Framing trauma leaders' request in emergency care interactions: A multimodal analysis using eye-tracking glasses

KEIKO TSUCHIYA[1], FRANK COFFEY[2, 3], ANDREW MACKENZIE[3], SARAH ATKINS[4], MALGORZATA CHALUPNIK[2], STEPHEN TIMMONS[2], ALISON WHITFIELD[2], MIKE VERNON[3] AND DAVID CRUNDALL[3]

(1) Yokohama City University, Japan (2) University of Nottingham, UK (3) Nottingham Trent University, UK (4) Aston University, UK

Abstract

A team leader's request is a crucial factor for successful team interaction to ensure patient safety in emergency care. This study examines how team leaders accomplish and frame immediate requests through language use and corresponding eye-movement patterns in emergency care simulation, focusing on when the team is led by a senior doctor (SD) and when it is led by a junior doctor (JD). The team included two foundation doctors, who are in their first two years in medical practice, two emergency department (ED) nurses and one ED expert. They were recorded undertaking separate simulated operations on a simulated patient, and the team leader wore eye-tracking glasses. Interactional linguistic and multimodal analyses of video, audio and eye-movement data revealed that SD made immediate requests to the team members with multimodal emphasis – i.e., gazed at the recipients and addressed them verbally, especially when asking for recipients' actions – while JD often used only gaze in requesting such actions. Although our study has limitations in terms of the small size of the data, the findings nevertheless highlight that the leader's

requesting was framed and ascribed in the continuum from a question to an instruction

through co-construction of joint action with recipients in the social interaction.

Keywords: emergency care interaction, eye-tracking, frame, healthcare simulation request,

multimodality

1.   Introduction

People perform, perceive and interpret what they are doing in social interaction, *framing* their action in a given situation (Goffman 1974; Bateson 2000 [1972]). In the context of emergency care, a team leader's request is a crucial factor for successful team performance (Mondada 2014), and this study investigates the embodiment of discourse frames in trauma team leaders making requests in emergency care simulation noting interlocutors' linguistic forms and non-verbal behaviours Three research questions are addressed: (1) how and in what syntactic forms do the trauma leaders initiate requests?; (2) what gaze and multimodal behaviours are observed in their requesting practice?; and (3) are there any differences in request frames between a senior doctor and a junior doctor as team leader? The current study employs both quantitative multimodal corpus analysis and qualitative interactional linguistics to engage with the dataset.

The following sections first review existing studies of discourse frame and requesting. In the data and method section, the details of the simulation data and the multimodal analytical method with eye-tracking information are provided. Trauma leaders' verbal and gaze behaviours in requesting practices are analysed qualitatively and quantitatively in the results section, and the discussion section explicates how the leaders with different levels of expertise frame requesting practices with their team members.

2.   Literature review

Discourse frames in healthcare communication have mainly been investigated in primary care consultations. Frankel (1983) visually analysed a sequential transition from the activity of a paediatrician touching a child patient in a medical examination to the physician talking and then on to the patient's response, capturing gaze orientations of the physician. Heath (1986) observed doctor–patient interactions and recognised a 'middle-distance orientation' of patients' gaze to make their body an object of a doctor's inspection. Focusing on discourse in a paediatric examination, Tannen and Wallat (1983) identified different frames and participation structures, a social work session and a staff meeting. Later, Candlin (2002) found that an experienced nurse framed a medical consultation with an elderly patient as a social interaction, expanding beyond ostensibly relevant topics to put the patient at ease.

As regards gaze in healthcare interactions, Deppermann (2013) has described how paramedics used gaze in mutual monitoring between team members while dealing with multiple tasks simultaneously. Another study from an operating theatre is reported by Mondada (2014), who analysed the sequence of a surgeon's verbal/non-verbal instructions and an assistant's responses to achieve *joint attention*, which is a triadic interaction with people and objects (Tomasello 1999: 62). How healthcare professionals as a team multimodally frame the leader's requesting practice in emergency care settings is the central focus of the present study.

Requesting has been investigated from different perspectives and there has been a shift in the discussion from the cognitive nature of request as a *speech act* to the interactional practice of request as *action formation* in interaction linguistics (as reviewed in Drew and Couper-Kuhlen 2014). In linguistic philosophy, request as an act is directive and performative (Austin 1962; Searle 1969), and requires felicity conditions to be fulfilled. In politeness theory, a request is potentially face threatening to the recipient (Brown and Levinson 1987). Different pragmatic strategies are employed to mitigate or exercise the force

of requesting. Focusing on linguistic forms, for instance, Blum-Kulka *et al.* (1989) compared pragmatic strategies of requests across cultures, establishing a classification of indirect strategies, e.g., *ability* ('Can you do X?'), *willingness* ('Do you mind doing X?'), *prediction* ('Will you do X?') and *suggestory* ('Why don't you do X?'). From an interactional linguistic view, Walker and Drew (2008) investigated the use of two syntactic forms of requests in medical calls in the UK. They found interrogative form ('Could you do X?') and a declarative form ('I wonder if'), concluding that with the latter, a speaker expresses their entitlement to request.

