Action in time: Ensuring timeliness for collaborative work in the airline cockpit

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ABSTRACT

In the airline cockpit it is critical to say and do things at the appropriate time and in the appropriate order. When a pilot is responsible for initiating a next action but has not yet done so, the pilot NOT responsible can prompt or perform the action with talk that is prefaced with *and*. Rather than make conspicuous another's possible lapse, *and*-prefaced talk presents the not-yet-initiated action as timely and merely occurring routinely next in sequence. *And* occurs in talk for monitoring another's conduct and for maintaining accountability in the temporal organization of work by situating actions acceptably in time. This article points to the value of seeing grammatical forms as consequential for just how work gets done in particular settings, and especially for identifying local means of creating order for agenda-based activities. The article analyzes transcriptions of pilots interacting in the cockpit on actual scheduled passenger flights. (*And*, aviation, collaborative work, conversation analysis, ethnomethodology, institutional interaction, repair, sequential organization, temporal organization)

INTRODUCTION

This article is concerned with a feature of language in interaction for collaborative work. When people work together, the appropriateness and competency of action for a task can be dependent on WHEN it is done within a recognizably acceptable sequence of actions. Here I explore a feature of talk for participants to create and organize their work actions in time. I examine the use of *and* as a turn preface in talk for ensuring timeliness of actions in a socio-technical setting where timing and ordering is critical: the airline cockpit. This article uses transcriptions of talk made from video recordings of airline pilots at work on actual scheduled flights.[1]

I share the concern of ethnomethodology (EM) and conversation analysis (CA) for studying naturally occurring interaction to uncover the language, practices, and processes of reasoning by which people accomplish social actions

and produce the recognizable order of everyday life (Garfinkel 2002, Sacks et al. 1974, Sacks 1992). More specifically, within that tradition this study joins a growing body of research focusing on institutions and workplaces (see Drew & Heritage 1992, Button 1993, McHoul & Rapley 2001, Richards & Seedhouse 2004, Arminen 2005). There are now many studies of professional–client interaction, such as counseling or doctor–patient interaction, calls to emergency or help services, or legal or educational settings. This article joins a comparatively smaller but growing line of research in EM and CA on professional–professional interaction, especially in socio-technical work settings such as oceanographic research (C. Goodwin 1995), a newsroom (Heath & Nicholls 1997), architectural practice (Luff & Heath 1993, Murphy 2005), surgical teams (Mondada 2003), control centers of various kinds (e.g., C. Goodwin 1996, M.Goodwin 1996, Goodwin & Goodwin 1996, Suchman 1997, Heath & Luff 2000, Luff 2002), or the airline cockpit (Nevile 2004a). A recurring point of interest in studies of interaction for collaborative work is how participants coordinate their contributions by monitoring each other's talk and visible nontalk activities and interpreting their potential significance for a jointly developed, extended course of conduct. In various ways, participants monitor one another's actions for what they can reveal about the progress of the work. Another's action, or inaction, can be monitored for its possible implications for one's own possible action, and for the direction work should take. Mutual monitoring is important for accomplishing work, and for participants to hold each other accountable for their respective contributions.

I will focus on the role of talk for monitoring and prompting the TIMING of actions for collaborative work, as a relatively under-explored area within EM and CA studies of work. While matters of temporality are significant, few studies actually focus on the impact of time for organizing interaction for collaboration (e.g., Lynch et al. 1990[1983]; Ochs & Jacoby 1997; Button & Sharrock 1998; C. Goodwin 1994, 2002).[2] For example, Lynch and colleagues (1990 [1983]:229) show how what to do next and when, in the science laboratory, is visible in scientists' arrangements of objects that are treated as mnemonics, as records of activities-so-far. Charles Goodwin (1994, 2002) analyzes how archaeologists classifying soil color at a field excavation "orient to multiple orders of temporality simultaneously . . . [and] . . . use resources constructed in the past to build records that will form the basis for action in the future" (2002:19). C. Goodwin (2002:19) describes how "a variety of different frameworks for the organization of time are implicated in even apparently simple actions such as a single utterance," what he refers to as "time in action" (C. Goodwin 2002:19). This article studies how actions for work are distributed in time (Suchman 1997). Participants create and coordinate their task-oriented actions, including talk or nontalk activity, to time and order them appropriately within a larger sequence of task-oriented actions for setting specific goals they are trying to accomplish, and relative to immediate and evolving circumstances. My principal focus is

actions' timeliness, and it might be worded as the inverse of C. Goodwin's phrase: action in time.[3]

In the airline cockpit it is critical to say and do things at the appropriate time and in the appropriate sequential order. Particular actions for flight tasks are mostly relevant, and maybe even possible, only when particular other actions have been completed. For pilots' work there is an acceptable professional timeliness, outlined for pilots in formal procedures, manuals, and training. Also, it is considered good professional practice to perform some actions as they become possible, especially during the often busy approach stage of flight, partly because this can help to avoid the prospect of later having to rush actions (Murray 1997).[4] Here I develop a line of research examining what such timeliness and sequential ordering actually looks like in talk, and how it is achieved, recognized, and made accountable in practice (Nevile 2004a, 2004b, 2005a, 2005b, 2006, in press). In short, how do pilots establish, through processes of interaction, what next and when? My specific interest is in what happens at moments when this order and timeliness are understood as potentially vulnerable – when an action is seen as relevant and due now but has not yet been initiated. How do pilots manage such moments and ensure an acceptable flow of talk for actions to perform tasks for their flight?

This article uses naturally occurring data to consider moments when an action is treated as possibly overdue. It examines a feature of talk for maintaining accountability in the temporal organization of collaborative action (Suchman 1997). I consider *and*-prefacing in talk that is evidence of one pilot's monitoring and prompting another pilot's conduct. The talk presents an action as timely, as relevant and due now but not yet initiated by the pilot responsible for doing so. The *and*-prefaced talk is evidence of how pilots themselves treat an action as noticeably and accountably absent.

INTERACTION AND GRAMMAR: *AND*-PREFACING

This article adds to research on the linkages between grammar and interaction (e.g., Ochs et al. 1996, Selting & Couper-Kuhlen 2001), where grammar is seen as not limited to the linguistic organization of words, but as "part of a broader range of resources – organizations of practices . . . – which underlie the organization of social life . . . [and] the way in which language figures in everyday interaction and cognition" (Schegloff et al. 1996:2). Of particular relevance are several studies that explore the significance of various types of preface for the trajectory and interpretability of turns in naturally occurring talk (e.g., on *oh* see Heritage 1984, 1998, 2002), and how a feature of grammatical organization can be used by one participant to prompt further talk from another – for example, to expand a turn at talk (Lerner 2004, Raymond 2004). Most directly, the article furthers understanding of the meanings and functions of *and* (e.g., van Dijk 1979; Schiffrin 1986, 1987; Heritage & Sorjonen 1994; Sköries 1998; Szymanski 1999).

One example is the role of *and* for "back-connecting" (or "skip-connecting") to display that a speaker's turn is not to be treated as cohering with an immediately preceding turn, but instead links back to the speaker's own earlier talk (e.g., Sacks 1992 v.2:348–53; Local 2004).[5] In a recent substantial review of studies of *and*, Turk (2004:245–46) notes that, apart from a few exceptions, previous research has examined sentence-level data removed from actual discourse contexts. One of these exceptions, Heritage & Sorjonen 1994, is especially significant here because it concerns *and* in naturally occurring interaction during work.

Heritage & Sorjonen (1994:1) have argued that *and*-prefacing "is a commonplace feature of interactions in 'institutional' settings . . . where the parties are occupied with a restrictive set of tasks, or address one another as incumbents of particular social roles." By prefacing their talk with *and*, participants can mark their talk as having "a routine or agenda-based character" (Heritage & Sorjonen 1994:1), and can "establish and maintain an orientation to the course-of-action character of their talk across sequences" (5). They considered *and* as a turn preface in nurses' talk to first-time mothers in informal medical encounters. They found that *and*-prefacing is a feature of nurses' question design, allowing questions to be formed as a continuous or coherent group, where this coherence is not one of topic and is maintained across a series of adjacency pair sequences. *And*-prefacing therefore allows nurses to achieve "the maintenance of a larger activity" (Heritage & Sorjonen 1994:5).

