

## Seeing the point: attention and participation in the airline cockpit

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### Abstract

This paper studies pointing in naturally occurring interaction in a sociotechnical work setting: the airline cockpit. To conduct their work, airline pilots do not actually have to point to anything. However, pilots *do* routinely point to things. Pointing in the cockpit is a means for embodying varied forms of attention and participation. How a point is produced, and specifically *where* a point is produced in surrounding space relative to its target and to the other pilot's field of vision, can make a point more or less *witnessable*, and so make more or less visually salient its target's status as a source of visual evidence for a task-related action or event. Varying a point's witnessability allows pilots to vary the nature and immediacy for how a location in the cockpit should be attended for collaborative action for work. Some gesture researchers have suggested that systematic variations in the manner of pointing can relate to the kind of action being undertaken and the speaker's expectations of how what is said is to be dealt with by an interlocutor. This paper addresses this possibility from an interest in ethnomethodology and conversation analysis for uncovering the practices and processes of reasoning by which people accomplish social actions and produce the intelligible orderliness of everyday life, including the everyday life of institutions and workplaces. The paper adds to studies of gestures as embedded in practices and as occurring and made intelligible within spaces in a physical environment that participants organise, create and treat as relevant and meaningful for what they are doing.

**Key words:** *attention, interaction, participation, pointing, work*

### 1. Introduction

This paper studies pointing in naturally occurring interaction in a sociotechnical work setting, the airline cockpit, and uses as data video recordings of airline pilots on actual routine passenger flights.<sup>1</sup> As part of a larger line of research on interaction in the airline cockpit, here I present findings and thoughts, which are still in course of development, from a focus on pointing as a recurring gesture in the aforementioned setting. In this

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paper I do not analyse gesture's relation to pilots' talk in detail (see instead Nevile 2004a, 2004b), but instead examine variations in the manner of pointing as pilots perform flight tasks, and specifically, the significance of *where* a point is made in space relative to its target and the pointer's body. My interest is in how pilots can see the point as they collaborate to work together.<sup>2</sup>

For the most part, airline pilots do not actually have to point to anything, and pointing is rarely required to identify or disambiguate something from a range of possibilities in a visual field. Pilots mostly know the answers to questions of what, or where, or which one. When there is a change in setting, aircraft performance, or flight progress, pilots can mostly rely on the talk associated with the particular task, together with their professional knowledge and experience, to know just where to look without the need to point. For example, pilots know where to find information about altitude, or current engine performance, or a new radio setting. This characteristic distinguishes pointing in the airline cockpit from pointing in naturally occurring interactions examined by other studies, for example in a courtroom (Goodwin & Goodwin, 1997), at an archaeological research site (Goodwin, 2003b, 2003c), or in interaction with a man with severe aphasia (Goodwin, 2003a; Goodwin, Goodwin & Olsher, 2002).

However, pilots *do* routinely point at things as they go about their work. I will discuss pointing in the cockpit as a means for embodying forms of attention and participation. I will suggest that varying the location of a point can vary the extent to which it can be public, or witnessable. This witnessability can be a resource for distinguishing between targets, and the evidence of task-related actions or events they make available, for how they are being attended, and might warrant co-attention.

### **1.1. Pointing and visual attention in the airline cockpit**

Some gesture researchers have suggested that systematic variations in the manner of pointing can relate not just to the meaning of what is said, but the kind of action being undertaken and the speaker's expectations of how what is said is to be dealt with by an interlocutor (Kendon, 2000; Kendon & Versante, 2003; Kendon, 2004). As Kendon (2004, p.199) notes, few studies have focussed on the significance of meaning as "the way in which pointing is done". Pointing can indicate not just an object, but also how that object should be regarded; and it can realise finer semantic distinctions, and establish a link between an utterance and its spatial or temporal circumstance (Kendon & Versante, 2003).

