Title Page

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Article title: Action request episodes in trauma team interactions in Japan and the UK -

A multimodal analysis of joint actions in medical simulation

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Action request episodes in trauma team interactions in Japan and the UK - A multimodal analysis of joint actions in medical simulation

Abstract:

Grounding is a fundamental human practice for cooperation and collaboration in a joint activity, when more than two people interact. Emergency care is one such interactive situation, and whether a trauma team can efficiently establish and increment their common ground at an appropriate timing during the complex and fluid activity of emergency medical treatment is a key to maximise collective competence to best perform as a trauma team. This article investigates recurrent patterns in the grounding process between the trauma team leader and the members, comparing the practices between Japan and the UK, using an eye-tracking device. The embodied practice of grounding was multimodally described, applying both quantitative multimodal corpus analytic and qualitative interactional linguistic approaches. The analysis has shown that five grounding episodes reoccurred, most of which were more ego-centric and one of them *ba*-centric interactions, drawing on intersubjectivity and the theory of *ba* in Western and Eastern philosophy respectively. (151 words)

Keywords: multimodal analysis, emergency care simulation, common ground, request, eye-tracking

Introduction

A trauma team leader's requesting practice is of crucial importance to successful team interactions in emergency care settings, playing a key role in the orchestration of care provision and enhancing collective competence of the team (cf. Lingard, 2012; Sarangi, 2016). This study reports on a multimodal analysis of trauma team leaders' requesting behaviour observed in the context of emergency care simulation in Japan and the UK.

The focus is specifically on grounding for joint activities (Clark, 1996; Clark & Brennan, 1991; Keysar, Barr, & Horton, 1998) and request sequences (Drew & Couper-Kuhlen, 2014; Mondada, 2014; Rossi, 2014), in which the team leader and members recognise an error or misunderstanding in their communication and orientation of activities.

In Japan and the UK, two emergency care simulation sessions were examined, one involving a senior doctor (SD) and the other a junior (JD). In each case, the team leader's requesting behaviours were examined and compared both quantitatively and qualitatively, applying multimodal corpus analytic (Adolphs & Carter, 2013; Knight, 2011; Author, 2013) and interactional linguistic approaches (Couper- Kuhlen & Selting, 2001, 2018; Enfield, 2013). Here, we focused on team leaders' verbal and non-verbal practices in requesting, examining what was being said and also the direction of the team leaders' gaze, captured through the means of eye-tracking technology. Embodied practices in the activity of the team leader's action request and the recipient's response in both sites were compared, and the results are discussed by drawing on the concept of *intersubjectivity* in the West (Duranti, 2010; Husserl, 1931 [2002]; Schutz, 1967) and the *ba* theory in the East (Hanks et al., 2019; Shimizu, 2003, 2020).

The next section first look at the concept of *common ground* and review previous studies of requesting in everyday and healthcare contexts, which is followed by analysis and discussion sections.

Common ground

Emergency care interaction is a multiparty *joint action*, which involves several healthcare professionals (HCPs). In the context, HCPs act jointly with "coordination of both content, what the participants intend to do, and processes, the physical and mental systems they recruit in carrying out those intentions" (Clark, 1996, p.59). Through the

process of *grounding*, interactants form a *common ground* (Clark & Carlson, 1981; Stalnaker, 1978 [1999]), which is interactants' awareness of "certain information they each have", and can be *communal* or *personal* (Clark, 1996, pp.120-121). Clark and his colleagues explored common ground in understanding a demonstrative reference, proposing that the listeners' judgement was made based their assumption of shared perceptual salience with the speaker (Clark, Schreuder, & Buttrick, 1983). Two phases in grounding were then identified: *presenting phase*, which is a speaker's "initial presentation of the content", and *accepting phase*, which is a speaker's and listener's "mutual acceptance of that content" (Clark & Schaefer, 1987, p. 21). These were termed as *contributions* to conversations (also see Clark & Brennan, 1991). The model was developed and there are four levels in the cognitive process of grounding in Clark (1996): Speaker's proposing joint project and Addressee's considering, Speaker's signalling the proposal and Addressee's recognising, Speaker's presenting the signal and Addressee's identifying, and Speaker's executing the action and Addressee's attending (ibid., p.152). Distinctions were also made between *shared common ground* (CG-shared) and *reflexive common ground* (CG-reflexive): the former is mutual belief, knowledge, assumption and awareness of a presented content between the interactants, and the latter their belief and knowledge that they believe the information (ibid., pp. 94-95). Keysar et al. (1998) conducted an experimental study on grounding processes and proved that "adults routinely process language egocentrically" (p.46) as children do, but they monitor and adjust their plan to establish a common ground. Kecskes and Zhang (2009) updated Clark's two types of common ground, labelling with the new names: *core common ground*, which is "the relatively static, generalised, common knowledge that belongs to a certain speech community", and *emergent common*, which is "the relatively dynamic, particularised, *private* knowledge created in the course of

communication" and found in intercultural encounters (Kecskes & Zhang, 2009, p. 347, original emphasis).

Grounding is an embodied practice that involves both verbal and non-verbal behaviors, e.g., gaze and posture. Holler and Bavelas (2017) conducted a systemic review on gestures in grounding, identifying repetitive gestures, pointing and interactional gestures contribute to constituting a new common ground or re-activating a previously shared common ground. Clark (2012) calls a pair which consists of verbal and non-verbal pair parts a *projective pair*, to distinguish it from *an adjacency pair* in conversation analysis, which features a pair of verbal utterances. Before moving on to the research data and method, existing research of grounding in request sequences is reviewed in the next section.

Grounding and multimodally embedded request

As seen in a detailed review in Drew and Couper-Kuhlen (2014), request is a fundamental social practice for cooperation and collaboration. The cognitive nature of request was first sought in linguistic philosophy, such as *felicity* conditions where particular speech acts, such as request, are fulfilled, i.e., the content of a request should be a future action the speaker believes the recipient is able to perform, building up a taxonomy of performative languages (Austin, 1962; Searle, 1962). The discussion on request was then shifted from the pragma-cognitive aspect of request as a *speech act* to interactional practice of request as *action formation and ascription* (Levinson, 2013), which concerns what is being requested, with what linguistic form a request is made by a speaker and how the request is recognised by a recipient through interactions, and then towards request as *recruitment* (Drew and Couper- Kuhlen, 2014). Through an analysis of a multimodal corpus of informal interaction among family and friends in the UK, for instance, Kendrick and Drew (2016) further developed the discussion by introducing the

notion of *recruitment* of Others' assistance in multimodally embodied interactions. This involves "both the linguistic and embodied semiotic resources through which Others are recruited to help resolve difficulties" (ibid., p.15). To develop the concept of recruitment, Zinken and Rossi (2016) added that Others' engagement can be characterised as *contribution* to a shared course of action rather than *assistance* when Others' commitment has been already established. In such situation, they also highlight that "recruitment sequences can be progressed nonverbally based on established commitments and activity roles" (ibid., p.26). In Rossi's (2014) conversation analysis of informal interactions among family members and friends in Italy, non-verbal requests were often observed in a joint activity in progress where the interactants share a goal, and to make those requests observable to recipients, some manual actions were accompanied with verbal requests or without them, e.g., pointing to the object (ibid., p.311).

