

### **30 The sounds of silence inform situation awareness concepts: Methodological and terminological aspects in aviation culture and the work of OMEODEK in the context of Greek and English**

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#### **ABSTRACT**

In communication theory, airplane flights are abstract representations of the "sender-receiver" model with flight operating manuals dictating all activities in a sense of "flight normality"; but aviation is paying attention to detail and monitor exceptions beyond ideal flight situations. Different scholars had highlighted diverse aspects in such conversations like linguistic factors; problematic discourse; message misunderstandings, and human error variations. The current study aims to show the convergence of that conversation in terms that play a key role in explaining expertise and knowledge production in the broader field of critical environments.

OMEODEK as a special task force for Greek air traffic administration terminology operates under the auspice of the Hellenic Civil Aviation Authority and monitors aviation communication, combining terminology and field knowledge. OMEODEK's interactions are material properly formulated to apply research methodologies like grounded theory, protocol analysis and discourse analysis. In its current work, OMEODEK examines speech acts with the professional community of the field to ensure terminological quality and linguistic security. OMEODEK realizes that translation is an on-going process in order to accomplish localization and deal with open challenges of topical adjustment. In this study, raw data from pilots and air traffic controllers interactions were collected, as part of the work of the theoretical foundation of OMEODEK in order to highlight conceptual and research-oriented contribution and its didactics.

The role of silence in non-verbal communication and organization theory, as well as the meaning of expertise in scaling stages of awareness are key theoretical contributions of the current analysis, deriving from the work that supports OMEODEK operations. By reviewing these terms in Greek and in English OMEODEK network partners offer material for specific subject fields like pragmatics and safety-related investigations.

### **Οι ήχοι της σιωπής ενημερώνουν πτυχές της επίγνωσης κατάστασης: Μεθοδολογικές και ορολογικές πτυχές στην αεροπορική κουλτούρα και το έργο της OMEODEK στο πλαίσιο της ελληνικής και της αγγλικής**

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#### **ΠΕΡΙΛΗΨΗ**

Στη θεωρία επικοινωνίας, οι πτήσεις αεροπλάνων είναι αφηρημένες αναπαραστάσεις του υποδείγματος "αποστολέα-παραλήπτη" στο οποίο η τήρηση των εγχειριδίων υπαγορεύει τις ενέργειες που οδηγούν στην κανονικότητα της πτήσης. Πολλές φορές αυτή η κανονικότητα είναι μια ιδεατή κατάσταση μια και στην

αεροπλοΐα η προσοχή στη λεπτομέρεια και δυνατότητα διάγνωσης και εντοπισμού εξαιρέσεων είναι απαραίτητη. Διαφορετικοί μελετητές έχουν επισημάνει διαφορετικές πτυχές σε τέτοιες συζητήσεις όπως οι γλωσσικοί παράγοντες, η προβληματική του λόγου, τα αμφίσημα μηνύματα και οι παραλλαγές του, και παραλλαγές του ανθρώπινου λάθους. Η τρέχουσα εργασία επιδιώκει να δείξει τη σύγκλιση αυτής της τυποποιημένης κανονικότητας με όρους των πραγματικών συμβάντων που παίζουν ένα ρόλο κλειδί για την εξήγηση της παραγωγής γνώσης σε κρίσιμα περιβάλλοντα.

