Report of the Mathematics education and the analysis of language working group

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In this paper, we report on the discussion and issues raised at the working group session at the day conference in Cambridge.

Key words: language, gesture, analysis, mathematics education.

Brief history of the working group

At Cambridge there was the third meeting of the re-formed Mathematics Education and the Analysis of Language Working Group. In the first meeting (November 2011) we worked with conversation analysis and linguistic ethnography approaches to analyzing data. This was followed in March 2012 by a session that triangulated conversation analysis and a multi-modal approach (see Farsani 2012). The aims of the group are to share and develop approaches to the analysis of classroom talk. We aim to dwell in the detail of how we work with language in our own mathematics education research. In this session we worked on some data collected by Yvette during a teacher-training course on which she taught in the UK, asking the questions of how we understand transcript data and what do different transcription methods allow or constrain?

Context of data

We offered the working group three different transcriptions of the same event, in which some prospective teachers were performing (with their bodies) a demonstration of how the earth moves around the sun. The prospective teachers' task was to explain why we have seasons. They were modelling this with M moving around D and spinning, whilst leaning her body towards and away from D, who was holding a torch (the sun). The most pared down transcript (that we offered first) is below. If you were not at the group meeting, you might want to try to make sense of this data and consider what you bring to your sense making.

Transcript 1

A: well this is [‘] summer

A: This is in winter

D: Right.

D: Northern hemisphere’s in winter.

D: the southern hemisphere’s in summer

A: Earth’s moving *this* way

D: Mandy’s moving anticlockwise *round* me.

D: but she *spins* round *clockwise* as well

A: yeah

A: Stop!

A: Now this is summer

A: and this is winter when you're at the furthest point aren't you

A: we had erm summer and a cold winter as well

M: shall I finish off? [laughing]

A: and there you go

In the session, we then offered the transcript below, with more details about gestures and movement. You might want to consider what, for you, is the same of different about engaging with the following transcript compared to the one above.

Transcript 2

A: well this is ['] summer [Ashley moves towards Mandy and supports her with one foot underneath Mandy's raised foot, indicating that the foot end of Mandy is summer. Mandy is leaning back at an angle, Danielle is holding the torch. Mandy starts to wobble, Ashley holds on to her]

A: This is in winter [at the same time Mandy taps her own head, Ashley gestures towards Mandy's head]

D: Right.

D: [Lifts hand in air to indicate upwards] Northern hemisphere's in winter.

D: [Lowers hand to point at Mandy's foot] the southern hemisphere's in summer

[??]

A: Earth's moving ['] *this* way [Ashley and Danielle both gesture to indicate orbit in slow anticlockwise sweeping circular movement with their lower arms]

D: Mandy's moving anticlockwise *round* me.

[At 'round me' Mandy simultaneously raises her left hand and gestures fast and tight anti-clockwise rotation from the wrist]

D: but she *spins* round *clockwise* as well [Danielle sweeps her hand down and fast to turn her lower arm movement into a clockwise rotation]

A: yeah

[Mandy starts to spin round clockwise (according to her own body, ie she moves to the right as she turns) and orbit anticlockwise at the same time. Ashley holds on to her to keep her balance (Mandy is on one foot all the time)]

A: Stop! [Mandy has completed a 180degree orbit. Danielle has turned round and is shining the torch on to Mandy, who has her back turned]

A: [moves to hold Mandy and demonstrate]

A: [voice for audience] Now this is summer [Mandy pats the back of her own head]

A: and this is winter [both point to Mandy's raised foot] when you're at the furthest point aren't you [non-public teacher-to-child voiced question directed at M]

[.. indistinct brief dialogue between A and D]

A: we had erm summer and a cold winter as well [?indistinct, transcription may not be faithful]

M: shall I finish off? [laughing] [completes orbit]

A: and there you go

We then had a third transcript, not reproduced here, which included snapshots from a video and, in the session, we also showed participants the short video clip itself, on which this transcript is based.

Discussion

We now summarise some of the issues that arose from discussion of the task of engaging with the data above.

There were several comments about an initial preference for working with the most pared down transcript. Engaging with transcript 1 first, forced an attempt to reconstruct the events and work out what they meant. The effect of then being offered transcript 2 was described, by several people, as a shift from working something out yourself to then being told. It was as though the 'authorial' voice of the researcher was much more present in transcript 2. It was clear there were interpretations in transcript 2, for example, "non-public teacher-to-child voiced question". On reflection, of course, it was recognised that the authorial voice and interpretation of the researcher is just as present in transcript 1 but perhaps not as visible. This became apparent when we watched the video clip. There were a lot of other voices and noises on the clip and the intentions and interests of the researcher suddenly became relevant. We needed to know the context of why Yvette had transcribed what she had – and this context was in fact an interest in embodied understandings of mathematics. What is *left out* of the data we present each other is often not alluded to in research reports.

Another preference for transcript 1 was that the relationships between speakers and turns in the dialogue were more apparent than when all the detail was added. One sense that came across from the discussion was that, as researchers, we need to see the data in its "fullest" form, i.e., in this case the video, but that to actually work on the job of analysis a pared down transcript was easier. Exactly this issue is raised in Powell, Francisco and Maher (2003, 412), do we use tapes as data or transcripts as data? A preference for transcripts with more non-verbal detail was also expressed and it was noted that even in the transcript with the images, there was not an attempt to convey tones of voice, or pauses and timings and these "vocal" aspects of talk can be important in our interpretations, particularly if we want to be able to tell how "hedged" contributions are, i.e., how much they are expressed in ways that communicate a lack of certainty.

One participant reflected on how she had been constrained to use audio rather than video recordings of lessons, in order to comply with ethical concerns expressed by some students, but that she had ultimately valued this constraint and the way it made her focus on aspects of talk only.

We hope the group will continue at the next BSRLM meeting and we invite anyone to contact Alf if they have some data/issues they would like to share.

References

Farsani, D. 2012. Mathematics Education and the Analysis of Language Working Group Report: Making multimodal mathematical meaning. *Proceedings of the British Society for Research into Learning Mathematics*, 32(1): 19-24

Powell, A., J. Francisco and C. Maher. 2003. An analytical model for studying the development of learners' mathematical ideas and reasoning using videotape data. *Journal of Mathematical Behaviour*, 22: 405-435