Eye gaze in request sequences has also been gained researchers' attention. In an operation theatre in the UK, a surgeon's embodied practice of requesting action to his colleague nurses was captured. The surgeon adjusts their utterances, body and gaze orientation, depending on a recipient's medical knowledge and skill sets (Bezemer, Murtagh, Cope, Gunther, & Kneebone, 2011). In emergency settings, the trauma leaders' requesting practice was explored in relation to discourse frames and gaze behaviours (Authors, in press; Authors, 2019), such as gaze address and *joint attention* (Kidwell & Zimmerman, 2007; Tomasello, 1999).

The practice of grounding in request could be socio-culturally embodied in a local context and influenced by underlying cultural orientations. The following section explores notions of shared understanding further through looking at two theoretical

concepts, *intersubjectivity* and *ba* respectively, which are employed in the discussion at a later stage.

Intersubjectivity and *ba* for grounding

In the western philosophical tradition, phenomenology (Husserl, 1931 [2002]; Schutz, 1967) has influenced society and various academic disciplines such as sociology, anthropology, and linguistic philosophy. *Intersubjectivity* is the central thought of Husserlian phenomenology, which is described as: "more than mutual or shared understanding" and "the source of objectivity" (Duranti, 2010, pp. 4-13). Intersubjectivity is thus a process of separating Self from Others by objectifying Others to establish mutual understanding with them. In the *ba* theory in Japan, which was first conceptualised by the Japanese philosopher Nishida Kitaro[1](Nishida, 1926[2019]) and is rooted in Zen/Chinese Buddhism and Shinto, on the other hand, this egocentric process of intersubjectivity would be regarded as *secondary ba*, where interaction process occurs. In contrast, *primary ba* attributes to "impermanence and ultimately non-separation" from Self and Others/context, which is a status "prior to the subject-object distinction" (Hanks et al., 2019, p. 64; Shimizu, 2003). The literal meaning of the Japanese word *ba* is equivalent to 'place' or 'space' in English, but in the *ba* theory, *ba* is both spatial and interactional, which involves "participation frameworks, norms governing behaviour, one's own sense of belonging, and the singularity of any particular interaction" (ibid.). Subjectivity is also treated differently in phenomenological thoughts and the *ba* theory:

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[1] The name is written in the order of the Japanese system, where surname comes before first name.

The phenomenological focus on the first person point of view is contrary to both

primary *ba* and *ba* theory, because it starts from the premise that the subject is

given, whereas primary *ba* is devoid of individuation, and *ba* theory generates the

subject from the joining of primary and secondary *ba*.

(Hanks et al., 2019, p.66)

The *ba* theory is thus an ontology of mutual dependence, which has been advocated by

scholars in emancipatory pragmatics, which is a new approach to analysing embodied

interactions in various cultures from non-classic/non-Western linguistic and pragmatic

views (Hanks, 2014; Hanks, Ide, & Katagiri, 2009).

The current study explores how a trauma team leader establishes common

ground for the joint activity of medical treatment with their team members in requesting

in emergency care simulation in Japan and the UK, capturing their eye gaze with an

eye-tracking device. The results will be discussed from the different philosophical

thoughts on interactions among humans and contexts in the East and the West.

Research data and methods

In the context of each site, Japan and the UK, two emergency care simulation sessions

were recorded and examined, one involving a senior doctor and the other a junior as the

team leaders.

Session 1: recorded in the UK with a senior doctor as a leader (UK_SD),

abdominal bleed

Session 2: recorded in the UK with a junior doctor as a leader (UK_JD),

abdominal bleed

Session 3: recorded in Japan with a senior doctor as a leader (JP_SD), brain

haemorrhage

Session 4: recorded in Japan with a junior doctor as a leader (JP_JD), traffic

injury

Two recordings of emergency care simulation with the same trauma scenario were

recorded at a large teaching hospital in the UK, as part of regular simulation training

(see Figure 8 in Appendix 1 for the setting). Each comprised of a team leader wearing

eye-tracking glasses (the first session with a senior doctor as a leader [SD] and the

second with a junior doctor [JD]), two foundation doctors (FD1 and FD2), two

emergency department (ED) nurses (a senior nurse [SN] and junior nurse [JN]), one ED

assistant (EDA), and one anaesthetist, who joined the team in the middle of the

scenario. The same team members participated in both sessions with a different team

leader. Several recording devices were set up in the room: three video cameras and a

pair of eye-tracking glasses (SMI), which the leaders wore. In both sessions, the

scenario was a trauma case with a simulated patient (60 years old, male), who suffers

from a falling wardrobe. After the patient comes in, a paramedic conducts a handover

with the team leader, who then directs the members of the team in taking tests,

providing care and preparing the patient for a scan.

     Similarly, the two recordings from the Japanese data sets took place in the

resuscitation area at a university hospital as part of regular simulation training (see

Figure 9 in Appendix 1 for the setting). Both teams were comprised of a team leader (L)

with eye-tracking glasses (Tobii Pro 2), another two doctors (D1 and D2), a foundation

doctor (FD) in Session 1 and two FDs in Session 2 (FD1 and FD2), two nurses (N1 and

N2), two X-ray technicians (X1 and X2), and a simulated patient in Session 1 and a

manikin in Session 2 (both assumed as male, 60 years old). The scenario of Session 1 was a brain haemorrhage and Session 2 was a traffic injury. The patient was taken into a hybrid resuscitation room with a built-in CT scanner. The teams inserted an intravenous (IV) line and an arterial line, intubated the patient, and did X-rays/CT-scans before leaving for the intensive care unit.

In each case, the team leader's requesting behaviours, especially their requests for immediate actions, were examined and compared, applying a multimodal corpus analytic and interactional linguistic approaches. The leaders' eye-tracking data and utterances were stored and annotated using applications iMotions (2018) and ELAN, (2001-2015). The images provided as screen shots were captured by the eye-tracking glasses the leaders wore, and the circles in the figures indicate objects of his gaze. Gail Jefferson's transcription conventions were adapted to the transcripts[2, 3].

Results

The leaders' first and second position requests

Four patterns of request-action episodes were observed in the way the leaders made requests in both sites. The term *episode* is used here, which is a similar concept to a

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[2] The number in brackets indicates a time gap in tenths of a second, and a dot enclosed in a bracket indicates a pause in the talk of less than two-tenths of a second. Square brackets between adjacent lines of concurrent speech indicate the onset and end of a spate of overlapping talk, and a double bracket indicates non-verbal activity (Hutchby & Wooffitt, 1998, pp. x-xi). All the name used in the transcripts are pseudonyms.

[3] For the Japanese data sets, English translations appear in bold below the original transcripts in Japanese in italic with abbreviations of literal glosses adapted from Suzuki (1995) (see Appendix 2 for the abbreviations).

paragraph in a story in narrative analysis (van Dijk, 1982), to capture a larger unit of multimodally embedded sequence in interactions. In some cases, the recipient member gazed at the leader before the leader made a first position request (Episode 1). We shall call the recipient's gaze behaviour *anticipation gaze.* In other cases, the leader made requests to assign a task or confirm a task the recipient was already attending to (Episode 2). The leaders were sometimes verbally prompted by team members, which led to the leaders' making second position requests (Episode 3). In this case, a team member recognised a required task that had not yet been completed in the interaction and highlighted it to the leader. The leaders' second position requests could also be prompted by member s' non-verbal behaviours (Episode 4). The leaders gazed at a member and noticed s/he was doing or trying to do something that should not be done, and then made a second position request to reorient the activity.

Table 1 shows that most of the leaders (UK_SD, UK_JD and JP_SD) made immediate requests for members' action about 40 times in the session except JP_JD, who made requests more than twice than the others. Both the SD and the JD in each site self-initiated requests (first position request, FPR) more frequently than made requests after being prompted by other members (second position requests, SPR).