I have found elsewhere that *and*-prefacing is indeed a feature of interaction in the airline cockpit (Nevile 2006) and is a means for pilots to connect actions and maintain an ongoing sense of their conduct of their flight as a whole. One outcome of the importance of sequential order for pilots' work is that pilots' talk and conduct is mostly formally determined for them through standard operating procedures and is specified in manuals, checklists, and training, as directed by government regulations, aircraft manufacturers' guidelines, and company policies. So most of what pilots do, and how and when they do it, is structured for them in advance as many discrete actions, for which there are scripted wordings that the pilots are required to use. However, while pilots' talk for work is subject to professional constraints, as they talk on real flights pilots vary these scripted wordings in ways that situate them as part of ongoing interaction (Nevile 2001, 2004a, 2004b, 2005a, 2006). These in situ variations do specific interactional work as pilots meet in real time the contingencies of local circumstances. *And*-prefacing is one such variation. It makes salient the sequentiality of talk for actions where the official wordings can leave this sequentiality implicit. *And*-prefacing presents some new task as connected and relevantly next in a larger macro-sequence of work. A very common occasion for a pilot to preface a turn with *and* is in talk that initiates a task.

In this article I show how pilots can take advantage of the value of *and*-prefacing for making sequentiality salient, to accomplish something critical for their work: ensuring timeliness of actions for tasks. I explore instances of *and*-

prefaced turns that stand out from others considered previously and that differ in four key respects. First, the *and* prefaces a turn that is NOT officially scripted. Second, the *and*-preface is produced by the pilot who is NOT responsible for talk to initiate an action. Third, the *and*-preface DOES NOT ITSELF INITIATE AN ACTION, but is responded to with talk that does (with one exception). Fourth, the *and*-preface signals that an action is not yet initiated when it might have been by now. The action is or could soon become overdue. When a pilot is responsible for initiating a next action but has not yet done so, the pilot NOT responsible can prompt or perform the action with talk that is prefaced with *and*. Instead of talk that makes conspicuous a possible lapse (Jacoby & Gonzales 2002), *and*-prefaced talk presents the not-yet-initiated action as timely and merely occurring routinely next in sequence. I will suggest that the *and*-prefaced talk acts as a form of repair – repair not of a trouble-source in some prior or currently emerging talk, but of an action's timeliness in a developing larger sequence of actions that constitutes the pilots' conduct of the flight as a whole.

COLLECTING AND TRANSCRIBING THE DATA

The transcriptions are of filmed recordings of naturally occurring interaction and were made for a larger project on interaction in the airline cockpit (Nevile 2004a). Data for this article come from cockpit flights I made by arrangement with two Australian airlines to film pilots at work on actual scheduled passenger flights.[6] I made 18 flights in total. Twelve were on the Fokker 50 aircraft, a 40–50-seat twin propeller regional airliner. These flights ranged in duration from 30 minutes to 2.5 hours, but most were between 1 and 1.5 hours. The other six flights were on Boeing 737 aircraft, a twin-engine jet airliner seating approximately 130–140 passengers. These flights lasted a little over an hour. On all flights I sat in the cockpit observer/training seat, or "jumpseat," which is positioned in between and immediately behind the seats of the two pilots. I recorded entire flights, from engine pre-start to shutdown. Recordings captured the pilots' talk to each other, their talk to others outside the cockpit (e.g., air traffic controllers, passengers), the many cockpit alert sounds and automated voice warnings, and external noises (e.g., engines). I transcribed 12 flights in full, and the other six partially as required for targeted analysis. The examples here are for various tasks and come from various flights and crews.

The transcription notation used here is adapted and simplified from a system originally developed by the conversation analyst Gail Jefferson (recent variations can be found in ten Have 1999 or Jefferson 2004). The following transcription conventions are specific to the aviation data and should be noted. First, I use *italics* to represent talk outside the cockpit, typically talk over the radio to or from air traffic controllers. Second, I identify pilots with combinations of C for captain, FO for first officer, PF for pilot-flying, and PNF for pilot-not-flying (these roles are explained below). Third, I use fictitious aircraft call signs and

generic descriptors such as "Airline One Two," "Destination airport," "City," and "navigation point" to conceal the identity of airlines, flights, and pilots. "Data flight" refers to the flight on which the recording was made.

My analyses and claims about the data are informed by my knowledge of the commercial aviation industry and its practices, including crew training and operating procedures, terminology, radio protocol, aircraft types, cockpit instrumentation, and the functioning of aircraft systems, as well as issues of specific interest to the industry concerning safety and pilot performance. I read numerous general texts on aviation and commercial aviation, official accident reports, operations manuals for particular aircraft, and company training materials. Airlines restrict access to some of their texts and materials, and so I am not able to quote from them directly. I read government and industry research reports on flight crew performance, and scholarly research in human factors psychology, particularly aviation human factors. I studied commercially available information videos on various aircraft types, showing pilots at work during scheduled flights and in sessions in full mock-up cockpit simulators. I attended a conference on aviation psychology, and I met with air accident investigators, airline pilots, and human factors research psychologists working with military flight crews. As a consultant to investigators, I have transcribed and analyzed recorded voice data for air accidents (e.g., Nevile & Walker 2005).

It is important to know a little about cockpit roles. On any flight each pilot holds two formal roles. One is associated with professional career status as either a captain, with senior ranking, or first officer. The other role can vary from flight to flight and relates to control of the aircraft. On any flight one pilot acts as pilot-flying (PF) and the other acts as pilot-not-flying (PNF). The PF is in control of the aircraft and is responsible for the routine planning and decisions for the flight. The PNF assists the PF (e.g., is responsible for most talk over the radio). A first officer can act as the PF, but a captain always retains ultimate command and responsibility. I discuss other details of these roles as required when analyzing examples.[7]

The transcription segments are by nature technical and can sometimes be difficult to follow for those unfamiliar with aviation. I cannot explain every detail, so instead I prioritize explanation of what is necessary to highlight the significance of *and*-prefacing for prompting action. For example, I will not discuss any overheard radio talk that the pilots treat as having no impact on their conduct of the flight – that is, it does not influence their talk or activity. I will not explain what is going on during periods of silence, unless this relates to the action in focus. Actually, much of pilots' time is spent sitting still and silently looking forward to monitor instrument panels. Pilots routinely treat silences of many seconds, or even many minutes, as unremarkable (see data segments in Nevile 2004a).

ENSURING TIMELINESS OF ACTIONS

My interest is in how pilots ensure timeliness of actions by using *and*-prefaced talk to bring an action to attention, where that action is timely, due around now, but has not yet been initiated by the pilot responsible for doing so. A pilot presents the action as being relevant and appropriate now. The first four examples show how *and* prefaces a prompt for an action, and then two examples show other possibilities. I will limit my discussion to the placement and role of *and*-prefaces, and so I will make only occasional comments on other details of pilots' turns. Elsewhere I provide extensive analyses of whole transcription segments (Nevile 2004a, 2004b).

Prompting an action

The action that is initiated as timely might be a required call over the radio to an air traffic controller. The pilot typically responsible for most talk to air traffic controllers is the pilot-not-flying. If the PNF has not yet made a particular call, the pilot-flying can present the call as appropriately timed now by prompting this action. The first two examples show this occurring.

(1) 'and if you could let him know'

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 1                    (5.1)
 2   FO/PNF:     (        ) (.) a thousand to altitude.
 3                    (0.4)
 4   C/PF:       check.
 5                    (0.5)
 6                    ((altitude alert buzzer))=
 7   C/PF:       =alert seven thousand.
 8                    (1.0)
 9   FO/PNF:     check.
10                    (7.4)
11   Approach:   〉echo yankee india〈 descend to two thousand five hundred.
                     {this is overheard radio talk, not concerning the data flight}
12                    (1.3)
13   EYI:        to two thousand five hundred (.) 〉echo yankee india.〈
                     {this is overheard radio talk, not concerning the data flight}
14                    (1.1)
15   C/PF:       okay I'm going to hand [fly] from here.
16                                       [((aural alert indicating autopilot is
                     disengaged))]
17                    (0.5)
18   FO/PNF:     check.
19                    (4.3)
20   C/PF:    →  and (if ) you could let him know we're approaching.
21                    (1.3)
22   FO/PNF:     Airline One Two is approaching seven thousand.
23                    (0.8)
24   Approach:   Airline One Two descend to five thousand.
25                    (0.9)
26   FO/PNF:     five thousand, (.) Airline One Two.
27                    (0.6)
28   C/PF:       five thousand is checked.
29                    (0.4)
30   C/PF:       check.
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Here a flight is on descent, and the segment begins as the FO/PNF calls to announce that the flight will soon be 1,000 feet from the target altitude (7,000 feet) that they had set with the plane's automated systems (line 2, *a thousand to altitude*). Later in the segment the C/PF *and*-prefaces his prompt of the FO/PNF to inform the approach air traffic controller of the altitude progress: *and (if) you could let him know we're approaching* (line 20). The FO/PNF's call of *a thousand to altitude* (line 2) is acknowledged by the C/PF (line 4), then 0.5 seconds later a buzzer sounds as they descend through this 1,000-to-altitude mark (line 6). The buzzer is acknowledged by both pilots (lines 7–9), many seconds later there is an overheard radio call (lines 11–13), and then the C/PF disengages the autopilot (lines 15–18). Some 4.3 seconds after this the C/PF asks the FO/PNF to call and inform the controller of their altitude progress.

