ATTENTION TO STUDENT FRAMING IN RESPONSIVE TEACHING

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One of the significant challenges of responsive teaching is in deciding where and how to focus attention, including one's own attention as the teacher and, insofar as the teacher has influence, the class's attention as a group. These choices influence what the teacher notices and what aspects of students' thinking she pursues.

In this paper, we present a case study from a third-grade class engaged in an extended study of motion. We present two episodes from their work, one from the 2nd day and one from the 14th. The evidence, we argue, shows difference from one episode to the other in the scope of the teacher's attention, from a wider consideration of the class's sense of what they are doing—their *epistemological framing*—to a more narrow consideration of the conceptual substance of particular ideas. We then discuss the dynamics and possible influences on this scoping, including the teacher's sense of the stability of students' framing.

The importance of attending to student thinking

Over the past few decades, research in science and mathematics education has considered the importance of attending and responding to the substance of students' thinking in fostering disciplinary engagement and learning (NRC, 2007; Hutchison, 2008; Pierson, 2008; Warren, Ogonowski & Pothier, 2005; Warren, Ballenger, Ogonowski, Rosebery & Hudicourt-Barnes, 2001; Russ, Scherr, Hammer & Mikeska, 2008; Levin, Grant & Hammer, 2012). Teacher responsiveness has been linked to students' conceptual gains (Pierson, 2008; Manz, 2012), their engagement in disciplinary practices and assessment (Yackel & Cobb, 1996; Driver, Newton & Osbourne, 2000; Berland & Reiser, 2009; Russ, Coffey, Hammer & Hutchison, 2009; Sohmer & Michaels, 2005; Manz, 2012), and an increased sense of their agency as knowledge builders (Scarmadelia & Bereiter, 1991; Engle & Conant, 2002; Ball, 1993).

Among the challenges of responsiveness is that a teacher cannot attend and respond to all aspects of the classroom dynamics. Teachers must constantly decide, explicitly or tacitly, how to distribute their attention. Prior analyses have focused on when and how teachers direct their attention to the substance of student thinking, arguing that it is context-sensitive and influenced by many factors, including the teacher's long-term and short-term instructional goals, pedagogical content knowledge and epistemologies, what takes place among students, and by institutional expectations and time constraints (Lau, 2010; Levin, 2008; Maskiewicz and Winters, 2012; Richards, 2013).

Much of the discussion has focused on whether teachers attend to the substance of student thinking as opposed to other aspects of what is taking place in class, including student behavior, logistics, and listening to students' discourse for target vocabulary from the canon (Coffey et al., 2011) and so on. But "attention to substance" is quite broad itself. So, even when attending to the substance of student thinking, teachers must constantly make decisions about whether and how to take up that substance.

In this paper, we study tacit choices within how one teacher, Sharon Fargason, attends and responds to student thinking. In particular, we identify her tacit choice between attending to students' epistemological framing and attending to specific conceptual substance.

Attending to students' epistemological framing

The "wider" view Sharon takes is of the students' sense of what it is they are doing, in particular with respect to knowledge. In other words, it is a sense of the "game" students are playing (Lemke, 1990; Ford, 2005). Students are beginning scientific inquiry, for example, when they are looking for sensible explanations of phenomena, identifying and trying to reconcile possible inconsistencies, and testing predictions with experiments. For our purposes here, we take engagement in science to be the pursuit of coherent, mechanistic accounts of natural phenomena.

For teachers, much of the challenge is in recognizing and supporting students' beginning that pursuit (Hammer, Goldberg & Fargason, 2012; Radoff, Goldberg, Hammer & Fargason, 2010). It is difficult, in part, because students' sense of what is taking place can vary, from student to student as well as from moment to moment. In this analysis, we are specifically interested in students' sense of what is taking place with respect to knowledge, which we will discuss in terms of their *epistemological framing* Redish, 2004; Scherr & Hammer, 2009).

Redish (2004) proposed the construct of epistemological framing to connect research on epistemological resources (Hammer & Elby, 2002) with research on frames and framing (Goffman, 1974; Tannen, 1993). The former describes people as having rich collections of resources for understanding knowledge and epistemic activities, which they draw on in various ways in different contexts. The latter describes people as forming a sense of what is taking place in different contexts, something that happens dynamically in the moment, drawing on perceptions and past experiences.

For example, young children become familiar with various kinds of epistemic activities—storytelling, guessing games, pretending, and so on—each with various rules or heuristics for engagement, values and assumptions, goals and criteria. Part of what needs attention in responsive teaching is the students' epistemological framing: part of what instruction should accomplish is students' becoming familiar with science as a kind of epistemic activity, with its aims, values, and ways of constructing and assessing knowledge (Chinn, Buckland, & Samarapungavan, 2011; NGSS, 2013).

The dynamism of framing makes attending at this wider scope more complex than simply assessing whether or not students are doing science. For young children in particular, who are coming to understand many kinds of epistemic activity, the transitions and shifts of framings can be frequent and dramatic, including into and out of the beginnings of scientific sense-making (Hammer, 2004). Thus, how students frame what they are doing in one moment may not be the same as in another.

The reflexive relationship between conceptual substance and epistemological framing

The “narrower” views we see Sharon taking focus on details within the conceptual substance of student thinking. Below, for instance, students consider whether a car will catch on fire. Hearing them raise the idea, Sharon could focus on it, eliciting further and more detailed thinking about fire and cars and motion, or she could keep her attention wider in scope, a broader survey of the kinds of ideas students are offering.

There is a reflexive relationship between interpreting the conceptual substance of what students are trying to say and interpreting their epistemological framing. Teachers can infer the kind of epistemic activity in which students are engaged from the kinds of conceptual substance they offer, and they understand that substance based on their sense of what students are doing.

Imagine, for example, a student telling a story about her family’s trip to the theme park. She says it was raining, and so the bumper cars were closed. She asked a park attendant why she couldn’t ride the bumper cars in the rain, and he told her that the tires might slip around on the wet road and the driver could lose control of the car. The student might be trying to explain what she knows about tires and traction, or she might be trying to convey her disappointment at missing the ride. The teacher and other students listening would be influenced in their sense of her meaning by the epistemic context, whether it has been a discussion about friction or about what she did over the weekend.

At the same time, the teacher’s and other students’ responses would help to shape that context. The conversation could go one way if the teacher presses the student to unpack the connection between the slippery surface and the possibility of losing control of the car, and it could go another way if a student responds with a comment about his trip to that park.

If there are multiple ways for students to interpret what is happening, a teacher might zoom out to a wide view in order to help students come to some stability around what they’re doing. Instead of deeply pursuing the conceptual substance of an idea, she might serve as the gatekeeper to allow or deny entry for certain kinds of ideas, hoping to affect students’ expectations around what kind of conceptual substance is appropriate. Once the students are more stably engaged in a particular kind of epistemic activity (in this case, doing science), the teacher can zoom in to a narrower view where she delves deeply into particular aspects of student thinking.

