Multimodal participation in simultaneous joint projects

Interpersonal and intrapersonal coordination in paramedic emergency drills

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This paper analyses paramedic emergency interaction as multimodal multi-activity. Based on a corpus of video-recordings of emergency drills performed by professional paramedics during advanced training, the focus is on para-medics' participation in multiple joint projects which become simultane-ously relevant. Simultaneity and fast succession of multiactivity does not only characterise work on the team level, but also the work profile of the individual paramedic. Participants have to coordinate their own participation in more than one joint project intrapersonally. In the data studied, three patterns of allocating multimodal resources stood out as routine ways of coordinating participation in two simultaneous projects intrapersonally:

1. Talk and hearing vs. manual action monitored by gaze,
2. Talk and hearing vs. gazing (and pointing),
3. Manual action vs. gaze (and talk and hearing).

Introduction[1]

Medical interaction is one of the fields of applied Conversation Analysis researched most (see ten Have, 2013; Nowak & Spranz-Fogasy, 2010). Research has focused on medical doctors, psychotherapists, and nurses interacting with patients or colleagues. This paper studies one of the medical disciplines which have not yet become the object of research in CA and multimodal interaction

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analysis. It deals with professional paramedics providing first aid treatment to patients.[2] The recorded data document emergency drills performed in the context of paramedic professionals' advanced training. Existing literature on paramedic emergency action deals with the symptoms and diagnoses of injuries and diseases encountered in situations of primary care as well as their treatment (Engelhardt, 1999). Further work has focused on legal and medical knowledge relevant to paramedics, as well as manual and equipment-based procedures executed on site (Flake & Hoffmann, 2011; Gorgaß et al., 2004; Semmel, 2008). Psychological literature mainly addresses issues of coping and general considerations about how to talk to the patient (Bengel, 2004). Practical checklists provide advice on how to conduct anamnestic interviews. The details of how paramedics interact with each other multi-modally as a team and with the patient, however, have not been studied yet.

Emergency paramedics have to deal with accidents and acute medical crises. The emergency drills in the corpus studied include, e.g., a patient suffering from an asthmatic attack, a biker jammed under a car after a crash, probably with paraplegic injuries, a woman with stab wounds to her stomach, and a heavily pregnant woman suffering from severe pain becoming unconscious with hypertonia. In such cases, members of the paramedic team provide first aid before an emergency doctor arrives, and prepare patients for transportation to a hospital. Emergency teams work under heavy time constraints: urgent help is needed, delays and inappropriate responses can cause additional damage to patients (Büscher, 2007).

The team has to select and coordinate its actions by orienting to a number of constraints in order to avert danger from the patient's life and to make sure that his/her medical condition improves or, at least, does not deteriorate. This involves organising team action according to both enduring and temporally ordered priorities as defined by check lists and 'algorithms' in the professional literature. Semmel (2008) provides a basic "ABC" of the most important objectives: Airway (A), i.e., respiratory passages, breathing (B) and blood circulation (C) have to be guaranteed continuously in this order. "DE" follow: checking disability (diagnosis of neurological problems) and exposure (comprehensive bodily examination). For providing first aid to a conscious, non-traumatic patient, a sequence of diagnostic tasks is recommended (Semmel, 2008, p. 54):

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2.   The organisation of emergency calls and officers' dealings with specific problems and types of callers, however, have been an important area of research in CA, see, e.g., Zimmerman (1992), Whalen et al. (1988), Bergmann (1993) and also in studies of computer assisted collaborative work (Pettersson, Randall, & Helgeson, 2004). There is also ethnographic work on emergency teamwork (Büscher, 2007), however, not focusing specifically on paramedics' work on and with patients.

1. Evaluate the site,
2. Check whether patient is awake and responsive to verbal stimuli,
3. Conduct anamnestic interview,
4. Examine patient based on main complaints,
5. Take vital parameters (blood pressure, pulse, frequency of breathing, percentage of oxygen in arterial blood, blood sugar),
6. Decide about transportation of patient.

Officers orient to check list priorities, but situated paramedic action is far from simply being an instantiation of predefined agendas, as has been shown for other types of professional work (Deppermann, Schmitt, & Mondada, 2010; Nevile, 2005, 2007). Paramedic emergency action is shaped by situational contingencies, the particulars of the patient's condition, outcomes of interactions and medical treatment, and by emerging simultaneous and intersecting multiactivities by team members.

This paper studies how paramedics coordinate multiactivities in emergency drills. Multiactivity has to be coordinated interpersonally, i.e., by multiple participants who contribute to a joint project. Interpersonal coordination involves continuous spatial and personal reconfigurations of participation frameworks. Participants have to collaborate on the temporal management of joint projects, e.g., in accomplishing transitions between projects, in sequencing, initiating, suspending, resuming, and aborting them and in performing multiple projects simultaneously. The individual participant has to coordinate him/herself intrapersonally with respect to emerging multiactivity as well: S/he must coordinate the investment of his/her individual multimodal resources with respect to multiple lines of action, taking into account partners' activities and their temporalities, spatial restrictions and affordances, and the opportunities and constraints of the individual modalities and their combination.

After a description of the corpus, key concepts of the study are introduced (section 'Theoretical background'). The main body of the paper deals with paramedics coordinating multiple activities on the team level (section 'Interpersonal coordination of multiple joint projects on the team level') and then analyses how paramedics manage participation in simultaneous joint projects (section 'Intrapersonal coordination of simultaneous participation in two joint projects'). The paper closes with a summary and discusses more general constraints on intrapersonal coordination in multiactivity.

