A conversation analytic intervention to help neurologists identify diagnostically
relevant linguistic features in seizure patients' talk

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Abstract

Recent Conversation Analytic work has revealed that there are systematic differences between the ways in which patients with epilepsy and patients with “psychogenic” non-epileptic seizures (NES) describe their seizure experiences. But these differences may not become apparent if patients are exposed to traditional fact-oriented questioning. This article describes a one-day intervention workshop, informed by Conversation Analysis, which was designed to help doctors change their history-taking style and solicit diagnostically useful narrative features. A comparison of video-recordings of 38 routine consultations before the intervention, and 20 consultations after it, showed that the intervention had the desired effect. Doctors' problem presentation solicitation changed, and the patient responses were better suited to revealing diagnostically-relevant features of their talk. Data in British English.

It is difficult to correctly distinguish between epilepsy on the one hand and (psychogenic) nonepileptic seizures on the other. Epileptic seizures are caused by abnormal electrical activity in the brain. Non-epileptic seizures (NES) bear a superficial resemblance to epileptic seizures, but represent an abnormal (dissociative) response to distressing external or internal triggers (Malmgren et al., 2012). Most patients with NES are initially misdiagnosed as having epilepsy; and it takes a mean of over seven years to reach a correct diagnosis of NES (Reuber et al., 2002). It is important for clinicians to get the diagnosis right because the choice of treatment critically depends on the cause of the patients' seizures: antiepileptic drugs are the first line of treatment for epilepsy, psychotherapy can stop NES. Apart from the fact that the wrong treatment is unlikely to stop attacks, an erroneous diagnosis may cause psychosocial or socio-economic problems (e.g. loss of employment, driving

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restrictions, unnecessary limitations of activities) and result in patients taking ineffective drugs with potentially serious side effects.

In patients with frequent seizures "gold standard" diagnoses can be made by the simultaneous recording of patients' behaviour (with a video-camera), electrical brain activity (using electroencephalograph or EEG) and heart rate (using electrocardiograph or ECG). Unfortunately, most patients' episodes are too infrequent to make the recording of spontaneous seizures a viable option (Jacoby et al., 1996). What is more, even when seizures are captured with video-EEG, health professionals need to establish that the recorded seizures were typical of events occurring at home. For all of these reasons, in clinical practice, the diagnosis relies heavily on the doctor's interpretation of the patient's own accounts of their experiences, and witness accounts of what others have seen.

Traditional medical teaching has underlined the importance of factual details relating to seizure manifestations in the distinction of epileptic seizures and NES. For instance, there is evidence from video-EEG studies that the observable features such as eye closure during a seizure can help with the distinction between epilepsy and NES (Reuber and Elger, 2003). However, research has also shown that the reports of such observations by patients or witnesses are often inaccurate and therefore unreliable (e.g. Syed et al., 2011). While the elicitation of the patient's history thus remains the cornerstone of diagnosis, it is fraught with difficulties.

Closer inspection (Schwabe, Howell, and Reuber, 2007; Schwabe, et al., 2008) of the narratives of patients who (on later evidence) turned out to have either epilepsy or NES revealed some notable and reliable differences. Epilepsy patients typically volunteer the seizure as a topic, and provide precise, detailed accounts of their symptoms in individual episodes, placing any period of lost consciousness in the context of what they are able to remember, and making spontaneous reference to their attempts to stop or suppress their seizures. In contrast NES patients focus on the consequences of the seizure episodes rather than their subjective seizure symptoms. They tend to highlight their inability to remember anything. When questioned more specifically about specific seizure episodes, they offer little detail of symptoms, and tend to generalise, presenting the period of lost consciousness as the most dominant element of the episodes (Schwabe, Howell, and Reuber, 2007; Schwabe, et al., 2008). On the basis of these and other features linguists have been able to accurately predict a patient's medical diagnosis (Reuber, et al., 2009). These conversational observations would be very useful to doctors if they could be elicited in routine consultations in ordinary clinical practice. However, these diagnostically useful features are only going to emerge if the patient is given enough interactional space to display them.