Η ΟΜΕΟΔΕΚ ως μια ειδική ομάδα εργασίας για της διαχείριση της ορολογίας ενέργειας κυκλοφορίας λειτουργεί υπό την αιγίδα της ελληνικής Υπηρεσίας Πολιτικής Αεροπορίας και παρακολουθεί την αεροπορική επικοινωνία, την ορολογία και τη γνώση που παραγεται στο πεδίο της διαχείρισης ενέργειας κυκλοφορίας και διαχεεται με τη γλώσσα επικοινωνίας. Οι αλληλεπιδράσεις των μελών αλλά και των επαγγελματιών που συνεισφέρουν με περιγραφές συμβάντων στην ΟΜΕΟΔΕΚ αποτελούν υλικό σωστά σχεδιασμένο για να εφαρμόσει μεθοδολογίες έρευνας όπως η θεμελιωμένη θεωρία, ανάλυση πρωτοκόλλων εργασίας και ανάλυση συνομιλιών. Στην τρέχουσα εργασία, η ΟΜΕΟΔΕΚ εξετάζει τη διαδοχή ομιλίας και πράξης στην επαγγελματική κοινότητα του πεδίου για να εξασφαλίσει ορολογική ποιότητα και τη γλωσσική ασφάλεια. Η ΟΜΕΟΔΕΚ συμβάλλει στη συνειδητοποίηση ότι η μετάφραση είναι μια συνεχής διαδικασία προκειμένου να ολοκληρώσει τη την τοπική προσαρμογή και να αντιμετωπίσει τις προσκλήσεις των περιφράσεων και των νεολογισμών. Σε αυτή τη μελέτη συγκεντρώθηκαν ανεπεξέργαστα δεδομένα από τους πιλότους και τις αλληλεπιδράσεις ελεγκτών εναέριας κυκλοφορίας, που καταδεικνύουν τη δουλειά της θεωρητικής θεμελίωσης της εργασίας της ΟΜΕΟΔΕΚ προκειμένου να αναδειχτεί η συμβολή της στη διδακτική της γλώσσας πεδίου και στην εννοιολογική εκλέπτυνση της ορολογίας. Η χρήση των διαθέσιμων για την ΟΜΕΟΔΕΚ πηγών για τη συλλογή δεδομένων, κατηγοριοποίηση και ανάλυση, περιλαμβάνει ενδεικτικά τα ακόλουθα:

- προσωπικές εμπειρίες και προκαταλήψεις;
- εθνογραφικές επισκέψεις πεδίου σε αερολιμένες, αεροπορικές βάσεις, πύργους ελέγχου και αρχές πολιτικής αεροπορίας
- περιπτωσιολογικές μελέτες πτήσεων ορόσημο, συνεντεύξεις με επαγγελματίες στην αεροπλοΐα
- ιστορίες ζωής στα βιογραφικά βιβλία και τα προφορικές αφηγήσεις
- αντικείμενα, πολιτιστικά κείμενα και παραγωγές μέσω μιας δραματοποιημένων σειρών για πιλότους μαχητικών αεροσκαφών

Ο ρόλος της σιωπής στην μη-λεκτική επικοινωνία και τη θεωρία οργάνωσης, καθώς και την έννοια της εμπειρογνωμοσύνης σε κλιμακωτά στάδια της επίγνωσης κατάστασης είναι βασικές θεωρητικές συνεισφορές της τρέχουσας ανάλυσης, που απορρέουν από την εργασία που υποστηρίζει τις λειτουργίες της ΟΜΕΟΔΕΚ. Με την αναθεώρηση αρχικών όρων μετάφρασης στα Ελληνικά και των περιγραφών τους στα Αγγλικά, η ΟΜΕΟΔΕΚ προσφέρει υλικό για συγκεκριμένα θεματικά πεδία και διαμορφώνει και ένα περιβάλλον διάχυσης πληροφόρησης που προάγει το αντικείμενο της εργασίας του ελεγκτή.

## **0 Introduction**

In communication theory, airplane flights are abstract representations of the "sender-receiver" model with flight operating manuals dictating all activities in a sense of "flight normality"; but aviation is paying attention to detail and monitor exceptions beyond ideal flight situations. Different scholars had highlighted diverse aspects in such conversations like linguistic factors; problematic discourse; message misunderstandings, and human error variations. The current study aims to show the convergence of that conversation in terms that play a key role in explaining expertise and knowledge production in the broader field of critical environments.

A great deal of relevance was accomplished after a series of my field visits for evaluation and active observation in aviation installations, as well as from the accumulated participant observation and work in such environments. A process of constant comparison starts with the first level of reading and identifying phenomena of interest in the analysis of data and then a decision on the theoretical sampling is taken; it is about what type of data are to be collected next to support the theory construction [1].