The continuum between request and related acts has also been explored. Candlin and Lucas (1986: 22–23), for example, looked at the act of advising and proposed the model of the advice continuum, from 'educate' to 'direct', in counsellor–client interactions (also see Sarangi 2000). To develop the theoretical argument for defining directive and commissive actions, Couper-Kuhlen (2014) has examined the forms of these acts in casual dyad conversations, describing differences between the agent and the beneficiary of the act. The epistemic stance of a speaker and a recipient also involves how the speaker performs acts of request and asserts (Heritage 2012). Both acts can be expressed in the same syntactic forms of declarative or interrogative, but a declarative of the matter in a speaker's epistemic domain (K+) is assertion, while that in a recipient's epistemic domain (K−) is a declarative question (requesting information).

Levinson (2013: 122) has introduced the concept of 'action ascription', which means 'a course of action that at least one participant is pursuing, which may at first be opaque to others then retrospectively discernible'. When requesting, a speaker has a plan of what, when, how and to whom he will request, which is projected in their utterances although the plan may not always be explicit or observable to others when it is uttered. This again touches upon the incompleteness of actions and how a speaker and a recipient collaboratively frame

potentially ambiguous activities. Syntactic forms and frames of requests are both examined in the current study from an interactional linguistic perspective, in combination with multimodal corpus analysis.

3.   Data and methodology

The dataset consists of two recordings of emergency care simulation with the same trauma scenario. The recording took place at a large university hospital in the UK, as a part of regular simulation training (see Appendix 1 for the setting). The research project was approved by the ethics committee of Nottingham University, and informed consent was obtained from all the participants involved.

A trauma team was recorded undertaking separate operations with a simulated patient, but in one case with a senior doctor (SD) as team leader, and in the other with a junior doctor (JD). The other team members in both exercises consisted of two foundation doctors (FD1 and FD2), two emergency department (ED) nurses (a senior nurse [SN] and junior nurse [JN]), and one ED assistant (EDA).). Each session lasted about 19 minutes. In both sessions, the simulated scenario was a trauma case involving a 60-year-old, male on whom a wardrobe had fallen. After the patient was brought in, a paramedic did a handover to the leader as the primary recipient, one of the FDs conducted a primary survey as assigned by the leader in advance, and the patient was given TXA (tranexamic acid), which prevents haemorrhage. The team pretended to take blood for a blood gas test, and give a blood transfusion . They put a dressing on a wound on the patient's wrist and a pelvis bandage on his waist, then prepared for a trauma scan.

Three video cameras were set up in the room, and the team leader wore an SMI ETG2 device that uses the corneal reflex to track eye movement via a pair of special glasses. . The eye-tracking data were first transferred to the application software iMotions, and then

extracted as text and video streaming for importation into the annotation tool ELAN (2001–2015). The recordings were transcribed and time stamped for a multimodal corpus analysis. Annotation conventions in multimodal corpus analysis were applied to the transcriptions (see Appendix 2).

3.1.   Analytical framework

Corpus linguistics has been in transition from monomodal to multimodal for the last two decades, addressing multiple semiotic resources in interactions from verbal utterances to gestures, posture and gaze (Allwood *et al.* 2000; Baldry and Thibault 2006; Knight 2011; Adolphs and Carter 2013; Tsuchiya 2013). Adolphs *et al.* (2011), for instance, captured participants' views and activities through a head-mounted camera, and Auer (2018) has captured eye gaze in a multi-party interaction with eye-tracking glasses for the analysis of turn-taking mechanisms. The current research positions itself in both multimodal corpus analysis, using eye-tracking glasses to capture the trauma leaders' eye gaze, and in interactional linguistics, which derives from multiple disciplines, e.g., discourse functional linguistics and conversation analysis (Couper-Kuhlen and Selting 2018). This mixed method allows us to gain both a global pattern in the use of linguistic forms and a detailed description of embodiment of the leaders' requesting practice in interactions.

Syntactic forms in the two leaders' requests were first coded in a spreadsheet and compared quantitatively, after which seven episodes from their activities of making requests with the use of gaze were qualitatively described. Snapshots of the leaders' utterances and eye gaze were also provided in the qualitative analysis, in reference to illustrations that appear in the study by Mondada (2014). For the quantitative analyses, chi-squared tests of association were conducted to determine if the type of request behaviour that was observed was associated with the experience of the team leader. Inferences about the association

between the request behaviour and the respective doctor's experience were made through inspection of the Pearson residuals, where the more positive values suggest a stronger association between variables and negative values suggest weaker or no association between variables.

4. Data analysis

4.1. Quantitative analysis

Table 1 shows the lengths of the operation time of the simulation and the leaders' speaking time, which are similar in the two sessions: the operation time is about 18 mins 40 secs in both, and SD spoke about 9 mins in total and JD about 9 mins 40 secs.

[Insert Table 1 about here].

During the simulation, SD made requests 57 times in total, about 84% of which were self-initiated. The number of occurrences of making requests by JD was 72, about 32% of which were initiated by others. This indicates that JD was more frequently prompted by a member of the team to make requests. Occurrences of the leaders' requests in the third position were also included in the latter category, e.g., the leaders' requesting by uttering 'yes, please' in response to a suggestion made by a team member.