The corpus

The corpus used in this study contains video-recordings of nine emergency drills performed by professional paramedics in German language (12–30 min. each, 152 min. in total). Paramedics participate in emergency drills on a regular basis (about once per year) as part of their advanced professional training destined to improve their skills of providing first aid to severely injured patients. The interactions recorded are therefore role-plays by professionals from the field, performing exactly the same role as in real-life emergencies. The only exception is the role of the patient (henceforth: PAT), who is also played by a paramedic. In emergency drills, a range of different emergency cases are practised. Each drill begins with the arrival of the team with the patient and ends when the patient is transferred to the ambulance coach. The exercise instructor, a senior paramedic, has instructed the participant playing the patient which symptoms s/he should enact. They are not known in advance to the participants playing the paramedic team. There is neither a detailed script nor any instruction for the paramedics apart from being assigned the roles of officer-in-charge (henceforth: OCH), who heads the paramedic action, and assistants (henceforth: AS). The main purpose of the emergency drills is to assess and critically discuss the skills and performance of the paramedics involved. This is done immediately after the role-play.[3]

Framed as professional training with subsequent evaluation, there is no indication that the roles of the paramedics in the drills differ systematically from real paramedic action. An important difference to actual cases of emergency, however, is that issues of urgency, time constraints, stress and fear figure much less prominently. This is also because PAT roles sometimes prove to be problematic in terms of authenticity. Most role-play PATs express only relatively few symptoms of pain, confusion, and fear, while some tend to overact symptoms. Because of these pitfalls, the analyses presented do not focus on episodes where showing empathy with or understanding PATs is crucial. Recordings were made by a former professional paramedic, who was associated with the team and who acted as paramedic assistant in some of the role-plays. All drills recorded involve patients who are at least initially conscious (which is not necessarily the case in authentic emergency aids).

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3. Feedback sessions were not recorded because of privacy concerns.

Theoretical background

Like in other types of professional multi-party interaction, emergency interaction is performed by multiactivities carried out in fast succession or simultaneously (e.g., Heath & Luff, 2000; Hindmarsh & Pilnick, 2002, 2007; Mondada, 2011; Schmitt, 2010). Activities contribute to joint projects (Clark, 1996), e.g., conducting an anamnestic interview with the patient, immobilising the patient, measuring vital parameters, putting an oxygen mask on, rescuing the patient from a crashed car. Joint projects often depend on one another, e.g., measures depend on the outcome of the anamnestic interview, while treatment in turn depends on measures. In this paper, "joint project" (Clark, 1996, pp. 191–220) is used to refer to multiactivities which

- are accomplished by a temporally extended trajectory of actions which
- are collaboratively performed by several actors
- contributing individual actions
- to a shared overall pragmatic concern.

Joint projects, in the present context, always involve task-oriented actions (see Haddington, Keisanen, Mondada, & Nevile, this volume) which are accountable according to professional standards and which are subject to a professional division of labor. Minimally, a joint project involves projection of a joint action by one participant and its uptake by another. It may also involve larger trajectories of action by several actors, enacting their functional roles in a situated manner by specialised contributions to the joint project. Since 'activity' is a much broader term, ranging from single bodily behaviours to 'activity types' (Levinson, 1979), 'multiactivity' in this paper either is used to refer to bodily behaviours, which, under this description, do not make for an accountable action by themselves alone, or it is used as a cover term for all sorts and orders of coordinated behaviour.

Joint projects are performed within a specific participation framework accomplished in situ (Goffman, 1981). Joint projects in this context are most importantly organised in terms of changes in participants' bodily formations and alignments (Goodwin & Goodwin, 2004; Rae, 2001). They depend on and involve the organisation of spatial and semiotic contextual configurations (Goodwin, 2000), i.e., properties of the emergency site, the bodily state of the patient, or the use of medical aids including semiotic objects like measuring devices.

Multiactivity requires the coordination of bodily alignments, gaze and common performance of manual tasks, the concerted timing and sequencing of activities and monitoring of others' actions (e.g., Hindmarsh & Pilnick, 2007;

Mondada, 2012; see also Haddington et al., this volume). Since multiple joint projects are pursued simultaneously and in fast succession in emergency drills, participants have to coordinate their participation in multiactivity both interpersonally and intrapersonally (Deppermann & Schmitt, 2007). Interpersonal coordination refers to the way multiple participants coordinate their participation in multiactivity in terms of their response to, projection of and collaborative execution of activities by self and partners. Coordinated multiactivity crucially requires monitoring others' activities and displaying their interpretation, indexing (un) availability for participation and acting in a way that allows others to interpret these actions according to their relevancies for next actions (Heath & Luff, 2000; Heath, Sanchez Svensson, Hindmarsh, Luff, & vom Lehn, 2002; Schmitt & Deppermann, 2007). Intrapersonal coordination refers to the concerted timing of multimodal resources employed by one participant in multiactivity in order to contribute to one or more joint projects. A case in point is the coordination of bodily posture, gaze, gestures and talk when directing an addressee's attention to some indicatum pointed at (Mondada, 2009; Stukenbrock, 2014). In social multiactivity, intrapersonal coordination operates under the constraints of interpersonal coordination. The precise timing, the multimodal resources deployed and the way they are bodily enacted are recipient-designed, and they depend on the contingencies of prior and ongoing multiactivities which include other participants.

Interpersonal coordination of multiple joint projects on the team level

In emergency drills, participants have to deal flexibly and responsively with multiple activities, which either happen simultaneously or in fast succession. This requires interpersonal coordination on the level of the team (this section) and intrapersonal coordination on the level of the individual participant (next section), who may be involved in more than one joint project. In this multiactivity context, participation frameworks change from moment to moment in line with transitions between joint projects, the emergence of joint projects pursued in parallel and the precise kinds of multiactivities performed.

This section analyses the process of accomplishing one such joint project, the attachment of a cervical collar at PAT's neck, and its coordination with other ongoing and emerging joint projects. In this example, an ambulance was called because PAT had fallen down a staircase hitting his head, probably because of a heart attack, as diagnosed in the anamnestic interview. He suffers from severe pain in the head and may have brain injuries. A cervical collar is needed to immobilise

PAT's head in order to prevent cerebral concussion. Attaching the collar to the patient's neck, however, is not the only joint project pursued. It is coordinated with other joint projects, proceeding in four phases:

- OCH announces to PAT that the collar will be attached to his neck while collar is prepared (Phase 1),
- OCH adjusts collar, while PAT complains and assistants impart vital parameters (Phase 2),
- OCH suspends adjustment of collar to check measures and requests pulse oxymetre (Phase 3),
- OCH attaches collar (Phase 4).

The following analysis traces these four phases, focusing on the organisation of multiactivity on the team level:

- How are multiple joint projects temporally coordinated by simultaneous activities, transitions between activities and suspension of activities?
- How are multimodal resources coordinated in dealing with multiple joint projects?
- How do emerging joint projects involve transitions of participation frameworks?