An approach that is well able to pursue this line of research is one informed by the ethnomethodology and conversation analysis, for using recordings of natural occurring interaction to uncover the practices and processes of reasoning by which people accomplish social actions and produce the intelligible orderliness of everyday life, including the everyday life of institutions and workplaces (Drew & Heritage, 1992; Arminen, 2005). In the workplace, pointing can be a resource for collaborative seeing in joint action to perform work tasks (Goodwin, 1995; Heath & Luff, 2000; Luff & Heath,

<sup>2</sup> I refer to pointing by hand with the outstretched index finger.

2002; Alač & Hutchins, 2004) and for realising forms of professional vision (Goodwin, 1994; Goodwin & Goodwin, 1997). It is necessary to study the body and gestures not in isolation but as embedded within consequential collaborative action, where participants act and interpret one another's conduct within spaces that they create and treat as relevant and meaningful (Heath, 1992; LeBaron & Streeck, 1997; Goodwin 2000, 2003a, 2003b, 2003c; Goodwin, Goodwin & Olsher, 2002). In such a view, pointing is an embodied action, a situated practice, and part of a "situated activity system" (Goodwin, 2003b:225). Pointing does not only indicate a target, and does not only involve its producer, but in interaction it can locate and involve a particular space in the surrounding "as a shared focus for the organization of cognition and action" (Goodwin, 2003b:219).

Looking, and establishing awareness of what is seen, and its significance, is a critical part of collaborative work in sociotechnical settings (Goodwin & Goodwin, 1996; Heath & Luff, 2000). Indeed, flying modern airliners consists largely of pilots looking at instrument displays to manage and monitor various automated systems, for information on aircraft performance and flight progress and of the impacts of their own actions. Pilots need to determine, in situ and moment-to-moment, where to look and how to look, and establish what is worthy of attention and who is appropriately attending to what. Pointing can be a resource for pilots to accomplish this situated looking and attention.<sup>3</sup>

In general, airline pilots point as they talk to perform tasks. Pointing directs visual attention (own and/or other's) to something in the immediate physical cockpit setting (or sometimes outside the cockpit e.g. other air traffic). It occurs most commonly as pilots build shared (crew) awareness of their own physical actions to fly the aircraft, and the impacts of their actions on the aircraft's configuration. For example, pilots might point to a light indicating that a button has been pressed, or to a lever that has been moved, or to a display showing the number dialled to select a target altitude or heading, or to a marker set manually as a visible reference for a planned speed. Pointing also occurs as pilots monitor events and changes in aircraft performance and flight progress. For example, pilots might point to displays for engine performance, speed, altitude, fuel consumption, or navigation.

Whether or not a point is seen at all is greatly dependent on where it is produced in surrounding space, because *most times pilots do not look towards one another's face and body*. Seating arrangements in the cockpit are fixed and pilots sit side-by-side and face forwards toward the instrument panels and windows as the relevant locations for their gaze to do work (e.g. to push buttons, or monitor displays and the external environment). A pilot's field of vision is therefore mostly forward, but occasionally taking in the overhead panel or the low central console. So while pilots are physically co-present, they only rarely talk face-to-face.

However, *pilots do often look at one another's hand movements*: when hands are busy with activities and tasks (cf. LeBaron & Streeck, 2000), for example pushing a button, pressing a computer key, dialling a setting, moving a lever, or flicking a switch. Hand movements are possible evidence of significant and action. My interest here is in how

<sup>3</sup> See also related cognition focused research on pilots' work (e.g. Hutchins & Palen, 1997).

pilots can use this possible evidence as a resource when using the hand for pointing, and for presenting pointing as more or less witnessable. A point can be produced as *not for witness*, as *witnessable*, or as *for witness*, depending on where it is produced relative to its target.

## 2. Data

The paper uses as data video recordings of pilots at work on 18 actual scheduled passenger flights (for details see Nevile, 2004a, 2004b). I arranged with two Australian airlines to make 12 flights on a Fokker 50 aircraft (seating approximately 50 passengers), and six flights on a Boeing 737 aircraft (seating approximately 140 passengers). I filmed entire flights from engine start up to parking and shut down. Flights ranged from 40 minutes to 2.5 hours. I filmed from the observer seat located just behind the two pilots. The original recordings were collected for a larger study that was generally concerned with examining cockpit talk-in-interaction (Nevile, 2004a). The discussion here is based on analyses of around thirty instances of pointing. I present a sample of stills from the video recordings. I do not have permission from the airlines to present segments of actual video data.