A (2×2) chi-squared test of association was conducted to determine if the request type (self-initiated, other-initiated) was associated with the experience of the team leader. The test revealed that the request type was significantly associated with the doctor's experience ($\chi2$ (1) = 4.45, p = 0.035). From inspection of the Pearson residuals (brackets) we can infer that there was a stronger association between the senior doctor making a self-initiated request (0.79) than is the case with the junior doctor (−0.70). There was a stronger association

between the junior doctor making an other-initiated request (1.22) than the senior doctor making an other-initiated request (−1.37).

Through the observation of the data, two types of immediate requests in the leaders' utterances were recognised: seeking action (recipient takes action in response) and seeking information (recipient provides information in response). Some requests were accompanied with gazing at a recipient and the use of address terms. The co-occurrences of the leaders' gaze and address terms in the leaders' requesting are summarised in Table 2.

[Insert Table 2 about here].

Both in SD and JD, half of the instances of immediate request was used for seeking action and the other half for seeking information. When SD made requests, he often gazed and called their names (50.9%), especially when directing the recipient's action (65.5%). In contrast, JD tended to use gaze at the recipients without address terms when requesting (59.7%). The co-occurrence of address terms and gazing in requesting in JD (15.3%) was limited compared with SD (50.9%).

A (2×4) chi-squared test of association was conducted to determine if the co-occurrence of gaze-address with request was associated with the experience of the doctor, distinguishing between Gaze Only, Address only, Gaze & Address and No Gaze & No Address. The test revealed that request type was significantly associated with the doctor's experience ($\chi 2$ (3) = 23.38, $p < 0.001$). From inspection of the Pearson residuals (brackets), we can infer that there was an observed association between the junior doctor making a Gaze Only request (1.39) that was not observed with a senior doctor (−1.56), as well as an observed association between the senior doctor making a Gaze & Address type request (2.56) that was not observed with the junior doctor (−2.28). There was also an association between

the junior doctor making a No Gaze & No Address request (1.25) that was not observed in

the senior doctor (−1.40). Whilst one could infer an observed association between the senior

doctor and an Address Only request (1.45) compared to the junior doctor (−1.29), this is

unlikely to be meaningful given the total number of this type of request (3). These data can be

viewed in Figure 1 as a proportion of the total requests.

[Insert Fig. 1 about here].

Because of the comprehensive system, the classification in Blum-Kulka (1989) was

adapted for our analysis. Syntactic forms of the trauma leaders' requests were categorised

into direct and indirect requests, with the latter having six sub-categories: ability ('Can

you/we do X?'), willingness ('Do you mind / Are you okay with doing X?'), predictory

('Will you do X?'), suggestory ('How about X?' / 'I suggest X'), necessity ('I/We need X')

and knowledge ('Do you/we know X?') (the latter two have been added for our analysis).

Tables 3 and 4 show the number and percentage of each syntactic form in SD and JD,

respectively, and the latter includes agents and objects of requested actions.

[Insert Table 3 about here].

[Insert Table 4 about here].

The leaders sometimes used two or three syntactic forms to make a request, so the

total number of their request forms in Tables 3 and 4 (SD = 64, JD = 83) is larger than those

in Table 2 (SD = 57, JD = 72). Their requests in the third position were categorised as

unclassified (UC) in Tables 3 and 4. There are few instances of direct requests only for JD

(4.1%), but most of the leaders' requesting was realised indirectly. More than 40% of the leaders' requesting was realised in forms of questions to seek knowledge (43.8% for SD and 51.8% for JD). Apart from them, request strategies concerning recipients' (or their own) ability (25.0% for SD and 23.2% for JD) are the ones that both leaders used most to request recipients' actions. SD also made requests with consideration of recipients' willingness (17.2%), with prediction of recipients' actions (6.3%) and suggestory forms (4.7%). In JD's requests, there was only one instance categorised in willingness and no occurrence in predictory and suggestory categories. Instead, JD tended to express his or 'our' necessity when requesting (9.6%) more frequently.

Breakdowns of the figures in Table 3 were shown in Table 4 with agents of actions and objects of knowledge the leaders requested. In requesting strategies concerning abilities, both SD and JD used the expressions concerning abilities ('Can you do X?' or 'Can I do X?'), but the form 'we' as an agent ('Can we do X?') was observed only in JD's requesting. JD also made requests by claiming 'our' necessities ('We need to do X') in some cases (6 times for JD and only once for SD). When seeking information, both leaders requested the recipients to report their knowledge about the progress of medical treatments (knowledge of us, e.g., '*Did we get a venous blood gas?*'; or knowledge of you, e.g., '*Have you taken the blood off?*') and health conditions of the patient (knowledge of patient, e.g., '[*Does the patient have*] *any allergy at all?*'). In JD's request behaviours, these utterances in the form of knowledge seeking in fact led to requesting recipients' immediate actions (5 instances, 12.2%). The leaders also asked about procedures and details of medical treatments (knowledge of others, e.g., '*How does it [the order of a blood unit] work?*').

Descriptions of the leaders' requesting with their gaze behaviours are offered through qualitative analysis in the next section.

5.2. *Qualitative analysis*

Drawing upon the quantitative results, seven episodes are focused on to describe the multimodal embodiments of the leaders' requesting practice, as follows:

Episode 1: SD's request concerning the recipient's willingness.

