Unpacking corrections in mobile instruction

Authors:

Lena Levin (corresponding author)

Jakob Cromdal

Mathias Broth

1 (2)

Anne-Danièle Gazin

Pentti Haddington

Paul McIlvenny

Helen Melander

Mirka Rauniomaa

Unpacking corrections in mobile instruction: Error-occasioned learning opportunities in driving, cycling and aviation training

1. Introduction

This article is about the organisation of correction in mobile instructional settings. It draws on different empirical materials showing students being instructed how to control different vehicles – cars, bicycles and aeroplanes – as part of real life mobile training. In so doing, it highlights a range of trouble sources and participants' ways of identifying, and correcting erroneous, or otherwise problematic, actions as well as anticipating and explaining their potential consequences for the vehicle, its position and movement in the surrounding traffic infrastructure.

Analytically, we treat driving instructions (which may entail navigational information or focus on matters of vehicle control, cf. De Stefani & Gazin, 2014) as well as their corresponding driver actions as locally achieved phenomena by highlighting the ways in which the parties make sense of – and act on – each other's actions, as well as of the unfolding mobile environment. Focusing on correction-relevant mobile contexts – that is, sequences of talk and action through which the vehicle is operated, while simultaneously handling problems related to its manoeuvring in the immediate setting – we identify the practices by which corrective instructions (Deppermann, 2015) are explicitly accounted for in terms of situational contingencies – features of the mobile setting relevant for the operating of the vehicle. By demonstrating how the parties embody correction procedures, and how these procedures are unpacked as local rationalities, this article contributes new insight into the practices of teaching and learning in mobile environments.

2. Social interaction, instruction and mobility

Following the perspectives of ethnomethodology (EM) and conversation analysis (CA) first introduced by Garfinkel (1967, 2002) and Sacks (1992/1966), instructional settings host socially organised activities (cf. Seedhouse, 2004) that characteristically comprise sequences of locally sensitive, recipient-designed instructions and instructed actions. An important theoretical upshot of this perspective is the emphasis on the participants' procedures for sense making, which is methodically retrieved by anchoring the analysis in the participants' own orientations towards their joint conduct – thereby offering a glimpse of social interaction from a members' perspective. For the current purposes, the thrust of this approach lies in the ability to shed light on what constitutes development of competence to the participants themselves, rather than buying into preconceptualised notions of learning.

In this vein, recent studies of social interaction have examined the organisation of instructional activities in a variety of settings such as classroom task instructions (St. John &

Cromdal, 2016), craft education (Lindwall & Ekström, 2012), second language learning (Hellerman, 2007; Majlesi, 2014), computer-engineering courses (Vickers, 2010), surgical training (Zemel & Koschmann, 2013), pre-clinical dental training (Hindmarsh, Hyland, & Banerjee, 2014), dance lessons (Keevallik, 2010) and driving instruction (Broth, Cromdal, & Levin, in press; Deppermann, 2015; Gazin, 2015). While these studies represent an effort to explicate the participants' methods and practices that are pitched to enhance students' competence in some domain, very few studies have examined how such practices are organised in mobile settings where the participants operate in – and act on – a constantly changing physical environment (but see Broth & Keevallik, 2014; De Stefani & Gazin, 2014; Gazin, 2015; Juhlin, 2010; McIlvenny, forthcoming; Melander & Sahlström, 2009). Building on these current developments in studies of social interaction in educational settings, the present article shows how the participants' accomplishment of a routine instructional practice – corrective instruction – is sensitive to different aspects of mobility.

2.1 Instruction in mobile settings

The familiar scene of instructional activities, with one party engaging in courses of action previously prescribed by another party, cuts across any array of institutional as well as mundane settings. However, mobile settings tend to impose their own set of infrastructural conditions and requirements upon the participants' interaction. For instance, in training to operate mobile units – craft, vehicles or other means of transport – instructions and their responsive actions should be seen as “relative to emerging contingencies in real time” (Haddington, et al., 2013, p. 6). Therefore, an important feature of training in mobile settings is that instructional exchanges are sensitive to matters of time and space. For instance, instructions may be designed to make relevant immediate responsive actions, or they may project corresponding instructed actions at a later moment. Accordingly, De Stefani and Gazin (2014) show that the design of instructional turns in driver training exhibits the instructor's orientation to the local spatiotemporal contingencies: “late” instructions are typically short and (and occasionally reduplicated for urgency), while “early” instructions provide the participants with more time, both for the formulation of the instruction and for the performance of the instructed action. For these reasons, taking account of the mobile unfolding environment in the instructional exchange is analytically inescapable.

Another feature of mobile instructional activities is that instructions typically comprise verbal actions, often accompanied with embodied actions such as pointing and other indexical gestures, while the subsequent actions they make relevant may often be performed without talk, for instance through the student's manipulation of vehicle controls (De Stefani & Gazin, 2014). Indeed, in the case of instructions concerning vehicle control, students cannot comply by means of talk alone, although they may well produce talk (e.g. receipt tokens, comments or questions) while carrying out the instructed actions. For this reason, instructors can be seen to inspect the students' practical actions for their fit with the original instruction, and where relevant, to comment on, evaluate or to initiate correction activities.

2.2 Correction in mobile training

In contrast to ordinary mobile activities such as driving, cycling and flying (cf. Haddington, 2012, 2013; Haddington & Rauniomaa, 2014; Laurier et al., 2008; Laurier et al., 2012; McIlvenny, Broth, & Haddington, 2014; Nevile, 2010), the aim of mobile training sessions is not to reach a specific location, but to expose the student driver, cyclist or pilot to a variety of real-life situations (e.g., different traffic or weather conditions) that allow him or her to exercise and improve their handling of the vehicle or craft with respect to the local contingencies of the emerging environment. A central feature of such training, we argue, has to do with the ways in which performance errors are dealt with not just for the purposes of safely handling the vehicle *in situ*, but also, and crucially, to enhance student skills prospectively. Accordingly, in this article we show how student mistakes/errors and correction procedures offer a fertile ground for doing instructional work.

In an analysis of the very first attempts at driving a car, Broth et al. (in press) examine how a novice driver student practices her “pedal skills”, i.e., the embodied practice of coordinating the gas and clutch controls when setting the car in motion. Central to this activity is the instructor’s monitoring of the student’s incipient technique by analysing the vehicle’s behaviour – engine sound, vibration level at the biting point, etc. – and by initiating student correction with reference to such natural indications. As Broth et al. (in press) conclude, through such instructive correction “[r]elevant sensory information was introduced, levels were calibrated and analytic skills relevant to the manoeuvre at hand were taught by the [driving instructor]” (pp. 22–23).