Table 1   The four patterns of the leaders' request sequences[4]

	UK_SD	UK_JD	JP_SD	JP_JD
Operation Time (MM:SS)	18:44	18:40	16:55	19:49
Word Count	1888	2090	2433	2088
No of Immediate Request	35	38	40	86

[4] The word count for the Japanese leaders (JP_SD and JP_JD) indicates the number of characters, which include all the three letters in Japanese, i.e., *hiragana*, *katakana* and *kanji*. FPR means first position request and SPR second position request.

Episode 1 (FPR, Member's anticipation gaze)	22	62.9%	20	52.6%	2	5.0%	1	1.2%
Episode 2 (FPR, Members in task)	7	20.0%	5	13.2%	25	62.5%	59	68.6%
Episode 3 (SPR, Member's verbal prompt)	5	14.3%	11	28.9%	11	27.5%	24	27.9%
Episode 4 (SPR, Member's non-verbal prompt)	1	2.9%	2	5.3%	2	5.0%	2	2.3%

The percentage of second position requests is higher in the JD in both sites. The percentage of second position requests is higher in UK_JD and the two Japanese data sets compared with that of UK_SD. The pattern in Episode 1 was observed more often in the British leaders' making requests, while, Episode 2 can be attributed more to the Japanese leaders' requesting patterns. The detail of these leaders' requesting practices in their interactional context are qualitatively described in the following sections.

Episode 1: Requesting to commence an activity

Extract 1 is an instance of the UK_JD's self-initiated requests in Session 2. In the interaction immediately prior to this extract, the leader was listening to the foundation doctor's (FD1) primary survey. Listening to FD1's report of the patient's saturation level in line 2, which is 94 when the normal range is 97 to 100, the leader first looked at it on the monitor by himself in line 5 (Figure 1-1), then gazed at N2 in line 7 (Figure 1-3) and asked her to put an oxygen mask on the patient in line 8. The leader's request seemed to be anticipated by N2, who was looking at the leader in line 6 (Figure 1-2) before the leader's request, because the members' commitment to the course of activity was already established. N2 was also listening to FD1's survey reporting and she seemed to anticipate the leader would ask her to put an oxygen mask on, or at least to do something. N2 responded with a headnod, walking towards a cabinet to get an oxygen mask.

(1) The recipient's gaze and UK_JD's self-initiated request [Session 2 at 02:15]

```
1   L:      ((gazes at the patient.))

2   F1:     the satu[ration is 94] now.

3   L:             [((gazes at the monitor.))]

4   L:      (0.2)((gazes at the patient.))

5   L:      (.)((gazes at the monitor. #fig.1-1))

6   N2:     (0.2)((gazes at L. #fig. 1-2))

7   L:      (.)((gazes at N2. #fig. 1-3))

8 ->L:      can you put the [oxygen on?] Thank [you].

9   L:                      [((gazes at the monitor.))]

10  L:                                          [((L

                                    gazes at the

                                    patient.))]

6   N1:     [((headnods.))]

7   N1:     ((walks towards a cabinet.))
```
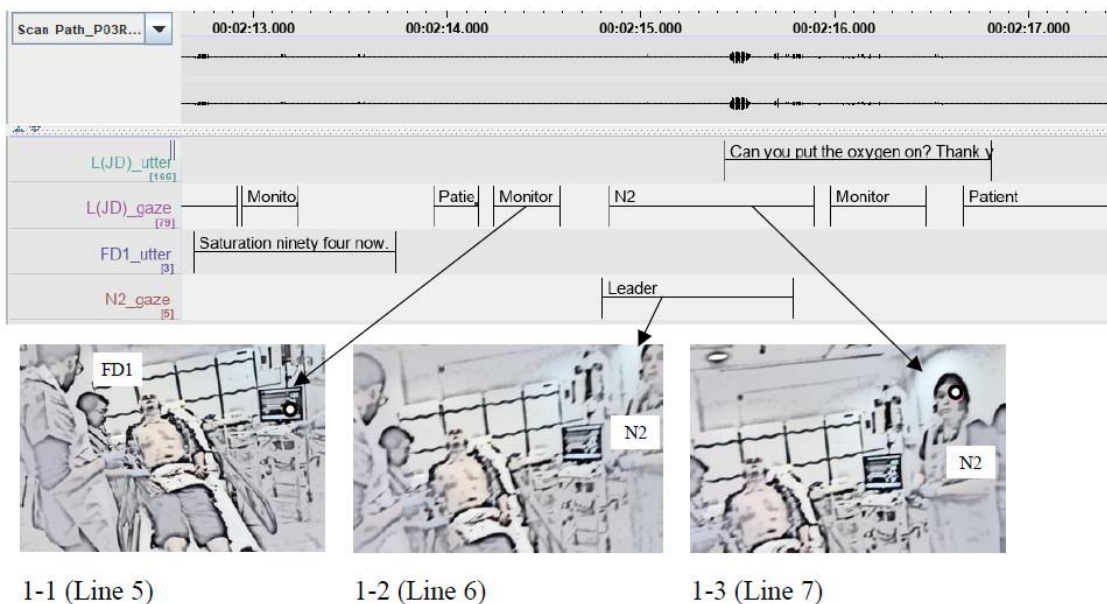
Figure 1 UK_JD's requesting with Episode 1 in Session 2

1-1 (Line 5)   1-2 (Line 6)   1-3 (Line 7)

In contrast to the UK data, only few cases of Episode 1 were observed in the Japanese simulation data. In Extract 2, JP_SD has just finished a call to the emergency intensive care unit to secure a bed for the patient while X-ray technicians were preparing for the CT scan. Seeing they were almost ready for the CT scan, the leader came to the door, pretending to close the door for the CT scan, uttering "Okay we assume we closed the door" in line 1. He knew the door should be closed when taking a CT scan in an actual operation, but he left it open since there were many observers at the simulation. A foundation doctor (FD1) was standing near the door, looking at the leader in line 3 (Figure 2-1). The leader then addressed, looked at FD1 and said, "Okay Foundation Doctor after we finish CT scan" in line 8, standing by FD1. FD1 looked back to the leader, which led to their mutual gaze (lines 9- 10, Figure 2-2), and responded verbally, "Yes", in line 12.

