Social positioning and consensus building in two contentious “board” meetings

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Context
• Calculus-based physics (~24 students), employs University Modeling Instruction [1-5] and Modeling Discourse Management [6].
• Students work in small groups, then gather in a large circle to hold a student-lead whole-class “board” meeting.
• Goal: Students converge on shared meaning and reach consensus [7].
• Some board meetings have sharp initial disagreements amongst the students that do not quickly or easily resolve.
• These are called contentious “board” meetings.

Research question
Some contentious board meetings reach consensus, some do not. Why?

Hypothesis
Students establish a transitory participatory identity by positioning themselves when they talk to each other [8, 9]. When “experts” soften their position by “hedging” more frequently, they open the collaborative space to collective sense-making, and board meetings are more likely to reach consensus.

Methodology
We analyzed audio recordings of contentious board meetings - one that reached consensus, and one that did not. We coded students’ positional moves every 15 seconds [10].

The two board meetings
Quick Little Problem (QLP)
You walk into a room and see a book sliding across the floor and slowing down. The book then comes to rest. Make (a) a system schema [12], (b) appropriate coordinate system and graphs of velocity, acceleration and force total, and (d) a force diagram for the book [7].

Two Stacked Blocks (2SB)
Find everything you can about the scenario to the right [15].

The coding scheme (social positioning)
When a group of students hold a discussion, they “position” themselves by the way they talk, either presenting ideas or asking questions.

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert</td>
<td>Presents information or argument with confidence.</td>
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<tr>
<td>Intermediate Expert</td>
<td>Softens expert tone by using “hedging” words such as “I think…” or “I guess, maybe…”</td>
</tr>
<tr>
<td>Novice</td>
<td>Asking lower-level questions like “How do I do this?” or expressing ignorance, giving up.</td>
</tr>
<tr>
<td>Facilitator</td>
<td>Metacognitive discussion about the purpose of what they are doing, or planning future actions.</td>
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The pattern of the two episodes is remarkably similar until the later discussion. During that period the students in QLP engage in a sustained period of hedged statements that opened the collaborative space and allowed the consensus position to be taken up and reified by skeptical members of the class, thus reaching consensus.

Discussion
Board meeting discourse in QLP has three features that 2SB is largely missing:
• proposed resolutions to the contentious issue were presented with hedges,
• moments of humor that seemed to open up the collaborative space [18],
• moments of facilitation when multiple students made attempts to summarize the nature of the contentious issue in a non-confrontational way.

Conclusion
The pattern of the two episodes is remarkably similar until the later discussion. During that period the students in QLP engage in a sustained period of hedged statements that opened the collaborative space and allowed the consensus position to be taken up and reified by skeptical members of the class, thus reaching consensus.

References

Acknowledgements
JN thanks Colin Hilt for helpful peer collaboration. SH thanks Mike, Eads, & Fenn for encouragement & support. DWI for a stipend to work on this project, the Drury Provost’s office for a grant to support an undergraduate on this project, IIRE for professional development, DE for affective mentorship and kind hospitality, and the kindness and mercy of God. DB and SH thank PERLOC for a “nacho-in-recession” mini-grant that enabled them to collaborate externally productively on this research project.

Inter-rater reliability for different segments of audio

QLP
<table>
<thead>
<tr>
<th>Consensus achieved</th>
<th>Consensus failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Stacked Blocks (2SB)</td>
<td>11</td>
</tr>
<tr>
<td>10:00 - 20:00</td>
<td>0.00 - 16:00</td>
</tr>
<tr>
<td>κ = 0.62</td>
<td>κ = 0.67</td>
</tr>
</tbody>
</table>

QLP coding

Comparing discourse from the “later discussion”

QLP
2SB

Consensus achieved
Consensus failure

Dave: “...when we get to the force diagrams, ours is at an angle, um, we did that because we basically went through the motion diagram up here and we determined our acceleration had to be pointing in the negative direction.”

Min: “Ok, well, we had that same thing, except we labelled our other interaction the unknown interaction, but I guess we could have labelled it friction, that would have been smart.”

Kimi: “I just wanna know why you can... say there’s a vector for friction if it’s not an interaction within your schema?”

Chad: “…when we got to the force diagram, we kind of, threw our hands up, and said well, hopefully you guys will teach us.”

Sue: “With that being said, I do agree with your board, and your board, so respect your stuff.”

Inter-rater reliability for different segments of audio

QLP
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QLP coding

Comparing discourse from the “later discussion”

QLP

Sam: “Isn’t friction, like, due to contact? It’s, it’s a product of... So it is, it is possible to label it as its own interaction or is it due to the contact interaction? It’s a product.”

• Sam offers a resolution to the main contentious idea in a hedged manner.
• This leads him to idea being taken up by the whole class.

John: “And then we said there’s friction between box A and the ground, which is a part of the frictional coefficient, like for me.”

Wade: “We don’t need to assume that, it is part of the problem.”

John: “Well then you wouldn’t need to say the other one if it’s just part of the problem.”

Wade: “This isn’t an assumption, this is a fact.”

Wade and John appear to “talk past” each other, leading to frustration and unresolved disagreement.

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References
[18] Cohen’s Kappa between 0.6 and 0.8 indicates “substantial” level of agreement [17].