## 3. Witnessability

### 3.1. Not for witness

When a point is made not for witness it is *not presented to be seen, or at least not to ensure it will be seen*. The point is produced outside of the surrounding space of its target (e.g. a display). The point is not made in a way that easily allows the other pilot to track from the point to the target. It is not made in the other pilot's field of vision, nor made to claim to itself the other pilot's attention. In each case here, the point is made with *the hand remaining in its current location*, either on the body or in one instance on the engine power levers. The point is made from a rest or "home position" (Sacks & Schegloff, 2002; Nevile, 2004a), rather than from a new space relative to the target to which the hand has moved.

The producer of the point treats any associated talk as itself sufficient for alerting and directing the other pilot's attention to the target, and so to obtain there any evidence of task performance and flight progress. Such a point may well be part of the expressive or cognitive act of the speaker (Kita, 2000, 2003a; McNeill & Duncan, 2000), but it is not designed to be seen, and so its communicative impact is minimal at the most. The point is not made such that the other pilot is necessarily its recipient. See Examples 1-4.

#### Example 1



After takeoff, a First Officer (seated right) announces that he has selected ‘climb power’ for the engines. He points to an illuminated light that indicates he has pressed the climb power button. He points with his left hand, currently resting on his left leg and around 20cm away from the light placed low and central on the main panel. He does not lift his hand to point, but produces the point with his hand remaining on his leg. Out of camera shot, the Captain is adjusting his sunglasses and looking forward.

#### Example 2.



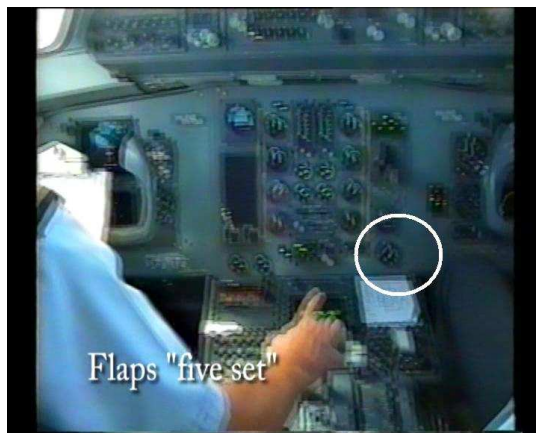
Here a Captain (seated left) informs the First Officer that he has programmed the flight plan into the on board computer, and that it is now ready to be ‘fired up’. He points with his right hand to the relevant display, just forward and to the right of his right knee. The display is very close to his pointing hand, but the hand remains on his right leg and the point is made from there. The pointing finger is not actually placed on the display, despite the display being just 5-10 cm away. At this time the other pilot (the First Officer) is busy making changes at the Flight Mode Panel (for the aircraft’s automated systems).

#### Example 3.



Before takeoff, a First Officer (seated right) is stating the details of the clearance their flight has received from air traffic control. The First Officer tells the specific altitude that the pilots will use as their cruising altitude, and points with his left hand to the data pad on the low central console, where he had previously written this information, placed just to the left of his left knee. The pad is only a few centimetres from his leg and his left hand, but his pointing hand remains on his leg.

Example 4.



In Example 4, the pilots work through a pre-flight checklist. The First Officer is leading the checklist and calls the ‘challenge’ for the wing flaps item. The Captain (seated left) says in response “five set”. The image is blurry, but it shows that the Captain’s right hand is on the engine power levers, and it remains there as he points to the relevant display which is low and central on the main instrument panel, around 30cm away from his hand. The Captain points by just lifting his index finger while holding the power levers.

### 3.2. Witnessable

A point can be produced so it is *witnessable*, that is, possibly *able* to be seen by the other pilot, but not so that it must be seen. The point is produced *within the other pilot’s likely*

*field of vision or line of gaze*, and so the other pilot is treated as a *potential recipient* of the point. In these cases, the pointing hand is moved, or remains away, from either a resting position on the body, or from where it has been engaged in some flight task-related activity. The point is produced and is visible in a space somewhere between the body, or activity location, and the point's target.