(2) The recipient's gaze and JP_SD's self-initiated request [Session 3 at 07:15]

```
1   L:      [hai ja [tobira wa] [shimeta]]

            Okay then door TP close-PAST

            [toiu koto ni nari masu.]

            say NOM ADV become COP.POL.

            okay then we assume we closed the door.

2   L:      [((L comes to the

            door where FD1 is

            Standing.))]

3 FD1:          [((gazes at L and headnods.

                            #fig. 2-1))]

4   L:                      [((gazes at
```

```
                                               the door.

                                               #fig. 2-1))]

     5   L:     [((gazes at the ECG.))]

     6   L:     ((gazes at SD and X-ray technician.))

     7 FD1:     ((gazes at the patient.))

     8 ->L:     ja kennshuui no sen[sei sore ga][owatta-ra],
                then Foundation Doctor it S finish-PAST-COND

                then Foundation Doctor after we finish it,

     9 FD1:                        [((gazes at L

                                   and headnods.

                                   #fig.2-2))]

    10   L:                        [((gazes at FD1.

                                   #fig.2-2))]

    11   L:                                    [((gazes at

                                                ECG.))]

    12 FD1:                                    [hai.     ]
                                                Yes

                                                yes.


    13   L:                                    [((gazes and

                                                points at

                                                ECG.))]

    14->L:      [[shindenzu toka]        [ato ha (.)
                ECG       something like  and TOP

                you are going to do ECG and (.)

                are dane   nyokate            toka
```

```
                   That COP.FP urinary catheter something like

                   wo ireru] tsumori de.

                   DO insert you will COP

                   that one- insert a urinary catheter.

          15 FD1:  [((FD1 looks at ECG.))]

          16   L:  [((L looks at

                    Patient.

                    #fig.2-3))]

          17   L:  ((L points at Patient. #fig.2-3))

          18 FD1:                          [((FD1 looks at

                                            Patient.))]

          19 FD1:  wakari mashita.

                   understand COP.POL.PAST

                   okay I will.

                   ((FD1 starts to prepare for taking an ECG.))
```
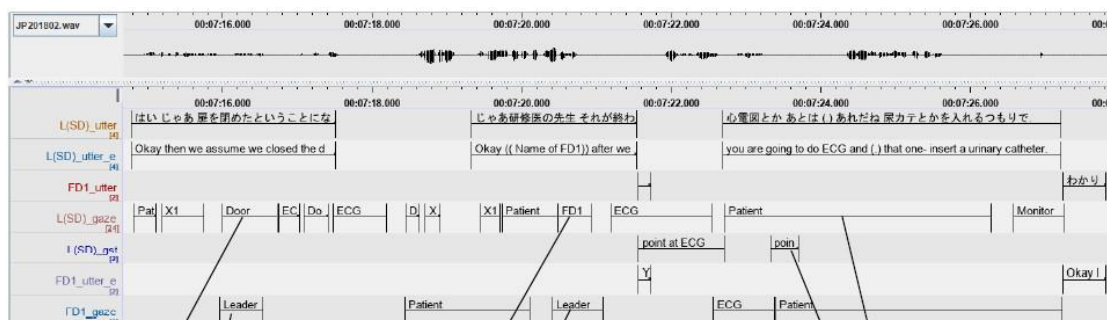
Figure 2 JP_SD's requesting with Episode 1 in Session 3

2-1 (Lines 3-4)   2-2 (Lines 9-10)   2-3 (Lines 16-17)

Coordinating his gaze and pointing gestures towards the electrocardiograph (line

13, ECG) and the patient (line 17, Figure 2-3), the leader assigned the tasks to FD1,

saying "you are going to do the ECG and (.) that one- the urinary catheter" in line 14.

The leader also gazed at the equipment (the ECG) to be use for the treatment before he

initiated the request verbally (line 5). FD1 looked at the leader while listening, and

verbally responded again (line 19), starting the preparation for taking an ECG. In both

cases, the recipients seemed to anticipate that the leader would assign a task to them

before the leader actually verbalised the requests, which we name Episode 1.

Episode 2: Requesting to confirm a task in process

More instances of Episode 2, where the leaders make requests when members were

involved in a task, were observed in the Japanese data than the UK data. Extract 3 is an

instance of JP_JD's self-initiated requests in Session 4, which is categorised into

Episode 2. Soon after the arrival, the patient was transferred to the bed in the

resuscitation room, and Doctor 1 (D1) and Foundation Doctor 2 (FD2) started to take

off an immobiliser from the patient's head. The leader, who was standing on the right

side of the bed, looked at FD2 from her back (line 2, Figure 3-1), watching D1 and

FD2's removing the immobiliser and saying, "Take it off".

(3) The JP_JD's self-initiated request [Session 4 at 00:41]

```
1 D1&FD2: ((D1 and FD2 are taking the immobiliser

            Off from the patient's head.))

2   L:    ((gazes at FD2. #fig.3-1))

3   L:    anpakke:ji [shite. ]

            Remove    do-IMP
```

take it off.

4 L: [((gazes at D1. #fig.3-2))]

5 ->L: *ja sato sensei ((Name of D1))*

then Dr Sato

then Dr Sato ((Name of D1))

ue kara hyouka shite itte kudasai.

top from evaluation do-CONV please

please do the primary survey.

6   ((Few lines are omitted.))

7 D1: *ja C kara hyoka shimasu.*

Then C from evaluation do-POL

okay I will start checking with C.

8   ((Few lines are omitted.))
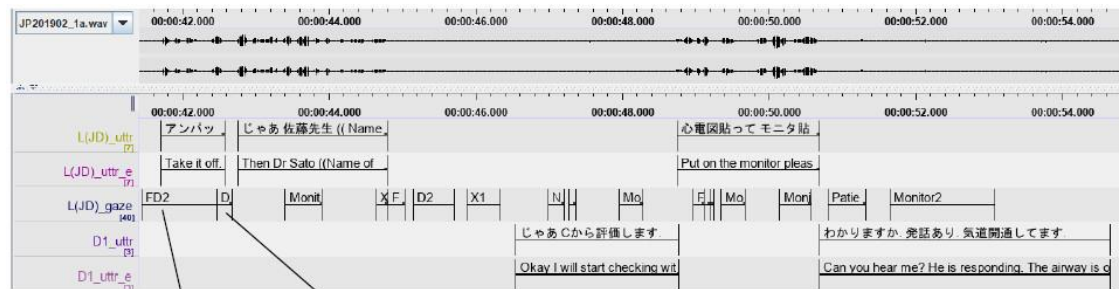
9 D1: *wakari masu ka.*

Understand COP.POL Q

can you hear me?

10   *hatsuwa ari. kido kaituu shite masu.*

speak COP airway open do-COV COP.POL

he is responding. the airway is open.

Figure 3 JP_JD's requesting with Episode 2 in Session 4

3-1   (Line 2)   3-2 (Line 4)

When they finished removing the immobiliser, the leader quickly looked at D1 and

asked D1 to start the primary survey (lines 4-5, Figure 3-2). D1 was already attending

the patient at that moment and responded to the leader, saying "Okay I will start

checking with C" in line 7. In line 9, D1 then started talking to the patient, "Can you

hear me?", for the primary survey, and reporting "He is responding. The airway is

open" (Line 10).

The number of these instances is relatively small in the UK data, but they were

still present. For example, in Extract 4, FD1 and FD2 were putting a pelvis bandage on

the patient and a nurse (N2) was helping them by holding the patient's left arm since the

patient had an open wound on his wrist. UK_SD looked at N2 (line 2), addressed her

name and asked her, "can I ask what was the temperature?" (line 3). Responding to the

leader's address, N2 first looked at the leader, which led to their mutual gaze (lines 5-6,

Figure 4-2), and then looked at the monitor to see whether the temperature is displayed.

Looking at N2's gaze, the leader also looked at the monitor, which is an instance of

joint attention. They both seemed to confirm that the temperature was not on the

monitor due to the simulation environment. The leader then uttered "okay" in line 10,

which was followed by N2's response, "Yeah" in line 13. During the process, N2 also

looked at the cabinet behind her to search for the thermometer. After this extract, N1,

who was listening to the conversation, came to the cabinet, took out the thermometer

from a drawer and brought to N2 since N2 was holding the patient's arm and not able to

leave the bedside.

