



# Air traffic communications in routine and emergency contexts: A case study of Flight 1549 ‘miracle on the Hudson’<sup>☆</sup>



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Received 25 January 2016; received in revised form 17 October 2016; accepted 19 October 2016

Available online 5 November 2016

## Abstract

This paper is a conversation analytic investigation of Air Traffic Control (ATC) communications with U.S. Air Flight 1549 and other flights before, during, and after a critical emergency in which the plane (safely) landed in the Hudson River. While foundational conversation analytic research on air traffic communications has already been done, this method has not yet been systematically applied to air traffic communications during actual emergencies. This project will therefore fill a gap in previous research by analyzing ATC/plane interactions during an actual emergency and investigating whether routinized procedures alone are the most effective when emergency situations occur. I will show how routine interactional conventions in this work setting (e.g., the use of scripted talk and ‘positional’ grammar) help participants to maintain the safe flow of air traffic and to accommodate emergencies when they occur. I will show that during the critical emergency the ATCO and the pilot of Flight 1549 switched from a routinized (scripted) form of interaction to a conversational form of interaction, and at times to a ‘hybrid’ format which combined elements of routine ATC talk with elements of the speech exchange system of ordinary conversation.

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**Keywords:** Conversation analysis; Air traffic communications; Talk in institutional settings; Emergency communications; Airplane accidents

## 1. Introduction

Previous studies of air traffic communications and human factors in aviation have investigated a wide range of issues. Falzon (2009) analyzed how participants manage the coordination of multiple tasks in Air Traffic Control/Aircraft Crew interactions. Other studies investigate how safety analysts should study incidents in order to more effectively reduce mid-air collisions (Brooker, 2005), how the work of air traffic controllers can be studied in simulators (Ham et al., 2008), and how new technology can affect air traffic control communication (Cox et al., 2007; Fulton et al., 2011; Malakis and Kontogiannis, 2014; Mosier et al., 2013; Olson and Sarter, 2001; Sharples et al., 2007; Stedmon et al., 2007). Other research investigates how communication problems within crews or between the plane and Air Traffic Control can lead to accidents (e.g., Cushing, 1994, 1995; Jones, 2003; Howard, 2008).

When aviation emergencies are successfully resolved it is useful to explore the factors that lead to that success. The “miracle on the Hudson” occurred on January 15, 2009, when U.S. Airways Flight 1549 lost both engines due to bird strike shortly after taking off from LaGuardia Airport in New York City (McFadden, 2009). The pilot was rightfully congratulated

<sup>☆</sup> Paper presented at the *American Sociological Association* annual meetings, Chicago, IL, August, 2015.  
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on his skill in landing the plane safely in the Hudson River without losing a single life. Part of the miracle was due to the skill of the pilot, and part was due to the “miracle” of the routine interactional procedures used by air traffic personnel in the cockpit and in the air traffic control tower.

Planes are assisted through take off from airports by the airport's Air Traffic Control. The Radar Approach Control (“TRACON”) officer views the planes on his or her radar screen and gives them directions such as which way to turn or how high to climb after takeoff (the “initial climb”). The RAC officer is continually available for radio communications from all the planes in his or her range, and knows their location from watching the radar screen (see [Harper and Hughes, 1993](#)).

RAC officers' interactions with the planes differ from ordinary conversation (e.g., [Sacks et al., 1974](#)), and from many other types of institutional or workplace talk (e.g., [Drew and Heritage, 1992](#)), in several ways. In this paper I will outline some of these differences and show how these routine interactional procedures help the RAC officer facilitate the safe flow of air traffic and manage emergencies when they occur. This will be done through an analysis of the audio recording and transcript of the communications immediately prior to and during Flight 1549's emergency landing.