In general, as pilots descend through a number of progressively lower altitudes assigned to them by air traffic controllers, when possible they can prefer to make a continuous descent, rather than leveling out at any particular altitude before later descending to the next altitude. To achieve this continuous descent they will often call the controller as they approach the current assigned altitude, hoping to receive permission to continue descending to a new altitude, or may even explicitly ask for a new altitude. Making this call is the responsibility of the PNF, on this flight the FO, and it becomes a particularly relevant and timely action once it is clear that the flight is approaching a current assigned altitude. Here the pilots have noted that they are approaching their assigned altitude, and the altitude progress was confirmed by an altitude alert buzzer (there are also alert lights).

However, the FO/PNF has not yet made a call to the controller to seek a new altitude, and it is now over 20 seconds since the pilots' first exchange about the altitude (lines 2–4). So there is a possibility that if this call is not made, it could become necessary for the pilots to level out. The C/PF initiates the action by saying *and (if) you could let him know we're approaching* (line 20), and the FO/PNF then makes the call (lines 22–26). By *and*-prefacing his talk, the C/PF does not explicitly hold the FO/PNF to account for not yet making the call (as a lapse), despite having the opportunity to do so, especially during the silences at lines 10 and 19. That is, the C/PF does not say directly words that convey "You haven't done X." Instead, the *and*-preface allows the C/PF to present the call to the controller as just another routine next relevant action, that "you can do X now." The C/PF presents calling the controller as a sequentially relevant action given the pilots' now established shared understanding that they are approaching an assigned altitude. His talk can draw on their professional knowledge of the implications for their flight and their work together if they actually reach that altitude without first receiving a new one.

(2) 'and ah request the lineup'

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 1   C/PF:            and it's ah my go wi:th (.) go-around ASE:L left (0.2) autopilot
 2                    command=
 3   Tower:           =car six nine remain off runway two four.
                      {this is overheard radio talk, not concerning the data flight }
 4   C/PF:            engine failure as discussed.
 5                    (0.7)
 6   Car 69:          ca::r six nine.
                      {this is overheard radio talk, not concerning the data flight }
 7                    (0.5)
 8   FO/PNF:          check.
 9                    (3.2)
10   C/PF:     →      and ah request the lineup (      ).
11                    (0.6)
12   FO/PNF:          yep.
13                    (0.2)
14   FO/PNF:          North tower (0.3) one two five,
15                    (1.3)
16   FO/PNF:          City tower (0.6) gidday Airline One Two request lineup.
17                    (1.5)
18   Tower:           Airline One Two gidday (.) backtrack approved lineup.
19                    (0.5)
20   C/PF:            li[neup
21   FO/PNF:            [backtrack approved and lineup (.) ⟩Airline One Two⟨.
22                    (0.5)
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As in example (1), here we see the same kind of action on another flight, as the pilots are taxiing the aircraft to the runway for takeoff. The pilots have earlier received clearance from an air traffic controller to taxi to the runway. The next relevant action, if they are ready, would be to enter the runway and lineup (position themselves) for takeoff. Rather than coming to a stop just before the runway, as they are now cleared to do, the pilots can prefer to continue taxiing onto the runway, but for this the pilots need a new clearance from the controller: permission to lineup. Here the C/PF finishes briefing the FO/PNF with critical details for the conduct of the takeoff (lines 1–2, 4). After a following 3.2 seconds of silence, the C/PF says *and ah request the lineup ( )* (line 10).

The C/PF's talk, *and ah request the lineup ( )* (line 10), is a prompt to the FO/PNF to call the controller to seek permission to lineup. We know the FO/PNF understands the talk this way because after acknowledging hearing the instruction (*yep*, line 12), he then calls the controller to do just this (lines 16–21). The C/PF's talk at lines 1–2 and 4, providing the final details for the takeoff, together with the aircraft's progress toward the runway, could have been understood by the FO/PNF as making possible a call by him to the controller to seek the next clearance required to enter the runway. Calling the controller is his responsibility as PNF on this flight. However, he did not immediately make this call. A delay could unnecessarily slow their progress to the runway. The C/PF's talk can therefore present such a call as a timely action. It places the call as a routinely sequentially next action given the trajectory of

the pilots' conduct so far to taxi to the runway and prepare and position the aircraft for the takeoff.

(3) 'and you can tell him that we've left seven and a half'

1			(1.0)
2	C/PF:		three zero zero (.) so he's out there.
3			(0.5)
4	FO/PNF:		okay.
5			(0.5)
6	C/PF:		yeah we'll keep going °down°.
7			(0.6)
8	FO/PNF:		*okay yeah well you're out to the north west we'll keep on going down*.
9			(1.1)
			{some turns omitted, relating to other tasks and not about aircraft BYG}
10			(1.2)
11	C/PF:		he's seven and a half isn't he.
12			(0.3)
13	FO/PNF:		yeah he's seven and a half.
14			(2.1)
15	FO/PNF:		well he's out ah: (1.9) the other side of that lake.
16			(0.3)
17	C/PF:		yeah.
18			(25.4)
19	FO/PNF:		*City Airline One Two ⟨changing to: the⟩ Town CTAF (.) one two five four*.
20			(2.2)
21	Center:		*Airline One Two*.
22			(2.2)
23	C/PF:	→	and you can <u>tell</u> him that we've left seven and a half so he doesn't have to worry
24			about it.=
25	FO/PNF:		=yeah.
26			(1.0)
27	FO/PNF:		*bravo yankee golf (.) ⟩Airline One Two⟨ we've left seven and a half*
28			*thousand see ya*.
29			(1.9)
30	BYG:		*bravo yankee golf (.) (thanks)*.
31			(1.5)

This example also shows a prompt to a pilot-not-flying to make a radio call, only this time the call is to another aircraft, not an air traffic controller. The pilots had earlier become aware of another aircraft, with the identifying callsign *bravo yankee golf* (BYG), reporting on the same radio frequency as them, and therefore flying in the same controlled airspace. The data flight is on descent and will pass through the altitude at which BYG is flying. Therefore, the pilots must be certain of BYG's location and movements relative to their own flight, and they must communicate with BYG to ensure that the two aircraft remain "separated" from one another – that they do not collide. Some minutes earlier the pilots had discussed BYG's location, its directional heading, and its current position near a particular lake. As a consequence, the FO/PNF had told the pilot of BYG that

his own aircraft would level out at 8,500 feet, a safe altitude, while he discussed with his fellow pilot to determine exactly where the two aircraft were. This is an entirely routine radio exchange according to procedures that the pilots are required to follow. The segment here begins with the C/PF deciding that because of the other aircraft's heading of 300 degrees (*three zero zero*, line 2), and its distance from them (*so he's out there*, line 2), which the FO/PNF confers (*okay*, line 4), they will not level out but instead will continue their descent through BYG's altitude (*yeah we'll keep going °down°*, line 6). The FO/PNF calls BYG with this information (line 8).

Line 23 is the line of interest. As the segment continues, the C/PF and FO/PNF talk to reconfirm their understanding that BYG is flying at 7,500 feet and is distant from them (lines 11–17). Then follow over 25 seconds without talk, before the FO/PNF talks to air traffic control to announce a change in radio frequencies (lines 19–21). In the meantime, their aircraft has descended through 7,500 feet. Two seconds after the controller's reply to the FO/PNF, the C/PF *and*-prefaces a prompt to the FO/PNF to call BYG to say they have left BYG's altitude: *and you can <u>tell</u> him that we've left seven and a half so he doesn't have to worry about it* (line 23).

Calling the other aircraft now is not an action the FO/PNF must do, but it is an action he could do, and it is good practice to do so. Recall that the FO/PNF had already told BYG that *we'll keep on going down* (line 8), and the pilots have acted accordingly and descended through the critical altitude. Nevertheless, calling BYG to say their own aircraft has actually left the critical altitude allows the pilots of both aircraft to be certain that the planes are no longer "traffic" to each other. They need no longer consider each other's presence. Making such a call is a thorough approach to radio communication to ensure safe separation. It makes explicit that communication between the aircraft can be considered no longer relevant and is now closed. If the call is not quite a next-relevant action, it is at least a timely next-possible action, and it could well be considered a next-preferable action.

The FO/PNF is the pilot who would be responsible for making such a call, but he does not do so. It is possible for him, like the C/PF, to monitor his own aircraft's descent, even during his call to the air traffic controller (Center) (lines 19–21), and/or in the 2.2 seconds after that exchange (line 22). However, calling the controller places on the FO/PNF an extra demand, and that can divert his immediate attention from monitoring his aircraft's changing altitude and the significance of change for maintaining separation from aircraft BYG. He may not think to make the closing call to BYG. The C/PF *and*-prefaces his prompt to present the call to BYG as a timely action, as something that can appropriately be done now.