In this paper, we focus on Sharon Fargason, who was part of the *Responsive Teaching in Science* project (Goldberg *et al*, NSF DRL-0732233). Sharon’s teaching is featured at the project website (cipstrends.sdsu.edu/responsiveteaching) as well as in several published accounts (Bresser & Fargason, 2013; Hammer, Goldberg & Fargason, 2012). We analyzed a year of her science lessons and have evidence that as the year progressed, students became more stable in nascent scientific engagement (Radoff, in

preparation). In what follows, we examine two episodes to argue that, as students showed more stability in doing science, Sharon focused her attention more narrowly on the ideas within their inquiry than she did at the outset, when she was attending and responding with a wider view toward how they were framing what they were doing.

METHODOLOGICAL CONSIDERATIONS

Episode Selection

The episodes we present took place in the second and fifth weeks of the toy car unit (cipstrends.sdsu.edu/responsiveteaching/carmodule/), which began with a launching question about how to make a toy car move.

In the first episode, we suggest, the students and teacher were in the throes of co-constructing expectations of what they were doing, both socially and scientifically. In the second episode, by contrast, the students were evidently framing what they were doing as a pursuit of coherent, mechanistic accounts of (a toy car's) motion. The change in stability of students' framings from the first episode to the second is characteristic of the shift we observed over the course of the year.

We chose these particular episodes for evidence of a contrast in how Sharon chose to pursue ideas. In the first episode, she was selective, actively discouraging lines of reasoning that did not seem like the beginnings of science. In the second, we noticed Sharon take up a student's idea that, we suggest, did not seem obviously scientific. We argue that the difference reflected a shift in Sharon's interpretation of students' framing and scope of her attention.

Evidence of student framing

To build this argument, we begin with evidence of student framing. In essence, we are making conjectures about Sharon's thinking on the presumption that, in the moment, she noticed at least some of this evidence too. There is some evidence about Sharon's attention in what she says and does, and we have checked our interpretations with her own memory and sense, but our argument depends on plausible inferences.

There is evidence of students' framing, for us as for Sharon, in their discourse, as Tannen (1993) described in several studies. In one, she examined interview data of women talking about a short movie they had seen, to show how "surface evidence" can give insight into "underlying expectations," or framing. Tannen identified a variety of forms of evidence of the subjects' framing, regarding both what was taking place in the movie as well as in what was taking place in the interview. For example, many subjects noted things that *did not* occur in the movie, evidence suggesting they expected those things were possible. There was evidence as well in linguistic markers that indicated attitudes such as surprise and judgment. Still other evidence included linguistic registers, shifting in ways that indicated, for participants in the conversation, how to interpret the meaning of an utterance.

In another study, Tannen and Wallat (1993) analyzed data of a doctor examining a child. Similar sorts of evidence, of vocal register and language, signaled shifts in the doctor's framing of what she was doing, in particular whether she was speaking to clinicians, to the mother, or to the child. These markers we available to the mother and child as well, who were able to recognize which audience the doctor was addressing. In effect, Tannen and Wallat were making explicit the tacit channels of communication among participants in the conversation.

In what follows, we similarly study students' discourse for evidence of their framing. The evidence, we suppose, was also available to the students and to the teacher. We invite readers to watch the video and assess our interpretations themselves. To track and document the indicators of student framing, we coded at the grain size of conversational turn, with each turn numbered in the transcript. We include the details of our coding as Appendices 1-3.

DATA AND ANALYSIS

We begin with our analysis of an early episode, which we show reflected instability of student framing. That is, the class had yet to settle on the kind of conversation they were having, and this, we will argue, influenced how Sharon attended and responded. We then provide a brief description of an episode from halfway through the unit, and finally turn to the analysis of an episode from the final day. Videos of the Early and Late Episodes are available at [address], which we recommend readers watch before reading our accounts. Full transcripts are available in Appendices 2 and 3.

Early Episode overview

On the first day of a unit on motion and energy, Sharon held up a toy car in front of her third-grade class and asked the launching question, "How would you get this toy car to move?" The students spent some time in small-group discussion and then shared with the class how they might get the toy car to move. On the second day of the unit, the students worked in small groups, recording and illustrating their ideas for how to get a toy car to move on butcher paper to share out with the entire class. Isaac and Jimmy were the first to share their idea: a large and complex roller coaster, equipped with fiery loop-the-loops and terrifying jumps over shark-infested waters (Fig. 1).

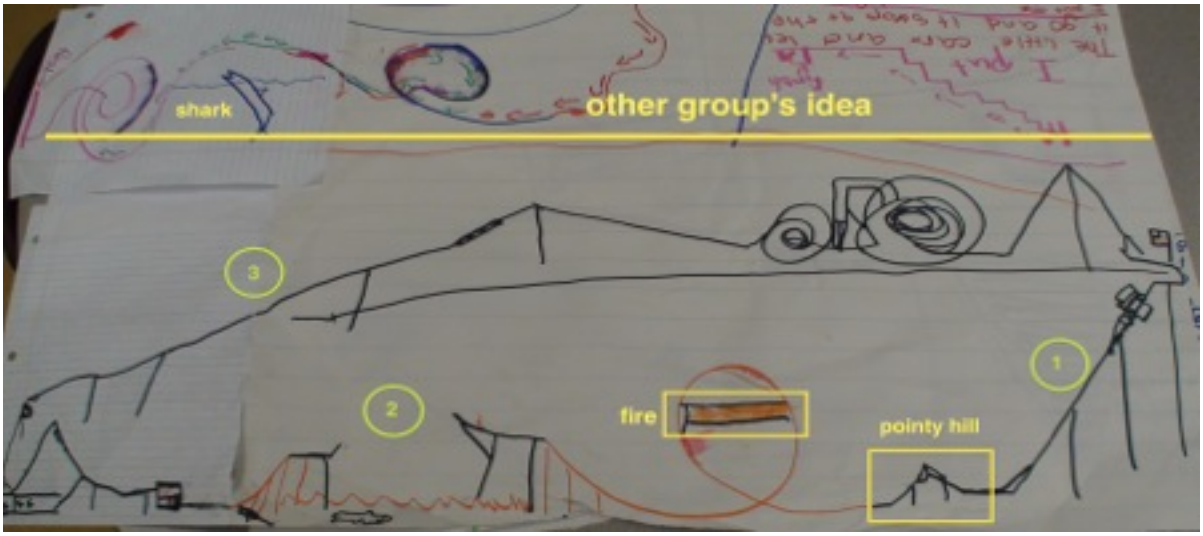

Figure 1. Isaac and Jimmy's roller coaster

As Isaac and Jimmy presented their idea, the students attended to many different aspects of it. Some picked up on the sensational aspects of the roller coaster, while other students held Isaac and Jimmy accountable to whether the idea would actually work to make a toy car move. Several students switched between talking about a toy car that lacks a power-source, and thus relies only on the rollercoaster design, and a real car that has an internal energy source, which allows it to move independently.

Thus there was evidence of variation in how students framed their participation. While there were glimmers of proto-scientific engagement—in students' attention to plausible mechanisms—the students were not stable in it. In fact, it is difficult to see them as stably doing any one kind of thing in talking about the roller coaster: as a group at least, they seemed unsure whether they were engaged in playful imagination, realistic sense-making, or something else.