(4) The UK_SD's self-initiated request [Session 1 at 06:17]

```
1   N2:    ((N2 is helping FD1 and FD2 to put a

                  pelvis bandage on the patient.))

2    L:    ((gazes at N2. #fig.4-1))

3  ->L:    Ruth ((N2's Name))[ can I ask what was

                                the temperature?]

4  N2:                            [((gazes at L.

                                   #fig.4-1))]

5   N2:    ((gazes at the monitor. #fig.4-2))

6    L:    ((gazes at the monitor. #fig.4-2))

7    L:    ((gazes at N2.))

8          ((Few lines are omitted.))

9   N2:    ((gazes at the cabinet behind.))

10   L:    okay.

11   L:    ((gazes at FD1.))

12   L:    ((gazes at the patient.))

13  N2:    ((gazes at the leader.)) Yeah.
```


Figure 4 UK_SD's requesting with Episode 2 in Session 1
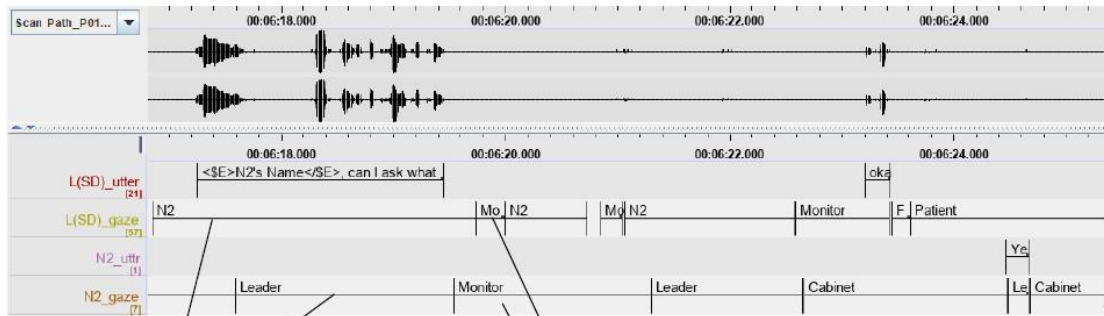
4-1   (Lines 2 and 4)   4-2 (Lines 5-6)

There are two patterns in Episode 2: (1) confirming the orientation of the activity, which the recipient was already attending, by making a request, and (2) asking the recipient to do a task, when s/he was working on another task. We shall call the former Episode 2-1 and the latter Episode 2-2. The recipient's anticipation gaze at the leader before a request was not observed in Episode 2.

Episode 3: Responding to members' verbal prompts

The leaders' requests were sometimes prompted by other team members' verbal utterances. Extract 5 is an excerpt from the moment described in Extract 3, but the focus is placed on another interaction observed at that time between JP_JD and a nurse (N1). Soon after the leader asked D1 to do the primary survey, N1 gazed at the leader, pointing at the monitor (line 7, Figure 5-1). The leader noticed N1's oriented her torso towards him, gazing and pointing to the monitor, and gazed back at N1 (line 8, Figure 5-1). After the establishment of mutual gaze, N1 uttered, "ECG?" (line 9), in a rising tone, which should mean "do we have to put the ECG monitor on the patient?".

(5) The JP_JD's other-initiated request [Session 4 at 00:41]

```
1 D1&FD2: ((D1 and FD2 are taking the immobilizer from

            the patient's head.))

2   L:    ((gazes at FD2.))

3   L:    anpakke:ji [shite.]

            Remove do-IMP

            take it off.

4   L:                [((gazes at D1.))]

5   L:    ja sato sensei ((Name of D1))

            then Dr Sato

            then Dr Sato ((Name of D1))

            ue kara hyouka shite itte kudasai.

            top from evaluation do-CONV please

            please do the primary survey.

6         ((Few lines are omitted. ))

7   N1:   ((gazes at L and points at the monitor.

            #fig.5-1))

8   L:    ((gazes at N1. #fig.5-1))

9   N1:   shindenzu?

            ECG

            ECG?

10  N1:   ((gazes at the monitor. #fig.5-2))

11  L:    ((gazes at the monitor. #fig.5-2))

12 ->L:   shindenzu hatte monita hatte ne.

            ECG  put-CONV monitor put-CONV FP

            put on the monitor please.
```
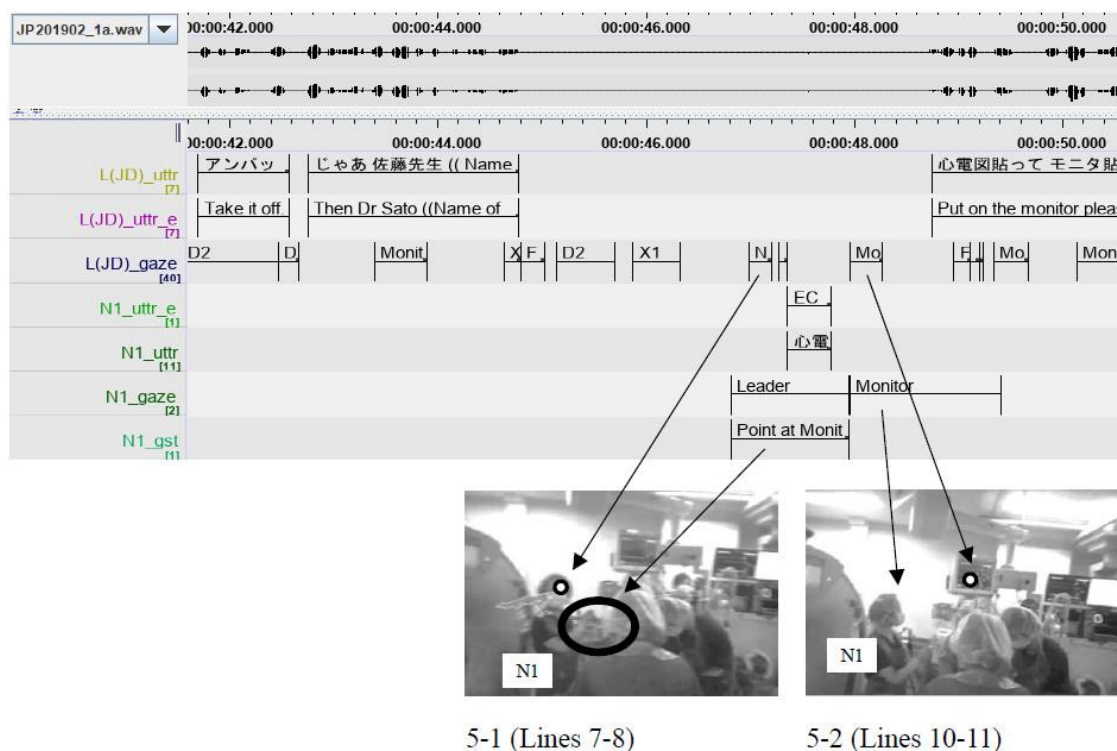
Figure 5 JP_JD's requesting with Episode 3 in Session 4

5-1 (Lines 7-8)　　　　　5-2 (Lines 10-11)

N1 then looked at the monitor behind her, which is followed by the leader's gaze shift towards the monitor, leading to joint attention (lines 10-11, Figure 5-2). The leader then asked N1 to put the monitor on the patient in line 12. As seen in this extract, the leader's request was sometimes prompted by a member's previous utterance.

Similar cases of a leader's second position request were also found in the UK data. Extract 6 is the time when an anaesthetist (A) came into the simulation room to give help. A greeted UK_JD with mutual gaze (lines 1-4) and the leader asked who he was, which was followed by A's self-introduction of his name and expertise (lines 5-6).

