

MATHEMATICS TEACHING: MOVING FROM TELLING TO LISTENING

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*The senses are not only the basis for the epistemological constitution of reality,
but also for its transformation, its subversion in the interest of liberation.*

—Marcuse, *Counter Revolution and Revolt*¹

Vision is a spectator; bearing is a participation.

—Dewey, *The Public and Its Problems*²

*[The] development of our capacity for listening is a meaningful way of reclaiming
alienated meaning and assuming response-ability for the future.*

—Levin, *The Listening Self*³

Tom wanders among his grade 7 mathematics students as they “play” with their Fraction Kits—sheets of paper cut into halves, thirds, fourths, and other fractional pieces. He has posed a question to the class that was raised by a student in a previous lesson: Using the pieces from the kits, how many different ways can you make three-fourths?

The class members are noisy and active. Groups huddle together, producing a variety of answers. As Tom moves about the room, he listens, he asks more questions, he asks students to display their work on the chalkboard.

Not everyone is finished when he calls them to attention, but they listen eagerly, knowing they will soon have an opportunity to tell their classmates what they have done or discovered. A lively discussion of the activity ensues, during which Tanya asks, “How many different ways are there?” “I don’t know,” Tom replies honestly. “I’m not sure anyone knows. It’s possible that no one has ever asked that question. Let’s see if we can find an answer.”

¹Herbert Marcuse, *Counter-Revolution and Revolt* (Boston: Beacon Press, 1972), p. 71.

²John Dewey, *The Public and Its Problems* (New York: Henry Holt, 1927), pp. 218–219.

³David Michael Levin, *The Listening Self* (London: Routledge, 1989), p. 8.

The activity with the Fraction Kits resumes, groups excitedly attempting to find not just some, but *all* of the answers to the original question. Near the end of the class, Tom calls for the students' attention and then asks Leanne to tell the rest of the class about the method she is using to record her answers. Leanne describes the table she has devised and attempts to explain the logic behind its structure and its use. As she does so, Tom asks questions, in part for further clarification, in part to aid her explanation.

In the final moments, Tom asks students to arrange their answers in a similar table. They commence earnestly. Just before the bell rings, he suggests that they attempt to complete the question for homework. That will be the starting point for tomorrow's class.

Sitting in on this lesson as an experienced mathematics teacher, I couldn't help but be amazed. As I listened, I heard references to addition, subtraction, multiplication, and equivalence concepts—all at a level of complexity far surpassing the recommendations laid out in the mandated curriculum documents. But what was more surprising was that Tom did not seem to be saying much at all. He wasn't teaching by *telling*, rather he seemed to be teaching by *listening*.

In this article, I explore what it might mean to "teach through listening," attempting first to understand the nature of listening before exploring its place in the mathematics classroom.

LOOKING FOR LISTENING

Across the noisy classroom, I watch Tom as he moves from group to group. At first, he stands apart from a cluster of students, silently observing their interactions. He leans toward them, his eyes not only on their faces but on the movements of their hands and on the products of their explorations. Then he moves closer, his interest piqued by a spoken comment or a silent action.

Without being able to hear what is being said, I can tell that Tom is listening. There is a particular bodily aspect to listening, a visible orienting to the subject of discussion. When two persons converse, for example, it can be *seen* that they are listening to each other as the actions of their bodies become bodily *interactions*. They lean toward and reach out for each other, momentarily unaware that they are violating the Western taboos on proximity, touch, and extended eye contact. They seem to focus in a way that suggests they are oblivious to the noise around them; they attend to each word and to each action as though nothing of importance had occurred prior to the discussion and nothing of importance awaits them at its end. They are unconcerned that their voices are perhaps too loud, their bodies too animated.

Listening, then, need be neither motionless nor silent—although, more often than not it seems, it is precisely this sort of inactive attention that teachers demand of students. Of course, the listener may assume this pose, but it is something other than an audience's lack of motion or their silence that makes us aware that they are listening. In the classroom, for example, as the novel is read or as the mathematical principle emerges, the teacher knows the students are listening not because they have ceased to move but because a certain rhythm or harmony is established—there is an awareness that each is immersed in and conducted by the same subject matter. The gazes are fixed not on the teacher nor on one another, but on that which is among them.

An important quality of this listening, then, is that it be active, and an immediate implication is that listening cannot be held silent. As Tom listens in on a group, he questions, he challenges, he smiles, he frowns. His actions convey not only that he is listening, but that he is learning from the interaction.

Similarly, during a classroom discussion, his methods of questioning indicate a sincere underlying desire to hear the answers the students might give. The questions are not preselected, nor does he know the responses. "Tell me how you got that answer." "That's an interesting statement. Can you tell me more?" These are questions of a different sort than those we normally associate with mathematics classes—that is, questions for which the answers are already known, questions whose answers have little or no effect on subsequent inquiries.

These points become clearer as we compare Tom's classroom with a more conventional mathematics lesson.

LISTENING IN A TRADITIONAL CLASSROOM

The bell rings and Wendy moves to the front of the room. Above the students' chatter we hear her voice: "ONE . . . TWO . . ." The class falls silent before she reaches three. Wendy waits a few more seconds until everyone is seated properly at their desks.