In aviation communication occurs in an environment which challenges effectiveness and where failures may have severe consequences. Although English as a lingua franca was designated for international aviation use in 1951 [2], substantial issues of culture (in terms of habits and safety), professional behavior, operational training, and compliance in standardization still exist [3] . As Cushing [4] has analyzed, contextual constraints and language are combined in communication problematic inside the flight deck and when pilots and controllers interact. Jones [5], in his review, writes about "symptoms of miscommunication"; those include procedure or instruction violation (like clearance avoidance) and communication-specific problems (like arbitrary interpretation, dialects, and inappropriate phrasing). Also, Jones speaks about "phraseology defects", like multiplicity of meaning, multiplicity of synonyms, and implausible words, with a contextual meaning that may be different from the colloquial meaning, as pointed out by Howard [6].

## **1 Raw Data in the Ego- Alter Conversation**

The work of OMEODEK paved the way of systematic collection of diverse sources of aviation expression means and cultivated a mindset of sharing events, ideas, and the incorporation of professional experience as applied and perceived. This paper highlights the methodological

aspects surrounding the work of OMEODEK. Data collection acquires theoretical significance with the selection of additional data (events, testimonies, visual productions, activities, experts, etc.) to exposit all properties of the developing conceptual categories and develop them further, at both the individual and social levels [7]. These resources, as proposed by a grounded theory approach for data gathering, categorizing and analyzing, include the following:

- personal experiences and preconceptions;
- ethnographic field visits to airports, air bases, control towers and aviation authorities;
- case studies of landmark flights;
- interviews with aviation professionals;
- life stories in biographical books and oral narratives;
- artifacts, cultural texts and productions via a special drama series on fighter pilots;
- observational, historical, interactional and visual texts, in documentaries and media interviews.
- protocol analysis lessons to facilitate the acquisition of insights and
- discourse analysis practices with close reading for the theory construction, sorting and comparisons.

A real discussion is the first phase of data acquisition for real life events in aviation is contained below to highlight one type of sources used from OMEODEK. The transcription has several similarities with pieces of the proceeding of MOTO [8]. An excerpt is contained below to highlight the qualitative approach needed to evaluate the knowledge factor in the semantics of "Ego-Alter" interaction:

*Ego: I was serving my duty in 115 CW during the Imia crisis and I was a substandard during the week of COC missions.*

*Alter: nice, I was in the Academy at the time...*

*Ego: coming from that experience I wanted to accent the importance and role of HAF pilots as highly skilled, risk-taking practitioners and decision makers. Furthermore, I would like to explore the limitations, tolerance or creativity involved when following SOPs and RoEs. Lastly, to explore the role of communication in an efficient implementation of a flight mission.*

*Alter: these are kind of esoteric questions that we keep in the back of my head, since*

*when I am about to fly I never know what my experience would be.*

*Ego: I know, I know ...and I thought to use some real cases to have a base for this discussion.*

*Alter: (nonverbally knocking head to go on)*

*Ego: Here is a situation reported in NASA's Aviation Safety Reporting System:*

**A real case of a B737 Captain's Report:** *On takeoff roll approaching 80 knots, the Tower Controller called us and said in a very slow, unsure voice, "[Callsign 1...2...3](pause)." He sounded as if he had something to tell us, but did not know what to say. We both noted a tone of concern and hesitation in his voice as if he was still unsure of something at that moment. We were light weight and had 13,000 feet of runway ahead of us. We had to make an immediate decision.*

*Ego: What is going on here, in your opinion?*

*Alter: Oh... that is not so uncommon situation [laughing]. I am not sure why they report it.*

*Ego: What do you mean? This is the ASRS anonymous system of reporting. What are the rules for that?*

*Alter: So, when we are in the flight school we share training ours with ATC so that we understand their work. They have multiple stimuli in their screens and visual scope and each communication unit is a separate case.*

*Ego: [interrupting] is or should be? Do they have to multitask?*

*Alter: Of course, they do but they have resources to isolate frequencies, call signs, one flight-after another and also to categorize intra-flight communications (from pilot-to copilot etc).*

*Ego: I see, but let's go back to the rules. What are the SOPs applied in this situation.*

*Alter: I have to say that in such a discussion I feel like a doctor who evaluates another doctor's patient, without being there. But, this is straightforward to say that I should ask back to ATC, before reporting back on the command, "what happened? Repeat Tower"?*