So far in the first three examples, the first officer, as the pilot-not-flying (FO/PNF), had not yet initiated an action, and the captain, as pilot-flying (C/PF), used *and*-prefaced talk to present that action as noticeably absent and to prompt

its initiation. The FO/PNF subsequently initiated the action. Prefacing the turn with *and* presents the action and its prompted request as timely and occurring routinely next in sequence. A vulnerability to routine is noticed and addressed, and the routine is maintained.

(4) 'and the descent checks?'

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 1                      (2.6)
 2   A223:          〉 Airline Two Two Three 〈 we have runway in sight.
                      {this is overheard radio talk, not concerning the data flight}
 3                      (0.5)
 4   Approach:        Airline Two Two Three. (.) further descent in ah (.) four: track miles.
                      {this is overheard radio talk, not concerning the data flight}
 5                      (0.9)
 6   A223:            Two Two Three.
                      {this is overheard radio talk, not concerning the data flight}
 7                      (16.6)
 8   (FO/PF):         errm.
 9                      (4.8)
10   C/PNF:     →     a:nd the: descent checks?
11                      (0.5)
12   FO/PF:           yeah go ahead °descent checks°,=
13   C/PNF:           =landing data,
14                      (0.6)
15   FO/PF:           is ah checked set,
16                      (0.3)
                      {pilots continue the checklist}
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Here, *and* is used to preface talk that prompts the other pilot to initiate an action. A captain, this time as pilot-not-flying (C/PNF), *and*-prefaces talk to present an action as timely. The FO, as the pilot-flying and in control of the plane, has not yet called for the C/PNF to initiate the descent checklist. The C/PNF's *and*-prefaced talk presents calling for the checklist as timely in the sequence of actions for the flight. But this time the talk is uttered with rising terminal pitch and is heard as a prompt for the FO/PF to initiate the action.

This segment occurs at the descent stage of a flight and begins with an overheard radio call between the pilots of *Airline Two Two Three* and the Approach air traffic controller. After many seconds without talk (lines 7 and 9), the C/PNF says *a:nd the: descent checks?* (line 10), to which the FO/PF replies *yeah go ahead °descent checks°* (line 12). The C/PNF then talks for the first item of the checklist (*landing data*, line 13). Calling for the checklist, and deciding exactly when to do so, is the responsibility of the pilot-flying, here the first officer. However, this call always occurs as part of a routine series of actions for an approach, and the FO/PF has not yet made the call. The C/PNF presents the checklist as timely, as occurring relevantly now in the trajectory of actions for this stage of the flight. By talking when he does, the C/PNF is asking if he can be called on to begin the action now, if it is now possible. The C/PNF's talk orients to an understanding that it is often good professional practice to perform actions when possible, especially during the busy approach stage of flight (Murray 1997), to avoid the prospect of having to rush actions later.

The C/PNF's talk prompts the FO/PF to initiate the action, and so to call on the C/PNF to act. The FO/PF is prompted to add to previous talk and so progress the sequence of actions for the flight. By prefacing his talk with *and* the C/PNF frames the prompt for the checklist in a form that is recognizable as routinely used by pilots to initiate actions and place them as relevantly next. The C/PNF does not address directly that the FO/PF has not so far called for the checklist. We can know that the FO/PF understands the C/PNF's talk to be a prompt to call for the checklist because 0.5 seconds later the FO/PF does exactly this (line 12). The FO/PF's wording includes both a response to the C/PNF's turn (*yeah go ahead*), so accepting and confirming the action as legitimate, and also talk that formally initiates the checklist action (°*descent checks*°). Therefore, despite his talking in response to the C/PNF, the FO/PF's wording nevertheless presents him as producing talk consistent with initiating the next action, and so to be producing the formal wording for which he is accountable. The C/PNF's talk ensured the timeliness of the action.

In the examples so far, one pilot *and*-prefaced talk to prompt another pilot to initiate an action for a task. The next examples show different possibilities.

Performing or delaying an action

(5) Performing an action: 'and you've got cruise power'

```
                    {the pilots are conducting the after takeoff checklist}
 1                  (0.4)
 2   C/PNF:         after takeoff checklist completed.
 3                  (2.6)
 4   C/PNF:         City Airline One Two's maintaining one zero thousand.
 5                  (1.7)
 6   City:          Airline One Two.
 7                  (6.4)
 8   C/PNF:         ⟩just have a⟨ quick word with the: (.) cabin crew.
 9                  (0.6)
10   FO/PF:         okay.
11   C/PNF:         ( ) (st[ay in there).
12   ( ):                 [( )
13                  (3.1)
                    {C/PNF talks via intercom to cabin crew member outside cockpit.
                    Two turns omitted}
14                  (13.9)
15   C/PNF:    →    and you've got cruise power there as well.
16   FO/PF:         cruise power thank you.
17                  (17.8)
```

Instead of talking to prompt some action that the responsible pilot has not yet initiated, the non-responsible pilot may actually perform the action and then *and*-preface talk to announce it as done. Thus, the responsible pilot does not produce the talk ordinarily required to initiate the action. Example (5) occurs soon after a flight has reached its assigned cruising altitude as the pilots complete the after-takeoff checklist (line 2). It is timely for the pilot-flying, here the first officer (FO/PF), to call for the pilot-not-flying (here C/PNF) to select cruise power, a

next appropriate engine power setting. According to the airline's operations manual, the procedure to follow is for a PF to call *cruise power*, and for a PNF to then push the relevant button and call *cruise power selected* to complete the sequence of talk and nontalk activity. However, the FO/PF does not make this call, and instead, at the end of nearly 14 seconds without talk, the C/PNF pushes the button and says *and you've got cruise power there as well* (line 15), to which the FO/PF replies *cruise power thank you* (line 16). So, the C/PNF selects *cruise power* and calls it to be done, even though he has not yet been asked to perform the action, and he prefaces his turn at talk with *and*.

The C/PNF's talk is the first for the action to select cruise power, and occurs AFTER the C/PNF carried out the nontalk activity, pushing the relevant button. This activity would have been required of him had the FO/PF spoken to initiate the action. The PF, here the FO, is ordinarily responsible for initiating this action. The FO/PF has had some 13.9 seconds since prior talk to initiate the action and has not yet done so, but the C/PNF does not use wording that draws attention to the absence, so far, of a call for cruise power from the FO/PF. The C/PNF's talk does not directly hold the FO/PF to account for this – for example, with talk of the form "you didn't do X" or "shouldn't we have done X now?." Rather, the C/PNF produces talk that is oriented to getting on with the job of flying the aircraft, placing selection of cruise power unremarkably into the appropriate timing for the sequence of actions for their work. The C/PNF's *and*-preface presents selecting cruise power as a timely and next relevant action for a flight newly established at the cruising altitude.

Another outcome of the C/PNF's talk is that it allows the FO/PF to produce talk, *cruise power thank you*, that is well suited as a routine and unproblematic response.[8] The two pilots talk to present the action as not possibly delayed or forgotten, but as apparently routine. Note that as the initiator of talk here, the C/PNF does not produce what would have been for him the scripted wording were he responding to the FO/PF, that is, *cruise power selected*. Instead, he produces an *and*-prefaced turn that makes salient the sequential placement of selecting cruise power as one action of many for the flight, and a relevant next one now.[9] The FO/PF's reply, *cruise power thank you* (line 16), demonstrates both awareness of the task performed and acknowledgment of the C/PNF's conduct. It includes the wording *cruise power* that would have been required of the FO/PF had HE actually spoken to initiate the action. That is, the FO/PF says not just the acknowledging *thank you*, but also the formal wording that puts him on record for his understanding of the action that has been performed.

(6) Delaying an action: 'and … I'll give the company a call in a sec.'

```
1                (29.9)
2    FO/PF:      ⟩there's a big⟨ mine up here called {name omitted} (0.7)
3                approach ah onto:: (0.4) ah: runway one seven, (0.4) joining left
4                crosswind, (1.1) ah: landing flap twentyfi:ve, (0.5) overshoot (.) make
5                a left visual circuit back to one seven, (1.5) ah: (.) fuel on board on
```

6		arrival we got enough to go back to City, (0.9) a::nd ah: (1.3) Vref
7		ninety eight, (2.3) ah Vfr a hundred and eight (0.3) Vcl a hundred and
8		thirteen (1.0) a:nd app- (0.9) approaching at a hundred and thirteen,
9		(1.2)
10	C/PNF:	set (0.2) crosschecked,
11		(1.1)
12	FO/PF:	okay (.) and obstacl:es oh it's just the (0.5) the small town to the
13		south,[10]
14		(6.5)
15	C/PNF:	ye:p (.) that's fine.
16		(0.8)
17	FO/PF:	okay,
18		(0.6)
19	FO/PF: →	a:nd ah: (1.3) I'll give the company a call in a s:ec.
20		(1.8)
21	C/PNF:	yeah.