Conversation analysis and the seizure clinic

The element of conversation that most concerns us here is the question/answer pair. The prospective function of a first turn in projecting a constrained set of possible second pair parts has been clearly described in the design of questions where action and grammatical format determine the set of relevant next responses (Schegloff, 2007; 1968; Raymond, 2003). Heritage and Robinson (2006) found that using general enquiries to solicit patients' problems (e.g., "What

can I do for you today?”) was not only associated with significantly longer problem presentations when compared to requests for confirmation (e.g., “I understand you’re having some sinus problems today?”), general enquiries also led to patients reporting significantly more satisfaction with the physicians’ communication (Robinson and Heritage, 2006). This problem presentation phase is typically brief, and is terminated by the physician’s move into history-taking (Heritage and Robinson 2006b). Questions in the history-taking phase are designed to elicit necessary information, establishing particular medical or social topics for enquiry, and the patient is more constrained as the interactional initiative tends to be in the hands of the physician (Beckman and Frankel, 1984; Boyd and Heritage, 2006).

Bringing such general insights to bear on the seizure clinic, and following Schwabe, Howell, and Reuber (2007) and Schwabe, Reuber, Schöndienst and Gülich (2008), we might suggest that clinicians’ questions ought to be as unconstraining as possible. They ought to begin the encounter with a general enquiry relating to the patient’s expectations. The clinicians ought then to refrain from interrupting the patient (other than to ask for clarifications) or – especially – from introducing new topics, for ten minutes or so. Later in the interview health professionals would be encouraged to prompt patients to speak about particularly memorable, specific seizure episodes. These question formats are more open, and make relevant more extensive tellings than the question designs found in traditional seizure clinic consultations where the emphasis is on time-efficient elicitation of factual details relating to the patient’s subjective seizure experience or to objectively observable seizure manifestations (especially if seizure witnesses can be questioned) (Reuber and Ekberg, forthcoming).

An intervention

Given that doctors would only be able to observe these interactional or linguistic differences if their history-taking approach differed from the dominant routine interview style and mirrored those in the research studies briefly summarised above, the authors developed a one-day training programme which sought to teach senior neurology trainees (Speciality Registrars) to design their questions in a way more likely to solicit unconstrained narratives.

Data

This study is based on the recordings of interactions between Speciality Registrars and patients obtained from specialist seizure outpatient clinics at the Royal Hallamshire Hospital in Sheffield and the General Infirmary at Leeds between October 2012 and December 2013. Patients had typically been referred to the specialist seizure clinics by their General Practitioner, the Accident and Emergency department or less specialised neurologists. Patients were routinely encouraged to bring someone with them, ideally someone who had witnessed seizure episodes. The main focus of this study was on the opening, problem presentation and history-taking phases of the consultations.

Audio or video-recordings of 38 routine pre-intervention consultations with 10 doctors were transcribed and analysed. The 38 patients all presented to the seizure clinic for the first time (28 of these were accompanied). The median duration of the history-taking phase in these 38 consultations was 17 minutes (range 6-59 minutes).

Following the intervention workshops, consultations with 7 of the 10 doctorsⁱ whose interactions had been captured in the first part of the study contributed audio or video recordings with 20 different patients newly presenting to the clinics in Sheffield and Leeds (11 of these were accompanied). The median duration of the history-taking phase in these 20 consultations was 18 minutes (range 11-52 minutes).

Ethical permission was granted by the South Yorkshire Research Ethics Committee, and all participants provided written informed consent. All names in the data extracts are pseudonyms.

Intervention

The one-day intervention workshop, designed by Katie Ekberg, Markus Reuber and Laura Jenkins, consisted of a range of presentations and interactive data sessions and was delivered by the two authors (see table 1).