(6) The UK_JD's other-initiated request [Session 2 at 9:44]

```
1    A:    ((A comes into the room and gazes at L.))

2    L:    ((gazes at A.))
```

```
 1
 2
 3        3    L:   hello [what's-]
 4
 5        4    A:        [Hi.]
 6
 7        5    L:   [Who are you my friend?]
 8
 9        6    A:   [I'm Tom ((Name of A))] one of the
10
11                  anaesthetics.
12
13        7    L:   hi nice to meet you anaesthetics [Tom.
14
15        8    L:                                   [((gazes
16
17                                                  At the
18
19                                                  patient.))]
20
21        9    L:   yeah [perfect.]
22
23        10   A:        [How can I help you?]
24
25        11   L:   [are you] part of the trauma team?
26
27        12   L:   [((gazes at A.))]
28
29        13   A:   yeah.
30
31        14   L:   ((gazes at the patient.))
32
33        15   L:   okay erm so we got a chap he is now erm
34
35                  about thirty minutes post injury.
36
37        16        ((Few lines omitted. L continues to share
38
39                  the situation with A.))
40
41        17   A:   ((points at the patient's head. #fig.6-1))
42
43        18   A:   ((gazes at L. #fig.6-1))
44
45        19   L:   ((gazes at A. #fig.6-1))
46
47        20 ->A:   do you want me to go on the top end?
48
49        21   L:   ((gazes at the patient. #fig.6-2))
50
51        22   L    ((points at the top end with open palm
52
53                  supine. #fig.6-2))
54
55
56
57
58
59
60
61
62
63
64
65
```

```
23 ->L:    please that would be very sensible.
```

Figure 6 UK_JD's requesting with Episode 3 in Session 2
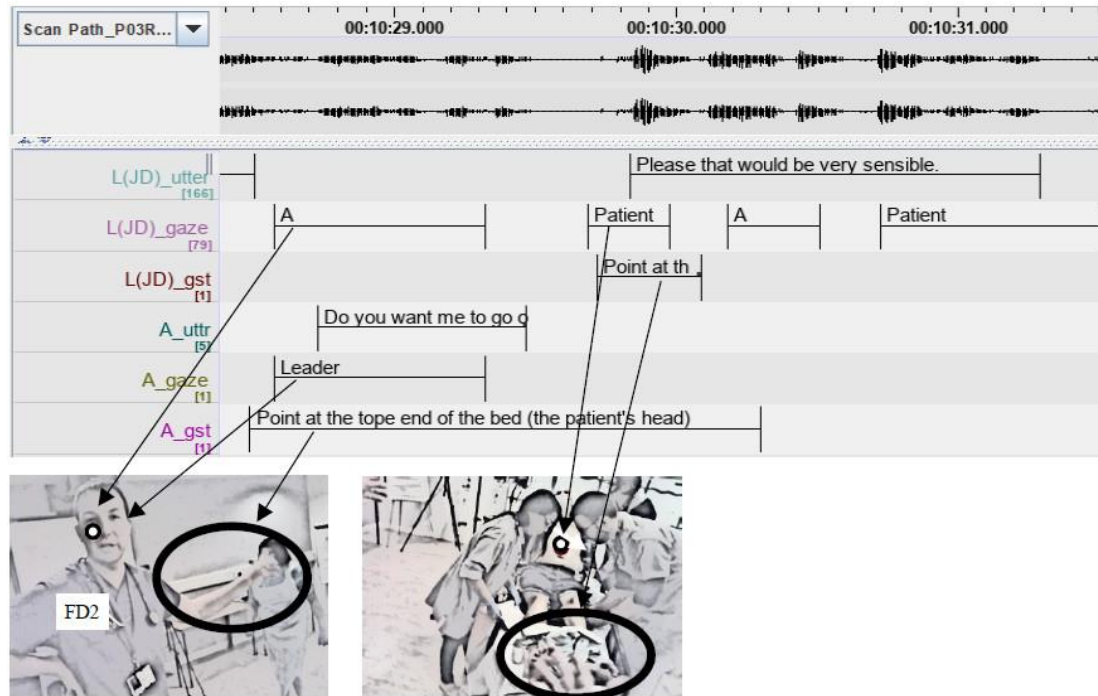
6-1 (Lines 17-19)   6-2 (Lines 21-22)

The leader then started explaining the current situation to A, shifting his gaze on the patient (lines 14-15). After the leader's explanation, A asked, "Do you want me to go on the top end?" with mutual gaze with the leader and a pointing gesture at the bed top (the patient's head) (lines 17-20, Figure 6-1). The leader also looked toward the patient and pointed at the bed end with an open palm supine (palm up) gesture, accepting his suggestion (lines 21-23, Figure 6-2).

Episode 4: Responding to members' nonverbal prompts

Although the number of cases was limited, the leaders also responded members' nonverbal behaviours, which is related to the phenomenon called *projective pair* (Clark, 2012). In Extract 7 from Session 4, JP_JD and the team were preparing for taking X-

rays after intubating the patient. The leader requested to take X-rays (lines 1-5), and X1 came beside the bed and asked the team to lift the patient up to insert the spacer (a flat rectangle plate) under the backboard (line 7). The leader looked at the patient's body, where the spacer was going to be inserted (line 9, Figure 7-1).

(7) The leader's other-initiated request after FD's nonverbal prompt [Session 4 at 9:01]

```
1   L:    ja rentogen da.

            then X-ray COP

            then let's take X-rays.

            [mune [to      ] kotsuban,]

            chest and pelvis

            [chest and pelvis,]

2   L:              [((gazes

                 at X1.))]

3   X1:   [hai tori masu.            ]

            yes take COP.POL

            [Yes, I will do.]

4   L:    ((gazes at D1.))

5   L:    toroo.

            take-VOL

            let's do it.

6   L:    ((gazes at the monitor.))

7   X1:   ha:i bakku[boodo no]

            okay backboard  GEN

            [shitani supe:sa: iretai desu.]
```

```
                         under spacer insert-want COP.POL

                         oka:y I want to insert the spacer under

                         the backboard.

 8   L:                  [((gazes at FD2.

                             #fig.7-1)) ]

 9   L:     [((gazes at the patient.))    ]

10          ((Few lines omitted.))

11   D2:    hai,

            okay

            okay,

12    L:    ((gazes at the patient.))

            [ja                ] [ashi mochi masu.]

            then legs take COP.POL

            then I will lift his legs up.

13    L:    [[(((gazes at D2.))]

14    L:                         [((gazes at FD2.

                                     #fig.7-2))]

15    L:    hai.

            okay

            okay.

16   D1:    atama [mochi        ] masu.

            head take COP.POL

            I will lift his head up.

17    L:        [((gazes at D2.))]

18    L:    ((gazes at FD2. #fig.7-3))

19          ((FD2 is about to stop pumping to help
```

```
                               others.))

        20 ->L:    ii yo Sasaki sensei ((Name of FD2)) ha

                   okay FP Dr Sasaki                    TOP

                   zutto           ponpingu shitete.

                   all the time    Pumping do-IMP.STAT

                   it's okay Dr Sasaki((Name of FD2))

                   you can continue pumping.

        21           ((Few lines omitted.))

        22 FD2:    hai.

                   okay

                   okay.
```
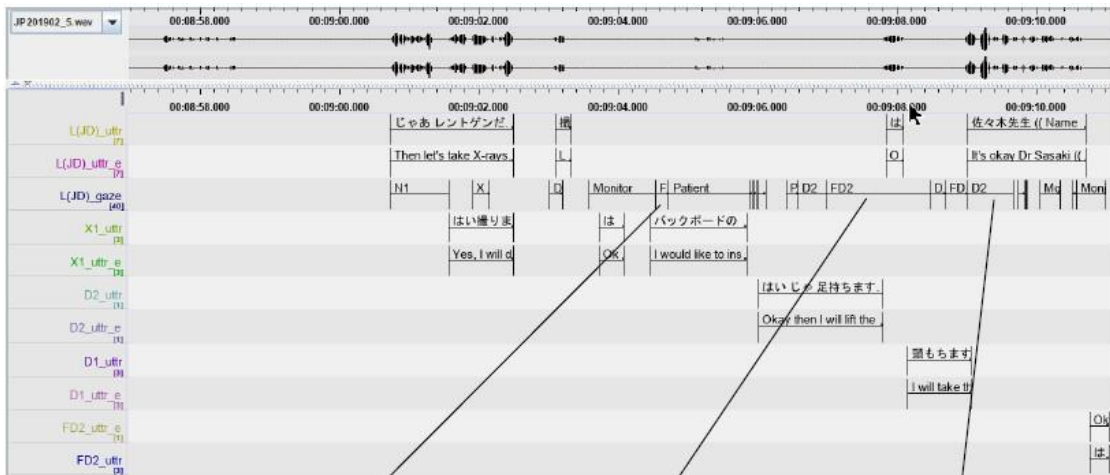
Figure 7 JP_JD's requesting with Episode 4 in Session 4