*Ego: Do you just repeat, as we would do in routine conversation? What about the tone of the voice and hesitation?*

*Alter: If it is not incidental (as it could be), it could be a warning sign for an*

*uncomfortable situation, a problematic pendency or something that has to do with the actual flight, or the status of the runaway, or the taxiway.*

*Ego: So how do you evaluate that on site? Do you just follow the book or try to relate more with the ATC person?*

*Alter: It is quite different is you are airborne or you are preparing for clearance. It seems that this pilot is still on the ground, isn't he?*

*Ego: Correct, he was in the ground. But, how do you decide?*

*Alter: At first, when on the ground, if I have a co-pilot I consult him for his opinion as it is common for us to challenge the ATC when in small airports. If you are airborne that is a different story.*

*Ego: Is it so objective to tell, about a busy or a small airport or how you relate with ATC?*

*Alter: Of course, if I know the ATC person I may bypass the standard phraseology to say "Eh, John what happened? Why do you hesitate?" If not I may just stay to wait, especially if I do not have a series of corresponding flights in a sequence. I know that safety is the primary concern but we are also employees...*

*Ego: So, do you think that this is judgment call? What are your criteria? Are they different from the book?*

*Alter: when I started my career I had a concern, almost fear about the risks that are uncertain when I receive indefinite communication. It took me several hundred hours, I could say after 1,000 flying hours to start feeling safe about myself and specific travel routes (when the weather is general terms "stable"). I try to include in my social relations people from ATC, as well as other aviation professionals in order to develop a level of familiarity for their personalities. When I fly abroad, especially overseas I make an effort for an intense briefing about the local controllers, their behaviors and stereotypes in the use of air-speak English and phraseology.*

...

The excerpt above simulates a pattern of realistic conversation commenting on specific scenarios and not just answering questions of Q/A sessions. The scenario approach is more effective for knowledge elicitation rather than perceptions and opinions.

## **2. Advancing from Questioning Route to the Representation**

The ego-alter discussion provides the data for a structured questionnaire which was dissolved due to the lack of discussion focus; then I introduce the Ishikawa (fishbone-shaped) diagram with contributing “causes and a key effect (in the fish head)” with the a different core topic regarding the conformity and deviance to rules. The operation-related fishbone format disqualified its use from commercial pilots and controllers, where as fighter pilots where keen on it. The Ishikawa diagrams (also known as fishbone diagrams or cause-and-effect diagrams) are visual tools that show the path for contributing factors to a certain event (area of interest or problem). Ishikawa diagrams were first introduced in quality improvement of industrial processes [9]. The theoretical theme is in the “fish head”: Practitioners in their daily practice, rather than totally relying on Standard Operating procedures, make use of their own tacit experiences when faced with decisions to make.

Is it valid for pilots? In order to draw the frame for pilots as highly-skilled practitioners in an environment of mediated communication, and explain communicative activities that they commit.

Is it valid for Air Traffic Controllers? In order to show how pilots (senders) perceive or understand the position of ATC (receivers) in their communication interaction. This sequence could be used to validate questions.