The training day culminated in a final workshop devoted to the practice that we wanted to change, namely the way in which the doctors asked questions. Firstly, inspired by Stokoe's (2011) CARM technique (see also Stokoe, 2014, this volume), we played actual recordings of consultations from the pre-intervention stage of the project, with accompanying transcript, and paused following the doctor's question. Participants then discussed possible responses to the questions, and finally the patient's actual response was played. Secondly, participants were provided with a script which suggested a series of question formats to be used in consultations during the post-intervention stage (see table 2 below). The script also included hints to encourage the patient to continue their narrative, by displaying reciprocity using gaze, nodding, tolerating silence, issuing continuers, and repeating what the patient has said to encourage elaboration.

Table 1. Intervention schedule

Title	Description	Time
What does CA tell us about medical interactions (LJ)	Presentation on foundational aspects of talk and application in medical interaction	30 mins
Openings (LJ)	Data session examining consultation openings to get familiar with CA transcripts	30 mins
Using CA in the differential diagnosis of epilepsy and NES (MR)	Presenting findings of diagnostically relevant linguistic features from previous research	1 hour
Finding differential diagnostic markers (MR & LJ)	Data session analysing video-recordings and transcripts to identify linguistic features	1 hour
History-taking styles (LJ)	Exploring how question design shapes a patient's response	1 hour
Final Workshop (MR & LJ)	1. Data session: Examining doctors' styles in pre-intervention consultations 2. Considering a new structure to history-taking	2 hours

ⁱOne doctor withdrew from the study (as he moved overseas) prior to recording consultations in the post-intervention stage, one doctor recorded post-intervention consultations after this article had been completed, one doctor was unable to record consultations following the intervention.

Table 2. Intervention script

Aspect of consultation	Question design
Problem presentation solicit	How can I help you today?
Memorable seizure episodes	Can you tell me about the first/worst/last seizure you can remember?
Challenge	Repeat part of patient's description and question aspects of the account.
Further questions	Ask direct questions about items not covered in the previous phases of the interview (e.g. about past medical history, family history, medication, employment, driving).

The workshop was delivered once in Sheffield and once in Leeds to ensure the 10 doctors on both sites taking part could participate. One doctor was unable to attend either session and viewed video-recordings of the workshop sessions.

Analytic Evaluation

In this section we provide an analytic evaluation of the intervention which focuses on a specific phase in the opening of the consultations: the problem presentation. This phase is normally initiated by doctors with questions, and has been described as the only phase of medical visits in which patients are given license to pursue their own agendas (Heritage & Robinson, 2006). In each subsection we provide examples of the differences between doctors' interactional techniques in routine practice, and the approach they adopted following the intervention. Firstly, we examine the doctors' problem-presentation solicits, and explore the implications for the type of response they make relevant. Secondly, we describe the extent to which the doctor aligns with the role of problem presentation recipient, and the impact this has on the response the patients provide.

1. Turn design of problem-presentation solicit

1.1 Pre-intervention consultations

Prior to the intervention workshop, the way that the doctors prompted the patients' accounts of their problem restricted the recipients' responses in several ways. Firstly, in some of the problem-presentation solicits observed in the pre-intervention consultations, the doctor selected the third party, rather than the patient, as the next speaker. In this first extract the patient, Debbie (all names are pseudonyms), has experienced seizures in her sleep. The doctor seeks permission from the patient to ask her partner what happened:

(1) Debbie (doctor 6) [Neu=neurologist and Pat=patient]

- 1 Neu: Is it okay if I ask him because you: won't
- 2 [remember what happened is that all right?
- 3 Pat: [No yeah that's fine.
- 4 Neu: Could you tell me what you saw?

In this way selecting the third party is marked as an accountable matter. The patient provides agreement, and on line 4 the doctor invites a description from the partner. It makes relevant a telling exclusively from the partner, and is specifically formulated in terms of what the partner *saw*, highlighting the partner's epistemic access as a witness to the event. A formulation of this kind clearly prohibits the doctor from identifying diagnostically relevant features in the patient's narrative.