Phase 1: OCH announces to PAT that the collar will be attached to his neck while collar is prepared

Excerpt 1 (FOLK_RETÜ_01_A03; 02:04-02:14)[4]

AS1 holds PAT's head with both hands and gazes at PAT, AS2 prepares cervical collar for use

```
204 OCH:   mir s gucken jetz ERSCHT mal
           we will first see to it
    OCH:   gazes at PAT, touches his arm
205 OCH:   dass ma die *HALSwirbelsäule Abstützen-=*
           that we support the cervical spine
           ............*points at PAT's collar*
206 PAT:   =[jaHA,]
            yes
207 OCH:   [un*_der] kollEG der macht da %GRAD-*
            and the colleague he is just preparing
    OCH:   ....*gazes and points twice at cervical collar*
                                         %Figure 1
```

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4. Transcription conforms to the convention GAT2 (Selting et al., 2011, see Appendix).

Figure 1. OCH talks to PAT while pointing at cervical collar and monitoring AS2

```
208          *(1.2)*
     OCH:    *circular pointing gesture*
209  AS2:    mh:=
             uh
210  OCH:    =h *so_ne HALskrause fertisch,
                 a cervical collar
     OCH:    ...*gazes at PAT, touches his arm--->
211  OCH:    die* zieh mer ihne dann *an,=
             then we will dress you in it
     OCH:    -->*.....................*looks at cervical collar
             and reaches for it--->
212  PAT:    =oKAY,
              okay
213          (0.3)*
     OCH     ---->*
```

In Excerpt 1, two simultaneous projects are in progress: OCH announces to PAT, whose head is held steady by AS1, that a cervical collar will be attached to his neck; AS2 prepares the cervical collar, being monitored by OCH. Each project has its own participation framework with different participants contributing, OCH participating in both projects simultaneously. In line 204, OCH announces to PAT (and thereby also to his team-mates, cf. Hindmarsh & Pilnick, 2002) that the next action of the team will be to attach a cervical collar. During this announcement, OCH bodily orients to PAT by gazing at him and touching his arm, then pointing to PAT's neck. As OCH expands his announcement by explaining that AS2 is about to prepare the cervical collar for use (line 207), OCH shifts his bodily orientation towards AS2: He gazes and points at the collar (Figure 1). In doing so, OCH is involved in two joint projects simultaneously: He informs PAT about

the upcoming action and he monitors the state of AS2's preparation of this action. OCH then transforms his gesture directed to the cervical collar from a straight point (line 207) to a down and up pointing movement (line 207), followed by a circular point (line 208). The point is not simply used to direct PAT's attention to the cervical collar anymore, but it becomes an iconic gesture, simultaneously instructing AS2 to adjust the size of the cervical collar to the size of PAT's neck. This is taken up by AS2, who produces an acknowledgement token (*mh*, line 209) and starts immediately to adjust the collar. OCH then shortly re-orients to PAT, gazing at him and touching him (210), but finally turns back to AS2 to reach for the cervical collar (lines 211–213).

In Excerpt 1, OCH uses talk, gaze and gesture. At some points, all three multimodal resources are put in the service of one project (i.e., announcing the next action of the team to PAT, lines 204 and 210). At other points, there is a division of labour between the resources: talk is used for keeping PAT informed, while gaze and pointing are used for monitoring AS2's action and for participating in the project of preparing the collar by gestural instruction (lines 207–209, 211–213). Interestingly, gestures partly gain a dual function, playing different roles in two joint projects: the same gesture figures as a referential point with respect to informing PAT, while at the same time, it serves to pantomime the action OCH requests from AS2.

Phase 2: OCH adjusts collar while PAT complains and assistants impart vital parameters

Excerpt 2 (FOLK_RETÜ_01_A03; 02:15–02:25)

```
214   OCH:  %hier-
            here
      OCH:  %takes cervical collar from AS2
            %Figure 2
215         (0.6)
216   OCH   *noch_n stück RUNner;
            a bit further down
      OCH   *looks at cervical collar and adjusts it--->
217         (2.6)
218   PAT:  das zieht jetzt wie so_n wA:rmer BRENnender
            schmerz wo ich dann hab
            [den rücken runter.]
              it's now a pulling sensation like a warm
            burning pain that I now
              have down the back
219   AS1:  [also der DRUCK vom]gerat sagt hundertzwanzig zu:-
            well the pressure of the device says 120 to
```

256

Figure 2. OCH takes cervical collar from AS2

```
220   AS1:   [zu vierunachzich;    ]
             to 84
221   AS3:   [hundert zu%Achzisch-] (.)
             100 to 80
                         %Figure 3
222   AS3:   frequenz #fünfund%*vIErzisch;
             frequency 45
      OCH:   ---------------->%*stops to manipulate collar
      OCH:        .....#gazes at AS3------------------------>
                             %Figure 4
```


Figure 3. OCH looks at collar manipulating it

Figure 4. OCH looks up at AS3 and stops manipulating collar

In Excerpt 2, the ongoing project of attaching the cervical collar intersects with two other projects started in short succession: PAT issues a complaint and the assistants inform on measures of PAT's vital parameters. In line 214, OCH takes the cervical collar from AS2 and adjusts it to the size of PAT's neck (lines 216–222), looking at the collar (Figure 3) and talking very softly, seemingly to himself, commenting on his own action (*hier noch_n stück RUNner*, 'here a bit further down', lines 214–216). Meanwhile, PAT complains about a pain in his back (line 217–218). Starting in overlap with the complaint, AS1 and AS3, who is outside the picture to the left of AS1, inform on PAT's blood pressure and heart rate (lines 219–222). At this point, there are three projects which simultaneously require OCH's participation:

1. OCH adjusts the collar,
2. PAT's complaint projects uptake by OCH,
3. On the basis of the assistants' informings about PAT's vital parameters, OCH must decide if any actions are required to improve PAT's vital parameters.