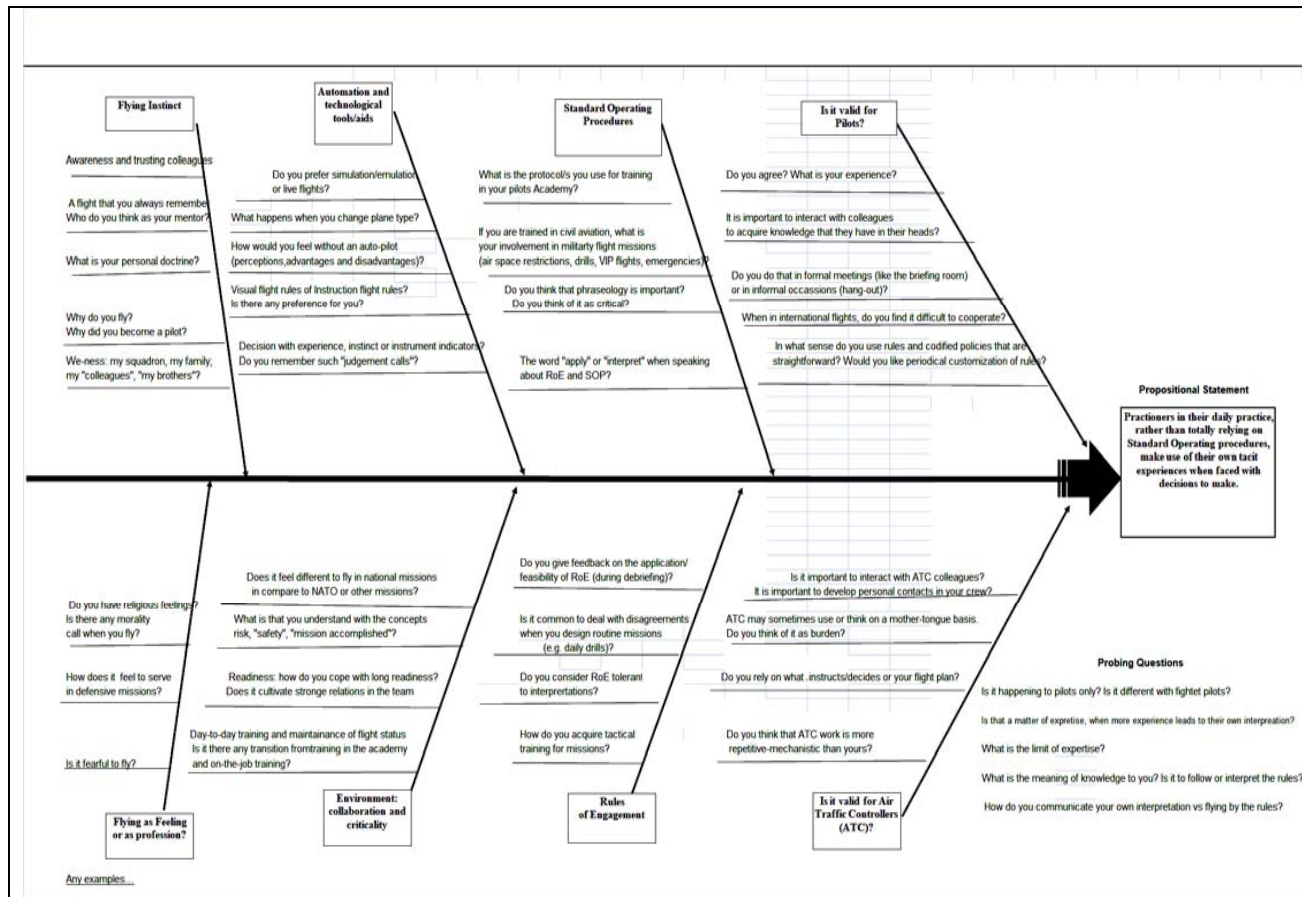


Fig.1 The Ishikawa diagram



Among others, indicative questions, in different branches of the diagram, are the following:

- a. Flying Instinct: to investigate deeper characteristics that define the pilot's personality and affect their communication and team spirit.

Awareness and trusting colleagues  
A flight that you always remember  
Who do you think as your mentor?  
What is your personal doctrine?  
Why do you fly? Why did you become a pilot?  
We-ness: my squadron, my family; my "colleagues", "my brothers"?

- b. Flying as Feeling or a Profession: emotional profile of a pilot in regards to implicit communication.

Is it fearful to fly?  
How does it feel to serve in defensive missions?  
Do you have religious feelings for what you do?  
Is there any morality call when you fly?

The questioning sequence directed by the fishbone diagram generates a context of familiarity for pilots and air traffic controllers to offer their insights. Since the early years of (mainly) civil aviation, crew members' reluctance to speak up, and the resultant silence has posed a serious threat to flight safety. Silence, in the mid of the responders, may be observed inside the airplane cabin (with passengers, pursers, and flight attendants), inside the airplane cockpit, between cockpits (in crisis situations) or may be measured institutionally with the flight log reports where the crew has to fill any noteworthy information (for the airlines and the manufacturer, such as mechanical problems, operating environment problems, technical inconsistencies and so on).

