 Speech function of AE dialogue structure

5. Conclusion

This study investigates the functional feature of AE communication, examines the realization of AE move and constructs the speech function or procedure of AE communication. The semantic function aspect of AE has pedagogical implications to AE training, and conversation analysis is useful to strengthen ATCOs' and pilots' knowledge of AE, minimize misunderstanding and miscommunication, and promote safe, efficient, and orderly air traffic.

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8. Copyright Statement

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