Episode 2: SD's request concerning 'my' ability.

Episode 3: SD's request predicting 'her' (*other's*) action.

Episode 4: JD's request expressing 'our' necessity.

Episode 5: JD's request seeking action by questioning.

Episode 6: JD's request seeking knowledge about 'ourselves'.

Extract 7: SD's request seeking knowledge without gaze at a recipient.

Episode 1 includes an instance of SD's request for a recipient's action concerning the recipient's willingness (see Extract 1). The extract starts just after the handover by a paramedic to SD. SD looked at the paramedic (Image #1) and moved his gaze towards FD1 (Image #2), who was standing close to the patient with gaze at SD, being ready to start a primary survey as planned in the pre-briefing. FD1 looked down at the patient once he heard SD thanking the paramedic, signalling a closure of the conversation. Then SD made a request concerning FD1's willingness in line 15, uttering 'You're okay to crack on that <$E> Name of FD1 </$E>?'.

Extract 1: SD's request concerning the recipient's willingness

1	01:41.5		<$F> SD looks at the
2			paramedics in Image #1</$F>
3	01:41.8	SD	Okay.

4	01:42.2	SD	Thank you very much for
5			that.
6	01:42.4		<$F> SD looks at FD2 </$F>
7	01:42.6		<$F> SD looks at FD1 in
8			Image #2</$F>
9	01:42.8		<$F> FD1 looks back to SD
10			in Image #2 </$F>
11	01:42.8		<$F> SD looks at FD1 </$F>
12	01:43.4	SD	Cheers.
13	01:43.8		<$F> FD1 looks at
14			the Patient </$F>
15	01:43.9	SD→	You're okay to crack on
16			that <$E> Name of FD1 </$E>?
17	01:44.1		<$E> FD1 shows thumbs-up
18			gesture in Image #3 </$F>
19	01:44.3		<$F> SD looks at
20			the Patient </$F>
21	01:44.5		<$F> SD looks at FD1 in
22			Image #4 </$F>

<Insert images for Extract 1, add #1, #2, #3, #4 under them>

To respond to SD's request, FD1 kept his posture towards the patient for the primary survey, simultaneously showing his thumbs-up to SD without any verbal response (Image #3). SD looked at the patient and gazed at FD1 again, who was interviewing the patient (Image #4). In

Episode 1, SD's request was expected by FD1 as seen in FD1's preceding gaze (Image #2), signalling his readiness for action, which was verbally confirmed by SD. We shall call this 'anticipation gaze' by a recipient.

Episode 2 (Extract 2) is a continuation of Episode 1, where SD made a request to SN with a request strategy concerning his own ability.

Extract 2: SD's request concerning 'my' ability

1	01:45.4		<$F> SD looks at SN in
2			Image #1 </$F>
3	01:46.7		<$F> SD looks at SN </$F>
4	01:47.1		<$F> SD looks at Memo in
5			Image #2 </$F>
6	01:49.6		<$F> SD looks at SN in
7			Image #3 </$F>
8	01:50.3	SD	<$E> Name of SN </$E>
9	01:50.7		<$F> SD looks at the
10			Patient </$F>
11	01:50.8	SN	Yeah
12	01:51.1		<$F> SD looks at JN </$F>
13	01:51.1		<$F> SD looks at the monitor
14			in Image #4 </$F>
15	01:51.5		<$F> SD looks at the drip
16			line </$F>
17	01:51.8	SD →	Could I get you to get a
18			gram of TXA please for this

19		chap if that's okay?
20	01:52.2	<$F> SD looks at the
21		patient </$F>
22	01:52.7	<$F> SD looks at the
23		monitor </$F>

<Insert images for Extract 2, add #1, #2, #3, #4 under them>

After SD asked FD1 to do a primary survey, SD looked at SN (Image #1), who was writing in a trauma book (operation records), and checked her name on the notes he had taken during the pre-briefing (Image #2). Then, SD looked at SN again (Image #3), calling her name at 01:50.3 to draw her attention, which was followed by SN's verbal response in line 8. SD quickly moved his gaze towards the monitor (Image #4) and the drip line behind, and then asked SN to bring TXA in lines 17–18. SN is then walking towards the cabinet to get the medicine. With the eye-tracking data, his action projection of requesting became observable, i.e., SD gazed on a recipient before verbally requesting. To accomplish the act of request with SN, SD accumulated multiple modes, gaze, address terms and utterances with mitigation, i.e., a request strategy concerning his own ability and the recipient's willingness ('*if that's okay*')

.

Before Episode 3, SD asked EDA to bring blood packs from a refrigerator. Extract 3 starts as EDA comes back with the blood packs and shows them to SD (Image #1).