This example shows a different way for *and*-prefaced talk to orient to timeliness of actions and pilots' accountability to time actions appropriately as next parts of a larger sequence. One pilot does not *and*-preface talk to prompt or initiate an action that the other pilot has not yet begun. Rather, the pilot actually responsible for performing the action produces *and*-prefaced talk to announce that the action, potentially perceived as now-due, will not be performed just yet. The *and*-prefaced talk makes public that a possibly now sequentially relevant action will be delayed. After completing a briefing for a forthcoming descent and approach, the FO/PF says he will NOT now be calling his airline, referred to as *the company* (line 19). In this airline's operating procedures, calling the company is a possibly next relevant action when preparing for descent (to indicate estimated arrival time and fuel consumption). The FO/PF says that he will do this action *in a s:ec* (line 19).

So the action to call the company is presented, with the *and*-preface, as timely, but it is then delayed. It is presented as a relevant next action but will not be occurring just now, and its absence is not to be taken as a lapse. The FO/PF's talk allows him to head off any talk from the C/PNF to initiate the action, to use the same feature of talk instead to forestall the kind of prompt for action that we saw in the previous examples. This is successful, as the C/PNF replies *yeah* (line 21) and then moves to talk concerning another action. Because it can make salient the sequentiality of actions (Nevile 2006), an *and*-preface can be drawn on as a resource for demonstrating orientation to appropriate timeliness for work, even when that timeliness cannot be achieved.

DISCUSSION: REPAIRING TALK FOR AN EXTENDED SEQUENCE OF ACTIONS FOR TASKS

It seems in the examples here that there is something being repaired, though in conversation analysis terms there is no trouble-source turn, no actual problem of speaking or hearing or understanding an utterance: Nobody is producing or receiving problematic talk (e.g., Jefferson 1974, 1987; Schegloff 1987, 1997, 2000;

Schegloff et al. 1977).[11] There is a kind of TROUBLE, only it concerns talk for acceptable and accountable progress within a setting-specific, formally predetermined sequence of actions for tasks. The *and*-prefaced talk is presented as signaling an action as now-absent, signaling that one pilot is "relevantly not talking" (Schegloff 1996:15). We know the talk is understood that way because the action is then initiated.[12] The talk does NOT repair progress within or from a current sequence (cf. Pomerantz 1984 on speakers' pursuit of response, or Lerner 2004 and Raymond 2004) – for example, as the second turn of an adjacency pair – but rather signals progress TO a professionally known and necessary next action that is due but not yet begun. The *and*-prefaced talk repairs an action's timeliness. It would seem to be what Sacks 1970 described, in an unpublished manuscript, as "forward looking" correction (cited and discussed by McHoul 2005:119). However, what is corrected here is not the structure and meaning of an emerging turn or adjacency pair sequence, but the structure of an extended and jointly produced agenda-based sequence of actions. Here we have something like a "repair of a sequence's proper development" (Schegloff 1997:510, citing Jefferson 1981), and "a repair of a sequence's progressivity" (Schegloff 1997:512), but for a larger collaborative project of sequenced actions for tasks.[13] An absent action is the obstacle to a "sequentially implicated next" action (Schegloff et al. 1977:380). We could liken the impact of talk here to repairs in group interaction at a music rehearsal. Keating (1993:420) found that in rehearsals, repair organization was "part of a larger set of resources for negotiating decision-making and responsibility and for co-constructing group performance … and invites collaboration." In the airline cockpit, *and*-prefacing occurs as pilots collaborate to ensure timely performance of flight actions for work.

Examples (1)–(4) could then be instances of other-initiated self-repair, and they are consistent with the argument of Schegloff et al. (1977:377) that "techniques for other-initiation are techniques for locating the trouble source," where here the trouble is one of an action's timing. Here, the pilot NOT responsible for initiating an action, and so not responsible for the timing problem, says something, and subsequently the pilot actually responsible produces the talk that officially initiates the action. Example (5) is different and is like other-initiated other-repair. Here the captain, NOT the pilot responsible for initiating the action, actually performs the activity required in the absence of talk from the first officer calling on him to do so. The captain pushes the button to select cruise power and then talks to announce that he has done so. In example (6), a pilot responsible for a possibly now-due next action produces talk to say that the action is delayed. It is therefore most like self-initiated self-repair where it is preempting another's possible interpretation of the action's timing as reparable. The action's possible (soon) now-absent status can instead be repaired, in that its timing is accounted for. The action's absence can now be understood as not representing a lapse in the first officer's conduct, but as knowingly and competently delayed.

If we interpret most examples as self-repairs of an action's actual timing, then the examples might be evidence that repair in the airline cockpit is consistent with the preference for self-repair found for mundane conversation (Schegloff et al. 1977). However, a difference from ordinary conversation is that here, actually doing the repair by initiating a next action is tied to the pilots' professional responsibilities to act according to specific roles. That is, according to procedures spelled out in operations manuals, it is the first officer's formal duty to call an air traffic controller (examples 1, 2), or to begin a checklist (4), as either the pilot-not-flying or the pilot-flying on the particular flight, and so a captain who instead does these actions would be doing something professionally accountable. That captain would be doing the first officer's job. In a sense this does happen in example (5), when the captain does not wait for the required talk. The captain does not say something like *and do you want cruise power?* to prompt talk from the first officer to formally initiate the action. We had earlier seen another captain say *a:nd the: descent checks?* (4, line 10), which prompted the first officer to produce talk that formally initiated the pilots' joint conduct of the checklist (*yeah go ahead °descent checks°*, line 12). Instead, in (5) the captain just performs the action by pushing the button, and then later talks to say he has done so. The captain's conduct is accepted by the first officer as unproblematic (*cruise power thank you*, line 16).

The examples here can therefore be valuable for indicating which flight actions are treated by pilots themselves, interacting on actual flights, as allowing for variation in the pilots' conduct relative to their formal responsibilities associated with individual roles like pilot-flying and pilot-not-flying. Which actions are treated as acceptably other-repaired, and which as only other-initiated?[14] We saw that one captain, as a pilot-not-flying, pushes the cruise power button BEFORE being formally asked to. However, another captain, as a pilot-not-flying, does NOT say the first item of a checklist before the first officer produces the talk formally to begin that checklist. We might see here a form of evidence for pilots' orientation to perform some actions for tasks, like checklists, more strictly according to formal procedures and flight roles.

In collaborative work it is possible that repair of another's contribution could be heard as pointing out a lapse or omission – in the data here, that a pilot had failed to initiate an action that ought, by now, to have been initiated. In general, one way that someone's perceived lapse can be identified and brought into talk is explicitly to refer to it as a lapse, or to refer directly to the absence of the action so far, with talk like *you didn't do . . .* or *you forgot to do . . .*, or *by now we should have done . . . .* Such talk could be heard as complaining (Schegloff 1988) and as a form of critique or negative observation (Jacoby & Gonzales 2002).[15] The talk can make the possible lapse itself a focus of attention and talk, AS a lapse, and can make salient an interpretation that it is the other who is individually responsible for it. However, the examples here show that *and*-prefaced talk does something different. It can bring a possibly lapsed action into the emerging

trajectory of actions and have it initiated unproblematically. The *and*-prefaced talk presents the action as just something to do next, routinely and appropriately. Importantly, it can do this because it draws on a feature of talk that pilots use routinely and unremarkably to initiate and sequence actions for their work (Nevile 2006). In this way, the *and*-preface can smooth the process of going on record as monitoring another's conduct and making salient another's possible lapse. It can mitigate the force of prompting the other to address the lapse. Indeed, the *and*-preface can make the prompts hearable AS prompts, rather than as instructions. The repair work is embedded (Jefferson 1987) within talk that makes salient the sequentiality of actions to maintain timely progression through the ordered tasks for the flight. In this way, *and*-prefacing in pilots' talk has something in common with its occurrence in nurses' talk to new mothers. Heritage & Sorjonen 1994 found that *and*-prefacing allowed nurses to present troublesome matters as occurring within the routine course of questions.[16]

To highlight these points, and by way of contrast to show what CAN otherwise happen, I will briefly discuss an example in which talk for noticing an absent action IS received problematically, and in which there IS some evidence of acknowledging a lapse. The prompting talk is NOT *and*-prefaced.