However, while the majority of routine consultations focus on seizure episodes in this way they tend to select the patient as the recipient. The second way in which a recipient's response may be constrained is in terms of the type of information about the episodes that is made relevant. In the few examples in which category constrained questions were used, they make relevant a specific detail of the seizure episodes, such as asking the patient when the seizures began.

(2) Fred (doctor 6)

1 Neu: So let's start from the top when did it
2 all these attacks star:t.
3 (.)
4 Pat: Er:m (0.5) about two years ago weren't it.
5 Oth: Yeah.

(3) Annabell (doctor 6)

1 Neu: Okay. ↑Do you mind if we start from the top
2 then if [tha]t's okay, so
3 Pat: [No,]
4 Neu: [t↑ell me]: (.) u::m (.) when these: seizures=
5 Pat: ['s fine.]
6 Neu: =started hap[pening?]
7 Pat: [Oh I] can't °remember that°
8 I can't remember yesterday.
9 (0.2)
10 Pat: U::m (0.2) a long time ago.

In extract 2 and 3 the doctor launches his turn as “starting from the top”, marking the formulation as the main business of the consultation. The doctor's turns then specifically make relevant a time frame (when the seizures started). In both examples the patient provides this information in their response (Fred: “about two years ago”; and Annabell: “a long time ago”).

These questions are described by Heritage and Robinson (2006) as bypassing the problem-presentation phase altogether. The strict constraints built into the turn design set the agenda for the patient's response and specifically propose the relevance of information gathering.

In routine clinic consultations, however, the most common problem-presentation solicits were less constrained in the sense that they sought a description of the patient's seizure episodes. In extract 4 the doctor asks Tiffany “What's been happening?”

(4) Tiffany (doctor 1)

1 Neu: .hh So w- °#e° what's been happening?

This formulation embeds the assumption that there is an on-going problem, and makes relevant a telling or narrative from the patient relating to the nature of the seizure episodes. Other examples include formulations such as:

- “if you were able to tell me about what happened that would be great.”
(Thomas: doctor 1)
- “Right if ↑you could tell us↑ first what you remember of:: (0.4) what happened”
(Wilson: doctor 2)
- “Just describe describe to me (.) wh: what d’you remember #e::r regarding that attack actually from beginning to end.”
(Wendy: doctor 3)

These examples refer to “what happened” or specifically “*that* attack” (emphasis added) in a way that makes relevant a telling of a past, rather than on-going, event. Unlike the category constrained questions in examples 2 and 3, these open questions use the words “tell” or “describe” to invite a narrative, and are less restrictive in the extent to which they constrain the patient’s response. These formulations resemble one form of those types of questions described by Heritage and Robinson (2006) in primary care as general enquiries. However, they still retain some restrictions on the type of response they make relevant. They invite an immediate presentation of patients’ medical business in a way that is general, but they index the existence of a problem, specifically seeking a description of an event.

1.2 Post-intervention consultations

What is distinct about the majority of the post-intervention problem-presentation solicits is that they do not presume anything about the seizure episodes. Their design means that the focus of the problem is provided by the patient, not the doctor. This is most obvious in the question *how can I help you?* as in the cases below.

(5) Sylvia (doctor 1)

- 1 Neu: SO: (0.9) how can I help you. [hh
2 Pat: [Ri:ght.
3 .h I went to the doctor:rs: I think it’s
4 about four weeks ago now .tmuh er complaining
5 that .h I’d been going dizzy again hh

(6) Taran (doctor 3)

- 1 Neu: so how can I help you today.
2 Pat: .h ah well basically er:m’st hh come
3 about my (1.2) suspicious fits.

Thus while still fitting the category Heritage and Robinson (2006) described as general enquiries, they are agnostic about the precise nature of the patients’ medical business and allow patients to present concerns in their own terms. They contain less pre-existing information than example 4. Whilst in examples 5 and 6 the patients’ responses begin with reference to seizures (“suspicious fits”) or symptoms (“dizzy”), the design of these questions allows the patient to select other concerns to present, as in example 7 below when the patient requests test results:

(7) Ted (doctor 2)

1 Neu: =So how can I help you today then.
2 (.)
3 Pat: Er: i:t's: basically I:'ve (0.4) passed
4 out at work a while ago and I got an em are eye
5 scan done (0.6) a:nd it's jus:' results that I need.