7-1 (Line 8)   7-2 (Line 14)   7-3 (Line 18)

Responding X1's request, D1 and D2 hold the patient's head and legs to lift him up (lines 11 and 16). Seeing the situation, FD2, who had been pumping blood, stopped doing so to help the team, which was monitored by the leader (lines 8, 14 and 18, Figures 7-1, 7-2 and 7-3). The leader then asked FD2 to continue pumping in line 20, which was followed by FD2's response in line 22.

There are only a couple of cases of Episode 4 in each session, but this captures the moments where the leaders anticipated the members' actions. Monitoring and anticipating members' judgements and actions which need to be corrected, the leaders reoriented the recipients' activities with requests, co-constructing a common ground for joint action.

Discussion

The phases of grounding in the four episodes

The leaders exploited request practices for recruitment of members' contribution by establishing a common ground for collaboratively performing medical treatments at each moment. Table 2 summarises the phases and the gaze behaviours of the leaders and the recipients in the grounding process in the four interactional Episodes identified.

Table 2 The processes of grounding in the four request-action episodes

Episode 1: *Anticipated Request* [FPR, Member's anticipation gaze]	Phase -1: Update about the patient's condition and medical procedures Phase 0: Recipient's anticipation gaze (signalling p) Phase 1: Leader's gaze/request (presenting p) Phase 2: Recipient's acceptance of p

Episode 2-1: *Request for confirmation* [FPR, Member in the requested task]	Phase -1: Recipient's executing the task to be requested Phase 0: Leader's gaze at Recipient who is already executing the task (signalling p) Phase 1: Leader's gaze/request (presenting p)
Episode 2-2: *Request for grounding* [FPR, Member in some other task]	Phase -1: Recipient's executing a task, which is different from the task to be requested Phase 0: Leader's seeking gaze at Recipient (signalling p) Phase 1: Leader's gaze/request (presenting p) Phase 2: Recipient's acceptance of p
Episode 3: *Recipient's verbal request initiation* [SPR, Member's verbal prompt]	Phase 0: Recipient's seeking gaze at Leader (signalling p) Phase 1: Recipient's request initiation (presenting p) Phase 2: Leader's gaze/request (accepting p)
Episode 4: *Recipient's non-verbal cue for request* (SPR, Member's non-verbal prompt)	Phase 0: Leader's anticipation gaze (signalling $p1$) Phase 1: Recipient's non-verbal cue (signalling $p2$) Phase 2: Leader's gaze/request (presenting $p1$) Phase 3: Recipient's acceptance of $p1$

In Episode 1, joint action was co-constructed with the recipient's anticipation gaze (signalling *p*), which led to the mutual gaze between the leader and the recipient before the leader verbally made a request (presenting *p*). After the mutual gaze between the leader and the nurse, the leader then made a request, and the recipient accepted the request (accepting *p*), establishing the common ground of what activity should be done by whom at that moment based on the information shared in the preceding phase. It is difficult to know to what extend the listener anticipates the leader's request, e.g., only the timing and/or the content of the request, but at least, the leader and the recipient have already shared a common ground that the leader is going to ask the recipient to do a task, and both the leader and the recipient signalled the proposal with gaze before the leader presented the proposal verbally.

In Episode 2, the leaders made a request while a recipient was on a task. Episode 2 was found to have sub-categories, Episodes 2-1 and 2-2. Episode 2-1 is the situation where the leader confirmed the activity the recipient was already engaged in with making a request. In this situation, the leader gazed at the recipient member who was executing the activity (signalling *p*) and verbalised a request the recipient to do the task, which both already shared, simultaneously indicating the common ground was reflexive. In other words, the recipient's commitment of the course of activity was already established before the leader's verbal request (presenting *p*) in this episode. About half of the occurrences of Episode 2 in JP_JD (27 out of 59) and about one fourth of those in JP_SD (6 out of 25) are categorised into Episode 2-1, whereas, no instance of Episode 2-1 was found in the UK data. In Episode 2-2, on the other hand, the leader asked the recipient to do another task after the one the recipient was working on at the time of the leader's requesting. The leader sought the recipient's attention with gaze (signalling *p*) and utterances (presenting *p*) in Episode 2-2. The request was taken up by

the recipient (accepting *p*) immediately in some cases, and in other cases the orientation

was verbally and/or non-verbally negotiated and co-constructed between the leader and

the recipient before establishing a shared common ground and executing the task as

described in Extract 4.

In Episode 3, absence of the leader's request or instruction is recognised and

prompted by the recipient with seeking the leader's attention with their gaze, body

orientation, gestures and utterances (signalling and presenting *p*). The leader then co-

constructs a common ground with the recipient by responding and making a request

(accepting *p*)[5]. In Episode 4 requests, the leader anticipates potential misorientation by

the recipient, monitoring the recipient's behaviours (signalling *p1*). Seeing the recipient

is going to attend an activity (signalling *p2*) which the leader did not intend her/him to

do, the leader verbally instructs the recipient (presenting *p1*) and reorients the activity.

Different embodiments of grounding – sharing intersubjectivity or ba

Although the data in the UK and Japan show many commonalities, two noticeable

differences were found in the practices of grounding in the emergency interactions

between the UK and Japan: (1) In the former, a recipient's anticipation gaze was

observed before the leaders' request in most cases (Episode 1), while in the latter, the

leaders asked the action which the recipient was already engaged in, confirming the

orientation of the activity, more frequently than the leaders in the UK, and (2) in the UK

data, the junior leader was prompted by the members to re-orient the current activity

(Episode 3) more often than the senior doctor, while in the Japan data, the members

---

[5] There are few instances of the leaders' rejection to the member's suggestion of an action in the

data sets in both sites, which will be discussed in a separate work because of the limited space

of a manuscript.

recognised and verbalised the absence of the leader's requesting a necessary action in both sessions led by the senior and junior doctors. This might reflect how the interactions are framed and embodied in the two distinctive sociocultural contexts. A discussion on the idiosyncrasies is added, employing the concepts of intersubjectivity and the *ba* theory.