(7) 'oh (.) top of descent'

```
 1                (1.8)
 2   C/PNF:       yeah I'll just give ⟩you (       ) call at your⟨ top of descent,
 3                (0.4)
 4   FO/PF:       yeah sure.
 5                (1.8)
 6   C/PNF:       you have top of descent,
 7                (1.0)
 8   FO/PF:       okay.
 9                (0.5)
10   FO/PF:  →    oh (.) top of descent is: ah: (0.4) ah I'll stay out of the bumps Ronnie
                  so I'll make
11                it ah (0.7) twentyfive mile?
```

Here, a captain, as pilot-not-flying, offers to initiate a new action (*I'll just give ⟩you ( ) call*, line 2) whose timing is contingent upon knowing the flight's "top of descent," the distance from the airport at which the flight will begin its descent for the landing. The first officer, as the pilot flying on this flight, is responsible for planning where this point will be, and for briefing the captain (as the PNF) about it. So the captain's offered new action is dependent for its timing on this briefing. The first officer hears the captain's offer and accepts it (*yeah sure*, line 4), but does not begin the briefing. Evidence that the captain's offer was also a prompt for the briefing is that the captain then pursues it with *you have top of descent* (line 6). The captain treats the briefing as timely now. The first officer replies with *okay*, but still no briefing. Then 0.5 seconds later, the first officer DOES begin the briefing (*oh (.) top of descent is: ah: (0.4) . . .* , line 10). His turn is prefaced with *oh*, signaling that he has undergone a change of state (Heritage 1984), that he now understands the captain's talk to have been prompting him

for action. Beyond this segment the pilots discuss the descent point, and then the captain makes a radio call to broadcast to the controller and any surrounding air traffic their aircraft's position and movement, in preparation for their descent. This is likely the *call* to which the captain referred previously (line 2), the action delayed by the first officer's absent briefing.

CONCLUSION

To collaborate for work, participants interact to create and coordinate their contributions, and they attend to one another's conduct to complete tasks and goals for the setting in ways that they themselves treat as acceptable. This article has addressed a relatively under-explored area for ethnomethodological and conversation analytic studies of the sequential organization and locally accomplished orderliness of collaborative work: how time organizes interaction, or action in time. I used naturally occurring data, transcriptions from video recordings of airline pilots interacting in the cockpit on actual scheduled passenger flights. I considered the role of talk, and specifically *and*-prefacing, for ensuring timeliness of actions for tasks and maintaining accountability in the temporal organization of collaborative conduct (Suchman 1997). The article's findings can most directly inform research on socio-technical settings where work actions are strictly ordered and dependent upon specific timings.

This investigation was undertaken within the commitment of studies in ethnomethodology and conversation analysis to explore and uncover the taken-for-granted situated production of orderliness of everyday life, and more specifically order for doing work. Despite all the computer automation, the displays and dials and lights and buttons and switches, the airline cockpit is a site rich in language. Pilots' work together is dependent on spoken interaction (Nevile 2004a). Much of pilots' time is spent monitoring instrument panels for evidence of aircraft performance, changing flight circumstances, and outcomes of their own actions. However, pilots also monitor one another's conduct for its contribution and acceptability for the job at hand. I considered evidence in talk for how pilots monitor actions' timing and orient to timing's importance and accountability. Actions for tasks in the airline cockpit are mostly performed in strict sequential order where the appropriateness of some action is dependent on WHEN it is done. *And*-prefacing is part of talk for presenting and creating situated awareness of how work is progressing, of how actions are emerging in sequence and in time.[17] Most specifically, the article has shown how time is situated and made relevant and intelligible in language and practices for accomplishing order for work.

We saw here that *and* occurred as part of a locally produced (there and then) means for dealing with moments when orderliness for work was treated and acted upon as vulnerable. In this sense, the approach here is consistent with a major principle of method for ethnomethodological studies. As Rawls (2002:7) notes in a discussion of Garfinkel's foundational thinking and breaching experiments,

"The taken for granted orderliness of everyday life is often revealed by problems, those times when participants fail to achieve orderliness." Finding how orderliness can be lost "reveals the ways in which that world was a made world in the first place" (Rawls 2002:33).[18] I considered the place of *and* in turns at talk THAT ARE THEMSELVES EVIDENCE of pilots treating timeliness in order for their work as possibly vulnerable to loss, of treating an action as now-due but still absent. As an analyst, I drew on my background knowledge of procedures and cockpit roles to know the sequence of actions for a flight, of what happens roughly when, but NOT to claim that an action was overdue. For that claim I relied on the evidence of what the pilots themselves did. Sacks (1992, v.1:293–94, original italics) asks:

> How do you go about talking about *absences*. Something is absent. Something didn't happen ... There's a tremendously tricky problem about talking about things that haven't happened ... What we can perhaps do is see whether there are some methodical ways that persons arrive at such noticings ... There are some occasions under which absences are noticed. If we can characterize the bases for them, we can come up with a usable notion of 'absence'. And such a notion could perhaps be generalized beyond the specific occasion that we happened to construct it in relation to.

I have gone a little way toward responding to this "tricky problem" for one setting. The examples showed moments when a pilot NOT responsible for talking to initiate an action spoke out of turn and used unofficial unscripted *and*-prefaced talk to present an action as timely but noticeably absent. Making absence salient was a means for ensuring actions' acceptable performance in time. The findings are generally consistent with Turk's (2004:246) conclusion that speakers use *and* to bridge gaps and restore coherence when there are discontinuities of some sort in interaction. Here, *and* was a resource for dealing with the threat of discontinuity for actions' timing and the acceptable progress of work.

This article points to the value of seeing features of grammar as consequential for just how work gets done in particular settings, and especially for organizing work in time. Examining links between grammar and sequential structure in interaction can help identify local means for creating and maintaining order for agenda-based activities. In this way, we further what Duranti (2003:332) refers to as an "interest in capturing the elusive connection between larger institutional structures and processes and the 'textual' details of everyday encounters." What we captured here was evidence of airline pilots' orientation to the importance of timeliness and strict sequential order for performing flight actions. I presented evidence in talk for how monitoring and prompting another's conduct was accomplished as a relevant social action for doing collaborative work. I suggested that an *and*-preface mitigated such talk and allowed it to be received unproblematically by not making conspicuous another pilot's potential lapse, but instead presenting an absent action as just something appropriate to do next. An *and*-

preface can do this because pilots commonly *and*-preface officially scripted talk for TIMELY initiation of actions (Nevile 2006). The article supports the view of Schegloff et al. (1996:2–3) that "matters of great moment are missed if grammar's order is explored as entirely contained within a single, self-enclosed organization ... Grammar's integrity and efficacy are bound up with its place in larger schemes of organization of human conduct, and with social interaction in particular." Getting timing right is always a matter of great moment for flying airliners, and it is something to which *and* can contribute.

NOTES

[1] This research was supported by a research fellowship funded by the University of Canberra, Australia. I am very grateful to two anonymous reviewers, and to the editor Barbara Johnstone, for suggestions that have greatly improved this article. Marja-Leena Sorjonen was kind enough to offer helpful comments on early notes from which I began to develop the ideas and analyses here.

[2] This point is also made by Duranti (2003:332): "Although not always explicitly recognized or theorized, temporality has come to play an important part in these studies, whether in the form of the moment-by-moment constitution of conversational exchanges or of the historically situated understanding of particular linguistic practices ... There has been an effort to develop analytical constructs and methods of data collection that can CAPTURE LANGUAGE AS IT MOVES THROUGH TIME AND SPACE" (my emphasis). See also Auer, Couper-Kuhlen & Mueller 1999.

[3] Collett (1989:223) also uses this phrase, but from a different analytic perspective and with a different goal.

[4] A contributing factor for many airline accidents is that the pilots were rushed, sometimes even when they did not need to be (e.g. Helmreich 1994; BASI 1996; FSF 1996, 1997). Rushing can increase workload and the possibility that pilots will omit actions, perform actions incompletely or inadequately, or plan poorly and make poor decisions. High workload during the approach was a significant factor in a cargo flight accident for which I transcribed and analyzed the cockpit voice recording (Nevile & Walker 2005). I identified features of the pilots' talk that suggested the pilots had created an interactional context for human error. The pilots selected an incorrect minimum descent altitude, and the aircraft flew into terrain.

[5] Similarly, Mazeland & Huiskes 2001 show how Dutch *but* is used as a resumption marker, whereby speakers return to an abandoned line of talk.

[6] I thank the airlines for supporting this research, and the captains and crews who welcomed me aboard. The airlines' involvement was strictly limited to assistance with data collection, and so I am entirely responsible for all transcriptions and analyses, and all interpretations or claims made about the data.

[7] Elsewhere I discuss these roles in greater detail, and how pilots use choices of personal pronoun to make them salient for different tasks (Nevile 2001, 2004a).