In line 222, OCH suspends his current project, the adjustment of the cervical collar: He looks up from it, gazes towards AS3 and stops manipulating the collar (Figure 4). His bodily posture and his gaze give evidence of his change of participation in the ongoing joint projects: he now orients to the reception of the incoming informings about PAT's vital parameters. In contrast, OCH neither indicates in any way that he has understood PAT's complaint nor does he respond to it. PAT's complaint is not attended to later in the emergency interaction, either. In Excerpt 1, OCH takes part in two simultaneous projects. In Excerpt 2, in contrast,

OCH's participation is also required in several simultaneous projects, but OCH does not participate simultaneously in more than one of them. Instead, he suspends one project (adjusting the collar) in favour of another (receiving information about vital parameters), while ignoring the third (PAT's complaint). The reason why OCH chooses not to participate in several projects simultaneously and how he nevertheless displays to orient to more than one project will become clearer in the next excerpt.

Phase 3: OCH suspends adjustment of collar to check measures and requests pulse oxymetre

Excerpt 3 (FOLK_RETÜ_01_A03; 02:26–02:35)

```
219  AS1:  [also der DRUCK vom]gerät sagt hundertzwanzig zu:-
           well the pressure of the device says 120 to
220  AS1:  [zu vierunachzich;    ]
           to 84
221  AS3:  [hundert zu %Achzisch-] (.)
           100 to 80
                         %Figure 3
222  AS3:  frequenz #fünfund%*vIErzisch;
           frequency 45
     OCH:  --------------->%*stops to manipulate collar
     OCH:       .....#gazes at AS3----------------------->
                          %Figure 4
223        (0.2)
224  OCH:  BItte?
           Pardon?
225        (0.3)
226  AS3:  hundert zu ACHTzisch-%
           100 to 80
     OCH:  --------->#..........%gazes at cervical collar--->
                              %Figure 5
227         (0.3)
228  AS3:  [frequenz fünfen]vIERzisch;
            frequency 45
229  OCH:  *[(wieviel?)     %]
            (how much?)
     OCH:  *moves cervical %collar to PAT's neck------------>
                          %Figure 6
230         (0.4)
231  OCH:  FREQUENZ fünfenvierzisch.
           frequency 45
```

Figure 5. OCH gazes again at collar

Figure 6. OCH moves collar towards PAT's neck

```
232          *(1.1)
     AS1:    *lifts PAT's head------------------------------->>
     OCH:    *moves collar to PAT's neck, holding PAT's head->>
233  OCH:    okEE dann (mache) mer den pUlsOxi noch drAn-
             okay then we will attach the pulse oxymeter
234          (0.3)
     AS2:    %turns around to fetch pulse oxymeter
             %fig.7
```

Figure 7. AS2 (in the background) walks off

The measures of PAT's blood pressure imparted by AS1 and AS3 in lines 219–221 are unproblematic (100/80 rsp.120/84). OCH continues to manipulate the cervical collar when receiving this information (Figure 3). When AS3 starts to inform on another measure, PAT's pulse frequency, OCH stops manipulating the collar and looks up from it to AS3 (Figure 4). OCH seems to have trouble in hearing or understanding the information: he asks AS3 twice to repeat the measure (line 224, 229) and then confirms it by repeating it in line 231. OCH displays that receiving and responding adequately to this information is momentarily most relevant through a number of coordinated activities: he suspends his current project of adjusting the cervical collar, monitors the source of the information (AS3), checks the information verbally and finally initiates the next action based on his analysis of the information received, namely, he announces to link the pulse oxymeter to PAT (line 233). He suggests this because a pulse frequency of 45 is pathological and may indicate that PAT is short of arterial oxygen. The pulse oxymeter is requested in order to check if PAT's arterial blood is saturated with oxygen sufficiently, otherwise PAT would have to wear an oxygen mask. AS2, who had prepared the cervical collar, but who is currently not involved in any ongoing project, responds to OCH's announcement as a request for action: He walks off to fetch the pulse oxymeter (line 234, Figure 7).

We can see here an important feature of professional cooperation, which is pervasive in the emergency drills studied: professionals produce announcements, information, noticings and other verbal actions which describe states of affairs, but which do not require specific responses from specific addressees. Instead, descriptions are monitored by team members in order to be interpreted and responded

to according to professional logics of situated relevancies for next actions. Since descriptions do not address specific recipients, responses may be self-selected by recipients depending on availability and their role-related expertise for relevant next action(s) (see Schmitt, 2010). Descriptions are used in a way that resembles nonverbal displays designed to attract recipients' attention to events and features of a setting which require their awareness and their response (cf. Heath & Luff, 2000, pp. 88–154; Heath et al., 2002; Schmitt & Deppermann, 2007).

Although in this excerpt only the project of checking vital parameters is advanced, OCH still orients to the previously performed project of attaching the collar. Throughout Excerpt 3, OCH shows that it is not abandoned but only suspended (see also Haddington et al., this volume, concerning this distinction): he does not drop the cervical collar, but freezes his motion of adjusting it (Figure 4). The frozen posture displays that he orients to the ongoing relevance of the suspended project and that it should be resumed after the emerging project of checking vital parameters is completed. This frozen posture resembles a type of frozen gestural (or other bodily) displays which participants who have stopped talking because of overlap use to show that they still claim the turn and are waiting for the next opportunity to continue (Oloff, 2013; Schmitt, 2003, pp. 229–231). Not unlike body torque (Schegloff, 1998), by keeping the object indexing the suspended project ("attaching the collar") in hand and the trunk remaining in its former position (lines 221–225, Figure 4), OCH displays that the verification of vital parameters and any related decisions is, although most urgent at the moment, only an inserted project. Thereby, OCH projects his own resumption of the suspended project as soon as the side sequence is completed. In this way, AS1 can infer that his action of holding PAT's head (so that the cervical collar can be attached without causing danger to PAT's brain) is still needed despite a newly initiated project, and the progression of the project of attaching the cervical collar is suspended.

OCH gradually resumes his prior project, first by gazing at the cervical collar (line 226, Figure 5), then re-starting to adjust the collar (line 229, Figure 6) and finally instructing AS1 verbally how to help him (see Excerpt 4, line 237). Again, as in Excerpt 1, OCH deals with two projects simultaneously, whereas he had suspended one project in favour of the other before. He now uses talk and hearing to participate in the project of checking vital parameters, while employing gaze and manual activity to resume the suspended project of attaching the collar. This change in OCH's pattern of participation does not seem to hinge on the compatibility of the multimodal resources used. Rather, the earlier decision not to pursue two projects simultaneously, but to focus exclusively on checking the vital parameters until they are taken up properly (lines 222–228), may have been motivated by the need to attend to unforeseen new information which requires immediate appropriate response.