Deppermann (2015) introduced a class of instructions labelled *task setting requests*, which formulate complex navigational manoeuvres, such as to turn left at the next roundabout, or to go back to the city centre (cf. De Stefani & Gazin’s [2014] notion of “navigational instructions”). Task setting requests, Deppermann argues, should be distinguished from *corrective instructions*, which respond to the student’s failure to carry out the manoeuvre as expected, specifying the relevant individual steps involved in carrying out the task, including their temporal features relative to the traffic, road infrastructure and other environmental contingencies. In other words, corrective instructions “adapt the initial task-setting request, producing a more granular formulation of the next locally relevant action to be taken by the student, given the nature of the student’s failure and its relationship to the local contingencies of the emerging traffic situation” (p. 11). For example, a student who failed to competently follow the instruction to make a left turn at the third traffic light received a series of short corrective prompts, indicating when to change gears, check the side mirrors, look for traffic and to brake. Notably, such prompts are highly elliptical and indexical in nature, and serve as glosses for the expected actions (e.g., shifting *down into second* gear, checking mirrors *on the left*, look for traffic approaching *from both left and right*, etc.). Here, Deppermann (2015) points out that because the original task setting request trades on an assumption that the student already possesses the set of skills relevant to the task, corrective instructions do not introduce new knowledge to the student, but are designed as reminders of expected courses of action with which the student should already be familiar (p. 75).

In a study of mobile formations of cyclists, McIlvenny (2014) examines an episode in which a young cyclist leaves the side-by-side formation with her caregiver, resulting in a potentially hazardous traffic situation. The adult's correction activities – including verbal prompts to stay close to the curb due to car traffic approaching from behind, as well as the mobile actions of pulling up and restoring the side-by-side formation to shield the child from the road traffic – afforded a local “instructable passage” (p. 151) by which the adult could not only introduce the child to a cyclist's maxim (to keep near the curb), but also to offer a locally contextualised rationale for following the rule in the future.

Against the backdrop of the above research, the present article is an attempt to address some central issues involved in instructing mobile skills. In preliminary observations of data documenting practices of training to operate different means of transportation, correction procedures emerged as a propitious site for studying instructor and student behaviour in relation to mobile contingencies. A first aim is therefore to examine correction activities across different data sets for recurring patterns of instructor action which allow students to correct a current course of action in a relevant and timely manner, that is, in coordination with the unfolding mobile surroundings.

Practices of correction are by no means specific to instructional activities. Rather, along with the more encompassing phenomenon of repair, correction forms “the self-righting mechanism for the organization of language use in social interaction” (Schegloff, et al., 1977, p. 381). For this reason, a second aim of this article is to demonstrate analytically how the parties produce the corrections as taking place in the course of – and as a natural part of – training. That is to say, we will examine the correction procedures for evidence of pedagogy-in-action, highlighting in particular the practice of unpacking corrective instructions, which affords the students with an analysis of current trouble, a corrective towards its resolution as well as a prospectively oriented indication of how to handle similar scenarios in the future.

3. Methods and data

3.1 Methods

The data examined consist of audio-video recordings of naturally occurring interactions in different mobile instructional settings. Data were drawn from five empirical corpora (comprising three driving schools, one aviation school and one corpus documenting cycling training between children and caregivers or instructors) totalling over 250 hours of video-recorded mobility training in several European countries. For this reason, the talk analysed in this article took place in Italian, Finnish, Swedish and English. Each data set (presented in detail below) was collected independently by the authors working in five research teams, then brought together in a series of workshops and data sessions in search of phenomena of interest spanning across the different mobile settings. This was possible due to common expertise in analysis of conversation and a shared interest in mobility as well as instruction and learning,

which allowed us to observe some organisational similarities (cf. Schegloff 1993) in practices taking place in distinct types of vehicles and traffic conditions.

By way of drafting the empirical examples from the corpora, initial collections were made of correction sequences, focusing on variation within each data set. In a second step, we examined the collections for different types of trouble sources and the correction procedures that followed upon the identification of the trouble. This part of the analytic work involved repeated viewings of video clips and detailed multimodal transcription of selected excerpts. In the following analysis, our interest is with correction procedures that, in addition to seeking to alter a trajectory of action, were shaped for the purposes of teaching and learning. For this reason, the selected examples were examined to reveal participants' orientations to the instructional character of the activity. Finally, to explicate the endogenous features of mobile training, the analysis targets the sequential and multimodal organisation of interaction and shows how the participants' conduct is embedded within and oriented to the internal physical environment of the vehicle (or craft) as well as its surrounding mobile environment.

3.2 Data sets

3.2.1 Aviation training

Excerpt 1 was drawn from video recordings of pilot training at an upper secondary school. The data consist of twelve hours of video recordings documenting three pilot students during three consecutive flight lessons. Each flight lesson consists of a pre-flight briefing session, the flight lesson itself in an actual airplane and a debriefing session. The data were collected by Helen Melander, Department of Education, Uppsala University.

3.2.2 Driver training

Excerpt 2 was drawn from a Swedish research project. The corpus holds over 200 hours of video recordings of driver students and instructors in interaction. Three cameras are used in order to capture different angles of view inside and outside the car. The data were collected by a researcher team from Linköping University and The Swedish National Road and Transport Research Institute (VTI): Jakob Cromdal, Mathias Broth, Lena Levin and Daniel Björklund.

Excerpt 3 is part of a corpus of recordings of drivers in their sixties participating in voluntary post-licence training in real traffic in real time. The training consisted of three one-hour sessions per driver. The recordings provide a single, wide-angle view into the interior of a dual-controlled car. The data were collected by Heikki Summala and research team members¹ at the Traffic Research Unit, University of Helsinki, Finland, in 2010. Co-authors Haddington and Rauniomaa have access to data from five different drivers, amounting to approximately 15 hours of video recordings.

Excerpt 4 is part of a corpus of seven 1-hour driving lessons collected by Anne-Danièle Gazin in the Italian-speaking part of Switzerland. Two cameras and two microphones registered the participants talk and embodied conduct as well as the view through the windscreen. The

¹ Esko Lehtonen, Isa Dahlström, Harri Hiltunen, Jarkko Hietamäki and Jami Pekkanen.

collection was part of a research project at the University of Berne, directed by Elwys De Stefani.

3.2.3 *Bicycle training*

Excerpt 5 was drawn from a corpus of recordings using from three to seven video cameras placed on the bicycles of instructors, family members and children learning to cycle at school or with a family member. The corpus contains 30 hours of recordings in English and Danish. The data were collected by Paul McIlvenny.

4. Unpacking corrections in mobile instruction

In the following analysis we develop an empirically based, praxeological account of correction in mobile training. Five examples drawn from different instructional settings are examined focusing on participants' resources for identifying trouble in operating different vehicles, their ways of initiating and performing corrections, as well as any talk concerning the reason, logic or rationale underlying the correction operations. In other words, we attend to the *what*, *how* and *why* – aspects of correction procedures in mobile instructional settings.