The patient begins by mentioning an episode (“passed out at work”), but without describing this episode in any detail he goes on to mention the MRI scan, and asserts his need to get the results. There is a distinct significance of formulating the problem-presentation solicit in a way that does not contain pre-existing knowledge of the patient’s experience: previous work has shown that the nature of the concern presented by the patient differs between patients with epilepsy and NES, with epilepsy patients giving a detailed and often chronological account of a seizure episode including subjective symptoms, whereas NES patients tend to focus on circumstantial detail and consequences (Reuber, et al., 2009). The formulations adopted by doctors in the post-intervention phase of this project provide for the potential to identify linguistic features in the patient’s problem presentation that have diagnostic significance.

2. Problem presentation reciprocity

2.1 Pre-intervention consultations

We have described the way in which a general enquiry, with no reference to pre-existing knowledge about seizures, makes relevant a narrative problem presentation in the patient’s own terms. These types of enquiry were much more common in the post-intervention consultations. However, the nature of the patient’s response is also shaped by the way in which the doctor responds during or following the patient’s turn, and by the extent to which the doctor takes on the position of problem-presentation recipient.

In pre-intervention consultations, doctors tended to respond to a patient’s brief responses, or display of difficulty in answering, by issuing a closed question. Unusually for a pre-intervention consultation, in extract 8, the doctor issues an open general enquiry beginning with “what seems to be the problem” which is redone as “how can I help?”. The patient produces a very minimal response.

(8) William (doctor 2)

1 Neu: So what seems to be the problem
2 how can I he:l[p ?
3 Pat: [I've been having fi:ts.
4 (0.4)
5 Neu: When- when did you firs:t have a fit.

Once the patient has asserted in line 3 that they have “been having fi:ts.”, a brief silence in line 4 is followed by the doctor issuing a history-taking question requesting information about when the fits started. In this way the doctor is signalling a shift out of the activity of problem presentation and into history-taking, preventing any further opportunity for the patient to set

their own agenda, and jeopardizing the likelihood of obtaining a diagnostically useful extended description.

Displays of difficulties in answering also present doctors with a scenario in which they may respond by producing narrower question formulations. In example 9 the doctor issues an open enquiry that specifically invites a telling “what happened”. The patient’s response indicates that the patient has difficulty remembering or recalling the event, and the doctor immediately issues a specific history-taking question.

(9) Thomas (doctor 1)

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1 Neu: erm .hh (1.0) >there's< er:m °m° there's
2      not much information in the gee pee letter:
3      so if you were able to tell me about: what
4      happened that would be great.
5      (0.5)
6 Pat: I do- I don't really know, hh [really,]
7 Neu:                                     [Okay, ]
8 Pat: particularly: cos it- that's why my dad had
9      to come wi' me cos he:'s (0.8) the one that h
10     (0.5) like (0.2) sat there an' (0.2) watched
11     what's happened [and ]
12 Neu:                                     [#A'ight] okay so when was it then.
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The patient’s response on lines 6-11 asserts that he doesn’t “really know” what happened and accounts for this inability to answer with reference to his Dad, who witnessed the episode, and whom he has brought along to the consultation. The doctor begins his next turn on line 12, mid-way through the patient’s turn, and issues a specific information-gathering question that signals a shift into history-taking.

2.2 Post-intervention consultations

To counteract these short-circuiting moves, the intervention workshop described (and provided examples of) displays of reciprocity including nodding, tolerating silences at transition relevant places, issuing continuers, and repeating part of the patient’s prior turn to encourage elaboration. The doctor in extract 9 can be seen in extract 10 with a different patient dealing with a similar problem: the patient indicates difficulties answering. But notice that in this post-intervention consultation, the doctor now employs several resources in order to extend the problem presentation phase and provide opportunities for the patient to expand on their response.