Phase 4: OCH attaches the cervical collar

Excerpt 4 (FOLK_RETÜ_01_A03; 02:35–2:45)

```
229  OCH:   *[(wieviel?)      %]
              (how much?)
     OCH:   *moves cervical collar to PAT's neck--->
                           %Figure 6
230          (0.4)
231  OCH:   freQUENZ fünfenvierzisch.
            frequency 45
232          *(1.1)
     AS1:   *lifts PAT's head------------------------------>>
     OCH:   *moves collar to PAT's neck, holding PAT's head--->
233  OCH:   oKEE dann (mache) mer den pUlsOxi noch drAn-
            okay then we will attach the pulse oxymeter
234          %(0.3)
     AS2:   %turns around to fetch pulse oxymeter
            %Figure 7
235  PAT:   <<pp> passt scho->
                 it's okay.
236          (0.3)
     OCH:   --->*attaches cervical collar around PAT's neck--->
237  OCH:   <<p>kannsch mer des gebbe?>
                 can you give it to me?
238          *(4.3)
     AS1:   *hands OCH strap of cervical collar
     OCH:   *takes strap from AS1, attaches collar around PAT's neck
239  OCH:   <<p>okee::,>*
            okay
     OCH:   ----------->.*
240          *(1.3)*
     OCH:   *removes hands from collar and touches PAT's shoulder*
241  OCH:   *GEHT des so?
            is this okay?
     OCH:   *gazes at PAT and touches his shoulder--->
242  PAT:   JOa +de[s: ]
            yes it
     AS1:      +............turns head away from PAT towards AS2-->
243  OCH:        [dann] is *des- (.)
                 then it is
     OCH:   ---------------->*..........
244  OCH:   +*is des eigentlich in ORDnung;
            is basically okay
     AS1:   +gazes at AS2-------------------------------------->>
     OCH:   *removes one hand from PAT, turns head towards AS2--->>
```

In line 229 (Figure 6), OCH had resumed the manipulation of the cervical collar, starting to attach it around PAT's neck. AS1 collaborates self-initiatedly by lifting and stabilising PAT's head (lines 232–237) and complying with OCH's request to hand him the clip of the cervical collar to fasten it (lines 238–240). Finally, OCH seeks pat's confirmation that he feels at ease with the collar (lines 241–244).

In Excerpt 4, having mandated the next step of checking PAT's vital parameters (line 232), OCH exclusively deals with completing the action of attaching the cervical collar. Gaze, manipulation of the collar and talk are coordinated to accomplish this with the help of AS1, with PAT's share of cooperation consisting of letting his head movements be controlled by AS1 and OCH (lines 231–239). Upon completion, OCH assigns PAT an active role in the closing of the joint project, asking for his ratification (lines 241–244). Projecting this transition, OCH touches PAT's shoulder instead of the collar already in line 240 and then, in sync with his talk to PAT, he gazes at him (lines 241–243), thus embodying his changed orientation to PAT as a communication partner, not as an object of treatment as before (cf. Pilnick & Hindmarsh, 1999). As PAT ratifies, AS1 immediately gazes away from PAT (line 242) to monitor AS2, who brings the pulse oxymeter. Meanwhile, AS1 still continues to hold PAT's head with one hand, making sure that his head is rested safely.

Excerpts 1–4 document the overall process of executing a joint project. In terms of how multiactivity is organised by inter- and intrapersonal coordination, we could note:

– On the team level, multiple joint projects are pursued that feed into the overall project of emergency action, which are coordinated both simultaneously and in succession. Multiple activities often build on one another, with one joint project being the prerequisite for a next one. Projects are ordered by relationships of priority and urgency. Since events, actions and results from other projects may also be relevant for team members not involved in them, e.g., calling for assistance, providing necessary premises for their actions, producing information upon which measures need to be taken, etc., participants have to be at least peripherally aware of what happens in synchronous activities in which they are not involved. This applies a fortiori to OCH as the head of the emergency action.

– Transitions between joint projects involve changes in participation, because different projects may imply different sets of participants, different spatial constellations of participants and objects, as well as different activity-related roles of participants (e.g., patient as co-interactant vs. as object of treatment, assistant taking measures vs. preparing bandages).

- On the individual level, paramedics need to coordinate their participation and their investment of multimodal resources in multiactivity. In Excerpts 1–4, OCH manages to take part in two projects simultaneously by devoting talk and hearing to one project, while using gaze and manual activity for the other project, with gestures being multifunctional and suitable for dual use. Simultaneous participation was not achieved in more than two projects. When dealing with simultaneous demands from several projects, the preferred choice was to suspend an ongoing project in favour of another and ignoring a proposed project, in cases where projects could not be dealt with simultaneously.

Intrapersonal coordination of simultaneous participation in two joint projects

Interpersonal coordination becomes particularly complex when participants take part in two projects simultaneously. This being the case, participants cannot coordinate their multimodal resources holistically to contribute to one single integrated line of action, but they have to distribute resources to perform activities contributing to several projects. This requires a specialisation of resources, with one set of resources being allocated to one project, and another set of resources allocated to another project. Intrapersonal coordination of simultaneous multiactivity may involve different combinations of multimodal resources, each bundle of resources being in service of one (joint) project respectively. This section deals with how paramedics participate in two joint projects simultaneously, asking:

- Are there patterns of coordinating and distributing multimodal resources when participating in several projects simultaneously?
- Which constraints operate on intrapersonal coordination of multimodal resources for participation in simultaneous projects?

In the emergency drills studied, three patterns of intrapersonal coordination of multimodal resources proved to be routinely performed when dealing with simultaneous joint projects:

- Talk and hearing vs. manual action monitored by gaze,
- Talk and hearing vs. gazing (and pointing),
- Manual action vs. gaze (and talk and hearing).

Talk and hearing vs. manual action monitored by gaze

Vocal-auditive resources (talking and listening) may be used in service of one project, while bodily-manual action and visual resources (gaze) with convergent focus, i.e., manipulating objects or PAT and monitoring this manipulation visually, are employed for a different project. Excerpt 5, which is extracted from Excerpt 3, shows how OCH attaches the cervical collar to PAT's neck, monitoring this action visually, while he informs that a pulse oxymeter is to be applied to PAT.

