

## **Teacher noticing and teacher framing in teacher talk about a mathematics classroom**

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Taking an enactivist perspective, when a teacher talks about what has happened in their classroom their speaking, learning and doing is a function of their structural coupling with the people and contexts of past interactions. With each interaction, they are changed and they change the world that emerges. Drawing on existing models for what can be inferred about teachers' epistemological framing from what they say about their practice, particularly in response to video clips of the classroom, this report considers one stimulated recall interview with a teacher of mathematics. Their reflections provide a new interaction, building on, yet separate from, what they noticed in the original classroom event. In this context, I consider how the teacher frames accounts of the lesson, giving particular attention to accounts of what was noticed during the lesson and what this might indicate in terms of post-hoc noticing and future classroom observations.

**Keywords: teacher noticing; framing; teacher decisions; mathematics classroom.**

### **Teacher noticing from an enactivist perspective**

Where a teacher locates their attention during a lesson will heavily influence what the teacher notices during the lesson. This is not to say that deliberation on what to look for will rule out the unexpected or surprising (thankfully); rather, the capacity for explicit, in-the-moment awarenesses allows the teacher to see more and offer those with whom they work possibilities that are more powerful in supporting mathematical learning (Brown & Coles, 2012). There is an analogy with considerations involved in designing or adapting a mathematical task for a particular group, where deliberation on how mathematical thinking will direct attention to mathematical structures and ideas can lead to classroom experiences that give opportunities for learners, in turn, to deliberate on the qualities of their mathematical responses (Mason & Johnston-Wilder, 2006).

Although appearing in studies from the 1980s, the term 'teacher noticing' is often traced back to van Es and Sherin (2002) who proposed three key aspects of noticing: (a) identifying what is important or noteworthy about a classroom situation; (b) making connections between the specifics of classroom interactions and the broader principles of teaching and learning they represent; and (c) using what one knows about the context to reason about classroom interactions (p.573). Since then, the term has developed in many directions, centred around two intertwined main processes: attending to particular events in an instructional setting, and making sense of events in an instructional setting (Sherin, Jacobs & Phillip, 2011). This is sometimes bracketed with Mason's influential work on noticing as a discipline (Mason, 2002) although this work is directed at the development within the individual (teacher) of an inner witness – what *I* notice - with application to practitioners researching their own learning

(Helliwell, 2017), rather than as a process of researching teaching by examining what teachers notice – what *they* notice.

From an enactivist perspective, the realisation of any classroom interaction is a function of those taking part in it and the interaction has a formative effect on the participants, so that the aspects of what draws and holds a teacher's attention, whether as a result of explicit or tacit awarenesses, are specific to the singular event. Alongside this, however, the ideas of Maturana and Varela (1987) lead to a framing where structures of cognition co-emerge with the enacted world, informed by and arising from past couplings (Reid, Dowden, Jeans, & d'Entremont, 2000). In this way, "[t]he culture of a classroom can be viewed as emerging from patterns of interactions over time" (Brown & Coles, 2012 p.221). As a teacher works on becoming aware of awarenesses, so they come to see more in-the-moment. Teacher noticing, then, holds out the possibility of following these awarenesses as they become apparent to a teacher over time. The value and challenges arising from the conversation between teacher noticing and enactivist stances is discussed more fully elsewhere in these proceedings (Llinares & Brown, 2018) and so in the rest of this paper, having introduced the construct of teacher framing, I will focus on a single case in an attempt to exemplify these ideas.

### **Dynamic processes and teacher framing**

The work of Russ & Luna (2013) on local patterns in teacher noticing incorporates the construct of teacher framing to "create dynamic accounts of teacher cognition" (p.285). Such ideas draw on developments of frames and framing from linguistic and anthropological contexts (MacLachlan & Reid, 1994) as applied to education contexts (Hammer, Elby, Scherr & Redish, 2005). These ideas build from a position in which participants in a social situation construct an interpretative schema that act as a set of filters through which to make sense of the world, where a frame is represented as an individual's interpretation of 'what is going on here?', i.e. sense-making activity.

This appears to stand in contrast to the intuitive responses of teachers in-the-moment during the highly complex events that occur in mathematics classrooms (Brown & Coles, 2000; Mason, 2015), where there is insufficient capacity to engage in explicit attempts to make sense of the situation. The model of *epistemological* framing developed by Russ and Luna (2013) focuses on short timescale (seconds, minutes) changes in teachers' thinking, based on the assumption that "it is teachers' dynamic, tacit epistemological frames rather than more stable, long-term epistemological beliefs that give rise to teacher practice" (p.289). As such, it is suggested that teacher framing gives a route of potential interest in exploring observable behaviours, particularly since researchers have made inferences about teacher framing from such behaviours (see Russ & Luna, 2013, for a list of examples). This is put to the test in the case that follows, as part of the investigation of ways of working from observable actions to shifts in awareness for teachers as a way of supporting practising mathematics teachers in developing their own classrooms.