Extract 3: SD's request predicting 'her' (*other*'s) action

1	06:55.3	<$F> SD looks at Blood in
2		Image #1 </$F>

3	06:56.3	SD	That's fine. So, you can
4			hang up the unit, please.
5	06:56.9		<$F> SD looks at JN in
6			Image #2 </$F>
7	06:57.2		<$F> SD looks at the patient
8			in Image #3 </$F>
9	06:59.6		<$F> SD looks at FD1 </$F>
10	06:59.6	SD →	That's fine. <$E> Name
11			of JN </$E> gonna help you
12			with that.
13	06:59.9		<$F> SD looks at EDA in
13			Image #4 </$F>
14	07:00.1		<$F> SD looks at the
15			patient </$F>
16	07:00.4		<$F> SD looks at the
17			blood </$F>

<Insert images for Extract 3, add #1, #2, #3, #4 under them>

SD looked at the blood packs and at line 3 asked EDA to hang them up on the unit, and then looked around at JN near the unit (Image #2), the patient in the middle (Image #3) and FD1 on the other side of the patient. Being aware of EDA still standing by him (Image #4), SD repeated the request with a predictory form, uttering '*That's fine. <$E> Name of JN </$E> gonna help you with that*' in line 10, making requests to the two recipients: to EDA to bring the blood packs to JN, and to JN to hang them up.

A similar sequential pattern was observed in JD's requests. Episode 4 (Extract 4) is the excerpt after the handover from a paramedic and the primary survey by FD2.

Extract 4: JD's request expressing 'our' necessity

1	03:22.6		<$F> JD looks at the
2			monitor in Image #1 </$F>
3	03:24.9		<$F> JD looks at SN in
4			Image #2 </$F>
5	03:24.9		<$F> SN looks at JD in
6			Image #3 </$F>
7	03:25.1		<$F> JD looks at
8			the booklet </$F>
9	03:25.5		<$F> JD looks at the
10			monitor in Image #3 </$F>
11	03:25.6	JD →	Erm we need to get
12			some TXA.
13	03:26.8		<$F> JD looks at SN
14			in Image #4 </$F>
15	03:27.5	SN	TXA yeah.
16	03:27.6		<$F> JD looks at the
17			monitor </$F>
18	03:28.0	JD	Thank you.

<Insert images for Extract 4, add #1, #2, #3, #4 under them>

JD looked at the monitor (Image #1) and at SN (Image #2), who then looked back to JD (Image #3). This is another case of anticipation gaze. Without any address term, JD asked SN to bring TXA, claiming the necessity of the medicine with 'we' as an agent in line 11, while gazing at her. SN came close to JD, responding 'TXA yeah' in line 15.

Soon after the requesting sequence in Episode 4, JD requested FD1's action by questioning, which is described in Episode 5 (Extract 5). Before the extract, FD1 had just finished placing an intravenous line, and he comes towards JD and reports it in line 6. JD sees FD1's approach and shifts his gaze from the patient to FD1 in line 4 (Image #1).

Extract 5: JD's request seeking action by questioning

1	03:39.8		<$F> JD looks at the
2			patient </$F>
3	03:42.0		<$F> FD1 looks at JD </$F>
4	03:42.0		<$F> JD looks at FD1 in
5			Image #1 </$F>
6	03:42.1	FD1	I get it <$E> an
7			intravenous line </$E>
8			<$H> on the right limb </$H>.
9	03:42.8		<$F> JD looks at the
10			patient in Image #2 </$F>
11	03:43.3		<$F> JD looks at FD1
12			in Image #3 <</$F>
13	03:43.4	JD →	Thank you. Have you
14			taken the blood off?
15	03:44.8	FD1	Yeah.

16 03:45.2   JD   Yeah.

17 03:45.2   <$F> JD looks at the

18   patient </$F>

19 03:45.8   <$F> JD looks at FD1

20   in Image #4 <</$F>

21 03:45.9   JD →   So full trauma blood

22   please if that's okay.

<Insert images for Extract 5, add #1, #2, #3, #4 under them>

When JD heard the beginning of FD1's reporting, he shifted his gaze back to the patient's right arm, where the intravenous line was placed (Image #2). JD then looked at FD1 in face again (Image #3) and asked, 'Have you taken the blood off?' in line 13, which is followed by FD1's verbal response and action to go back to the patient to take blood. Thus, FD1's 'Yeah' does not mean 'Yes, I have', but 'Yes, I will', which evidences that JD's questioning was recognised by FD1 as requesting both information and action. JD gazed at the patient and FD1 (Image #4), uttering 'Yeah' to respond to FD1, and repeated the request, saying 'So full trauma blood please if that's okay' in line 21.

Another example of JD's use of questioning in a request sequence is described in Episode 6 (see Extract 6 in Appendix 3). This excerpt follows about one minute after Episode 5. Here, JD's request concerning the recipient's ability was preceded by his seeking information about the setting of the simulation with 'we' as an agent. After summarising the treatments provided so far, JD looked at the monitor behind JN (Image #1), then at JN and the trauma booklet on the table (Image #2). JD uttered '*Erm*' in line 6, showing hesitation, and asked, '*Do= we don't have a major trauma team or do we?*' in line 7 and '*Or do we*' in

line 13, expressing his epistemic stance of not knowing the procedure in the simulation without addressing a recipient. This action of JD's requesting the information of the setting was marked by a silent pause that followed. JD looked at JN, who silently gazed back at JD, then JD apologised for not knowing. This again was followed by a second-long pause. JD then looked at the booklet in front of FD2 again, then FD2 uttered '*Er*', showing hesitation. JD looked at JN, who took posture towards JD and FD2 and looked at FD2 (Image #3). Still keeping his gaze on JN, JD started asking, '*Can you activate major haemorrhage= er major trauma yet?*' in line 24. Hearing just the beginning of JD's utterance, FD2 immediately responded verbally, '*Yes yes*', overlapping with JD's utterance and gazing back to JD (Image #4). JD shifted his gaze to FD2 and then looked around the team while FD2 offered to give a call, saying '*<$H> We'd better call? </$H>*' in line 38. JD accepted the suggestion and requested the action in the third turn in line 45.