(10) Suzy (Doctor 1)

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1 Neu: .hh Erm so how can I help you today.
2      (1.1)
3 Pat: Er:m fhow do you mean? Sorr(h)y .hhuh
4      (0.9)
5 Neu: Tell me [all about what-
6 Pat:                                     [So?
7      (0.5)
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8 Pat: Well erm hh I was on my be:d like sort of
9 laid down and then I was just revising and
10 the:n (0.6) I got up hh and then I don't
11 really remember anything after that
12 (.)
13 Pat: Cos I'd (0.4) like (0.4) collapsed.
14 (1.6)
15 Neu: .tch °okay°. (0.7) .hh Any more (1.1)
16 [informat]ion?
17 Pat: [Well the]
18 Pat: the rest of the information she can say it
19 cos she came in and (0.8) found me.
20 (1.4)

The doctor solicits the problem with a very open general enquiry with no reference to seizures. After silence of over one second on line 2, the patient initiates repair “how do you mean sorry”, delivered with smiley voice and interpolated aspiration. Following another silence the doctor begins to redo their problem-presentation solicit “Tell me..” at which point the patient begins to talk, providing a brief description of the event in lines 8-11, ending her turn with the assertion that she is unable to remember anything after that. After a brief silence she adds an account for this absence of memory (as being due to the “collapse”). By asserting that she has no other information to provide the patient signals the completion of her problem presentation.

At this point the doctor, rather than issuing a turn that seeks information, tolerates a silence of 1.6 seconds, delivers an acknowledgement token in a quiet voice (“okay”) and then seeks further telling from the patient “Any more (1.1) information?”. The silence mid-TCU provides opportunity for the patient to come in, and they do begin their turn at this point in overlap. Rather than providing further information the patient reasserts their earlier declaration that they lack memory by suggesting that the witness (who is accompanying the patient) is a better placed recipient to that enquiry. That the patient does not provide further problem presentation at this point does not diminish the fact that the doctor's displays of reciprocity have continued to make relevant further problem presentation. The patient treats this as a relevant next, and indicates that a lack of further problem presentation is accountable.

The consultations that took place following the intervention demonstrated many more displays of reciprocity and, as a consequence, invited further problem presentation. In example 11 below (a replication of example 6 with more talk included) the doctor's general enquiry solicits a brief description of the “suspicious fits” following which the doctor issues continuers, an acknowledgement token, tolerates silence, and then redoes the problem presentation solicit to invite further telling.

(11) Taran (doctor 3)

1 Neu: so how can I help you today.
2 Pat: .h ah well basically er:m'st hh
3 come about my (1.2) suspicious fits.
4 You know, it's (1.2)
5 Neu: Mm hmm,=
6 Pat: =basically what I hear (0.2) well

7 I 'ear a flat line tone and that's
8 tells me I'm actually gonna have a
9 fit and .hhh the she's witnessed it
10 all hhh (0.7) and everything and hh
11 I've just (2.5) come to get answers
12 really. .hhh
13 Neu: Mm hmm,
14 (1.0)
15 Neu: Okay,
16 (2.8)
17 Neu: Can you describe me or tell me a bit
18 more about it.°

The patient provides a minimal description including the warning symptoms of a “flat line tone” (line 7), mentions that the accompanying person is a witness, and then concludes his problem-presentation on lines 11-12 declaring that he has “just (2.5) come to get answers really.”. The doctor’s continuer on line 13 is delivered with continuing intonation and in this way treats the problem presentation as incomplete. The doctor then tolerates a second’s silence before acknowledging the patient’s turn in line 15, again with continuing intonation, and tolerating a further silence. In lines 17-18 the problem-presentation solicit is redone, inviting a description in a way that treats the patient’s response as inadequate or incomplete.