Sharon, we will show, attended and responded largely at the level of the students' framings, apparently picking up on and trying to draw out the glimmers of nascent science. For example, she asked students to clarify or repeat contributions that suggested mechanistic sense-making, and she disregarded or deferred those that suggested playful storytelling. At times, she was explicitly directive, such as telling students that they should think of a toy car, not a real car with an engine.

We turn now to the analysis, to show (1) students' unsettled framing, and (2) Sharon's attention and responsiveness.

Early Episode analysis: Student contributions and teacher response

In analyzing this episode, we identified three general categories of framing. To be clear, our purpose in this coding is not to educe cognitive structure but to articulate general themes of students' framing that were available for Sharon during class. We call these categories *scientific beginnings*, *playful storytelling*, and *off topic.*

We consider how Sharon responded to students' contributions as evidence of her interpretations and local intentions. For example, her persistence in driving the conversation away from real cars indicates that she noticed that the students kept returning to the topic. Her multiple attempts to shift the conversation indicate her effort to disrupt what she saw as a local stability around discussing real cars.

Table 1 contains descriptions of each category, followed by an example of each kind of contribution.

Category	Description
Scientific Beginnings	Attention to phenomena and mechanisms of the toy car's motion
Playful storytelling	Attention to the dramatics of the roller coaster without regard to physical plausibility.
Off topic	Attention to phenomena that are disconnected from the toy car's motion

Table 1. Coding categories of student framing

Scientific Beginnings

This category refers to student contributions that focus on the toy car's motion and what may affect it. Contributions in this category fall at the intersection between what we as researchers value as scientific beginnings as well as what Sharon valued in the students' reasoning, as is evident in her attempts to promote this kind of substance.

Priscilla's question at the start of the episode [lines 2,5] is an example of scientific beginnings. She asked, "Is there something that pushes [the car] up here (referring to the stretch of incline labeled (3) in Fig. 1) because I cannot believe that it goes by itself." It is a question about causal mechanism, and evidence of her expectation that there must be one. Her critique is about the physical viability of Isaac's and Jimmy's idea. Sharon tried several times to make this a focus of student attention, by re-voicing it [8], asking Priscilla to repeat it [4, 8], and asking other students if they heard her question [4, 6].

Another example is Jamir's concern [47,49] about how the car would move when it gets to the "pointy hill": "won't the car jump and crash into the ramp…?" Again, Sharon supported the question, asking Jamir to repeat it and commenting that she "was kind of wondering that too."

Playful storytelling

In other moments, students' contributions suggest that they were not thinking about the physical plausibility of the phenomena but about the drama of the roller coaster ride.

For example, Isaac's response to Jamir's question about the pointy hill was to describe an implausible device—"a thing right there that knows if it's going to crash… and opens up a spot" to let the car through without crashing [52]. Sharon pointedly discouraged this response, treating it as silly and articulating a tacit rule of the activity she had in mind: "You're making stuff up as you go along! You can't do that!" [53].

In addition to fabricating ideas that extend past realistic bounds, in some moments students focused on flashy aspects of the design that were not relevant to how the rollercoaster made the toy car move. For example, early in the episode, Jourdan asked, "what is that part with the big fish right there?" [27]. Sharon deferred his question [29, 31, 33] asking for further conversation about an idea she had heard about the car's motion. She called on Scarlett, who kicked off a conversation about whether the car will get burned by the fire on the loop-the-loop. Sharon supported this conversation initially, especially picking out Ray's contribution that incorporates speed into the explanation [36-42], but shut it down when it moved too far away from issues concerning the car's movement [43-46].

Off-topic

Some student contributions focused on topics other than the motion of the toy car. In particular here, students frequently shifted to thinking of "real" cars—cars that have engines and brakes. That framing of the topic would obviate questions such as Priscilla's, of what pushes the car up the hill. Sharon tried repeatedly to keep students thinking about a toy car.

One example is when Jamir and Isaac considered how the point of the pointy hill could get caught on "the bottom engines" and "materials" on the underside of a "real car." [57, 59, 64, 65, 68, etc], Sharon asked, "OK, can we talk about toy cars just to make this easier?" [85], and she followed up with further insistence.

In coding a contribution as off-topic, we do not mean to suggest it has or could have no scientific value. Rather, we mean that, to us watching the video, it does not seem to concern the motion of a toy car. To be sure, part of our argument is that our (as well as Sharon's) sense of a contribution as off-topic would depend on the context.

Variation of student framing and patterns of teacher response

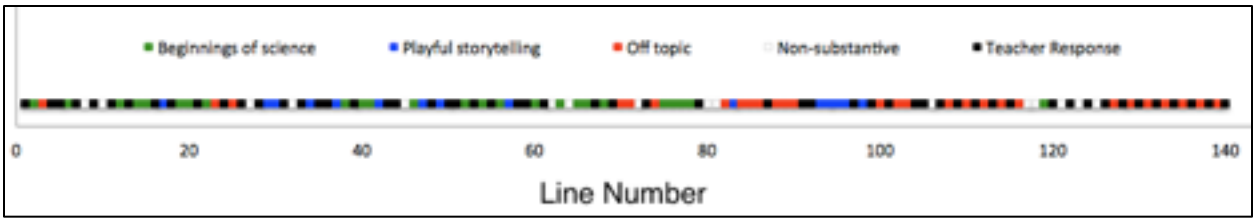

Figure 2. Coding of student contributions in Early Episode (13 mins.)

Figure 2 presents the coding of tacit framings in 11 students' contributions in the 13-minute episode, showing that, as a class, there was not stability in what they were doing. Sharon's responses during the episode provide some evidence of her interpretations, which seem to be in line with ours. Thus, she promoted contributions that, to us, seem oriented toward mechanistic sense-making, and she challenged or disregarded contributions that, to us, seem oriented toward playful storytelling or are off-topic in other ways.

Table 2 summarizes our coding of Sharon's responses. For efficiency and for easy comparison, we include both the Early Episode, which we have just discussed, and the Late Episode, which we present below.

Teacher Response	Evidence	Early Episode	Late Episode
Asking for clarification	-Asking questions in order to understand the substance of the contribution -Repeating idea for clarification	Lines 12, 20, 22, 81, 91, 103, 105, 107, 109, 114, 116, 120, 122, 124, 126	135, 142, 144, 155, 169, 173, 181, 185, 191, 193
Actively promoting a contribution	-Directing student attention to the contribution -Asking student to repeat the contribution for the class -Asking students to evaluate a contribution	Lines 4, 6, 8, 15, 24, 36, 40, 48, 55, 61, 63	146, 151, 198
Delving into contribution	-Asking follow-up questions -Posing new idea about contribution for student to evaluate -Asking 'why' or 'how' something happens	Line 50	147, 142, 153, 187, 189, 195

Disregarding a contribution	-Does not ask any follow-up questions about contribution -Quickly moves onto another contribution	Lines 4, 29, 31, 33, 40, 46	144, 161, 175
Actively challenging a contribution	-Explicitly marks contribution or behavior as out-of-bounds	Lines 53, 73, 85, 93, 95, 98, 128, 130, 132	Lines 161, 175

Table 2. The variety of ways that Sharon responds to student thinking in both episodes

Note that there is only one instance in the early episode of Sharon delving into the substance of a student's contribution, in line 50 when she asked Jamir what would make the car jump. Certainly there were other opportunities. There were several places, for example, when students focused on the car's motion in the loop-the-loop. Jourdan [27] for example, remarked that the car would not fall at the top of the loop, "because it goes down really fast"; later Jimmy [88] focused on the car's motion in the loop. Sharon's response to Jourdan (29) was to deflect his closing question about "the big fish," and her response to Jimmy (91) was to check that he was "talking about a toy car." At the same time, there are 15 instances of her disregarding or challenging a contribution, almost all following contributions we coded as playful storytelling or off-topic.