[8] This *thank you* is not itself sufficient evidence of anything problematic (i.e., that the recipient is hearing the talk as a possible challenge to competence and is offering a form of accounting). Later I will show what such hearing can look like. Pilots often thank one another when actions are performed when and as they are expected (Nevile 2004a), and I have shown how thanking can be particularly significant for creating shared understanding when closing tasks (Nevile 2005a). As one reviewer of this article suggested, thanking may also be a form of professional courtesy.

[9] As for other examples, I could say much more about the C/PNF's turn, but my specific interest here is in the *and*-preface. For example, elsewhere I have commented in detail on the significance of the use of personal pronouns in pilots' talk, such as the C/PNF's use of *you* that makes salient the other pilot's identity as the PF (Nevile 2001, 2004a).

[10] For pilots occupied with flying an aircraft, a city or town is not most relevantly somewhere that people live, but rather somewhere that pilots fly to or from, or here an "obstacle." Like a mountain, a town is something that pilots do not wish to crash into.

[11] Nor does the interactional work done here seem to fit Goffman's (1971) "remedial interchanges."

[12] With one exception.

¹³ For example, Schegloff 1997 describes how *when* can promote telling of a further bit of a story, and so advance a telling (see also Lerner 2004 and Raymond 2004 on prompting further talk). Schegloff et al. (1977:363) comment that "nothing is, in principle, excludable from the class 'repairable'," and "Not only language integration, but also social organization, require an organization of repair" (381).

¹⁴ Schegloff et al. (1977:380) note of storytelling in conversation that other-correction can enable an "as-of-some-point-non-teller" to make a bid for being a co-teller, and so make a "team" with the initial teller. These authors suggest, "Once noted as an environment for other-correction, the 'team' relationship of two parties may be further explored in other sequential environments for the presence of other correction" (380). It seems that in the cockpit team relationship other-correction is still dispreferred. Elsewhere I have discussed occurrence of other-repair in recorded voice data from an air accident, for its possible contribution to the pilots' creation of an interactional context for human error (Nevile & Walker 2005).

¹⁵ I am grateful to an anonymous reviewer for alerting me to this possibility. The present article has in common with such studies that it deals with something treated by participants as noticeably absent. Jacoby & Gonzales 2002 examine "saying what wasn't said" in performance feedback sessions in a physics research group. Participants "locate problems in what was never communicated" (2002: 128), when to say what is lacking "is simultaneously hearable as a corrective appeal" (2002:128). In contrast, in the examples of cockpit interaction here the participants are not delivering criticism and, as I establish below, they do not orient to the talk AS a complaint, and no complaint sequences develop.

¹⁶ In every example here it is a CAPTAIN who produces the *and*-prefaced talk, whether acting as pilot flying or pilot-not-flying, to ensure that an action is initiated, where initiating the action is ordinarily the responsibility of a first officer. Of the examples I have collected so far, only in one does a first officer *and*-preface talk to make salient an action for which a captain is ordinarily responsible. So this feature of talk might be something that mostly captains do, and that they can do AS captains, the senior ranked pilots with ultimate command of the flight, regardless of which pilot is actually in control (acting as the PF for the flight). *And*-prefaced talk might therefore play a role for situated instruction and learning (Jacoby & Gonzales 1991, Lave & Wenger 1991, Chaiklin & Lave 1993). It can act as an in situ means for captains to make available to first officers when to perform some action within the larger sequence of actions for the flight. This thinking recalls the suggestion of Schegloff et al. (1977:380–81) that other-correction may be a vehicle for socialization, in settings where one participant is somehow not-yet-competent (e.g., parent–child interaction), or in the data here maybe not-AS-competent (see also Macbeth 2004 on correction for instruction in competent performance in the classroom). *And*-prefaced talk may therefore be a means by which professional identities, like captain and first officer, are continuously occasioned, created, and reinforced through talk (e.g., Nevile 2001, 2004a; see also studies of different settings in Antaki & Widdicombe 1998).

¹⁷ I am making a distinction here between SITUATED awareness and SITUATION awareness, the latter being the focus for many studies in aviation human factors psychology and of interest for the commercial aviation industry and accident investigators. I have discussed in detail elsewhere (Nevile 2004a, 2004b) the many differences between my approach and studies of cockpit communication, even those that attempt to deal with interaction data (e.g., Hutchins & Klausen 1996, Hutchins & Palen 1997). Such studies are typically dominated by concerns and methods of cognitive psychology and often hold a limited view of awareness as only an individual and mental phenomenon. As Garfinkel (2002:211) points out, "There's nothing in heads but brains … What you want to do is find yourself in the midst of [people's] lived activities," to make observable "just what they are doing that is inspectably so."

¹⁸ This is well evidenced in Suchman's (1987) classic study of human–machine interaction. Suchman (1987:53) argues that "when action is proceeding smoothly it is essentially transparent to us." We can begin to see what is going on when action does not proceed smoothly.

REFERENCES

Antaki, Charles, & Widdicombe, Sue (eds.) (1998). *Identities in talk*. London: Sage.
Auer, Peter; Couper-Kuhlen, Elizabeth; & Mueller, Frank (1999). *Language in time: The rhythm and tempo of spoken interaction*. Oxford: Oxford University Press.

Arminen, Ilkka (2005). *Institutional interaction: Studies of talk at work*. Aldershot, UK: Ashgate.
BASI (Bureau of Air Safety Investigation, Australia) (1996). *Boeing 747-312 VH-INH, Sydney (Kingsford Smith) Airport, New South Wales, 19 October 1994. Investigation Report 9403038*. Department of Transport and Regional Development, Canberra, Australia.
Button, Graham (ed.) (1993). *Technology in working order: Studies of work, interaction, and technology*. London: Routledge.
⸺, & Lee, John R.E. (eds.) (1987). *Talk and social organization*. Clevedon, UK: Multilingual Matters.
⸺, & Sharrock, Wes (1998). The organizational accountability of technological work. *Social Studies of Science* 28:73–102.
Chaiklin, Seth, & Lave, Jean (eds.) (1993). *Understanding practice: Perspectives on activity and context*. Cambridge: Cambridge University Press.
Collett, Peter (1989). Time and action. In D. Roger & P. Bull (eds.), *Conversation: An interdisciplinary perspective*, 218–37. Clevedon: Multilingual Matters.
Drew, Paul, & Heritage, John (eds.) (1992). *Talk at work: Interaction in institutional settings*. Cambridge: Cambridge University Press.
Duranti, Alessandro (2003). Language as culture in U.S. anthropology: Three paradigms. *Current Anthropology* 44:323–47.
Engeström, Yrjo, & Middleton, David (eds.) (1996). *Cognition and communication at work*. Cambridge: Cambridge University Press.
Ford, Cecelia; Fox, Barbara; & Thompson, Sandra A. (eds.) (2002). *The language of turn and sequence*. Oxford: Oxford University Press.
FSF (Flight Safety Foundation) (1996). Two engines separate from the right wing and result in loss of control and crash of Boeing 747 freighter. *Accident Prevention* 53(1):1–8. January.
⸺ (1997). Flight crew's failure to perform landing checklist results in DC-9 wheels-up landing. *Accident Prevention* 54(5):1–15.
Garfinkel, Harold (2002). *Ethnomethodology's program: Working out Durkheim's aphorism*. A.W. Rawls (ed.). Lanham, MD: Rowan & Littlefield.
Goffman, Erving (1971). *Relations in public: Microstudies of the public order*. London: Allen Lane/Penguin.
Goodwin, Charles (1994). Professional vision. *American Anthropologist* 96:606–33.
⸺ (1995). Seeing in depth. *Social Studies of Science* 25:237–74.
⸺ (1996). Transparent vision. In Ochs, Schegloff, & Thompson (eds.), 370–404.
⸺ (2002). Time in action. *Current Anthropology* 43, Special Issue on Repertoires of Timekeeping in Anthropology:S19–S35.
⸺, & Goodwin, Marjorie Harness (1996). Seeing as a situated activity: formulating planes. In Engeström & Middleton (eds.), 61–95.
Goodwin, Marjorie Harness (1996). Informings and announcements in their environment: prosody within a multi-activity work setting. In Elizabeth Couper-Kuhlen & Margaret Selting (eds.) *Prosody in conversation: Interactional studies*, 436–61. Cambridge: Cambridge University Press.
Heath, Christian, & Luff, Paul (2000). *Technology in action*. Cambridge: Cambridge University Press.
⸺, & Nicholls, G. (1997). Animated texts: Selective renditions of news stories. In Resnick et al. (eds.), 63–86.
Helmreich, Robert L. (1994). Anatomy of a system accident: The crash of Avianca Flight 052. *International Journal of Aviation Psychology* 4:265–84.
Heritage, John (1984). A change-of-state token and aspects of its sequential placement. In J. M. Atkinson & John Heritage (eds.), *Structures of social action: Studies in conversation analysis*, 299–345. Cambridge: Cambridge University Press.
⸺ (1998). Oh-prefaced responses to inquiry, *Language in Society* 27:291–334.
⸺ (2002). Oh-prefaced responses to assessments: A method of modifying agreement/disagreement. In Ford, Fox, & Thompson (eds.), 196–224.
⸺, & Sorjonen, Marja-Leena (1994). Constituting and maintaining activities across sequences: and-prefacing as a feature of question design. *Language in Society* 23:1–29.
Hutchins, Edwin, & Klausen, Tove (1996). Distributed cognition in an airline cockpit. In Engeström & Middleton (eds.), 15–34.
⸺, & Palen, L. (1997). Constructing meaning from space, gesture, and speech. In Resnick et al. (eds.), 23–40.