The analysis has demonstrated key features more commonly found in the post-intervention consultations that make relevant a narrative telling from the patient. Firstly, the opening question or problem presentation solicit can be formulated in ways which provide the patient with the opportunity to determine the nature of the problem, rather than seeking details or description of seizure episodes. Secondly, displays of reciprocity, particularly in situations in which the patient’s initial response is minimal or displays some difficulty with answering, provide patients with further opportunity to describe their problem in their own terms and pursue their own agenda.

Discussion

This intervention project sought to investigate whether neurologists would be able to change their questioning techniques in routine outpatient clinic encounters in order to allow their patients optimal opportunity to demonstrate a number of diagnostically useful interactional and linguistic features described in a series of previous studies. Specifically, the intervention proposed a structure in which the opening question was a general enquiry which was agnostic with regard to the nature of the patient’s problem, and encouraged doctors to produce active displays of reciprocity to encourage the patient to provide a narrative. The results demonstrate that doctors were able to implement these interactional techniques.

This has exciting implications: Our study shows that this sort of one-day CA-based intervention can influence the way in which doctors solicit problems and descriptions from patients. The success of the current intervention presents a viable means by which questioning techniques previously used in a research setting may be fostered in everyday practice. The fact that doctors were able to create the kind of interview setting in a routine outpatient clinic in which patients

can demonstrate the diagnostically useful linguistic features described previously means that this change in interview technique may be associated with increased diagnostic accuracy. By leaving the patient more room to influence the agenda of their encounter with the doctor, the change in interview style could also lead to an increase in patient satisfaction, and future analysis will investigate this.

Regardless of the outcome of these further studies, the findings presented here provide support for using CA to inform and evaluate the effectiveness of communication interventions in applied settings. The current study contributes to a growing field of interventions which successfully operationalize a conversation analytic approach in their design (e.g. Heritage et al., 2007; Stokoe, 2011; Wilkinson et al., 2011).

During the realisation of the intervention the authors encountered some challenges. Firstly, requiring several doctors from the same team to partake in a day-long training was constrained by on-going needs arising in the medical environment. Several doctors were called out from the workshop to attend to medical matters throughout the day, breaking the continuity and potentially compromising their understanding of the topics discussed. One doctor was unable to attend the workshop on either of the days in which it was repeated, and watched video-recordings of the sessions, limiting the extent to which he could engage with the otherwise interactive sessions. While there is still evidence that the intervention remained effective and caused a change despite these problems, these are important pragmatic considerations to anticipate in future interventions.

The generalisation of our findings is limited by the fact that all participants in the training days were Speciality Registrars. We chose to target doctors at this level of seniority because they are expected to make diagnostic decisions independently but are still undergoing training (and perhaps at a stage of their medical careers when their history-taking approach can still be modified relatively easily). It is possible that the one-day intervention may have been less effective in doctors with a more limited understanding of the diagnostic challenge or with greater clinical routine.

There are several aspects of this project that warrant further investigation which will be discussed in more detail elsewhere, including the degree to which doctors found these new interactional techniques useful. The extent to which the newly adopted conversational strategies would be maintained over the long term is also a matter for future research. In addition, future work will explore the extent to which this change in style impacts both the patient's reported satisfaction with the consultation, and the potential benefits of the different style in terms of the impact of the interaction on the accuracy of diagnosis. A handful of post-intervention consultations failed to demonstrate the sort of changes in question design and displays of reciprocity shown in this article, and these cases will be explored elsewhere.

This study develops Heritage and Robinson's (2006) typology of questions by suggesting that, in this particular setting, the distinction between types of general enquiry (e.g. those that contain some reference to the nature of the patient's problem, and those that adopt an agnostic position) may be significant in terms of the nature of the recipient's response, and that this may have ramifications not only for patient satisfaction, but in terms of the patient providing medically relevant information that could, potentially, improve the accuracy of diagnosis. Overall, this paper provides compelling evidence for the potential for CA to inform effective clinical interventions that could improve patient care, and explores the use of CA in the evaluation of such interventions.

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