The last episode is SD's information seeking about the patient with No Gaze & No Address at a recipient (Extract 7 in Appendix 4). In the extract, FD2 was approaching SD with the result of the patient's venous blood gas test, gazing at SD and uttering, '*We've got the VBG result <$G?>.*' in line 2. SD looked at FD2 (Image #1) and the document (the result) FD2 brought (Image #3), responding by repeating 'VBG' in line 8. SD then shifted his gaze towards the patient and asked how many IV accesses they had placed (line 11), looking at the patient's arms where the IV lines were inserted (Images #3 and #4). He sustained his gaze at the patient while asking and listening to FD2's reply in line 26. This practice was observed in the cases of both leaders.

6.   Discussion

This section discusses the leaders' multimodal behaviours in requesting further with the notions of framing, action ascription and epistemic stance. From the analysis, two different

frames were identified in the leaders' requesting practices: *support-seeking frame* and *directing frame* (Figure 2).

[Insert Figure 2 about here].

The two frames were observed in both leaders, but the support-seeking frame is more attributed to JD's request behaviours and the directing frame to SD's request behaviours. JD sometimes questions the settings or procedures of the simulation, e.g., '*Do we have a trauma team?*' and '*Who is an appropriate recipient of a request?*', as seen in Episode 6. The negotiation of a recipient in a requesting sequence became noticeable to the researchers through the observation of JD's gaze behaviours. JD's instructions are more frequently realised by claiming their own or 'our' necessity. In contrast, SD restricts the use of questioning to seeking information about the patient's conditions and the progress of ongoing treatments. When instructing, SD distances himself from the team with the use of request strategies concerning recipients' willingness and predicting/suggesting actions (predictory/suggestory).

There are few cases where Gaze & Address was not observed when they sought information (see Episode 7, 14.3% for SD and 27.5% for JD). Thus, different patterns were observed in the leaders' gaze behaviours when instructing (seeking action) and questioning (seeking information). In the former, the leaders used Gaze & Address more frequently to monitor the execution of a requested action. While in the latter, they seemed to rely on their auditory sensory resources to listen to recipients' responses to questions without gazing at recipients, especially when an *interactional space*, where the interactants 'coordinate in joint action' (Mondada 2013: 246), was already established in previous turns. This allows the leaders to sustain their gaze on the patient's body or the vital monitor screen.

7.   Conclusion

This study has examined how team leaders with differential experience/expertise accomplish and frame immediate requests through multiple resources which include syntactic forms and corresponding eye-movement patterns in the emergency care simulation setting. A combination of multimodal and interactional linguistic analyses of video, audio and eye-movement data revealed that the senior doctor made immediate requests to the team members with multimodal emphasis, i.e., gazed at the recipients and addressed them verbally, especially when asking for recipients' action, while the junior doctor often used only gaze in requesting.

While our study has limitations in terms of the small size of the data, the findings nevertheless contribute to identifying two frames: a *support-seeking frame* (positioning oneself in the team) and a *directing frame* (distancing oneself from the team) in the leaders' requesting actions. The two leaders with different levels of experience/expertise strategically utilised these frames to draw on necessary knowledge and actions for treatments, which were then ascribed either as a question or as an instruction through co-construction of joint action with the team members in this particular context. It is hoped this study can stimulate further exploration of gaze and multimodal behaviours in interaction in healthcare settings and benefit medical simulation training to enhance team performance in emergency care and beyond.

Appendix 1

[Insert Fig. 10 about here].

Appendix 2: Transcription conventions

Conventions	Symbol	
Time stamps	00:00.0[1]	
Extralinguistic information[2]	<$E>… </$E>	
Unintelligible speech	<$G?>	
Guess	<$H>… </$H>	
Overlap	<$O1>… </$O1>	
Unfinished sentence	=	
Gaze behaviours	<$F>….</$F>	

[1] I.e. minutes, seconds and tenths of a second.

[2] Includes laughter, coughs and transcribers' comments.

(Adapted from: Adolphs 2008: 137–138)

Appendix 3: Episode 6

Episode 6, shows JD's request seeking knowledge about 'ourselves', is shown in Extract 6.

