Misunderstandings
in Air Traffic Communication
by Graham Elliott

"Incorrect or incomplete pilot-controller communication is a causal or circumstantial factor in 80 percent of incidents or accidents…." SKYbrary[1]

Graham Elliott

was the FAA Program Manager in Oklahoma City, USA, where he led U.S. support for the introduction of ICAO English proficiency standards in testing and training for airlines and air traffic control in more than 45 countries in Africa, Asia, Central America, and the Middle East.

Misunderstandings in ATC Communication was prepared by a psychologist, applied linguist and pilot, Dr. Immanuel Barshi, in the Human Systems Integration Division at NASA, and Candace Farris, a researcher at McGill University in Montreal. The 252-page book comprehensively reviews the aviation communication literature, reports an efficient experimental method to investigate the aspects of aviation speech and listening at play, and delivers solid recommendations to address real-world aviation miscommunications. The book sorts through a complex combination of factors from multiple sources to identify which ones contribute to miscommunications. The findings should dispel some common assumptions about reasons for pilot-controller miscommunications.

The research reported suggests that the communications error rate can be lessened by reducing ATC message length, and by training native English language speakers to take responsibility for the success of communications in English.

The purpose of the study was to better understand some of the factors influencing breakdowns in ATC communications; what the authors report is that read back errors grow as the number of topics in a message increases. Problems do come from distractions and interruptions from the workload in the cockpit and from poor English language proficiency, and it is often said that controllers "speak too fast" which is often seen as the heart of the problem. However, perhaps somewhat surprisingly, speech rate is not the main culprit causing communication breakdown. Nor, by itself, is

1- From 'The Operators Guide to Human Factors in Aviation' see:
http://www.skybrary.aero/index.php/Pilot-Controller_Communications_(OGHFA_BN)

poor English language proficiency. Using the "Barshi Navigation Paradigm", a laboratory environment to examine pilot-controller communications, overly-long messages were found as the chief cause of miscommunication.

While rapid delivery of commands, elision of words, stress and workload, and unfamiliar accents all take their toll, solutions to problems identified in the experimental data are clear: misunderstandings in ATC communication are reduced if controllers' messages are limited to three pieces of information. More than that and errors in read backs and hear backs and repeated transmissions are liable to climb rapidly.

Further, the authors recommend that when the pilot is either a non-native speaker of English or appears to be under a heavy workload, controllers

should limit each message to two pieces of information. And even at the cost of extending communication time, when an abnormal or emergency situation is being handled, it is suggested that one instruction at a time is probably best.

Until controller-pilot data link communication is more widely used and controllers are routinely able to transmit data directly to a flight deck computer, ATC depends upon voice communications. On the basis of the findings described in Misunderstandings in ATC Communication, controllers should be trained to resist the urge to say all they have to say in one long transmission. Satisfying as that may seem, it is a precursor for weak information transfer. The authors confirm that more read back and hear back errors occur when pilots are unable to fully understand, remember and process information in messages.

Bearing in mind the North American origin of the book, it reports that the origin of poor communications is found in both the controller and pilot communities and that both native English speakers and their non-native-speaking counterparts are involved. It recommends that native English speakers should be taking responsibility for the success of interactions. Apparently this is not widely addressed in pilot and controller training and neither is training in strategies to solve communications breakdowns required for licensing.

Witness an exasperated JFK controller unfairly featured on YouTube[2]. Frustrated by his inability to communicate successfully with a taxiing Chinese flight crew, to keep his traffic moving efficiently he gamely tries for a ninth time: "I'll try it again. It's a question. Hold your position. This is a question, interrogative. Have.. you.. been ..cleared ..in ..to ..your ..gate?"

Not surprisingly, even native English speaking pilots struggle with overly long messages. A British pilot preparing to depart JFK is reported as having difficulty assimilating seven separate pieces of information for his Merit 3 SID – Canarsie climb; vectors to the Putnam transition; 5000; 330; squawk 1607; Ground 121.9, all delivered in rapid 'Brooklynese'. As he attempted again to accept his clearance, he politely apologised with "you say it so quickly and in such a strange accent, I just don't understand." Research in Misunderstandings claims to show that with only three pieces of information per message, neither the speech rate nor the regional accent would appear to be barriers to effective communication. Maybe not all would agree…

Meanwhile, until data link spreads more widely, it may be that we should look to improve information transfer by voice-to-ear transmissions between controllers and pilots by first, the judicious limiting of commands to three, or fewer when communications are breaking down, and second, training in strategies for native-speaking English pilots and controllers to take responsibility for successful information transfer. ⌴

2- see http://www.youtube.com/watch?v=1NDqZy4deDI