In intersubjectivity and in egocentric interactions in secondary *ba*, Self objectifies Others by recognizing their distinctive assigned social and institutional roles to interact and seek for a common ground with verbal utterances and non-verbal behaviours. In such context, their agency as a leader/requester and a member/recipient is foregrounded, and the members tended to wait till the leader's making a verbal request, monitoring the leader with gaze, before they executed the action requested. In primary *ba*, on the other hand, Self is not separated from Others/context (Hanks et al., 2019; Shimizu, 2003, 2020), and the participants including the leader were immersed in the context of the activity of medical treatment and their behaviours were defined by *ba*, which were not necessarily initiated by the leader's requesting.

The ego-centric practice of grounding was observed in Episode 1, where the recipient gazed at the leader, anticipating and waiting the leader's request, and Episode 2-2, where the leader instructed the next task to the recipient member. In Episodes 3 and 4, the requester, either the leader or the member, was performing as part of *ba*, getting noticed the lack of certain necessary actions or some wrong actions in the context, and moving towards the ego-centric interactions with reorienting Other's activity with voice, gaze and body movements. The leaders' use of confirmation request in Episode 2-1 could be more *ba*-oriented, reassuring a shared common ground within a team.

Both practices of grounding were observed in the data sets of Japan and UK, but the egocentric interactions for grounding seemed the dominant practice in the UK

teams. The same practice was found in the Japan data, but only in the process of

grounding between the leader and the foundation doctors. On the contrary, the primary-

ba oriented practice seemed to be more attributed to the interactions in the Japan data. It

would, however, be too simplistic to claim that the egocentric process characterises the

interactions in the UK data and the mutual dependent practice of primary *ba* the

Japanese one, and this dichotomous interpretation is suggested cautiously. There are

many other factors to be considered. The Japanese data sets, for example, were recorded

in situ in the resuscitation area with the members of the emergency care department

who work together in daily basis. This differs from the UK data sets, where the ad-hoc

trauma teams took part for training in a simulation room. This could also affect the

team interactions and needs to be investigated further.

Conclusion

Whether a trauma team can efficiently establish and increment their common ground at

an appropriate timing during the complex and fluid activity of emergency medical

treatment is a key to maximise collective competence to best perform as a team. This

article has investigated recurrent patterns in grounding process between the trauma team

leader and the members, comparing the practices between Japan and the UK, and

between the leaders with different levels of experience in each site.

Request is a central move in grounding to (re)orient the course of joint activities.

These practices were embodied in the process of grounding by the leader and the

members in emergency care interactions. The analysis has shown that five grounding

episodes reoccurred. Two of them (Episode 1 and Episode 2-2) are more *ego*-centric

interactions based on intersubjectivity (Duranti, 2010; Husserl, 1931 [2002]; Schutz,

1967), another (Episode 2-1) *ba*-centric interactions which are urged by *ba* as a whole

(Hanks et al., 2014; Shimizu, 2003, 2020) and the other two (Episodes 3 and 4) have

both elements. The British leaders led the team in a more ego-centric manner, while, the Japanese leaders tended to submerge themselves in *ba* with the members, transcending Self and merging with Others/context, although these findings should be treated cautiously, avoiding simplistic cultural stereotypes.

Further investigation with a larger and more comparative set of data is necessary to make stronger claims, but this article sheds light on the potential of multimodal corpus analytic and interactional linguistic approaches to explore task-oriented multi-party interactions, drawing on the concept of grounding, intersubjectivity and the theory of *ba* for a cross-cultural comparison. It is also hoped this study stimulates multimodal research with eye-tracking technology on healthcare interactions, which contributes to a finer understanding of emergency care team interaction and informing medical simulation training and education.

Declaration of interest statement

The authors declare no conflicts of interest associated with this manuscript.

Ethics approval

The Ethics Committees of [details omitted for anonymous peer review] approved this study. Informed consent was obtained from all the participants involved.

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Appendix 1 Settings

Figure 8 The setting of the simulation room in the UK
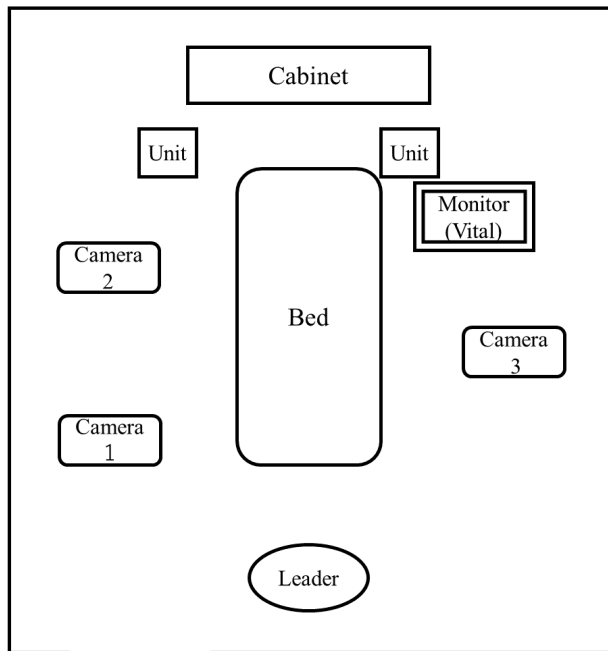
Figure 9 The setting of the resuscitation room in Japan
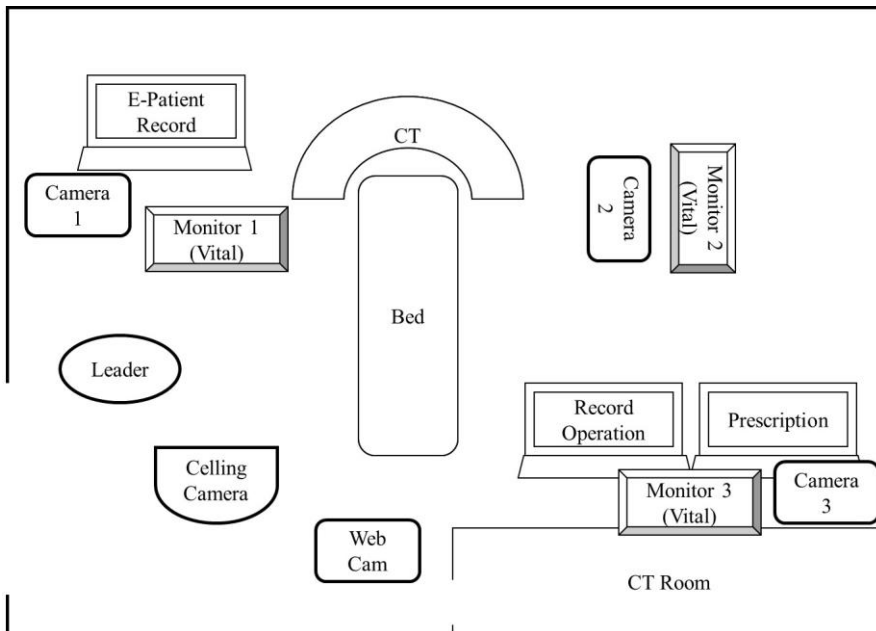
Appendix 2   Abbreviations

ADV	adverbial marker
COND	conditional morpheme
CONV	converb
COP	copula
DO	direct object marker
FP	final particle
GEN	genitive
IMP	imperative form
NOM	nominalizer
PAST	past morpheme
POL	polite form
Q	question marker
S	subject marker
STAT	stative morpheme
TOP	topic marker
VOL	volitional morphem

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Sarah Atkins is Research Fellow of Aston Institute for Forensic Linguistics, Aston University. Her research investigates language and professional communication. She has conducted research on the linguistic features of simulation with a range of professional groups, including GPs and emergency care providers. Her work has a strong emphasis on applying findings into practice.

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