Our first example is taken from aviation training. Characteristic for the aviation context is that the participants are moving in a three-dimensional and relatively unstructured space in which they sometimes navigate through looking outside the aeroplane, while on other occasions they need to rely solely on the flight instruments. The exchange shown in the excerpt is part of a larger activity in which the student is practicing to fly steep turns, i.e., to take a 360-degree turn a 45-degree angle. This involves making judgments about how to manoeuvre the aeroplane by looking at the instrument panel only. The student is wearing a hood to prevent him from looking outside the plane.

Before the excerpt starts, the student had just completed a steep turn to the left and this was followed by a demonstration performed by the instructor. During this demonstration, the instructor stressed the importance of keeping the nose at the same level throughout the turn and to take care to position the nose on the horizon (as displayed on the instruments) immediately when exiting the turn, so as to stay on the right altitude. The student is now prompted to do a steep turn on his own, this time to the right. As we shall see, the trouble which the participants encounter has to do with the exact nose position of the plane during, as well as when exiting, the steep turn.

This exchange took place 35 minutes into the flight lesson. The student had appr. 30 hrs. of airtime preceding this lesson and it was his second time flying a glass cockpit. The flight lesson focused on instrument flying (hence the hood that can be seen in the pictures) and on getting to know the glass cockpit. Up to this point in the lesson, the student had been practicing different manoeuvres, such as one rate turns, full and slow speed and stalling.

Excerpt 1. *Steep turn practice*. [F1-060502-2.flightlesson1; 05.15-06.10. Vertically corresponding signs (e.g., “+”, “&” or “Δ”) denote the temporal relationship between physical actions and talk or silence. See Appendix for a full set of transcription conventions.]

- 1 INS: du kan göra en åt hö:ger? de blir exakt samma sak där,
 you can do one to the right it will be exactly the same there
 2 + (7.4) +
 stu +enters into a steep turn to the right+
 3 +(3.0)+
 stu +flies the steep turn-->#
 fig #fig.1.1

Fig 1.1

Fig 1.2

- 4 INS: pitchar du upp till en fem: (kommer vi snart att)
 could you pitch up to five (we'll soon)
 5 hitta tillbaka upp till e: (0.8) tvåtusen fot?
 find your way back up to uh two thousand feet
 6 (20.5)+
 stu -->+
 7 + (6.3) +
 stu +exits the steep turn+#
 fig #fig.1.2
 8 INS: ja: (1.8) å så +ner me nosen,+ preci:s. (0.6)
 yes and then down with the nose precisely
 stu +adjusts nose +
 9 INS: där kommer de där lilla sti:get annars.
 otherwise you get that little climb there
 10 STU: a:,
 yeh
 11 (1.2)
 12 INS: bra jobbat, kan gå rakt fram ett litet tag:
 good work can go straight ahead for a little while

Save for the change of direction (to the right), the upcoming manoeuvre is introduced by the instructor as identical to the one just carried out. For the student, the implication of this instruction is to repeat the procedure of the steep turn exactly as the instructor just demonstrated. The student banks the plane steeply to the right (line 3; fig. 1.1) and the turn continues for roughly 27 seconds, upon which the student rolls out (line 7; fig. 1.2), exiting the turn.

A few seconds into the turn the instructor tells the student to “pitch up to five” (line 4) – to adjust the nose to five degrees above the artificial horizon on the attitude indicator – suggesting that they are currently losing altitude. This becomes evident in the account following the corrective instruction, where the instructor explains that correcting the nose attitude will allow them to “find [their] way *back up to* two thousand feet”. The instructor’s turn in lines 4-5 is thus designed not just to prompt the student to correct the aeroplane’s

attitude, but also to indicate the nature of the problem (loss of altitude) as well as specify the relevant parameters for a successful correction (target altitude of 2000 ft.).

The student adjusts the nose inclination and continues the turn. Several seconds later, the student rolls out from the turn (line 7; fig. 1.2). Typically, when the plane is no longer banked there is a vertical lift, so in order to remain on the same altitude, the pilot may need to counteract the climb by slightly dropping the nose. As the student completes the roll-out levelling the wings, the instructor shortly confirms that the turn is now ended (“yes_i”, line 8). As the student makes no visible attempt at further adjusting the flight controls, the instructor proceeds, after a 1.8 second pause, to initiate another correction telling the student to follow through the manoeuvre by dropping the nose. Note that the student’s reaction is immediate: as soon as the instructor’s turn may be heard as a formulation of a next step in the procedure (“and then”, line 8), the student begins adjusting the inclination of the nose. By the time the instructor finished the corrective prompt, the aircraft is already in the correct position for straight flight, and the instructor accordingly confirms the successful correction (“precisely”, line 8). Recalling Deppermann’s study (2015), we may conclude that the corrective instruction in line 8 is produced to remind the student that the nose of the plane needs to be dropped after rolling out of a turn, rather than offering this as new information.

However, the correction sequence does not end here. The instructor moves on to explain in line 9 that if the nose is not dropped after a roll-out, the altitude of the aeroplane will increase somewhat. After the student has registered the explanation with a short agreeing receipt (line 10), the instructor offers a positive assessment of the student’s performance and issues a new navigational instruction in line 12. This concludes the steep turn manoeuvre.

As we have seen, two problems are being observed in the student’s handling of the aeroplane, both of which are occasioned by his failure to keep the altitude constant throughout the turn. The first instance took place during the turn, where the steeply banked plane was losing altitude, and on the second occasion the aeroplane began to climb unwarrantably after rolling out of the turn. Both problems give rise to correction initiations from the instructor (lines 4–5 and 8–9). It should be noted that they do not merely prompt the student to make the relevant adjustments to the aeroplane’s attitude, but that they are incrementally expanded (Ford, et al, 2002) to include relevant information about the nature of the trouble and, relatedly, the reason for the corrective actions. In other words, the expansions explicate the logic underlying the suggested course of action: *what* the problem is, *how* it can be corrected and *why* it should be rectified the way that is being suggested. This excerpt thus shows how pedagogic considerations are embedded in the correction procedures.

Next follow three examples from driving training. One relevant difference with respect to the previous example is that drivers – in contrast to pilots – never rely solely on the vehicle’s instruments. Rather, they competently attend to and analyse relevant aspects of the visual field outside the vehicle, and continuously make decisions based on their analysis. Excerpt 2 below shows a student and instructor preparing for a left turn at a roundabout. It begins with the instructor multimodally identifying a landmark ahead – a give way sign – introducing a time

and space framework for carrying out some yet unspecified mobile action. The student confirms seeing the landmark (line 2) and begins to release the accelerator, as indicated by the tachometer arrow dropping (line 3–4).