### **A case to examine**

The case study offered here involves the observation and subsequent interview conducted with a teacher of mathematics with four years of experience of working with learners aged between 11 and 18 years. The lesson was video recorded and interactions between the teacher and members of the class were transcribed by the researcher and used in a subsequent stimulated-recall interview, when the teacher was asked to watch several clips from the video and to describe the events. For each of three clips, the

teacher was asked first to give an account-of the events, with the intention of capturing the narrator's telling of what they had observed without entering into overt interpretation, followed by an account-for the events, relating interpretations to what had been seen, moving into an explanatory mode (Watson & Mason, 2007). The focus of the interview was established in advance by the researcher by selecting the video clips, although control of the process was passed from the researcher to the participant in the course of the interview.

A key issue in this case study is the selection of clips to review. Where Russ and Luna (2013) made use of teachers signalling when to capture moments of interest (by pressing a button to capture the preceding 30 seconds of video footage from a camera worn by the teacher), this current study relies on the researcher identifying clips to review. Whilst the decision to not review the full 90-minute lesson with the teacher was driven by availability of the teacher, it should be noted that the current arrangement is likely to give more insight into researcher framing than teacher framing. This is discussed below.

The transcription that follows is from the audio recording of the teacher interview. The conversation is based around use in the lesson of the image shown in Figure 1. In the transcription, text shown as (xxx) is my best guess at any indistinct utterances, ((xxxx)) indicates vocal sounds other than speech and {{xxxx}} gives a description of activity other than speech. The speaker is indicated with an initial, with T being the teacher and H and I being learners in the class.

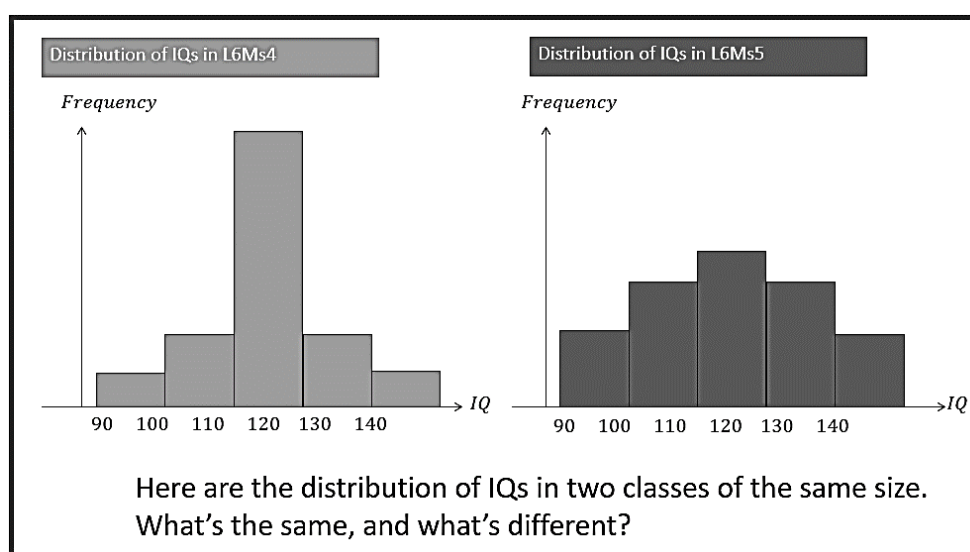


Figure 1: Graphic shared by the teacher in the observed lesson

### *Extract from lesson transcript*

T Alright, on your whiteboards, please, we've got two different distributions here. This is the IQ in one class {{T indicates the first distribution}}, this is the IQ in a different class {{T indicates the second distribution}}. Can you write down one thing that is the same and one thing that is different...

H We have to know different about them?

I Yeah.

T Well, they look different, don't they? But how do they look different?

H One's (thin) and one's (fat). ((Laughs))

T Let's try and... let's try and see if ( ). Let's see more... more details.