With any associated talk, the point is available to capture and direct attention, by at least identifying the location of the point's target (e.g. a display, light etc.), at least in the space in the cockpit that is relevant for attention, where the target for the point can be found. It is possible for the non-pointing pilot to track from the point to its target. The point may be made at or near the surrounding space of its target. The point's witnessability alone can make visibly salient, if nothing else, that there is something in the emerging talk with the status of *pointable*; that somewhere in the cockpit there is something worth looking at and attending to.

#### Example 5.



Here a flight has reached a target altitude. The Captain (seated left) says “one thousand to altitude” while pointing to the right side of the cockpit, towards the altitude display on the First Officer's side of the main instrument panel (out of view). The First Officer's response is then to check that target display and verbally confirm the altitude change. The Captain's point is produced over the central console, between the two pilots. To make the point the Captain raises his hand from his leg, but does not continue the movement by extending his arm, which would allow the point to be placed closer to its target. Instead he keeps his arm bent and his elbow close to his own body.

#### Example 6.



The First Officer (on the right, out of picture) has been saying the briefing to prepare for takeoff, and ends by saying the ‘minimum safe altitude’ to be used. The Captain (in picture) points with his right hand to the display window where that altitude has been selected, at the centre and top of the main instrument panel (out of picture). To produce the point the Captain raises his hand to the approximate height of the display on the panel, above the lower central console, and stops his hand movement in front of the panel. He does not extend his arm to make the point actually at the relevant display (his elbow remains bent), which is perhaps 15cm away further.

Example 7.



Here the pilots are working through a checklist before takeoff. The First Officer has called “fuel quantity”, to check the amount of fuel on board. The Captain (on left) responds by saying the fuel figure, and also points with his right hand to the fuel quantity display which is low on the forward instrument panel. He lifts his arm and hand from his right leg and produces the point over the central console between the pilots, about 40cm from the fuel display. He does not fully extend his arm, and he keeps his elbow close to his body.

### 3.3. For witness



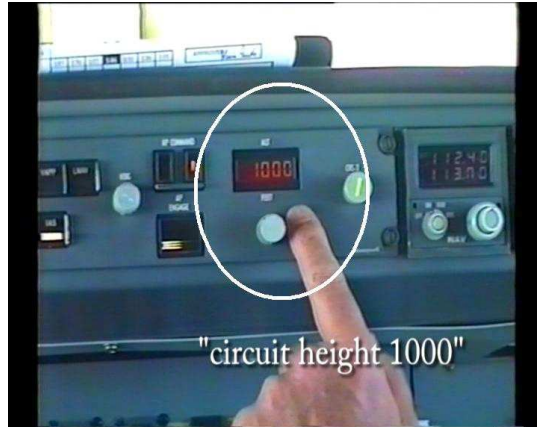
A point that is produced *for witness* is *designed to be seen* by the other pilot, to ensure that it will be seen. The point is produced *at the target itself*, that is, *at the display or button or whatever*, which is the subject of associated talk. The point does not merely point to a target within an identifiable cockpit space, but it *identifies the target itself directly*, in a physically explicit and maximally visible way, by occurring *actually at the target* within that very space. In Goodwin's (2003b, p. 221) terms, the point creates a domain of scrutiny around itself, marking out the exact location requiring visual attention for collaborative seeing and understanding for work. *The point is produced as if for, indeed calling for, an actual recipient*. It is presented as the current and legitimate focus for gaze. Indeed, the point may be modified to increase its visibility, to ensure it will be witnessed. By placing the hand and its pointing finger at the very site of the target, at the referent for associated talk, the pilot makes visible a maximally tight connection between the body and the technology with which the pilots work. The body can be seen together with the very process of the action or event etc, that it targets for attention. The point becomes part of the very visual field it indexes, and presents as joined two potential foci for pilots' attention: an active hand, and aircraft information to inform conduct of the flight. The point is not just within another's likely field of vision, but can create a field of vision as relevant now. We'll see some examples.