This exchange took place 43 minutes into the student’s 13th driving session. Up to this point, they have been driving on a minor country road and are now approaching a circular intersection that connects with other minor roads as well as a highway.

Excerpt 2. Roundabout approach

[ts1_13_k2_08m19s_10m06s].

1 INS: +.h: °↑ser du° vä#jningsplikten; där+ borta.=
 do you see the give way sign over there
 ins +.....points RH,,,,,+
 fig #figs.2.1/2.2

Fig 2.1

Fig 2.2

2 STU: =°mm;°=
 3 INS: Δ=°°m°°Δ
 com Δtachometer arrow dropsΔ
 4 (0.4)
 5 INS: .h kan ju fortsätta gasa,
 (you) can keep giving gas
 6 INS: för de ä ganska ↑lå:ngtΔ kvar till den va.
 because it's quite a long distance left to it right
 7 com Δtachometer arrow rises -->>
 8 INS: .h: ä: (0.8) tsk vi ska ↑vänster (.) i cirkulationsplatsen
 .h eh tsk we are going left in the traffic circle

As we can tell from the instructor’s correction initiation (Schegloff, et al., 1977) in line 5, in which he prompts the student to “keep giving gas”, letting off the accelerator at this particular moment is an unwarranted driver action. The rationale for keeping the accelerator steady is immediately unpacked in a turn increment (line 6), in which the instructor formulates the distance to the intersection as “quite long”. Note that the corrective instruction includes the epistemic adverb “ju”, which is commonly used in Swedish to appeal to shared knowledge, (see Heinemann, et al., 2011) and that the estimation of distance concludes with the particle “va” (“right”). By designing his actions this way, the instructor performs a driving-relevant analysis on the shared perceptual field (cf. lines 1–2), thereby affording the student with a member’s procedure for judging distance (Sacks, 1992/1966, on measurement systems) applied to the current situation.

Hence, reducing speed – normally an appropriate action when approaching a give way sign – is treated as premature. Consequently, we can see in line 7 that the student has resumed

The next excerpt shows another instance of a student driver slowing down prematurely, but in a very different traffic environment. The exchange below takes place as the vehicle is approaching a motorway exit junction. The excerpt begins twelve minutes into the student's second driving session. About one minute before the excerpt, they have entered a multi-lane motorway with a speed limit of 70 km/h. The motorway takes them over a bridge and, once they are across, the instructor provides further navigational instructions.

```

1  INS: #m:ennään +Δ seuraavaΔvasta liittymästä #Kulo+saareen.+
    let's take the next exit to Kulosaari
fig #fig.3.1                                #fig.3.2
ins +lifts RH to point right-----+lowers RH+
stu Δlifts RLΔ

```

```

2      (2.3)
3      INS: mutta hidastetaan vasta hidastuΔ#skaistalla.Δ
           but let's slow down only once on the exit lane
           Δlowers RL ->Δ
           #fig.3.3

```

4 STU: °mm,°
5 INS: ei sotketa liikennettä täällä.
let's not disrupt the traffic here
6 (3.8)

10

has been delivered in full (line 1; see fig. 3.2). This suggests that she is able to project the gist of the instructor's turn, and to act on this understanding by preparing to exit the motorway – a manoeuvre that involves, among other things, a considerable reduction of the vehicle's speed.

As the speed of the vehicle begins to drop noticeably a few seconds later, the instructor correctively points out that they should not be slowing down until they have changed into the exit lane. The student immediately begins to amend the mistake by pressing the accelerator pedal again (line 3; fig. 3.3), faintly acknowledging the corrective instruction with a minimal receipt token (line 4). At this, the instructor offers an account for the correction initiation, concluding that they should not disrupt the traffic on the motorway.

Exiting the motorway involves a step-by-step ordered procedure that involves (i) indicating before (ii) shifting into the exit lane before (iii) reducing speed, and finally (iv) leaving the motorway. Hence, the student's error can be seen as a matter of sequentiality (cf. Sacks, 1992/1966), rather than caused by an entirely inadequate driver action. However, in unpacking the corrective instruction, the instructor contextualises the problematic driver action in the current traffic situation, pointing to its potential consequences: slowing down before changing to the exit lane may disrupt the pace of the other road users – by implication, a risky scenario on the motorway.

In the following example, a student driver encounters some trouble getting into the right gear, and the transcript shows a trajectory of sequences comprising corrective instructions – correction trials by which the parties work to regain control of the vehicle's transmission machinery. The student has not been taken lessons for a while and during the first minutes of the journey it has become clear already that he still has some basic difficulties. More specifically, he has problems to correctly shift gears.

As the transcript begins, the car has just driven off from a traffic light and is gradually accelerating. After a successful change to second gear, the student twice fails to move the gearstick into the third gear. In the first attempt he puts the gearstick into the fifth gear position, and in the subsequent trial the car is forced into the first gear.

Excerpt 4. *Gear trouble*. [sg2_3842].

```

1          (2.0)
2 INS:     poi mettiamo bene anche la ↓terza giù...+frizione(>^e<)+via gas:/+
           then we put well also the third down clutch (and)release the gas
stu                                     +hand to gearstick      ->+
3          (0.2)
4 INS:     #+mano piat+ta+
           flat hand
ins        +gesture->+,,->
stu        +changes gear+>
fig        #fig.4.1
5          (0.3)
6 INS:     +s+ali al pun*to#      +
           go up to the point
ins        >,,+
```

```

stu      +looses RH from grstck+
stu      *gz grstck->
stu      +LL up >
fig      #fig.4.2

```

Fig. 4.1

Fig. 4.2

```

7 STU:    +(non lo so) *
           (i don't know)
stu      ->*
stu      +hesitates RH+
8         +(0.5)      +
stu      +RH to strwhl+
stu      ->+
9 INS:    +hai me+sso la+ quin+ta
           you've put the fifth
ins      +LH up-+,,,,->+
stu      +RH to grstck->
10 STU:    e::h/+
stu      ->+
11         +(0.7)#      +
ins      +LH to RHstu+
fig      #fig.4.3
12 INS:    giù con la frizione
           down with the clutch
13         (0.4)+(1.2)      +(0.3)
ins      +gear change+looses LH>
stu      +gear change+
14 INS:    o:c+chei [vieni su al pu+nto
           okay      come up to the point
stu      +RH back to strwhl-->+
ins      >+LH back to home----->+
15 STU:    [così no/
           like this no/
16         +(0.6)+(0.2)+(0.5)
car      +shock+
ins      +.....->
17 INS:    +mettiam+o la sec+onda +giù +frizione(^e) +via gas#+
           we put the second down clutch (and) release the gas
ins      +pp---->+,,,,->+      +LH grstck----->+
stu      +RH to grstck      ->+
fig      #fig.4.4
18         +(0.8)      +
stu      +ch. gear+
ins      +ch. gear+