Excerpt 5 (FOLK_RETÜ_01_A03; 02:33–02:35)

```
232        *(1.1)
     AS1:  *lifts PAT's head---------------------------------->>
     OCH:  *moves collar to PAT's neck, holding PAT's head--->>
233  OCH:  oKEE dann (mache) mer den pUlsOxi noch drAn-
           okay then we will attach the pulse oxymeter
234        %(0.3)
     AS2:  %turns around to fetch pulse oxymeter
           %Figure 8
```


Figure 8. OCH attaches cervical collar while informing about next action due

Two participants may each be dealing with projects of their own by manual action, while simultaneously contributing to a shared joint project of verbal interaction. This is the case in Excerpt 6.

Excerpt 6 (FOLK_RETÜ_01_A07; 07:49–07:55)

PAT sits in the driver's seat after a car crash.

Figure 9. OCH attaches bandage while instructing AS1

```
343  OCH:   gib grad HER, (.)
             just give [the strip] to me
344  AS1:   [mhm,      ]
345  OCH:   [und bitte] #grad nochmal n_BLUTdruck,
              and please just once again the blood pressure
     OCH               #takes strip from AS1
346          (1.0)
347  OCH:   danke;
             thanks
348          (0.5)
349  AS1:   +palpatOrisch %isch_s okAY?
             palpatory is it okay?
     OCH:   +attaches strip at bandage, looks at bandage--->>
                          %Figure 9
350  OCH:   <<all>jaja;>
                  yes yes
351          *(2.9)
     AS1:   *takes PAT's pulse--->>
```

Starting already before Excerpt 6 until line 352, OCH, who sits to PAT's right, attaches a bandage on her arm. He is aided by AS1, who prepares strips needed to fix the bandage (lines 343–345). In line 345, while continuing to attach the bandage, OCH asks AS1 to take PAT's pulse and negotiates with him the mode of measurement (lines 349–350).[5] AS1 then takes PAT's pulse.

---

5. OCH and AS1 agree on palpatory measurement, i.e., by feeling at which blood pressure values the systolic pulse becomes palpable in contradistinction to auscultation of both systolic and diastolic pulse with the help of a stethoscope.

The relationship between simultaneous and sequential coordination of activities by OCH and AS1 is differently organised for these two participants. OCH here (and also before and after this excerpt) deals with two different projects in parallel for a longer stretch of time: while attaching the bandage, he produces several requests and questions like the one in line 345 in order to initiate or check the state of different sub-projects of the emergency action. AS1, in contrast, is responding to OCH's initiatives. For AS1, selecting an appropriate response requires momentary simultaneous orientation to two projects, because OCH requests next actions from AS1, while he is still occupied with an ongoing project. This is the case in line 345, when AS1 hands OCH the strip while OCH already asks him to measure PAT's blood pressure. AS1 thus has to complete his participation in one project while already receiving an order and having to prepare for another project. While OCH performs a more enduring, repetitive pattern of manual action and simultaneous unrelated verbal initiatives, AS1 is responsively involved in two projects. This pattern of intrapersonal and interpersonal coordination of simultaneous projects can also be observed in Excerpt 7, which follows only eight seconds after Excerpt 6. OCH here asks AS1 whether the pulse oxymeter is connected, while walking off to fetch another measuring device. AS1 checks the pulse oxymeter, while taking PAT's pulse.

Excerpt 7 (FOLK_RETÜ_01_A07; 08:03–08:10)

```
360  OCH:   so? wie sieht die sAttigung AUs?
            okay how is the saturation?
361         %*(1.5)
     AS1:   *looks to his right, still taking PAT's pulse------->
            Figure 10
```


Figure 10. AS1 looks to his right to see if measure by pulse oxymeter is available

```
362   AS1:   öhm:-
             erm
363          (0.4)*
      AS1:   ---->*
364   AS1:   DIE is gar% nich DRAN;
             it is not connected
      AS1    .........%gazes at OCH,%then looks at PAT's wrist--->>
                       %Figure 11    %Figure 12
```


Figure 11. AS1 gazes towards OCH, who is behind the car

Figure 12. AS1 looks again at PAT's wrist where he takes PAT's pulse

```
365          (1.2)
366   OCH:   dann machen_mer die kupplung mal DRAN;
             so we will just connect the clutch
```

In response to OCH's request, AS1, who is still taking PAT's pulse at her wrist, shortly checks visually whether the device is connected (line 361, Figure 10). He informs OCH that this is not the case, shortly gazing at him (line 364, Figure 11). He then reorients to measuring PAT's pulse at her wrist, also visually, which he had not released (line 364, Figure 12). Again we see how AS1 enters into two simultaneous projects in response to OCH's initiative. While talk is exclusively used to deal with OCH's request and AS1's left hand keeps measuring PAT's pulse, gaze is employed flexibly for both projects: first, AS1 uses gaze to see if the pulse oxymeter is connected (Figure 10), then he uses it to see if and where OCH is available as a recipient for his answer in progress (Figure 11), and finally his gaze returns to his own individual project of measuring the pulse (Figure 12).

Talk and hearing vs. gazing (and pointing)

A pervasive feature of multi-party interactions, particularly in professional contexts, is to talk and listen to one person (or a group of persons), while monitoring other activities visually (e.g., Heath & Luff, 2000, 2013; Heath et al., 2002; Mondada, 2011; Schmitt & Deppermann, 2007, 2010). This also regularly occurs in emergency drills.

One routine environment for allocating verbal interaction and gaze to two simultaneous projects is the anamnestic interview OCH conducts with PATs early in the emergency drill. While talking with PAT, OCHs regularly monitor preparations of the paramedic team in order to check whether appropriate measures are taken and when devices are set up for diagnostic measures and treatment. In Excerpt 8, the team has just arrived to PAT, who was stabbed into her stomach by her boyfriend, who has since left the scene. OCH asks her about what had happened, while two assistants prepare measurement devices.