Also, responders are asked to take the point of view of their role, so that silence would emerge as a phenomenon with multiple dimensions: silence from whom, addressed to whom, used by the controller or the crew member, perceived by the controller, crew member, an external pilot or the airline operator. Since a flight is accomplished in a collaborative environment NASA introduced a managerial requirement in 1979, promoting the cockpit resource management that

evolved to Crew Resource Management (CRM). Symbolically, the prompting device of CRM was the triplet: communication, communication, and communication.

### **3 Language Expressing Awareness**

In the analysis of oral and written discourse in aviation it is important to understand the mechanics of language (and the language of special purposes used in aviation), but how human actors practice “what to say to whom” and “how to say it appropriately in a particular situation”. That is the notion of communicative competence introduced by Hymes [10], which defines what is correct and what is not (according to aviation phraseology and institutional contact standards).

Also, competence is needed in order to decide when and where to use language appropriately (like the motivating, collaborating language devices, the suspending order to co-pilots, the laconic calls to Control Tower, the readback of important instructions, the non-verbalisms that communicate emotion, activate mediated banner messages to the cabin or message updates to the passengers seats with no announcement) and with whom (controller, co-pilot, cabin crew members, passengers as a collective).

Another rather latent conceptual dimension is the representative nature of situational awareness (SA). As Flach [11] points out a form of circular reasoning might occur when SA is overestimated as an objective cause of flight accidents: “*How do we know that SA was lost? It is because the human actors responded inappropriately? And why did the human respond inappropriately? It is because SA was lost.*” In order to avoid tautological conclusions, SA in this study is connected with human communication consequences/effects to aviation safety. The process of SA refers to how SA develops and sustains during flight. At the same time, SA is the resultant concept, like a product of the process.

In the typology of awareness the transitory type is closer to the group communication and teamwork. The local type fits typical perception in communication models. Also, the local and global types are linked with situations of multiple levels of hierarchy and intra-organizational communication. The separation of SA in types denotes that an individual could commit in awareness of any type (or of all types at once). Real-life topical factors and message flow (in flight, combat, or other activity) indicate which type is relevant. As it happens in communication patterns, “the participants' confidence” in their situation awareness might be different than their “actual situation awareness”. Receivers perception of a message may be different that the intended content of the message.

SA, especially in the expansion of the three types, implies clear communicative dimensions as human actors should act upon, respond to, and confirm/correct important informational cues. Apart from that, human communication forwards the information flow functioning in L(ocal)A type, and facilitates the move to T(ransitory)A type. The G(lobal)A type needs also reporting and critical evaluation and access to privileged operational and mission information. Awareness (of all types) is internal to the individual and the meaning making process, and does not reside on any (technological) information display. The individual actor develops awareness when considering the interpersonal interactions and relationships with relevant communication. Interpersonal communication, here, includes the form of the “individual-group-team”, or the form of “own vs opposing force/group” in command and control contexts.

#### **4 Sustaining OMEODEK**

While Air Traffic Controllers are following a new intense period of everyday life work in the past two years due to the new legislation and administrative delays [12]. OMEODEK as a special task force for Greek air traffic administration terminology operates under the auspice of the Hellenic Civil Aviation Authority [13] and monitors aviation communication, combining terminology and field knowledge. OMEODEK's interactions are material properly formulated to apply research methodologies like grounded theory, protocol analysis and discourse analysis.

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The role of silence in non-verbal communication and organization theory, as well as the meaning of expertise in scaling stages of awareness are key theoretical contributions of the current analysis, deriving from the work that supports OMEODEK operations [14]. By reviewing these terms in Greek and in English OMEODEK network partners offer material for specific subject fields like pragmatics and safety-related investigations.

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## Appendix

### English to Greek glossary

	<b>Basic term in English</b>	<b>Βασικός όρος στο ελληνικά</b>
1	sender-receiver model	υπόδειγμα αποστολέα-παραλήπτη
2	flight normality	πτητική κανονικότητα
3	situational awareness	επίγνωση κατάστασης
4	local awareness	τοπική επίγνωση κατάστασης
5	transitory awareness	μεταβατική επίγνωση κατάστασης
6	readback	επανανάγνωση
7	hearback	επανακρόαση

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