Our conjecture is that Sharon was aware of the variation in students' framing of what they were doing, and for this reason she attended and responded at a wider view. In some places, Sharon asked a follow up question about a student's idea, but as a move to appropriate the student's contribution into the framing she intended, rather than to delve into the student's reasoning itself. When Scarlett asked, "What if the car gets burned when going through the fire?" [34] Sharon followed up by asking, "Will it get burned?" [36] Ray jumped in to say that if the car is "going really fast, the fire will just go off" [38]. When Isaac asked Jimmy about a design element involving the location of the fire, Sharon disregarded this comment and moved back to focus on Ray's speed-related comment. She said, "OK, so, but what you're saying is that the car is going to go so fast that the fire won't get to it?" [40]. In these ways, Sharon noticed and promoted the contributions that supported a focus on the movement of toy car.

Progress toward stability—an intermediate episode

It should not be surprising that the students' framing varied as it did near the beginning of their work on the toy car. It was the start of the year and of a new kind of task for them, and so it is only natural that they would need some time to develop a sense of what it entailed. As they spent more time exploring and discussing the motion of toy cars, they made progress. The story of this progress goes beyond our argument and

analysis here,[1] but to give readers a sense of what came between the early and late episodes, we summarize an episode along the way.

In a discussion on Day 7, Jamir expressed an idea about a track with two hills, a tall one and a short one. Jamir said that if he let the car go at the top of the first hill, it would make it over the second hill without needing to push it again. Sharon asked the class to consider his idea. Some students thought the car would make it over as long as the first hill was taller. Others thought it mattered how much taller the first hill was; for them, the hill Jamir had drawn did not look tall enough to give the car enough speed to make it over the second hill.

During the discussion, Sharon asked Jamir to explain something he had said, that "when its falling, its kind of pushing." In response, he drew a swimming pool and a diving board, and explained, "So, the diving board, you just jump on it and you get down faster because you get even downer in the water because like, the air's pushing you." As Jamir was drawing the diving board, Teresa said in frustration, "but we're not talking about that, we're talking about a toy car." Soon after, Priscilla said, "I think I get it. The higher you are, the lower you go."

In response to all of this, Sharon told the class, "I want you to think about what Priscilla just said. And Teresa's right, we're not talking about pools, but we could think about this. This might help us think about the car. She said—and I want you to think about how this could be similar to the toy car—she said, 'the higher you go up on the diving board, the lower you go into the pool.'" The conversation turned into a debate over whether a heavier or lighter person jumping off the diving board will fall faster.

This episode, about halfway through the students' study of the motion of the toy car, shows more evidence of scientific beginnings than in the earlier episode. Students expressed ideas about coherent relationships between weight, height, and speed. Jamir's analogy to the diving board was a connection of mechanism: In both cases, something falling is "kind of pushing," whether to penetrate water or to climb the second hill. As well, the students were beginning to follow up on each other's ideas, working to keep track of and hold each other accountable to the topic at hand, as Teresa was doing here.[2]

We turn now to an episode from late in their study, when the students' framing has seemed (to Sharon and to us) to stabilize around scientific beginnings.

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[1] We see a reflexive dynamic between Sharon and the students: Sharon's responses help students frame what is happening, leading to shifts in their contributions, which Sharon sees, affecting how she attends and responds (Yackel & Bobb, 1996).

[2] It is interesting to consider the fine-tuning in Sharon's interaction with Teresa, with respect to framing what is taking place. Someone diving into a pool is relevant to think about a toy car, while in the early episode, thinking about a real car was off-topic.

Late Episode overview
By day 14 of the toy car unit, the students had discussed various factors that could affect a toy car's speed as it moves on a ramp, including the weight and shape of the car, and the steepness and slickness of ramp's surface.

At the beginning of class on day 14, Jamir shared something he discovered the day before: when he put a rubber doorstop on a steep ramp, the doorstop didn't move at all. When he tried to demonstrate the phenomenon for the class, however, the doorstop slowly slipped down the ramp. After about fifteen minutes of discussing why the doorstop sometimes moved and sometimes did not, Ray said, "It's free will."

We chose this episode because of Sharon's response: she pursued the idea, delving into it for an extended discussion. The class went on to discuss the meaning of free will and the students gave arguments for why the toy car did or did not have free will.

Free will hardly seems, in itself, a likely topic in the pursuit of mechanistic understanding. By this point in their work, however, the students seem to have established a shared framing of what they are doing together—making sense of different things that impact a toy car's motion—and Sharon has seldom seen the need to intervene to promote scientific beginnings. Here, we propose, she interpreted the idea of free will as having meaning for students within that stable framing. That is, her sense of the students' stability in what they've been doing impacted her interpretation of an idea that, on the face of it, would seem off-topic.

Late Episode analysis: Student contributions and teacher response
The episode began with the puzzling observation that the doorstop would sometimes slide and sometimes just sit still at the top of the ramp. Sharon asked Jamir if he pushed it when it slid, and for the first several exchanges the focus was on comparing "pushing it" and "letting it go." Jamir said that "putting [it at the top of the ramp] it is like letting it go. If you just put it on [the top of the ramp], it's like letting it go."

Jamir's remark prompted Ray to say "It's free will." In response to Ray's comment, Sharon first asked the class whether the car or the doorstop had free will, and then she asked Ray what he meant [142]. Ray responded that free will is when "you just let it go because you're not pushing it, that's all" [143].

Sharon tried three more times to elicit a definition [144,146, 148] before she offered one herself, appropriating Jourdan's example of "letting a dog go for a walk by itself" [150]: "Free will means you get to choose what you want to do" [151]. She then moved on to ask, "Does the car or the doorstop have free will?" [151], to which several students responded, "No." Sharon seemed to expect this response, because she quickly moved onto the next and most important question, "What makes the car and the doorstop go down that ramp then?" [153].

It would be reasonable to expect the students to start working on other explanations, but Jourdan responded, "The car had free will" [154]. Sharon's exclamation, "Wait, a car has

free will?" [155], is evidence she was not expecting that response. Again, she chose to pursue the topic, and the conversation continued.

Throughout the rest of the episode, Sharon attempted to understand what students meant by "free will." One meaning seemed clear to her [169]—if a person controls the car, the car definitely does not have free will. For example, if the car is flat on the floor and requires a person to push it [172] or if it is a remote-control car [170], it does not have free will. But then Sharon asked, "Ok so is that free will if a car goes down a slide by itself?" [173], to which a group of students replied, "Yes."