#### Example 8.



During the climb phase of flight, the First Officer (right) turns on the autopilot, and while saying “and autopilot’s engaged” she points with her left hand to the illuminated autopilot button. The point is made immediately after the activity to press the button, while the hand is still at the panel. She rests her pointing finger on the instrument panel just to the right of the autopilot button, making the button easier to see for the Captain (seated left).

#### Example 9.



Similar to Example 8, here on approach of the airport a First Officer dials and sets the new target altitude of 1000 feet, the ‘circuit height’ of the destination airport. Without removing his hand from the panel, he says the circuit height selected and points to the altitude alert display ‘window’ where that altitude is shown. The First Officer places his finger directly on the panel below the window.

Example 10.



Here the Captain is calling out navigation information he has programmed into the onboard computer. After entering details his right hand remains at the display and he points with his finger resting on the left side of the display, making the display maximally visible for the First Officer seated right.

Example 11.



Before takeoff, the Captain (left) of another flight has earlier dialled to set the navigation radios on the lower instrument console, and then calls out these settings to the First Officer. He moves his right hand from a folder he has just placed in his lap and points to the displays by placing and leaving his finger beside each one as he calls out its setting.

Example 12.



Here a Captain conducts the engine start procedure and points to displays for engine performance. He moves his right arm from a stationary position on the engine power levers (1) and points with his finger at the top of the panel of the engine displays (2), and then moves the pointing finger down the panel (3) before moving his hand to the overhead panel for new activities there.

#### 4. Discussing the examples

I explained earlier that for the most part, pilots do not actually have to point to anything in the course of their work, because referents of pilots' talk can be identified from professional knowledge and experience. So why do pilots point? In this paper I have sought to consider the possible significance of one aspect of pointing across a number of examples: where the point is produced in surrounding space relative to its target.

The examples show that in the airline cockpit pointing does not just identify a target, it embodies looking and attention. The very act of pointing makes physical and visible that looking itself is a now-relevant activity, that looking and attending is being done, and that it can, or even should be, done now. Pointing makes visible that something is now worth attending to. The pointing hand presents the body at attention. In a work environment so dependent on looking, and interpreting and acting upon what is seen, this alone can be significant. For cockpit work, pointing embodies that knowing derives from looking and attending.

Pointing can therefore make public not just what to look at, but when and how to look. Controls and displays are always there to be looked at. What pointing can do is to make visible the relevance of looking at a particular target at a particular time. Pointing can signal that some always-available candidate for attention, say an altitude display, is *worthy of attention now as evidence*. Pilots continually monitor the instrument panels, the controls and displays etc., to gather information about the performance of the aircraft and the progress of the flight. Pointing can make salient that some information, available at the target of the point, constitutes visual evidence for a task-related action or event, evidence for a claim made in associated talk (see Nevile, 2004a, 2004b). Pointing occurs when there is something to be not just seen, but noticed and known for its significance for the pilots' conduct of the flight now. Pointing can help distinguish mere information from evidence that builds knowledge for action.

But more than this, the examples show that pilots can vary the location for pointing, that is, where a point is produced relative to its target. I have discussed this in terms of a point's *witnessability*. I suggest that a point can be produced *not for witness*, outside the surrounding space of the target and out of the other pilots' likely field of vision, even distant from the target and its surrounding space. Or, a point can be produced as *witnessable*, within the other pilot's likely field of vision, and close to the surrounding space of the point's target. Finally, a point can be produced as *for witness*, at the very target of the point, and so within the other pilot's field of vision, or to create a field of vision as relevant now. Such variations might have value for pilots as they jointly accomplish moment-to-moment understandings for their work. A point's witnessability is the extent to which it is made to be public, to be seen by the other pilot. I suggested that a point embodies looking and attending to some target for its worthiness as not just information, but as notable evidence of some task-related action or event, significant for pilots to know as they conduct the flight.