Extract 6: JD's request seeking information about 'us'

1   04:17.8   <$F> JD looks at the

2   the monitor in Image #1 </$F>

3   04:18.0   <$F> JD looks at JN </$F>

4   04:18.2   <$F> JD looks at the

5			booklet in Image #2 </$F>
6	04:18.4	JD	Erm
7	04:19.3	JD →	Do= we don't have a major
8			trauma team or do we?
9	04:19.9		<$F> JD looks at the
10			monitor </$F>
11	04:20.5		<$F> JD looks at the
12			booklet </$F>
13	04:21.8	JD	Or do we.
14	04:22.2		<$F> JD looks at JN </$F>
15	04:22.2		<$F> JN looks at JD </$F>
16	04:22.3	JD	Sorry I missed that.
17	04:23.2		<$F> JD looks at the
18			booklet </$F>
19	04:23.9	FD2	Er
20	04:24.4		<$F> JD looks at JN
21			in Image #3 </$F>
22	04:24.6		<$F> JN looks at FD2
23			in Image #3 </$F>
24	04:24.7	JD →	Can you activate
25			<$O>major haemorrhage=
26			er major </$O> trauma yet?
27	04:25.0	FD2	<$O>Yes yes </$O>
28	04:25.1		<$F> FD2 looks at JD
29			in Image #4 </$F>

30	04:25.1		<$F> JD looks at FD2
31			in Image #4 </$F>
32	04:26.1		<$F> JD looks at FD1 </$F>
33	04:26.4		<$F> JD looks at SN </$F>
34	04:26.6		<$F> JD looks at the
35			Patient </$F>
36	04:26.9		<$F> JN looks at JD </$F>
37	04:27.0		<$F> JD looks at SN </$F>
38	04:27.0	FD2	<$H> We'd better call? </$H>
39	04:27.3		<$F> JD looks at FD2 </$F>
40	04:27.3		<$F> JD looks at the
41			Patient </$F>
42	04:27.7		<$F> JD looks at JN </$F>
43	04:27.9		<$F> JD looks at FD2 </$F>
44	04:28.0		<$F> FD2 looks at JD </$F>
45	04:28.1	JD →	Yeah that would be lovely.

<Insert images for Extract 6, add #1, #2, #3, #4 under them>

Appendix 4: Episode 7

Episode 7, SD's request seeking knowledge without gaze at a recipient, is shown in Extract 7.

Extract 7: SD's request seeking knowledge without gaze at a recipient

| 1 | 07:46.5 | | <$F> FD2 looks at SD </$F> |
| 2 | 07:46.5 | FD2 | We've got the VBG |

3			result <$G?>.
4	07:46.5		<$F> SD looks at FD2
5			in Image #1 </$F>
6	07:47.4		<$F> SD looks at the
7			document in Image #2 </$F>
8	07:48.1	SD	VBG
9	07:48.4		<$F> SD looks at the
10			patient's body </$F>
11	07:48.8	SD →	<$E> Name of FD2 </$E>
12			How many accesses we got now?
13			We got two?
14	07:49.0		<$F> SD looks at the
15			patient's arm in Image #3 </$F>
16	07:49.4		<$F> SD looks at the Patient's
17			arm in Image #4 </$F>
18	07:49.9		<$F> SD looks at the
19			patient's body </$F>
20	07:50.6		<$F> SD looks at the
21			patient's arm </$F>
22	07:51.2		<$F> SD looks at the
23			patient's body </$F>
24	07:51.4		<$F> SD looks at the
25			patient's arm </$F>
26	07:51.8	FD2	Two yeah two <$G?>

<Insert images for Extract 7, add #1, #2, #3, #4 under them>

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Keiko Tsuchiya is an Associate Professor at the School of International Liberal Arts,

Yokohama City University. She is currently leading the EYE WORK project (JSPS

17KT0062), which aims to investigate multimodal emergency care interaction. Her research

interests also include language education in Japan, i.e., ELF (English as a Lingua Franca) and

CLIL (Content and Language Integrated Learning). Address for correspondence: School of

International Liberal Arts, Yokohama City University, 22-2 Seto, Kanazawa, Yokohama,

Kanagawa, 236-0027, Japan. Email: ktsuchiy@yokohama-cu.ac.jp

Frank Coffey is Honorary Professor in Urgent and Emergency Care at Nottingham Trent

Universityat the University of Nottingham. He is Head of Service at the Emergency

Department and Director of DREEAM (Department of Research and Education in

Emergency Medicine, Acute Medicine and Major Trauma), Nottingham University Hospitals

NHS Trust. He has a special interest in the field of Simulation Based Education. Address for

correspondence: Emergency Department Nottingham University Hospitals NHS Trust, Derby Road, Nottingham, NG7 2UH, UK. Email: frank.coffey@nottingham.ac.uk

Andrew Mackenzie is a Lecturer at Nottingham Trent University. His research explores the visual processes involved in tasks, attempts to understand the visual and attentional mechanisms, and develops diagnostic/training tools to assess/develop skill. He has recently co-authored 'Creating a hazard-based training and assessment tool for emergency response drivers' (2020, *Accident Analysis and Prevention*). Address for correspondence: Department of Psychology, Nottingham Trent University, Nottingham, UK, NG1 4FQ. Email: andrew.mackenzie@ntu.ac.uk

Sarah Atkins is a Research Fellow at 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. Address for correspondence: Aston Institute for Forensic Linguistics, Aston University, 295 Aston Express Way, Birmingham B4 7DL, UK. Email: sarahruthatkins@gmail.com

Malgorzata Chalupnik is a Teaching Associate in Linguistics and Professional Communication and Director of the Centre for Research in Applied Linguistics (CRAL) at the University of Nottingham. Her expertise is in professional communication, discourse analysis and pragmatics. Address for correspondence: School of English, Nottingham University, Room A38 Trent Building, University Park, Nottingham, NG7 2RD, UK. Email: malgorzata.chalupnik@nottingham.ac.uk