In response, Sharon clarified her definition of free will: "Ok so free will means that you get to make a choice, so Jourdan, did that car make a choice to go down that hill?" [175]. Jourdan responded, "I don't think, because cars can't go alive" [177] and Gustavo added, "Yeah, cars can't go alive only persons can" [178]. Kyleigh, who had been trying to speak for some time, added that a real car does not have free will, "because the person is driving the car" [182]. Following this new definition, Alexis concluded "It didn't have free will because it didn't have another choice of staying or going, it had to go down…Because like if you're on top of a hill and the car goes down a slippery thing, like it has to go down because like there's nothing that could hold it, unless if it was a real car, then the brakes" [196].

For much of the rest of the day, the students' framing was more clearly stable around scientific beginnings. Later, for example, the class sustained a 20-minute conversation about how wheels work to make a toy car move. The conversation focused deeply on mechanism, the students listened and responded to each other, and they held each other accountable to the larger framing so that Sharon didn't need to do much to maintain those boundaries (Radoff, in preparation).

Stability in student framing and patterns of teacher response

Our core contention about this episode is that it shows a different pattern in Sharon's attention and responsiveness to student thinking from the Early Episode.

At the outset of the episode, the students' participation was at least consistent with, if not indicative of, scientific beginnings: They seemed to focus on making sense of an inconsistency in the doorstop's behavior, paying attention in that to the difference between "pushing" and "letting go." Ray's suggestion of free will as an explanation could easily be seen as a move to a different kind of conversation. But Sharon chose to take it up, asking him to clarify and guiding the class to think about the idea.

There was another decision point for her a moment later, when Jourdan said, "the car has free will," after many students seemed to agree that it did not. Sharon could have shut down further consideration of "free will," but again she chose to pursue it further.

Jourdan's response showed a mismatch, indicating a need for Sharon to stop and reassess what she had previously taken for granted as shared understanding. But where is that mismatch located? On the face of it, the notion of free will has no place in

a discussion about causal mechanisms, and it would be natural to see it as disruptive to that framing. We suggest that, had it come up in the Early Episode, Sharon would have been more likely to interpret it as a matter of epistemology—a shift, perhaps, to ideas about anthropomorphized cars, like in the Disney movie, Cars—and so been more assertive in closing the topic. Recall how she closed discussions about whether the car would get burned in the loop and about “real cars.”

Coding Sharon’s responses in the two episodes (Table 2) shows strikingly different patterns. Out of 51 codes in the Early Episode and 27 in the Late, we found 9 of her ‘actively challenging a contribution’ in the Early Episode and only 2 in the Late. More striking, we found only 1 instance of her ‘delving into a contribution’ in the Early Episode compared to 6 in the Late Episode.

The difference, we contend, is that in the latter case she had experienced the students as more stably framing their activity, in ways that would exclude ideas about living cars from the landscape of acceptable knowledge. With reason to be more confident about the students’ epistemological framing, Sharon could feel more free to draw out the conceptual substance of students’ thinking and consider the possibility of a mismatch in meaning: what Sharon means by free will might not be the same as what the students mean by free will.

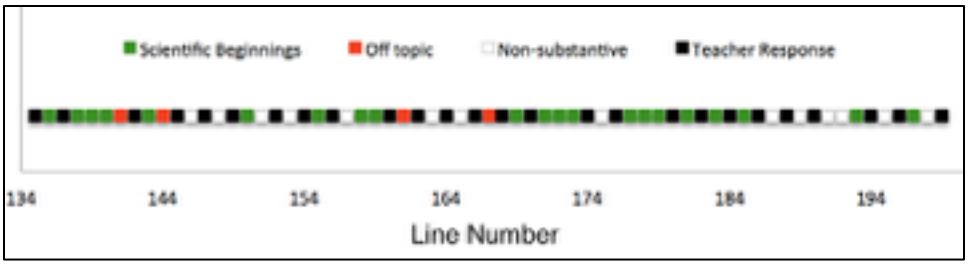

Figure 3. Coding of students’ contributions in Late Episode (7:47 mins)

Indeed, coding the contributions of 9 students in the Late Episode shows significantly more stability in scientific beginnings (Fig. 3). Some contributions are ambiguous, and that is much of the point: For a teacher attending closely to what kind of game students think they should be playing, a comment such as Jourdan’s “the car had free will” could seem an indication of the wrong game. For a teacher focused more narrowly on the conceptual meaning students are trying to convey, the comment could be an intriguing possibility to unpack.

In this way, we understand Sharon responses to reflect her sense of the students’ framing. Because she was not as concerned with establishing a stable framing in the Late Episode, she policed the substance much less than she did in the Early Episode. As well, because she didn’t have to monitor student thinking as rigorously for mismatches in framing, she had more opportunity to delve into student thinking and engage substantively with their ideas.

DISCUSSION AND IMPLICATIONS

On a larger scale, we are interested to understand how a class makes progress toward establishing shared expectations around epistemic activities, in particular, progress toward disciplinary practices. It seems to involve a complex, "reflexive" (Yackel & Cobb, 1996) dynamic of interaction between the teacher and the students, as the teacher attends and responds to student thinking, and her responses affect their sense of what they are doing and the contributions they make, which affects what she attends and responds to, and so on.

In this paper, we have focused on one aspect of this dynamic, to argue that Sharon's attention and responsiveness changes over the course of the toy car unit. In particular, we showed differences between two episodes. In the Early Episode, there was evidence of the students' varying, unstable sense of what they were doing together, and there was evidence that Sharon's attention was mainly at that level: Rather than delve into students' ideas, she focused more on the *kinds of ideas* students were offering. In the Late Episode, by contrast, it was the other way around: Sharon responded to student thinking by probing into specific ideas, even an idea, "free will," that on its own seems like the wrong kind of idea for a discussion about physical mechanism.

Our argument is that this shift makes sense if we understand Sharon as shifting in the way she attended as the students' thinking seemed to stabilize around scientific sense-making. In the Early Episode, there was extensive evidence of students' varied and unsettled expectations about what they were doing, in students' talk about implausible devices, fires, and big fish. By the Late Episode, there was evidence of stability in their framing around scientific beginnings. Put simply, Sharon probed into free will because she had reason to *presume* that it had meaning within the epistemic activity the class had established.

This claim, of variation in Sharon's attention to students' thinking, dovetails with Robertson *et al's* (In review) case that a teacher's attention can shift "between multiple foci within the substance of student thinking." Similarly, Maskiewicz and Winters (2012) compared across two successive years in "Mrs. Charles's" class, showing connected differences in the students' inquiry and the teacher's attention. They showed that the epistemic norms were different between the two classes, for the same teacher, and they argued that it would be a mistake to attribute the difference simply to Mrs. Charles having made progress in responsive teaching.

Like these authors, we are arguing that there are interesting, important dynamics of attention within a focus on the substance of student thinking. Where Maskiewicz and Winters compared across successive years, with different groups of students, we have compared across episodes within a single 14-day unit. Where Robertson *et al* identified multiple foci of conceptual substance, we have characterized a shift between "wider" and "narrower" views of that substance. For Sharon at least, attending and responding to the substance of student thinking can involve a relaxing of attention at one level to allow for greater attention at another. Sharon's relaxing her attention to student framing freed her for more in-depth engagement with students' ideas.