Excerpt 8 (FOLK_RETÜ_01_A02; 00:12–00:48)

PAT sits on the floor leaning against the wall; a knife sticks in her stomach.

```
039   OCH:   +WIE is_n des paSSIERT?
             HOW did it happen?
      OCH:   >>----crouches next to PAT and gazes at her------------>
      AS1:   +takes tube of pulse oxymeter out of her measurement bag
             and prepares it for use------------------------------->>
040          (0.3)
041   OCH:   ham se STREIT ge [habt;  ]
             did you have an argument?
042   PAT:                    [ich hab]gesagt er soll net RAUchen,
                              I told him not to smoke
```

```
043   PAT:   und er hat %trotzdem geRAUCHT,*
             but he smoked nevertheless
      OCH:   ---------------------------->*
                      %Figure 13
044   PAT:   +und DANN,%+
              and then
      OCH:   +gazes at AS1, still crouching+
                      %Figure 14
```


Figure 13. OCH listens to PAT and gazes at her

Figure 14. OCH gazes at AS1 (outside the screen) while listening to PAT

```
045          (0.5)
      OCH:   *returns gaze at PAT, still crouching--->
046   PAT:   auf EINmal is des EINfach hat er da reingestochen.
             all of a sudden he just stabbed me there
```

```
047        (0.6)
048   OCH: %*du machs viTAL*lpar#ame#ter; (.)
           you check the vital parameters
      OCH:   *points at AS1-*....#points at measurement device#,,,,,,
      OCH:   *gazes at AS1--------------------------------------#,,,,,,
           %Figure 15
049   OCH: %*von dir will ich_n öh öh STÜTZverband# (.) mit öh öhm#
           I want a support bandage from you         with erm erm
      OCH:   *points at first aid box standing before AS2----->,,,,
      OCH:   *gazes at first aid box--------------#gaze at PAT's
           belly#
           %Figure 16
```


Figure 15. OCH points and gazes at AS1

Figure 16. OCH points and gazes at A2's box

OCH interviews PAT while gazing at her until line 043 (Figure 13). In line 044, while PAT's report is still underway, OCH shortly turns her gaze towards AS1, who is preparing measurement devices (Figure 14), then gazes at PAT again. As soon as PAT's report is finished (lines 046–047), OCH proceeds from the anamnestic interview to the next joint project, i.e., requesting next medical actions from assistants. She first requests AS1 to take vital parameters, pointing and gazing at her (line 048, Figure 15), then she requests AS2 to prepare a support bandage, pointing and gazing at the box in front of AS2 (line 049, Figure 16). OCH uses a short gaze to the assistants (line 044, Figure 14) in parallel to the reception of PAT's report in order to monitor the state of the assistants' preparations. It foreshadows OCH's anticipation of the next joint project, which, however, she only initiates when PAT has completed her contribution to the ongoing project of the anamnestic interview.

While in Excerpt 8 participation in another project during talk involves only visual monitoring, observations gained by monitoring can also give rise to more active simultaneous intervention. We have already seen this in Excerpt 1, the relevant part of which is reproduced as Excerpt 9 below. OCH announces the attachment of the cervical collar to PAT, pointing at it.

Excerpt 9 (FOLK_RETÜ_01_A03; 02:06–02:10)

```
207  OCH:   [un*_der] kollEG der macht da %GRAD-*
            and the colleague he is just preparing
     OCH:   ...*gazes and points twice at cervical collar*
                                          #Figure 17
```


Figure 17. OCH talks to PAT while pointing at cervical collar and monitoring AS2

```
208         *(1.2)*
    OCH:    *circular pointing gesture*
209 AS2:    mh:=
            uh
210 OCH:    =h *so ne HALSkrause fertisch,
                a cervical collar
    OCH:    ...*gazes at PAT, touches his arm--->
```

While pointing at the cervical collar, OCH monitors AS2's preparation of it, and, having noticed that the size of the collar has to be adjusted, he transforms his pointing gesture into an instructional iconic gesture indexing how and where the collar has to be adapted. The delay of OCH's ongoing turn in line 208 indexes this transformation of the pointing addressed to PAT to an instructional pantomime addressed to AS2, displaying that an activity is inserted which is not part of the announcement produced to inform PAT.

Manual action vs. gaze (and talk and hearing)

Manual actions which require no visual (self-)monitoring are performed while talking to others, gazing at them, looking for objects, monitoring displays, etc. In the corpus studied, bodily-manual activities performed without visual monitoring are 'static activities', i.e., activities which aim at keeping some state of affairs stable, e.g., fixing PAT's head, holding a saline drip, measuring pulse at PAT's wrist. We could observe this at various points in Excerpts 1–4, where AS1 is constantly holding PAT's head, but also monitoring measuring devices and the other assistants' activities. An example is Excerpt 10, extracted from Excerpt 2:

Excerpt 10 (FOLK_RETÜ_01_A03; 02:21–02:25)

```
219 AS1:    [also der DRUCK vom]*gerät sagt hundert *zwanzig zu:-
            well the pressure of the device says 120 to
    AS1:    >>gazes at device---->*...gazes at camera>*..at device->
220 AS1:    [zu (vierun)achzich;]
            to 84
    AS1:    -------------------
221 AS3:    [hundert zu %Achzisch-*]
            100 to 80
    AS1:    -------------------->*
                        %Figure 18
222 AS3:    (.) *frequenz fünfund%vIErzisch;
                frequency 45
    AS1:    ....*gazes at PAT's head--->>
```

Figure 18. AS1 holds PAT's head while reading blood pressure from measuring device

AS2 here monitors the device measuring PAT's blood pressure, and he informs on the measure on display (lines 219–221). After that, he returns his gaze to PAT's head (line 222), expecting that OCH needs his assistance in attaching the cervical collar. During the whole excerpt and also beyond it, AS1 crouches next to PAT and holds his head in a stable position.

Visual monitoring and talk parallel to a simultaneous project of manual action may be self-initiated as in Excerpt 10 or responsive as in Excerpt 11. In Excerpt 11, OCH, AS1 and AS2 have just pulled PAT, a motorcyclist, out from under the car where she had been stuck since the accident. OCH commands that her helmet be removed first, but AS1 notices that PAT's leg is grazed.