```

Fig. 4.3

Fig. 4.4

```

19 INS:      +sali al pun+t+o
              go up to the point
ins          >+,,,,,,,,->+
stu          >+,,,,,,,,->+
20           (0.5)
21 INS:      e gas
              and gas
22 STU:      =(troppo)
              (too much)
23           (0.8)
24 INS:      hai tirato
              you pulled
25           (0.4)
26 INS:      +devi lavorare con la mano+ piatta +ade+sso mett+iamo la+terza giù
              you have to work with a flat hand now we put the third down
ins          +LH&RH flat up and down-->+          +...+ppLH--->+,,,,,->+
27 INS:      fri+zion+e(^e) via gas lavora >>co+nicon la-<< m+ano pia+tta o:cchei
              clutch (and) release the gas work >>with with<< the flat hand o:kay
ins          +gesture with RH, holding it flat----->+
stu          +brings RH to gearstck +changes gear---->+RH bck strwhl->

```

The instructor prompts the student to change into third gear (line 2), then immediately proceeds to parse this car control instruction (De Stefani & Gazin, 2014) into two component actions “clutch down” and “release the gas” that need to be carried out before the gear can be changed. As the student grips hold of the gearstick and begins to move it forward, the instructor demonstratively lifts his right palm saying “flat hand” (line 4, fig. 4.1). The student’s handling of the gearstick is thus manifestly treated as problematic and the multimodal design of the corrective instruction offers an audible as well as visible display of how to manoeuvre the gearstick correctly. With the gearstick in place, the student is further instructed to come up to the biting point (line 6) by raising his left foot off the clutch pedal, thus completing the gear change. At this point, the student looks down at the gearstick (fig. 4.2) then says “I don’t know” (line 7), thereby publically observing that something about the just performed gear change is potentially problematic.

The instructor responds to this unqualified indication of trouble by explaining that the student has put the stick into the fifth gear position (line 9). Seen against the backdrop of the initial instruction – to get into third gear – this works as a negative assessment of the instructed action. As such, it initiates the student’s correction: in line 10, the student receives the assessment with a hearably annoyed agreement token, then he begins to change gear. The instructor again accompanies the student by parsing the manoeuvre into component actions

(lines 12 through 14: “down with the clutch”, “come up to the point”), and by physically assisting, with his left hand, the student’s manipulation of the gearstick (fig. 4.3). As they jointly let go of the gearstick, the student produces another trouble indication (line 15), observing that something is not right. A moment later the engine begins revving heavily (line 16), indicating that the vehicle is now in first gear.

Whether due to the urgency of the situation or simply because there is no need to verbalise the problem, the instructor instantly produces a remedial directive “we put the second”, and while both parties move their hands to grab the gearstick (fig. 4.4), the instructor follows up the corrective instruction with the routine action components “down clutch (and) release the gas”. As the stick is being collaboratively moved into second gear position, the student is prompted to go up to the biting point and add gas (lines 19–21). This time, the gear change is accomplished successfully.

With the car being back in gear, the instructor offers an identification of the student driver’s error: that he had forcefully pulled the gearstick. He then reminds the student to “work with a flat hand”, thus explicating the correct manner of handling the gearstick. The correction exchange concludes with a new instruction to change into third gear (lines 26–27), and an incrementally positioned final reminder to handle the gearstick with a flat hand.

We have seen in this excerpt how the parties work in tandem to solve the problems as they unfold: the student’s verbalised indications that *something* is not working out as expected provide for the instructor’s formulations of the problem and the embodied actions that guide the student’s correction moves. Furthermore, the prolonged correction activity nicely demonstrates the sensitivity of instructions and instructed actions in driving vis-à-vis the ever-changing physical environment. As the speed of the car has been gradually dropping, the objectives of the correction actions have changed. The third gear that was the original target of the manoeuvre is no longer relevant, and we see that the third trial instead focuses on getting into second gear.

Again, it is important to note that, similarly with the earlier examples, the correction exchange is unpacked by the instructor to supply relevant information about the problem (“you pulled”, line 24) and how it should be avoided (“work with a flat hand”, line 26). Such unpacking of problematic actions and correction procedures – by which students are afforded not just retrospective accounts of what went wrong but, crucially, prospectively oriented guidance how to competently operate the vehicle in similar situations in the future – allows us to glimpse some inherent pedagogic features of the training activities.

The correction activities in our last example concern the positioning of a vehicle vis-à-vis the surrounding traffic topography and other vehicles. The data are drawn from a corpus which includes recordings of a father and daughter practicing cycling in city traffic. This mobility practice requires the two cyclists to perform many manoeuvres together – often simultaneously – while in control of separate ‘vehicular units’, which itself is a resource for instructed action. On this occasion, they are riding home from visiting a friend on the other

side of the city; they have been riding for 20 minutes. Riding on a cycle path, they approach a complex intersection over which they have to adjust their speed, change direction and cross over to take a side road to the left. They are riding on the right side (A) and they need to cross at a specific place (B), which has a separate cycle path lane and traffic light system for cyclists (fig. 5.1).

Fig 5.1: The cycle lane with traffic bike light and the crossing - the path of the cyclists is marked with a red line from A to B (copyright GoogleMaps 2013).

The transcript begins when the instructor instructs the trainee cyclist Aladdin to get in the right cycle lane in order to assemble at the relevant bicycle traffic light before crossing over.

Excerpt 5. *Intersection preparations.* [Big Bike + child bike 25.7.2010: 21:45-22:21]

- 1 **INS:** +and now we have
 ins +extends pointing gesture with LH-->
- 2 **INS:** to go he:re to this #little li:ght
 ins ->+
 fig #fig.5.2/5.3/5.4

Fig. 5.2

Fig. 5.3

Fig. 5.4

- 3 **INS:** and wait for it to go: (.) gree:n.
- 4 (0.5)
- 5 **INS:** and +then we have to go over the:re+
 ins +points with LH ->+
- 6 + (1.5) +
- ins +turns onto the 'crossing only' cycle path lane+
- 7 **INS:** so:: (1.0)+(0.5) #come +next to me:
 +points w RH +
 fig #fig.5.5/5.6/5.7

Fig. 5.5

Fig. 5.6

Fig. 5.7

```

8  INS: &'coz when it goes gree:n it won't la:st very lo:ng
    stu &slows and turns onto the 'crossing only' cycle path lane-->
9  ROL: aaaaAAAAAA+AAAAAAAAAAAA$AAAA (0.5)$ ((screams from rollercoaster))
    ins +looks to amusement park-->
    stu $glances at amusement park->$
10      (2.0)+&
    ins ->+
    stu ->&
11      (1.0)
12  INS: +come round he:re +
    ins +points with RH, looks down->+
13      (2.0)
14      + (0.5) +
    ins +glances at STU->+
15      #+ (6.0) +
    ins +stops at traffic lights and adjusts video camera->+
    fig #fig. 5.8