Of course, there is a risk in relaxing attention. In this instance, as the Late Episode continued, the evidence suggests it was a productive move for Sharon to delve into the notion of free will. It did not undermine the students' engagement in scientific thinking.[3] In other cases, teachers relaxing attention in this way may keep them from recognizing when there is a mismatch of expectations (such as if the students had actually shifted to teleological thinking about objects with free will).

Research in both science and mathematics education has already established that how teachers engage with the substance of student thinking impacts what students come to see as valued and valuable forms of knowledge in the classroom (Coffey et al., 2011; Cobb, Wood, Yackel & McNeal, 1992; Yackel & Cobb, 1996; Cobb, Stephan, McClain & Gravemeijer, 2001). Cobb, Yackel and colleagues attribute students' progress in mathematical engagement to the establishment of sociomathematical norms—sets of shared[4] expectations for what is appropriate in the classroom that are both social and disciplinary in nature. Examples of sociomathematical norms range from a wider sense that explanations should be mathematical in nature to a narrower sense of what counts as a good, different, sophisticated, or efficient mathematical explanation. These norms are reflexively established by the teacher and students in that the teacher discovers, recognizes, and supports productive aspects of students' contributions, which in turn signals to the students what kind of contributions are valued, leading to further contributions the teacher may discover.

In light of this research, how a teacher responds to student thinking clearly impacts how students come to understand what it means to do science. In Sharon's case, she responds to students' varied epistemological framings by acting as a gatekeeper, winnowing kinds of ideas, supporting some and suppressing others. In this way, she could support the emergence, development, and stability of students' more disciplinary framings. As the class progressed, she could focus less attention on forming shared expectations and more on delving into the substance of particular ideas, which in turn may have help students to refine their framing. It is this pattern of attending and responding that eventually leads to stable and productive scientific inquiry. We hope to further analyze these data in order to better understand the reflexive dynamics of Sharon's attention and students' progress in scientific engagement.

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[3] It is plausible that discussing free will helped stabilize the students' framing, helping them recognize a contrast between it and the sorts of ideas they were considering.

[4] Yackel, Cobb & colleagues actually refer to "taken-as-shared" norms because, while they have evidence of the class as a whole observing these norms, they do not want to presume that each individual shares these norms.

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APPENDIX 1: Contribution code and teacher response code keys

Student contribution codes

0	No evidence of framing
1	Scientific beginnings
2	Playful storytelling
3	Off-topic contribution

Teacher response codes

A	Calling on student
B	Asking for clarification
C	Actively promoting a contribution
D	Delving into contribution
E	Disregarding a contribution
F	Actively challenging a contribution

APPENDIX 2: Transcript and coding from the Early Episode

Challenges in coding.
We faced significant challenges while interpreting and coding this data, which are challenges that Sharon likely faced when attending to students' thinking. First of all, we code by conversational turn but not every conversational turn holds meaning as a stand-alone contribution. We make meaning out of many contributions by looking at them within the context of the conversation, which means we sometimes draw on *our* sense of student framing to make meaning out of an otherwise ambiguous contribution. Similarly, many of the contributions are vague and can be interpreted in a few different ways (Sharon is dealing with this in real-time!). We were hesitant to tag these contributions with any one code, so we sometimes included one or multiple codes with a question mark, and occasionally we provide an explanation via footnote.

Line	Transcript	Code
1	Sharon: Priscilla.	A
2	Priscilla: Is there something that pushes [the car] up here (referring to the long stretch of incline labeled (3) in Fig. 1) because I cannot believe that it goes by itself.	1

3	Isaac: Actually, Jimmy did this part.	0
4	Sharon: Ok, but. Ok, that's fine but did you hear her question? Can you say your question again?	E, C
5	Priscilla: Does something push it up here? For it to go fast...	1
6	Sharon: Do you guys hear what she's asking?	C
7	Students: Yeaaah.	0
8	Sharon: Is there something that pushes it up here? And then she said that she doesn't believe that it could do that by itself. Is that what you said?	C
9	Priscilla: Yeah. (3 second pause)	0
10	Sharon: Gustavo.	A
11	Gustavo: Can't the car fall when its going on the--when its gonna turn when its going on the thing that it goes fast?	1
12	Sharon: Which one, on the orange ramp?	B
13	Isaac: It's not gonna fall because like (mostly inaudible, but from his gestures it seems like he thought Gustavo was talking about the jump (2), not the Loop-The-Loop).	1
14	Gustavo: Because right there, when it's like, going up, it could fall down.	1
15	Sharon: Hold on, two people are talking at once. Gustavo is saying that, won't it fall down right here? at the top?	C
16	(40 seconds) [Students discuss whether the markings at the top of the Loop-The-Loop are a bridge or whether they are fire. They conclude that it is neither bridge nor fire.]	2
17	Sharon: Yes, Jimmy?	A
18	Jimmy: See how it goes, it goes up the big hill (tracks finger from the top of hill (1)...) and that's how it goes fast (...to bottom of hill (1)...) and it jump over (...to over the pointy hill...) and then its speed go a little, a little bit more faster (...to around the Loop-The-Loop...).	1
19	Isaac: And this makes it go even faster (tracks finger around the Loop-The-Loop) because it falls down.	1
20	Sharon: What makes it go faster? Sorry.	B

21	Isaac: The [Loop-The-Loop]--because it makes it go down, and when cars go down at the same time they're driving, it makes it go even faster. So that's why it could jump here (points to (2)). And it could jump over because on this side of the car its a little bit like that (brings his hands close together to represent a narrow bridge and then pulls them apart to represent a wider bridge) so we made it more wider like that so it won't fall on the side.	3
22	Sharon: You made the track wider than the car so that the car would stay on?	B
23	Isaac: Like if the track was like this and the car was going through (gestures with his hands to represent a narrower track), then we made the track like that (gestures with his hands to represent a wider track) so it could go through. Like, if it landed on that this side (points with one hand to the very edge of his other hand), like it would still make it.	3
24	Sharon: Do you guys get that?	C
25	Jourdan: I do.	0
26	Sharon: What did you want to say?	A
27	Jourdan: [The car] wouldn't fall [at the top of the Loop-The-Loop] because it goes down really fast, and then when it makes the jump [on the pointy hill], it jumps back down and then, cause, it jumps back down and then it goes down that hill and then it makes it more faster to zoom up there and then when it jumps [over the water] it can do like tricks and stuff. And what is that part with the big fish right there on the other paper?	2
28	Isaac: That's in the water.	2
29	Sharon: Oh, we'll get to that in a second.	E
30	Isaac: That's from [the other group's] side.	0
31	Sharon: Okay.	E
32	Jourdan: Is that the shark?	2
33	Sharon: Let's talk about Isaac and Jimmy's idea for just a minute more. Scarlett.	E, A
34	Scarlett: What if the car gets burned when it goes through the fire? It will get burned.	2
35	Alexis: No it won't.	0
36	Sharon (to Isaac and Jimmy): Will it get burned?	C
37	Isaac: Nope.	0