Excerpt 11 (FOLK_RETÜ_01_A05, 03:58–04:17)

```
326  OCH:   (.) jetzt als erstes den HELM ab;
                 now first away with the helmet
     OCH:   >>crouches at PAT's head holding PAT's head--->>
     AS2:   >>crouches to the PAT's right----------------->
     AS1:   stands up and moves towards PAT's feet
(...)
336  AS1:   ja +das BEIN %is aufgeschÜrft;
                 yes the leg is grazed
     AS1:   >>inspects PAT's leg--------------------------->
     OCH:       +looks towards AS1, then towards PAT's leg--->
                     %Figure 19
337  OCH:   (.) ja ja do mach *(.) mach ich GLEICH.%
                 yes yes there I'll do I'll do this in a moment
     AS1:   ---------------->*turns to PAT's head--->
                                    %Figure 20
```

Figure 19. OCH looks towards PAT's leg

Figure 20. OCH looks again at PAT's head

```
338   AS1:   <<aspirated>jha.>
                        yes
339   OCH:   als er[stes der HELM Ab.]
             first away with the helmet
340   AS1:          [hab nur (geguckt)]
                    yes I was only (looking)
```

In line 326, OCH announces the next joint project the team should collectively deal with. At the moment, it is not clear whether or not PAT has head injuries. Therefore, special care has to be taken when removing her helmet. AS1 notes that PAT's leg is grazed (line 336). OCH responds to this by gazing towards AS1 as he begins his turn and then looking at PAT's leg as soon as AS1 had produced the word *bein* ('leg', Figure 19). Thus, OCH's visual attention is closely coordinated with AS1's ongoing turn. OCH, however, defers what can be heard as a proposal from AS1's part to deal with PAT's leg first instead of the helmet (line 337: *ja ja do mach (.) mach ich GLEICH*, 'Yes yes there I'll do I'll do this in a moment'). During his turn, OCH re-orients his gaze to PAT's head (Figure 20). After this, he re-instates the priority of pulling off the helmet next (line 339). During the episode and beyond, OCH keeps PAT's head steady in a stable position.

Conclusion and discussion

This paper is a first attempt at analysing paramedic emergency action as multi-modal multiactivity. Based on a corpus of video-recordings of emergency drills, this paper has focused on paramedics' participation in multiple joint projects which become simultaneously relevant. They can be managed by executing them simultaneously, by dealing with them consecutively, by temporarily suspending one project in favour of another, dealing with a (momentarily) overriding relevance, and by declining or deferring projects judged to be of minor importance at that moment in time (cf. Haddington et al., this volume). Transitional phases between two projects, the initiation of a new joint project, and the integration of an additional participant in an ongoing joint project are moments where coordination of simultaneous projects becomes a task for participants. Although requests, questions and announcements are used as explicit devices for coordination, it heavily relies on tacit alignments resting on situated professional reasoning, shared routines, practical inferencing about liabilities, local opportunities and constraints of individual action and role-related division of labor (cf. Heath & Luff, 2000; Hindmarsh & Pilnick, 2002). Simultaneity and fast succession of joint projects not only characterise work on the team level, but also the work profiles of individual paramedics. Participants have to coordinate their participation in multiactivity intrapersonally. In the data studied, three patterns of using multimodal resources stood out as routine ways of coordinating two simultaneous projects intrapersonally:

- Talk and hearing vs. manual action monitored by gaze,
- Talk and hearing vs. gazing (and pointing),
- Manual action vs. gaze (and talk and hearing).

Since these are only initial observations which need to be supported and elaborated on by a larger study, it would be premature to account for generic motivations and constraints for the patterns encountered. Still, the instances studied suggest that there are more general constraints, which can be seen to be operative in a particular, context-sensitive manner in each case, adapted to the local contingencies and indexicalities of collaborative embodied action. Which multimodal resources are combined to pursue more than one project simultaneously may depend on the following conditions:

1. Situated contingencies of perceptual and pragmatic availability determine if an actor deploys activities to participate in simultaneous joint projects. Actors observe situated contingencies of partners' availability in order to decide whether visual, auditory, or tactile resources should be employed to attract the partner's attention. Thus, talk, gesture, body movement, and touch are used depending both on partners' availability and on which multimodal resources are already or necessarily in use for another project to be pursued simultaneously.

2. Static or highly repetitive manual actions which require a low degree of awareness and no visual self-monitoring allow being simultaneously coordinated with more demanding verbal actions and with auditory and visual monitoring involving skilled interpretation of perceptions.

3. Sustained simultaneous participation in more than one project over a longer stretch of time only seems to be possible if one of the activities performed is static or highly routinised. If this is not the case, simultaneous activities are restricted to short, momentary or intermittent co-participation in an ongoing joint project which is more continuously advanced by others. Alternatively, participants may perform simultaneous multiactivities in transitional phases of overlap between multiple projects.

4. Routine verbal actions and verbal actions not requiring elaborate planning (like narratives, complex descriptions and argumentative turns) may be combined with visual monitoring of other activities.

5. Auditory uptake of verbal action of others may be combined with demanding ongoing manual action and visual monitoring of other activities, if verbal action does not extend beyond one or two TCUs and if it matches the listener's expectations of what the speaker may produce.

6. Urgency, overriding relevance, precision requirements and failures of action and understanding are not conducive to simultaneous participation in more than one joint project, but they make suspending or (temporarily) abandoning one ongoing project in favour of another preferential.

7. In the data studied, persons were rarely and, if so, only very shortly involved in more than two projects at a time. However, quick transition between a series of (partially simultaneous) projects within a few seconds is common.

Further research is needed in order to elaborate on these observations and to test whether they may be generalised across contexts of embodied action.

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Appendix

Transcription conventions GAT2 (Selting et al., 2011)

[]	overlap and simultaneous talk
[]	
=	latching
(.)	micropause (shorter than 0.2 sec)
(2.85)	measured pause in seconds
geht_s	assimilation of words
:;:	segmental lengthening, according to duration
akZENT	strong, primary stress
akzEnt	weaker, secondary stress
?	pitch rise to high at end of intonation phrase
,	pitch rise to mid at end of intonation phrase
–	level pitch at end of intonation phrase
;	pitch fall to mid at end of intonation phrase
.	pitch fall to low at end of intonation phrase

<<p> >	piano, soft
<<pp> >	pianissimo, very soft
<<all> >	allegro, fast
h, hh, hhh	outbreath, according to duration
<<aspirated> >	commentary on voice qualities with scope
(solche)	uncertain transcription

Free English translation preserves German word order as far as possible.
Kinesic activities are transcribed according to Mondada (2009).