It is possible then that increasing a point's witnessability by producing it closer to the target, and so making it easier to see, presents point and target as more closely tied, and the pilot producing the point as more physically connected to the target. The target becomes increasingly visible as a site of one pilot's attention. A point produced closer to the target can present that target as receiving more immediate and detailed attention, and so possibly being more worthy of such attention from the other pilot. The target's salience as a source of evidence for some task-related action or event can be increased. So when a point is produced *for witness*, at the site of the target itself, the point and target are presented as available and relevantly taken together. The point does not present a visual trajectory to be tracked to the target: the point presents the target itself. It creates a bodily presence and field of vision at that target, and the body becomes part of the scene to be attended. The point is made as part of the flow for some task, whether the task involves a manual activity like pushing a button, or visual activity for monitoring or checking something.

So, a point made witnessably closer to its target can make a greater and more immediate claim for the other pilot's attention. In this way pointing can contribute to the structuring of participation in cockpit work (cf. Goodwin, 2003b). While pilots' actions for tasks are greatly determined by formal procedures and training, varying the location and witnessability of pointing is an embodied means for organising attention and participation. It can be a resource for distinguishing how and when visible evidence for different tasks is appropriately attended to, and by whom.

It might be that for flight tasks that are particularly worthy of closer and immediate joint attention, the point is made closer to the target. Pointing might be an embodied way for pilots to distinguish between something available to be looked at, from now, from something that should be looked at, right now. We saw for example that when pointing to engine power displays during the engine start procedure (Example 12), or when engaging the autopilot (Example 8), or setting navigation radios (Example 1), pilots produced points as *for witness*, at the site of the point's target. The hand is moved to, or after some activity remains at, its target. Alternatively, when pointing to announce that climb power had been selected (Example 1), or when referring to an altitude written on a pad (Example 3), or calling to check how the wing flaps had been set (Example 4), we saw that the point was produced *not for witness*, at some distance from target, out of the other pilot's field of vision, and that the pilot often made the point from a resting hand position. Varying where in space the point itself is produced might make the pilots' orientation visual to a distinction between the tasks and the activity for them. The manner of pointing presents particular actions, like starting the engines and setting the autopilot, as tasks that are appropriately and closely attended to right now, by both pilots jointly participating, while other actions, like looking to confirm climb power or a written altitude, or flap settings, are presented as available for reference, as just available for looking at from now.

## 5. Conclusion

In general, this paper adds to studies of gesture in naturally occurring interaction as embedded in meaningful practices for social action, and supports a view that the “positioning, actions, and orientation of the body in the environment are crucial to how participants understand what is happening and build action together” (Goodwin, 2003b, p. 19). Gestures occur and are intelligible within spaces of a physical environment that participants do not take as merely given, but rather organise, create and treat as relevant and meaningful for what they are seeking to accomplish (LeBaron & Streeck 1997).

Specifically, I examined pointing in collaborative work by using as data video recordings of airline pilots in the cockpit, on actual passenger flights. I discussed pointing as a means for embodying attention and calls for participation. I proposed that how a point is produced, and specifically *where* a point is produced in space relative to its target, distant or closer, can make a point more or less witnessable to the other pilot, and so make more or less visually salient its target’s status as a source of visual evidence for a task-related action or event. Variations in a point’s witnessability allow pilots to vary the nature and immediacy for how a location in the cockpit should be attended in collaborative action for work. Pointing is a situated means for organizing participation in cockpit tasks.

The paper presented findings from focussed analysis on pointing in one specific sociotechnical work setting: the airline cockpit. The analysis here can supplement detailed moment-to-moment micro-analysis of specific instances of pointing, which could include, for example, further details of talk, gaze, and bodily posture (see Nevile, 2004a, 2004b). Early analysis of numerous instances of a particular gesture can identify possible avenues for detailed data analyses by identifying what count, in this or that setting, as the gestural features significant for the participants and the social actions they conduct. I do not argue that pilots always point as shown here, but I have explored the possibility that proximity to target is an important design feature for producing a point in the airline cockpit. Location relative to target can affect how pilots see the point, and can know what it might reveal and ask of them.

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