38	Ray: Not—If it does, cause like if it's going really fast the fire will just go off.	1
39	Isaac (asking Jimmy about a design element of the fire): Wait, Jimmy, did you mean like little on the side, there's like fences and on the fences' side there's like little candles with fire? You meant that? (Jimmy shakes his head)	2
40	Sharon: Okay, so, but what you're saying, [Ray], is that the car is going to go so fast that the fire won't get to it?	E, C
41	Jimmy: Yeah!	0
42	Ray: But if it--if like a little fire does, its still just going really fast, so when it's coming down and it goes up a big hill, so when it jumps up the fire will go off... and little sparks.	1
43	Scarlett: Why don't they just don't make a flame because it will get burned?	2
44	Sharon: Kyleigh.	A
45	Kyleigh: Why couldn't they just put the fire like on top of it?	2
46	Sharon: Well they could've but this is how they did it. Jamir.	E
47	Jamir: But, in that little [pointy] hill, won't that car jump and crash into the bridge (points to the Loop-The-Loop)?	1
48	Sharon: Can you say that again? I was kind of wondering that too...	C
49	Jamir: In that thingy over there, won't the car jump and crash into the ramp or whatever (points to the Loop-The-Loop).	1
50	Sharon: What would make the car jump right there?	D
51	Alexis: No, it will crash on the back of that.	1
52	Isaac (responding to Jamir): Because there's like a thing right here (points to the pointy hill) that knows if it's gonna crash right here (points to the Loop-The-Loop), so if it does crash right there, it opens a spot up so people can go through fire and then come back.	2
53	Sharon: You're making stuff up as you go along! (students' laugher) You can't do that! (Sharon laughs) So, is it going to go up here into here (she points to the Loop-The-Loop)? Or is it going to go down like that [down the pointy hill]?	F
54	Jimmy: It's gonna go down like that.	1
55	Sharon: You think so Jamir?	C
56	Gustavo: It's gonna jump! It's gonna jump!	0

57	Jamir: Once I tried that before, but if it does that, it's gonna get stuck right there.	1
58	Sharon: What do you mean?	0
59	Jamir: Like if it doesn't jump, it might get stuck right there (he points to the pointy part of the hill). Because the car is flat and this is like a pointy spot, it might just get like stuck right there. It might get stuck right there, because you know right there under the car there's like a bunch of materials, there's like a bunch of holes on top there. So it might get stuck right there…	1
60	Brittney: I don't understand him.	1
61	Sharon: Brittney, say that again.	C
62	Brittney: I don't understand him.	1
63	Sharon: (to Jamir) Could you try to explain it again? (to Brittney) Thank you for saying that.	C
64	Jamir: Because the car is flat and this is like a pointy spot it might get like stuck	3
65	Isaac: Jamir's right. It might get stuck to the bottom engines.	3
66	Alexis: But I told him--	0
67	Sharon: Alexis! Please let him finish!	0
68	Jamir: It might get stuck right there because you know right there, under the car there's like a bunch of material. There's like a bunch of holes on top there. So it might get stuck right there.	3
69	Priscilla: Oh, I think I get what he's trying to say, can I explain it? (Sharon nods) It's cause I do not know if, is this a pack that he's carrying (points to the backside of the image of the car) when he goes here (trails finger down (1) to the pointy hill).	1
70	Jamir: No no no, not like that!	1
71	Priscilla: ...the bottom's gonna get stuck here.	1
72	Jamir: Not like that! No, this part is gonna get stuck because, like, where's the little car?	1
73	Sharon: I don't know. Use your words.	F
74	Jamir: No, it's cause I need the little car to show you.	0
75	Jimmy: Oh, back over here (hands Jamir the car).	0

76	Jamir: (looks at the car) Oh, no. It's cause there's some other cars that have like stuff right here, but it doesn't have no cap right here so it might get stuck right there. And this little part might get stuck.	3
77	Jourdan: But that's probably a rocket booster.	2
78	Jamir: No, could you give me another car that has like some materials here--	3
79	Alexis: Like the real cars?	3
80	Jamir: Yeah, like the real cars.	3
81	Sharon: Oh, like the engine?	B
82	Jamir: No, like...	0
83	Alexis: Oh, like the bottom stuff? Like the tubes and stuff?	3
84	Jamir: Yeah, like, the real car, a real car has like a bunch of material right here but it doesn't have no cap or nothing. So it might get stuck right there.	3
85	Sharon: Okay, can we talk about toy cars just to make this easier? Do you get him? Do you get what he's saying? Okay, wait, one more question or idea about this drawing and then we're going to go on.	F
86	Sharon: Jose.	A
87	Jose: I don't get it. Cause it's gonna go like this in a circle (traces finger around the Loop-The-Loop and a few times around the fire) and if it's gonna go like this it's gonna go through fire.	3, 2
88	Jimmy: No, it could go like this (traces finger up the first leg of the Loop-The-Loop) and it could go on that (traces his finger around the fire) and it could go a third (traces his finger around the fire again).	2, 3
89	Jose: Yeah, but it's gonna repeat it. It's gonna keep on repeating it and he can't go down here (seems like he's saying it will continue in an endless loop around the 'fire-bridge' that they had concluded before wasn't really a bridge).	3, 2
90	Jimmy: But it will just repeat two times.	2, 3
91	Sharon: Jimmy, are you talking about a toy car?	B
92	Jamir: But it might get on fire because there's a fire down there so it might get on fire.	2
93	Sharon: Make sure you're talking about a toy car. There's no driver in this car. Yes?	F
94	Jourdan: There it's probably automatic.	3

95	Sharon: No, it's not automatic. It's a toy car.	F
96	Gustavo: There's a bunch of toy cars that are remote control cars.	3
97	Jourdan: Yeah, like that.	3
98	Sharon: (interrupts) OK, Jose, I want you to scoot back to where you were. Jamir, scoot back to where you were. We're looking up here. And Lex, turn around please. Thank you, now we can all see. Okay, Just to be clear, we need to be talking about toy cars today, not cars that people drive. All right?	F
99	Sharon: Briza, what's your question?	A
100	Briza: (inaudible)	0
101	Sharon: So, Jimmy and Isaac actually need to work on this idea a little more. OK, thank you. You guys can sit down.	A
102	Jimmy: Hey! I have a new idea. This thing (points to (1)) helps it brake a little bit before it go up here (points to the pointy hill).	3
103	Sharon: What do you mean? It helps it brake...	B
104	Jimmy: A little bit, like brake a little bit. Brake like when you brake a car...(students talking at once)	3
105	Sharon: I can't hear Jimmy! What do you mean?	B
106	Jimmy: Uh, when you brake...	3
107	Sharon: Are there brakes in the toy car?	B
108	Jimmy: No, I would use this for the brake (points to (1)).	3
109	Sharon: What?	B
110	Jimmy: I would use that (points to the track near (1))	3
111	Priscilla: It's like a trunk.	0
112	Jamir: It's like something that breaks stuff down. It's like a knife or something like that.	0
113	Priscilla: It's like a trunk when it goes here (points to (1)), it makes it slow down a little and go.	1
114	Sharon: Are you talking about a toy car or a real car?	B
115	Jimmy: A toy car!	0
116	Sharon: And what on there is making it slow down?	B
117	Alexis: Maybe the brakes.	0