Stephen Timmons is Professor of Healthcare Innovation at the Centre for Health Innovation, Leadership and Learning, Nottingham University Business School. He previously worked as an NHS manager. His main research interests are in the implementation of innovations in health care, sociology of technology and sociology of the professions. Address for correspondence: Centre for Health Innovation, Leadership and Learning, University of Nottingham, Nottingham University Business School, Jubilee Campus, Nottingham, NG8 1BB, UK. Email: stephen.timmons@nottingham.ac.uk

Alison Whitfield is an Emergency Nurse Practitioner and a Clinical Educator in Emergency Medicine at the Emergency Department in Nottingham University Hospital NHS Trust and DREEAM (Department of Research and Education in Emergency Medicine, Acute Medicine and Major Trauma). Her research interests include emergency care simulation and professional development of simulated patients. Address for correspondence: Emergency Department, Nottingham University Hospitals NHS Trust, Derby Road, Nottingham, NG7 2UH, UK. Email: alison.whitfield@nottingham.ac.uk

Mike Vernon is a Lecturer in Psychology at Nottingham Trent University. He previously worked as a Data Manager. He has conducted psycholinguistics-based research investigating how the planning scope of typewriting is mediated by inner speech and the availability of stored motor codes. His additional research interests are in visual attention, transport psychology and motor control. Address for correspondence: Department of Psychology, School of Social Sciences, Nottingham Trent University, Nottingham, Nottingham NG1 4FQ, UK. Email: mike.vernon@ntu.ac.uk

David Crundall is Professor of Psychology at Nottingham Trent University. He does research in applied cognitive psychology, eye movements and attention, and situation awareness in natural situations. His current research focuses on diverse topics including road safety, virtual reality, lifeguarding and sports. Address for correspondence: Department of Psychology, School of Social Sciences, Nottingham Trent University, Nottingham, Nottingham NG1 4FQ, UK. Email: david.crundall@ntu.ac.uk

Table 1. *Speaking time lengths and numbers of requests*

| | Operation time (MM:SS) | Speaking time (MM:SS) | Word count | No. of immediate request | | | | |
				Self-initiated	%	Other-initiated	%	Total
SD	18:44	9:01	1888	48	84.2%	9	15.8%	57
JD	18:40	9:38	2090	49	68.1%	23	31.9%	72

Table 2. *Co-occurrence of gaze and address terms in the leaders' requests*

| | SD No of Request | | | | | | JD No of Request | | | | | |
	Action	%	Info	%	Total	%	Action	%	Info	%	Total	%
Gaze Only	8	27.6	12	42.9	20	35.1	21	65.6	23	57.5	44	61.1
Address Only	1	3.5	2	7.1	3	5.3	0	0.0	0	0.0	0	0.0
Gaze & Address	19	65.5	10	35.7	29	50.9	6	18.8	6	15.0	12	16.7
No Gaze & No Address	1	3.4	4	14.3	5	8.8	5	15.6	11	27.5	16	22.2
Total	29		28		57		32		40		72	

Note: The total percentage of SD's requests did not add up to 100% due to rounding.

Table 3. *Linguistic forms in the leaders' requests*

		Direct Request %	Ability %		Willingness %		Prediction %		Suggestory %		Necessity %		Knowledge %		UC%		Total
SD	Action	NA	16	44.4	11	30.6	4	11.1	3	8.3	1	2.8		NA	1	2.8	36
	Info	NA		NA		NA		NA		NA		NA	28	100		NA	28
	Total	0	NA	16	25.0	11	17.2	4	6.3	3	4.7	1	1.6	28	43.8	1	1.6	64
JD	Action	4	9.5	19	45.2	2	4.8		NA		NA	7	16.7	5	11.9	5	11.9	42
	Info	2	4.9		NA		NA		NA		NA	1	2.4	38	92.7		NA	41
	Total	6	7.2	19	22.9	2	2.4		NA		NA	8	9.6	43	51.8	5	6.0	83
Total		6	4.1	35	23.8	13	8.8	4	2.7	3	2.0	9	6.1	71	48.3	6	4.1	147

Note: UC = unclassified.

Table 4. *Linguistic forms and agents in the leaders' requests*

		Direct Request You	Ability I	Ability You	Ability We	Willingness You	Prediction We	Prediction You	Prediction S/He	Suggestory I	Suggestory We	Necessity I	Necessity We	Knowledge us	Knowledge you	Knowledge patient	Knowledge others	UC	Total
SD	Action		4	10	2	11	1	2	1	1	2		1					1	36
	Info													12	1	9	6		28
	Total		4	10		11	1	2	1	1	2		1	12	1	9	6	1	64
JD	Action	4	1	11	7	2						1	6	1	2		2	5	42
	Info	2										1		15	5	9	9		41
	Total	6	1	11	7	2						2	6	16	7	9	11	5	83
Total		6	5	21	9	13	1	2	1	1	2	2	7	28	8	18	17	6	147

Note: UC = unclassified.

Figure 1. *Proportion of the request behaviours exhibited by the Senior Doctor (SD) and*

Junior Doctor (JD)

Figure 2: *The requesting frame continuum in emergency care interaction*

Figure 3: *The setting of the simulation room*