```

Fig. 5.8

```

16  INS: +(0.5) come rou:nd Aladdin (1.0)+
    ins +turns to look at STU ->+
17      (2.0)
18      +(1.0)
    ins +turns to look at STU-->
19  INS can y'come over he:re
20      (2.5)+
    ins -->+
21      & (2.0) &
    stu &moves up to INS's position->&
22  INS: +(0.5) aladdin ri:ght next to me (please) (1.0)+
    ins +looks down on left side and points ->+
23      & (2.5) &#
    stu &moves next to INS->&
    fig #fig 5.9/5.10

```

Fig. 5.9

Fig. 5.10

The instructor prepares and instructs the trainee cyclist about the approaching manoeuvre that they have to perform together on an unfamiliar stretch of infrastructure: they must slow down as they approach the bicycle traffic lights, stop when the lights are red, and then cross the intersection when the lights change to green. During the approach to the traffic lights, the instructor uses deictic expressions (lines 2 and 5) as well as landmark references (line 2) together with pointing gestures (lines 1–2 and 5) to explain the correct procedure for getting ready to cross over (e.g., Goodwin, 2000).

In line 6, the instructor begins to turn onto the lane dedicated for bicycles crossing the intersection. The prosodically marked “so” in line 7 constructs the directive “come next to me” as instructing a next mobile action that is required to complete the prospective mobile actions introduced just prior (see figure 5.6 for a visual indication of the position to be achieved and the path the child is instructed to take) – namely, to cross the intersection. The instruction also initiates a correction of the trainee cyclist’s current position at the intersection, and through the turn increment in line 8 the instructor unpacks the corrective instruction offering the rationale for moving up closer to the instructor’s bicycle. As the trainee cyclist is not complying, the instruction to pull up parallel to the instructor’s position on the cycle lane is repeated in different forms several times (lines 12, 16, 19 and 22), and the trainee cyclist finally complies with the instruction in line 23.

As we can see, the trouble in this example has to do with both cyclists assembling in the same position at the traffic lights. In terms of the mobile action unfolding, two local concerns seem to be at stake: first, practicing the correct cyclist position relative to the cycle path as well as to other cyclists; and second, training to prepare for initiating a new manoeuvre, in this case to start off from a green light over an intersection. The first is an ongoing contingency that is negotiated as the riders move over the terrain together; the second requires a state of readiness for the two riders-in-motion to proceed over the intersection together in a timely manner when the lights turn green. It is to this latter concern that the unpacking of the corrective instruction is oriented. By appending the rationale for the instruction (line 8) “coz when it goes green it won’t last very long” (cf. Couper-Kuhlen, 2011, on *because*-fronted account clauses), the instructor explicates the temporal conditions of the upcoming manoeuvre.

This last example also raises the issue of the affordances and contingencies of the type of vehicle that a person is learning to use, and the consequence of these affordances for the

unfolding interaction. For example, whether or not the participants share the same vehicle has obvious implications for the relative independence of the learner. Clearly, the fact that there are two vehicles involved in this case generates practical problems of coordination and control not seen in any of the previous examples, and which the instructor seeks to handle by spatially aligning the two bicycles (McIlvenny, 2014).

5. Concluding discussion

Studies in ethnomethodology and conversation analysis have a long-standing interest in examining the organisation of social interaction in instructional settings. Practices of correction – of observing and dealing with student errors – form one of the central features of such settings (e.g. Deppermann, 2015; Koshik, 2002; Lindwall & Ekström, 2012; Lindwall, Lymer & Greiffenhagen, 2015; Weeks, 1985). The present study contributes to this literature by examining correction sequences in mobile training.

Drawing on recordings of participants learning how to fly aeroplanes, drive cars and ride bicycles, we have examined the methods by which corrections of student's conduct are (i) initiated; (ii) carried out; and (iii) elaborated or unpacked. Starting with a general observation, we have shown that different types of action, as well as lack of action, may be treated as problematic and construed as correctable. For instance, both corrections in the aviation example were occasioned by the student pilot's omission to adjust in a timely manner the inclination of the aeroplane's nose. Similarly, in our bicycle training example it is the absence of action (the child's not moving up next to the adult's bicycle) that forms the correctable element, and the missing action is pursued in several subsequent turns. In contrast, both student drivers in examples 2 and 3 do indeed carry out actions that are relevant to the instructed manoeuvre, but do so prematurely, which is what occasions the observed correction activities. Finally, in example 4, while the student acts in a timely manner, the corrections have to do with the student driver performing the wrong action (putting the car into wrong gear).

Our chief interest in this article, however, is with the practice of unpacking correction-relevant specifics, and in the following we offer two main findings that emerged from the analysis. First, we propose that while both the initiation and the actual performance of the correction are constitutive parts of correction sequences irrespective of their interactional context, the unpacking component is a distinctively pedagogic feature of the activities. It may be thought of, in the most general sense, as a technique for guiding the construction of knowledge (Mercer, 1995). It is here that instructors spell out for the students' benefit the relevant aspects of the trouble as well as explicate the rationale and inherent workings of the proposed remedy. In other words, while the corrective instruction is aimed at *what* needs to be done to come to terms with an erroneous move, the unpacking of this correction procedure attends to the *how* and *why* – aspects of trouble management. Their distinguishing pedagogic feature is that they contribute information not necessary to the successful accomplishment of the correction; instructions such as to pitch up the nose to five degrees or to hold off the brake

for a moment were, in themselves, perfectly (and demonstrably) followable by the students in our data. Yet, the instructors would proceed to unpack some of the relevant features of the instructions thereby providing for, we argue, their students' understanding of the rationality involved in the proposed correction procedure. Hemmings et al. (2000) point out that “(t)hings are learnt (or not), knowledge is acquired (or it is not), when there is something there *to be learnt*” (pp. 242-243, italics in original), and we propose that by unpacking their corrective instructions, the instructors across our data sets used the sequential environment of correction to expose their students to specific branches of practical reasoning.

One set of skills that students need to practice has to do with making sense in relevant ways of mobile scenarios. Without doubt, this will occasionally prove a challenge in training sessions. In explicating the local contingencies, the instructors engage in the shaping of students' analytic skills. For the students then, unpacking the particulars of correction activities makes the relevant actions locally meaningful (see Lindwall & Ekström, 2012), and provides them with resources for making the correct inferences and decisions in similar situations in the future. Students are hereby socialised into specialised forms of practical reasoning – into perceiving, analysing and acting on situational configurations in competent ways *as* pilots, drivers or cyclists (cf. Goodwin, 1994).