118	Sharon: I can't understand Jimmy because everyone's interrupting him. And that's why it's taking so long to hear Jimmy's idea.	6
119	Jimmy: Because it has this thing and...	0
120	Sharon: What is that thing?	B
121	Jimmy: That thing is for like the brake...the brake...	2
122	Sharon: What is the brake?	B
123	Jimmy: The brake to stop.	2
124	Sharon: Where is the brake to stop?	B
125	Jimmy: (points to a spot on the roller coaster in between (1) and the pointy hill) Right here. To stop a little bit.	2
126	Sharon: Wait, but right here (points to (1))? you're saying there's brakes? Right here? Does the car use brakes?	B
127	Gustavo: A real car, yeah.	3
128	Sharon: But we're not talking about a real car, we're talking about a toy car.	F
129	Jourdan: A remote control car, a remote control car!	3
130	Sharon: We're not talking about a remote control car right now. We're talking about a toy car. Are you saying that there's brakes inside the toy car?	F
131	Jimmy: (nods his head yes).	0
132	Sharon: Are there brakes inside a toy car?	F
133	Jimmy: (Smiles) No.	0
134	Sharon: Ok, let's talk about a different idea. Thank you Jimmy and Isaac, you can sit down.	A

APPENDIX 3: Transcript and coding from The Late Episode

Line	Transcript	Code
135	Sharon: Jamir, did you push it?	B
136	Jose: Well he let it go.	1
137	Sharon: Is that the same? Pushing it and letting it go?	D

138	Students: no!	1
139	Gustavo: Because, like, if you let it go, it just like, stays there but...	1
140	Jamir: well pushing it, well but putting it is like letting it go, if you just put it on there, it's like letting it go.	1
141	Ray: It's free will	3
142	Sharon: Does a car have free will (students: no) or does that doorstop have free will? What do you mean by free will?	B, D
143	Ray: I mean like free will-- has free will if you just like, if you just let it go because you're not pushing it, that's all.	1,3?
144	Sharon: But what is free will?	E, B?
145	Ray: Free will means like, it's--how am I going to explain this?	0?
146	Sharon: Who can explain free will?	C
147	Jourdan: I don't know what free will is.	0
148	Sharon: That's why we need to explain that, what you mean. Kyleigh, what do you mean?	A
149	Kyleigh: I think free will means, I probably think free will means like uh, letting it just go.	1
150	Jourdan: Oh, like letting a dog go for a walk by itself, huh?	0?
151	Sharon: Yeah, like a dog can walk by itself. Free will means you get to choose what you want to do. You guys have free will when it comes to choosing a place to sit. You get to choose where you want to sit. You lose your free will if you make bad choices. Then I choose for you. Does the car or the doorstop have free will?	C
152	Students: no.	0
153	Sharon: What makes the car and the doorstop go down that ramp then?	D
154	Jourdan: The car had free will.	1?
155	Sharon: Wait, a car has free will?	B
156	Student: Yeah...on the wheels	0

157	Jourdan: Yeah, the wheels because um, can I demonstrate? Because, um, when Jamir put the board and he put the doorstop and the car, the car had free will because he just let them go and the car went by itself, it didn't like, do, like the doorstop. Because the freewill is because of the wheels because the wheels are really slippery so it goes on slippery things.	1
158	Scarlett: When you're like putting the thing, you're telling it where to go, because when you're putting it straight, you're putting it straight so it goes straight.	1
159	Sharon: Brittney, you wanted to talk and I interrupted you, I'm sorry.	A
160	Brittney: I think because the gravity, I think the gravity with the air, it makes it kind of go slower, I mean, like the gravity and the air could make it kind of faster, but if it's only gravity, it could make it more slower.	3?
161	Sharon: Ok. Okay, so I have a question. Was it free will that made that car go down?	F?
162	Students: no.	0
163	Sharon: Kyleigh. (Kyleigh makes a frustrated look) I know.	A
164	Kyleigh: He could go.	0
165	Sharon: That was so nice, but really I think the reason she did that was that she doesn't want to be frustrated so she wants to let you go first. But that was really nice.	0
166	Jourdan: the reason why-something just popped in my mind because of- about the free will because of the free will when Gustavo yesterday, when Gustavo and the car went down the slide, the reason why the car won so many times is because of the free will of the car because the um, the wheels are slippery, so it goes on slippery things, and the slide is really slippery so it goes down it really really fast.	3
167	Sharon: Alexis.	A
168	Alexis: The car doesn't only go on slippery stuff, it could go on flat stuff like this. Um, like right here if you push it it's not free will because you need to push it right here.	1
169	Sharon: So that's not free will because you push it.	B
170	Gustavo: Not either a remote control is not either free will because you're controlling it with the remote control.	1
171	Jourdan: Because when you put it down the hill and you don't control it, it's going on free will.	1

172	Alexis: Ya, and if you get a car and put it right here, it's not free will because it's not going down. You need to push it.	1
173	Sharon: Ok so is that free will if a car goes down a slide by itself?	B
174	Students: yes.	0
175	Sharon: Ok so free will means that you get to make a choice, so Jourdan, did that car make a choice to go down that hill?	F?
176	Gustavo: No it didn't, it just went down the hill because--	1
177	Jourdan: I don't think, because cars can't go alive.	1
178	Gustavo: Ya cars can't go alive, only persons can.	1
179	Sharon: Kyleigh, it's your turn now.	A
180	Kyleigh: It's kind of like uh (to Jourdan) do you have something to say? It's kind of like uh, a person driving a real car, it doesn't have free will,	1
181	Sharon: Who doesn't have free will?	B
182	Kyleigh: The...car...doesn't have free will because the person is driving the car (students interrupt)	1
183	Sharon: Wait let her finish. Let her finish	0
184	Kyleigh: But a toy car, a person isn't inside a toy car so you have to push it. So if its on a slide or if you have a flat surface that's kind of like this, then it has power if you push it, it has power to go down.	1
185	Sharon: so pushing gives power?	B
186	Gustavo: Ya, pushing it gets power and like energy because it uhhh...	1
187	Sharon: You said pushing gives power and energy? What about when you don't push? Because right now when Jamir put those down the ramp, he did not push.	D
188	Gustavo: Ya, but he could try pushing them.	3
189	Sharon: So did the car have free will then when it went down?	D
190	Jourdan: no!	1
191	Sharon: Because he didn't push.	B
192	Alexis: It didn't have free will because it didn't have another choice of staying or going, it had to go down because--	1
193	Sharon: It had to go?	B
194	Alexis: Ya.	0

195	Sharon: Why did it have to go?	D
196	Alexis: Because like if you're on top of a hill and the car goes down a slippery thing, like it has to go down because like there's nothing that could hold it, unless if it was a real car, then the brakes.	1
197	Kyleigh: Oh, I see what he's talking about.	0
198	Sharon: Wait, so he said it has to go down because there's nothing to hold it.	C