One of the important elements of air traffic communications is the frequent use of scripted language (e.g., [Howard, 2008](#); [Nevile, 2004a](#)). [Howard \(2008\)](#) conducts a quantitative analysis of pilot/ATC communication and concludes that deviations from scripted speech increase the likelihood of communication problems; [Prinzo and Hendrix \(2009\)](#) found that the complexity of messages and increased message length increased likelihood of problems. [Tajima \(2004\)](#) discussed accidents resulting from insufficient knowledge of English. Insufficient fluency becomes increasingly problematic in non-scripted exchanges or in emergency situations. However, the use of a conversation analytic approach to analysis may reveal a different perspective on the role of “non-scripted” speech in pilot/ATC communication.

I will show that during the critical emergency the RAC officer and the pilot of Flight 1549 switched from a routinized (largely scripted) form of interaction to a conversational form of interaction, and at times to a ‘hybrid’ format which combined elements of routine RAC talk with elements of the speech exchange system of ordinary conversation. I will first describe the methods and data and then analyze the routine RAC/plane interactions and those that occurred during the emergency faced by U.S. Air Flight 1549.

## 2. Data and methods

### 2.1. *The conversation-analytic method*

The theoretical and analytical perspective used in this project is conversation analysis, a qualitative approach to analyzing talk in interaction which grew out of the ethnomethodological perspective developed by Harold [Garfinkel \(1967\)](#). The ethnomethodological approach to sociological investigations focuses on understanding human action, both in its social context and in terms of how it creates social structure and social organization ([Atkinson and Heritage, 1984](#); [Boden and Zimmerman, 1991](#); [Button, 1991](#); [Heritage, 1984](#); [Turner, 1974](#); [Watson and Seiler, 1992](#)). Conversation analysts study talk in its sequential context in order to discover the common-sense understandings and procedures people use to shape their conduct in particular interactional settings ([Garcia, 2013](#); [Heritage, 1984](#); [Heritage and Clayman, 2010](#); [Hutchby and Wooffitt, 2008](#); [Liddicoat, 2007](#); [Sacks, 1984](#); [Schegloff, 2007](#); [ten Have, 2007](#)). Members' shared interactional competencies not only enable them to produce their own actions but also to interpret the actions of others. Because participants display their orientation to the procedures they use in the utterances they produce (see also [Heritage and Atkinson, 1984](#); [Schegloff and Sacks, 1973](#)), analysts are able to discover conversational procedures by analyzing the talk itself. The conversation is assumed to be a context within which participants shape their own utterances and interpret the utterances of others ([Goodwin and Duranti, 1992](#); [Heritage, 1987](#)). Thus the sequential context—the immediately prior utterances, the interactional context, and physical and temporal contexts are all assumed to be potentially relevant to the participants as they structure their talk ([Heritage and Atkinson, 1984](#)). Roles do not just affect behavior by providing a set of rights, obligations and expectations; people instantiate their roles by their actions ([Halkowski, 1990](#)).

While the speech exchange system of ordinary conversation (whether conducted in a work place or in an informal context) provides for maximum flexibility in terms of the organization of turns at talk, types of turns produced by participants, and topics of talk, among other things ([Sacks et al., 1974](#)), talk in work place settings is often more highly structured or constrained on these types of dimensions (e.g., [Antaki, 2011](#); [Boden and Zimmerman, 1991](#); [Clayman and Heritage, 2002](#); [Drew and Heritage, 1992](#); [Heritage and Clayman, 2010](#); [Heritage and Maynard, 2006](#); [Sacks, 1992](#); [Sacks et al., 1974](#)). [Heritage and Clayman \(2010:32\)](#) describe how participants “talk... institutions into being”:

“We do not mean by this to suggest that every time persons talk they invent institutions from scratch. Far from it: the institutions of education, news, courts, and medicine plainly antedate the lives and actions of the persons who participate in them. But these institutions do draw life from, and are reproduced in, those actions. The word we have used for this in this chapter is ‘instantiate’. By this we mean that the sequences of talk we have examined are aligned with, and embody, some of the basic imperatives of the institutions within which they are found. Talking in these

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