Second, with reference to the emergent organisation of correction sequences, we show that the position in which this unpacking takes place depends on mobile as well as vehicle-specific contingencies. The analysis of sequential and multimodal organisation of interaction shows how the participants' conduct is embedded within and oriented to the internal physical environment of the vehicle (or craft) as well as its surrounding mobile environment. The strength of the analysis consists in the fact that the correction practice described above was found to occur across all five settings. This we propose is a general feature of training, where instructors can exploit student mistakes to create learning opportunities.

Across the different examples, we have seen how the corrective instructions are unpacked by instructors to provide students with relevant information concerning the trouble. Such unpacking may offer an analysis of the student's erroneous execution of the relevant action (Excerpt 4, line 24, “you pulled”) and supply an alternative procedure (Excerpt 4, line 26, “you have to work with a flat hand”). The correction may also be unpacked by specifying the negative consequences of the problematic (non-)action as in Excerpt 1 (unwarrantably gaining altitude, line 9), and Excerpt 3 (disrupting the traffic on the motorway, line 5), that therefore serve as accounts for the suggested correction. Alternatively, corrective instructions may also be accounted for by stressing the positive consequences of the correction, as in Excerpt 1 (climbing back up to the expected course altitude, lines 4–5). An important feature of such accounts in and for mobile correction is that they make manifest their relevant contextual features – they couple the trouble source or the suggested correction with their physical and mobile contingencies. For instance, in Excerpt 2, the instructor unpacks the spatial relevancies in approaching an intersection (“quite a long distance to it”) where one will have to give way, while in Excerpt 5 (line 8), the instructor explicates the temporal conditions involved in crossing a major intersection on a bicycle after the light has turned green.

Weeks (1985) pointed out that “the study of correction-techniques and sequences can be a valuable heuristic device for elucidating aspects of the distinctive orderliness of activities to which they are adapted or addressed” (p. 232), and it should be emphasized that the unpacking of local rationalities in correction episodes constitutes the sessions examined as training. Nonetheless, we need to bear in mind that the activities documented in our examples took place in their indigenous traffic settings. Rather than being simulated exercises, designed beforehand for the purpose of teaching and learning, they are instances of actual flying, driving and cycling, amenable to a variety of local spatio-temporally ordered contingencies. This has profound consequences on the organisation of the interaction:

- In Excerpts 1, 2 and 5, the corrections are unpacked incrementally. That is to say, the expansions are produced immediately after the correctional instructions, before (or overlapping with) the students’ correction. At the time of the student’s error, the mobile circumstances in these examples do not seem to call for urgent corrections, nor do they give reason for instructors’ interventions.
- In contrast, the interaction in Excerpts 3 and 4 is organised differently, with the instructors awaiting successful correction before expanding on the particulars of the problem. In Excerpt 4, the student twice fails to find the right gear, which results in loss of speed. We should recall that this takes place as they are driving off from a traffic light at an intersection – a situation in which vehicles are expected to accelerate. The relative urgency of successful correction is observable in that the interaction is entirely focused on correctional objectives – how to get in gear and begin to accelerate – and in that the instructor physically intervenes with the student’s handling of the gearstick.
- In Excerpt 3, the student begins to slow down on the motorway before changing into the exit lane, and the instructor expands on the reason for the correction only after the student has begun to correct the mistake by accelerating. Interestingly, the student in Excerpt 2 commits exactly the same error with respect to handling the vehicle – only this time the premature slowing down takes place on an empty country road – and we see no attempt from the instructor to ensure that the mistake is being corrected before explicating the reason for correction. In other words, the instructors orient their actions to the physical and mobile setting by temporally adjusting the instructional work to the local traffic concerns.

Drawing on recent work in ethnomethodology and conversation analysis on mobility, this analysis thereby offers a glimpse of the complexity involved in coordinating talk and action with unfolding spatio-temporal configurations of mobile environments within the realms of educational practice. This study also contributes to a general understanding of instructional settings as a members’ accomplishment, as well as to research on the interactional organisation of correction, both of which, we suggest, are central to educational inquiry as well as practice. While it may be a truism that mistakes are important for learning, this line of inquiry takes as its task to try to elucidate just how this is so.

Acknowledgements:

The writing of this paper was funded by research grants from the Committee for Educational Sciences of the Swedish Research Council (grant #721-2012-5367); the SNSF (Swiss National Science Foundation), the University of Bern; the Academy of Finland (project number 287219: iTask: Linguistic and embodied features of interactional multitasking, and decision nos. 251757 and 284595).

References

- Broth, M., Cromdal, J., & Levin, L. (in press). Starting out as a driver. Progression in instructed pedal work. In Å. Mäkitalo, P. Linell & R. Säljö (Eds.), *Memory practices and learning – interactional, institutional and sociocultural perspectives*: IAP.
- Broth, M., & Keevallik, L. (2014). Getting ready to move as a couple: Accomplishing mobile formations in a dance class. *Space and Culture*, 17(2), 107–121.
- Couper-Kuhlen, E. (2011). When turns start with because: An exercise in interactional syntax. *VARIENG: Studies in Variation, Contacts and Change in English*, 8. <http://www.helsinki.fi/varieng/series/volumes/08/couper-kuhlen/>
- Deppermann, A. (2015). When recipient design fails: Egocentric turn-design of instructions in driving school lessons leading to breakdowns of intersubjectivity. *Gesprächsforschung*, 16, 63–101.
- De Stefani, E., & Gazin, A.-D. (2014). Instructional sequences in driving lessons: Mobile participants and the temporal and sequential organization of actions. *Journal of Pragmatics*, 65, 63–79.
- Ford, C. E., Fox, B. A. & Thompson, S. A. (2002). Constituency and the grammar of turn increments. In: Cecilia E. Ford, Barbara A. Fox & Sandra A. Thompson (Eds.), *The Language of Turn and Sequence*. Oxford: Oxford University Press. 14–38.
- Garfinkel, H. (1967). *Studies in Ethnomethodology* Englewood Cliffs, NJ: Prentice Hall.
- Garfinkel, H. (2002). *Ethnomethodology's Program*. Rowman & Littlefield Publishers: Lanham, Boulder, N.Y., Toronto, Oxford.
- Gazin, A.-D. (2015). *Instructional sequences in the moving car: A conversation analytic approach to multimodal interaction in driving lessons*. (Diss.). Philosophisch-historischen Fakultät der Universität Bern von.
- Goodwin, C. (1994). Professional vision. *American Anthropologist*, 96, 606–633.
- Goodwin, C. (2000). Action and embodiment within situated human interaction. *Journal of Pragmatics*, 32, 1489–1522.
- Haddington, P. (2012). Movement in action: Initiating social navigation in cars. *Semiotica*, 191(1/4), 137–167.
- Haddington, P. (2013). Projecting mobility: Passengers directing the driver at junctions. In P. Haddington, L. Mondada & M. Nevile (Eds.), *Interaction and Mobility: Language and the body in motion* (pp. 179–209). Berlin: Walter de Gruyter.
- Haddington, P., Mondada, L., & Nevile, M. (Eds.). (2013). *Interaction and Mobility: Language and the body in motion*. Berlin: Walter de Gruyter.
- Haddington, P., & Rauniomaa, M. (2014). Interaction between road users: Offering space in traffic. *Space and Culture*, 17(2), 176–190.
- Heinemann, T., Lindström, A. & Steensig, J. (2011). Addressing epistemic incongruence in question-answer sequences through the use of epistemic adverbs. In: T. Stivers, L. Mondada & J. Steensig (Eds.), *The morality of knowledge in conversation*. Cambridge: Cambridge University Press. 107–130.