Jacoby, Sally, & Gonzales, Patrick (1991). The constitution of expert-novice in scientific discourse. *Issues in Applied Linguistics* 2:149–81.
———, ——— (2002). Saying what wasn't said: Negative observation as a linguistic resource for the interactional achievement of performance feedback. In Ford, Fox, & Thompson (eds.), 123–64.
Jefferson, Gail (1974). Error correction as an interactional resource. *Language in Society* 2:181–99.
——— (1987). On exposed and embedded correction in conversation. In Button & Lee (eds.), 86–100.
——— (2004). Glossary of transcript symbols with an introduction. In Gene H. Lerner (ed.), *Conversation analysis: Studies from the first generation*, 13–31. Amsterdam & Philadelphia: John Benjamins.
Keating, E. (1993). Correction/repair as a resource for co-construction of group competence. *Pragmatics* 3:411–23.
Lave, Jean & Wenger, Etienne (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.
Lerner, Gene H. (2004). On the place of linguistic resources in the organization of talk-in-interaction: Grammar as action in prompting a speaker to elaborate. *Research on Language and Social Interaction* 37:151–84.
Local, J. (2004). Getting back to prior talk: *and-uh(m)* as a back connecting device. In Elizabeth Couper-Kuhlen & Cecelia Ford (eds.), *Sound patterns in interaction: Cross-linguistic studies of phonetics and prosody for conversation*, 377–400. Amsterdam: John Benjamins.
Luff, Paul, & Heath, Christian (1993). System use and social organisation: Observations on human-computer interaction in an architectural practice. In G. Button (ed.), 184–210.
——— (2002). Broadcast talk: Initiating calls through a computer-mediated technology. *Research on Language and Social Interaction* 35:337–66.
Lynch, Michael; Livingston, Eric; & Garfinkel, Harold (1990 [1983]). Temporal order in laboratory work. In J. Coulter (ed.), *Ethnomethodological sociology*, 416–49. Brookfield, VT: Edward Elgar.
Macbeth, Douglas (2004). The relevance of repair for classroom correction. *Language in Society* 33:703–36.
McHoul, Alec (2005). Aspects of *Aspects*: On Harvey Sacks's "missing" book, *Aspects of the sequential organization of conversation* (1970). *Human Studies* 28:113–28.
———, & Rapley, Mark (eds.) (2001). *How to analyse talk in institutional settings: A casebook of methods*. London: Continuum.
Mazeland, Harrie, & Huiskes, M. (2001). Dutch 'but' as a sequential conjunction: its use as a resumption marker. In Selting & Couper-Kuhlen (eds.), 141–69.
Mondada, Lorenza (2003). Working with video: How surgeons produce video records of their tasks. *Visual Studies* 18:58–73.
Murphy, Keith M. (2005). Collaborative imagining: the interactive use of gestures, talk, and graphic representation in architectural practice. *Semiotica* 156:113–45.
Murray, S.R. (1997). Deliberate decision making by aircraft pilots: A simple reminder to avoid decision making under panic. *International Journal of Aviation Psychology* 7:83–100.
Nevile, Maurice (2001). Understanding who's who in the airline cockpit: Pilots' pronominal choices and cockpit roles. In McHoul & Rapley (eds.), 57–71.
——— (2004a). *Beyond the black box: Talk-in-interaction in the airline cockpit*. Aldershot, UK: Ashgate.
——— (2004b). Integrity in the airline cockpit: Embodying claims about progress for the conduct of an approach briefing. *Research on Language and Social Interaction* 37:447–80.
——— (2005a). 'Checklist complete.' Or is it? Closing a task in the airline cockpit. *Australian Review of Applied Linguistics* 28(2):60–76.
——— (2005b). You always have to land: Accomplishing the sequential organization of actions to land an airliner. In S. Norris & R. Jones (eds.), *Discourse in action: Introducing mediated discourse analysis*, 32–44. London & New York: Routledge.
——— (2006). Making sequentiality salient: *And*-prefacing in the talk of airline pilots. *Discourse Studies* 8:279–302.
——— (in press). Talking without overlap in the airline cockpit: Precision timing at work. *Text and Talk*.
———, & Walker, Michael B. (2005). A context for error: Using conversation analysis to represent and analyse recorded voice data. *Human Factors and Aerospace Safety* 5(2):109–35.

Ochs, Elinor, & Jacoby, Sally (1997). Down to the wire: The cultural clock of physicists and the discourse of consensus. *Language in Society* 26:479–505.

———; Schegloff, Emanuel A.; & Thompson, Sandra A. (eds.) (1996). *Interaction and grammar*. Cambridge: Cambridge University Press.

Pomerantz, Anita (1984). Pursuing a response. In J. M. Atkinson & J. Heritage (eds.), *Structures of social action: Studies in conversation analysis*, 152–63. Cambridge: Cambridge University Press.

Rawls, Anne W. (2002). Introduction. In Harold Garfinkel (ed.), *Ethnomethodology's program: Working out Durkheim's aphorism*. Lanham, MD: Rowan & Littlefield.

Raymond, Geoffrey (2004). Prompting action: The stand-alone "so" in ordinary conversation. *Research on Language and Social Interaction* 37:185–218.

Resnick, L.B.; Säljö, R.; Pontecorvo, C.; & Burge, B. (eds.) (1997). *Discourse, tools, and reasoning: Essays on situated cognition*. Berlin: Springer.

Richards, Keith, & Seedhouse, Paul (eds.) (2004). *Applying conversation analysis*. London: Palgrave Macmillan.

Sacks, Harvey (1992). *Lectures on conversation*. Gail Jefferson (ed.). 2 vols. Oxford: Basil Blackwell.

———; Schegloff, Emanuel A.; & Jefferson, Gail (1974). A simplest systematics for the organization of turn-taking for conversation. *Language* 50:696–735.

Schegloff, Emanuel A. (1987). Recycled turn beginnings: A precise repair mechanism in conversation's turn-taking organisation. In Button & Lee (eds.), 70–85.

——— (1988). Goffman and the analysis of conversation. In Paul Drew & Anthony Wootton (eds.) *Erving Goffman: Exploring the interaction order*, 89–135. Cambridge: Polity.

——— (1996). Issues of relevance for discourse analysis: Contingency in action, interaction and co-participant context. In Eduard H. Hovy & Donia R. Scott (eds.), *Computational and conversational discourse: Burning issues – an interdisciplinary account*, 3–38. Berlin: Springer.

——— (1997). Practices and actions: Boundary cases of other-initiated repair. *Discourse Processes* 23:499–545.

——— (2000). When 'others' initiate repair. *Applied Linguistics* 21:205–43.

———; Jefferson, Gail; & Sacks, Harvey (1977). The preference for self-correction in the organization of repair in conversation. *Language* 53:361–82.

———; Ochs, Elinor; & Thompson, Sandra A. (1996). Introduction. In Ochs, Schegloff & Thompson (eds.), 1–51.

Schiffrin, Deborah (1986). Functions of *and* in discourse. *Journal of Pragmatics* 10:41–66.

——— (1987). *Discourse markers*. Cambridge: Cambridge University Press.

Selting, Margaret, & Couper-Kuhlen, Elizabeth (eds.) (2001). *Studies in interactional linguistics*. Amsterdam & Philadelphia: John Benjamins.

Sköries, Ulrike (1998). Features of a blame type using *and*: An analysis of an example. *Journal of Pragmatics* 30:49–58.

Suchman, Lucy (1987). *Plans and situated actions: The problem of human–machine communication*. Cambridge: Cambridge University Press.

——— (1997). Centers of coordination: A case and some themes. In Resnick et al. (eds.), 41–62.

Szymanski, Margaret, H. (1999). Re-engaging and dis-engaging talk in activity. *Language in Society* 28:1–23.

ten Have, Paul (1999). *Doing conversation analysis: A practical guide*. London: Sage.

Turk, Monica J. (2004). Using *and* in conversational interaction. *Research on Language and Social Interaction* 37:219–50.

van Dijk, Teun A. (1979). Pragmatic connectives. *Journal of Pragmatics* 3:447–56.