### *Extracts from interview transcript*

Turn 31 (Teacher speaking):

I started off with two graphs on the board and I asked them to write down on their whiteboards one thing that is the same about them and one thing that is different. So, I did that. Then I said “Show me your whiteboards,” and they did and I started pointing to things on the whiteboards: “The range is the same,” “The maximum is the same,” “The biggest and smallest are the same,” and then I said, “One thing that is different...” and I think I read off a whiteboard, or I think someone said, “The average is different.” And I didn’t accept that. I think I questioned it. “Is the average the same? What’s the mode of them both?” Someone said that they’ve both got the same mode. So then I said, “Yes, so it looks like the average is the same. So what is different about them?” I guess there was nothing on the whiteboards at this point, but someone put their hand up and said, “The distribution was different.” That was a good answer, “the distribution was different.” And then I think I said “This one is more spread out than this one.” So I suppose what strikes me there is that I read out the things that were the same from the whiteboards, but I didn’t really read out the differences... I think that’s probably what happened: they found it harder to describe what was different about them.

Turn 51 (Teacher speaking):

I have a feeling that I didn’t want to get into a class discussion about it. ... I suppose I’ve got in the back of my mind a list of things which I would have picked up on and said “That’s a really nice point.” And maybe “One’s thin and one’s fat” didn’t fit in that list, so therefore I didn’t.... Whereas now, if I was doing this again, that has now made its way onto the list!

### *Discussion*

My perspective is that each of us brings, to any situation, all the experiences we have had. In making choices myself about the clips to discuss, I am aware (now and, according to my recollection, in the moment) that it was me who found them of interest. On encountering the graphic in Figure 1 and hearing the question, I was aware of twin impulses to interrogate the two distributions and to focus on making observation notes. Unlike the participants in the study of Russ and Luna (2013), it is me, both as an observer and outside the episode itself, who is ‘pushing the button’. It is an expression of my own awarenesses at the moment of selection. Why these clips? I would say now that they each involved interaction between the teacher and one or more pupils, each created an opportunity for the teacher to talk about what had held their attention and each captured behaviours that might be suggestive of shifts on the part of the teacher. For me, any attempt to make sense of the content of these clips apart from the teacher would be bounded by what I see in the situation, based on my own history of structural coupling. Indeed, there is for me no sense-making process that is separated from my historical and current interactions, rather like me coming to know what I am communicating here only through the communication itself. I am interested in whether and how I can know that a third party (the teacher, in this case) has experienced a shift in attention from which I might infer a shift in awareness, as a marker of learning (Marton & Booth, 1997; Mason, 2008). Without a mechanism for inferring shifts in awareness for others from observation of their actions, I turn to the substantial field of teacher noticing in order to begin to build a bridge between what I notice (with what that indicates of my own awarenesses) and what the teacher I am

observing notices. Accessing that noticing in-the-moment remains a challenge. Even with the teacher-led approach of Russ and Luna (2013) we cannot capture in-the-moment reflection since there is not time to deliberate and still capture the footage. Rather, pushing the button will be in response to an in-the-moment awareness of something noticed, with the button allowing it to become something marked (Helliwell, 2017).

Work with teacher noticing combines, to varying degrees, a first-person perspective, a paradigm of which is Mason's Discipline of Noticing (2002), with the third-person perspective of observational studies (Sherin, Jacobs & Phillip, 2011). In many cases, direct observation has been followed by one or more interviews with the teacher involved, with the intention of capturing the teacher's accounts of what they had noticed in particular episodes. This, in turn, raises a question of the nature of the data in such studies (and this one). It is not possible to have access to what was noticed by another but only to the accounts that are given, so that the data become the accounts themselves. In order to make inferences, Russ and Luna analyse teachers' comments for local patterns and interrogate the groupings of such patterns. Consideration of the two extracts from the transcript of the post-lesson interview offered in the previous section suggests a movement from commenting on decision making ("I didn't accept that. I think I questioned it" in Turn 31) to comments relating to approaches that might be taken in the classroom ("If I was doing this again, that has now made its way onto the list" in Turn 51). Across the interview, the teacher's talk can be characterised strongly by comments on behaviours (to be expected, since the interview included the teacher's accounts of what had been reviewed on video) and decisions, with each category appearing in half of the turns taken by the teacher. Given that the teacher did not select the lesson clips discussed, it has proved problematic to use this interview as a mechanism for making inferences of epistemological framing; the process has, however, established a space in which to begin a consideration of the interaction of the first-person and third-person perspectives described above.

### **Possible next steps**

Russ and Luna (2013) conclude their discussion by considering an alternative mechanism for gathering accounts of teacher noticing:

It is possible that having teachers deliberately capture moments they notice while teaching is not necessary for the analysis [of local patterns of noticing]; another methodology that simply infers teacher noticing at regular intervals (say every 3 minutes in a class video) from observable action may be just as successful. (p.310).

An extension of the work reported here is currently underway, working with a teacher to observe and review lessons over the course of an academic year. This offers an opportunity to explore the interaction between first- and third-person perspectives in working together to offer accounts of shifts in attention and awareness.

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