- Hellerman, J. (2007). The development of practices for action in classroom dyadic interaction: focus on task openings. *The Modern Language Journal*, 91, 83–96.
- Hemmings, T., Randall, D., Marr, L. & Francis, D. (2000). Task, talk and closure: Situated learning and the use of an 'interactive' museum artefact. In: S. Hester & D. Francis (Eds.), *Local Educational Order: Ethnomethodological Studies of Knowledge in Action*. Amsterdam: John Benjamins. 223–244.
- Hindmarsh, J., Hyland, L., & Banerjee, A. (2014). Work to make simulation work: 'Realism', instructional correction and the body in training. *16*(2), 247–269.
- Jefferson, G. (2004). Glossary of transcript symbols with an introduction. In G. H. Lerner (Ed.), *Conversation Analysis: Studies from the first generation* (pp. 13–31). Amsterdam: John Benjamins.
- Juhlin, O. (2010). *Social Media on the Road. The Future of Car Based Computing*. London: Springer.
- Keevallik, L. (2010). Bodily quoting in dance correction. *Journal of Pragmatics*, 43(4), 401–426.
- Koshik, I. (2002). Designedly incomplete utterances: A pedagogical practice for eliciting knowledge displays in error correction sequences. *Research on Language and Social Interaction*, 35(3): 277–309.
- Laurier, E., Brown, B., & Lorimer, H. (2012). What it means to change lanes: Actions, emotions and wayfinding in the family car. *Semiotica*, 191(1/4), 117–135.
- Laurier, E., Lorimer, H., Brown, B., Jones, O., Juhlin, O., Noble, A., Perry, M., Pica, D., Sormani, P., Strebel, I., Swan, L. Taylor, A.S., Watts, L. & Weilenmann, A. (2008). Driving and 'passenger-ing': Notes on the ordinary organization of car travel. *Mobilities*, 3(1), 1–23.
- Lindwall, O., & Ekström, A. (2012). Instruction-in-interaction: The teaching and learning of a manual skill. *Human Studies*, 35, 27–49.
- Lindwall, O., Lymer, G., & Greiffenhagen, C. (2015). The sequential analysis of instruction. In M. Numa (Ed.), *The Handbook of Classroom Discourse and Interaction, First Edition*, pp. 142–157. John Wiley & Sons, Inc.
- Majlesi, A. R. (2014). *Learnables in Action - The Embodied Achievement of Opportunities for Teaching and Learning in Swedish as a Second Language Classrooms*. (Diss.) Linköping: Linköping University Press.
- McIlvenny, P. (forthcoming). 'It's going to be very slippery': Snow, space and mobility while learning cross-country skiing.
- McIlvenny, Paul (2014). Vélomobile formations-in-action: Biking and talking together. *Space & Culture* 17(2): 137–156.
- McIlvenny, P., Broth, M., & Haddington, P. E. (2009). Communicating place, space and mobility. *Journal of Pragmatics*, 41(10), Special Issue.
- McIlvenny, P., Broth, M. & Haddington, P. (2014). Moving together: Mobile formations in interaction. *Space & Culture* 17(2): 104–106.
- Melander, H., & Sahlström, F. (2009). Learning to fly: The progressive development of situation awareness. *Scandinavian Journal of Educational Research*, 53(2), 155–166.
- Mercer, N. (1995). *The Guided Construction of Knowledge: Talk Amongst Teachers and Learners*. Clevedon: Multilingual Matters.
- Mondada, L. (2007). Multimodal resources for turn-taking: Pointing and the emergence of possible next speakers. *Discourse Studies*, 9, 194–225.
- Nevile, M. (2010). Looking for action: Talk and gaze home position in the airline cockpit. *Australian Review of Applied Linguistics*, 33, 3.1–3.21.
- Sacks, H. (1992/1966). *Lectures on Conversation*. Cambridge: Cambridge University Press.

- Schegloff, E. A. (1993). Reflections on quantification in the study of conversation. *Research on Language and Social Interaction*, 26(1), 99–128.
- Schegloff, E. A., Jefferson, G., & Sacks, H. (1977). The preference for self-correction in the organization of repair in conversation *Language*, 53(2).
- Seedhouse, P. (2004). *The interactional architecture of the language classroom: A conversation analysis perspective*. Malden, MA: Blackwell.
- St.John, O. & Cromdal, J. (2016). Crafting instructions collaboratively: Student questions and dual addressivity in classroom task instructions. *Discourse Processes*, 52.
- Vickers, C. H. (2010). Language competence and the construction of expert–novice in NS–NNS interaction. *Journal of Pragmatics*, 42, 116–138.
- Zemel, A., & Koschmann, T. (2013). Online math problem solving as a process of discovery in CSCL. *Journal of Computer-Supported Collaborative Learning*, 8(1).
- Weeks, P. (1985). Error-correction techniques and sequences in instructional settings: Toward a comparative framework. *Human Studies*, 8(3), 195–233.

Appendix. Transcription conventions

Verbal aspects of talk have been transcribed according to conventions developed by Gail Jefferson (see Jefferson, 2004).

An indicative translation is provided line per line, in italics.

The transcriptions for multimodal analysis follow the conventions developed by Mondada, et al. (see Haddington, Mondada, & Neville, 2013; McIlvenny, Broth, & Haddington, 2009; Mondada, 2007). The following conventions were used:

Δ Δ	delimit descriptions of one speaker's actions.
+ +	delimit descriptions of another speaker's actions.
Etc.	for each participant, a specific symbol is used.
*-->	action described continues across subsequent lines.
*-->>	action described continues until and after the end of the excerpt.
-->*	action described continues until the same symbol is reached.
>>--	action described begins before the beginning of the excerpt.
....	preparation of the action.
,,,,	retraction of the action.
cha	participant doing the action is identified in small characters.
fig	figure; frame grab.
#	indicates the exact moment at which the frame grab was recorded.
LH	left hand
RH	right hand
LL	left leg
RL	right leg
P	pointing.