"Take out your homework and pass it to the person in front of you." For the next five minutes, the students call out answers, one by one, up and down the straight rows. The exercises are corrected, the scores are tallied, the numbers are recorded.

"Okay, we're moving on to multiplying fractions today. Before we get started I want to emphasize that the way you multiply fractions is totally different from the way that you add fractions, so don't confuse the two."

A 10-minute "lesson" ensues, in which Wendy presents the multiplication algorithm, along with a variety of examples. As the lesson moves along, she gives the students a few "do now" exercises, and after some

hasty computations, they offer their answers. Notes are written on the board and copied into workbooks. The students ask few questions.

Wendy then announces the day's assignment—a textbook exercise—and the students use the balance of the class for independent work. During this time, Wendy moves from raised hand to raised hand—confirming answers, pointing out errors, and repeating fragments of her earlier explanation. As the bell rings to end the class, she reminds the students that they are to complete the “rest of the page” for homework.

The precise details of this account are specific to this one classroom on this particular day, but the situation is broadly familiar. This is a “typical” mathematics class—ordered, structured, calculated, predictable—reflecting a particular and pervasive conception of the discipline.

But it is not the greater emphasis on order and structure that most strongly distinguishes Wendy's classroom from Tom's; it is the nature of the communication that occurs among the members of the two communities. Unlike the previous classroom, here there seems to be almost no *interaction*. The actions of the students and the teacher appear coordinated, but independent; they lack a common rhythm. An observer has a clear sense that Wendy has taught this lesson before and will teach it again. The particular students in the class have little effect on the lesson's course. Their backgrounds, their varied interpretations are unimportant. The “correct understanding,” one that is independent of the students, is presented for mastery.*

The mathematics in Wendy's classroom is like an object that stands between the teacher and the learners. It is a collection of ideas that are separate from their experiences in the world, but that may be imposed upon those experiences. It is knowledge developed elsewhere and retold in this setting. It does not facilitate their relationships, but holds them apart. In this classroom, the teaching might be best characterized as an act of *telling* that demands little *listening*.

THE CONVERSATION—A KEY FOR UNDERSTANDING LISTENING

Comparing the sorts of interactions that are prevalent in Tom's class with those in Wendy's class leads to the suggestion that the former context is more conversational and the latter is more monological. As Taylor explains, conversations

*This is not to suggest that Wendy's students are not interested in the subject matter. Many are. But it is a different sort of engagement, as suggested by the sorts of questions that are asked by teacher and students alike: “What is the product of three-fifths and one-half?” “How do you do number four?” These are not questions that are oriented toward developing a deeper understanding of the concepts, nor do they suggest personal and meaningful relationships between learner and subject matter or among learners within the classroom context.

move beyond mere coordination and have a common rhythm. The interlocutor not only listens but participates with head nodding and “unh-hunh” and the like, and at a certain point the “semantic turn” passes over to the other by a common movement. The appropriate moment is felt by both partners together in virtue of the common rhythm.⁵

Taylor contrasts such “dialogical acts” with “monological acts”—acts of a single agent—a notion that seems to be more applicable to Wendy’s classroom.

The conversation is a fertile place to search for an understanding of the nature of listening. Gadamer’s description of the conversational relation seems particularly apt for interpreting the interactions in Tom’s classroom.⁶ In Gadamer’s formulation, the conversation is a triad involving you, me, and the topic or subject matter. The subject matter exists only in the conversation—neither in you nor in me, but between us—and we are “conducted” by it. Through the conversation we attempt to incorporate the insights of the other, moving toward a consensus, or “fusing of horizons.”⁷

And so the communicative relationship is an intimate one, an idea echoed by Merleau-Ponty, who suggests that human interaction involves a merging, or an intercorporeality:

[As I listen to another, my body] discovers in that other body a miraculous prolongation of my intentions, a familiar way of dealing with the world. Henceforth, as the parts of my body together comprise a system, so my body and the other person’s are one whole, two sides of one and the same phenomenon, and the anonymous existence of which my body is the ever-renewed trace henceforth inhabits both bodies simultaneously.⁸

We are thus *joined* in the conversation, a theme that is common in Merleau-Ponty’s writings. Elsewhere, for example, he describes the communicative act as “one system with two terms (my behavior and the other’s behavior) which function as a whole.” Husserl, Merleau-Ponty tells us, described such coordinated action as a “phenomenon of ‘coupling,’” where the notion of “coupling” is “anything but a metaphor.” Merleau-

⁵Charles Taylor, “The Dialogical Self,” in *The Interpretive Turn: Philosophy, Science, Culture*, ed. David Hiley, James Bohman, and Richard Shusterman (Ithaca: Cornell University Press, 1991), p. 310.

⁶In making this comparison, I do not mean to suggest that the mathematics classroom can or should be patterned after the conversation. It cannot be. As Gadamer suggests, “we fall into” a conversation that “reaches its own conclusions.” In contrast, we are thrust into the mathematics classroom, and once there, the subject matter and the “anticipated outcomes” are determined for us, for the most part.

⁷Hans-Georg Gadamer, *Truth and Method*, 2nd rev. ed. (New York: Crossroad, 1990), p. 387.

⁸Maurice Merleau-Ponty, *The Phenomenology of Perception* (London: Routledge and Kegan Paul Ltd., 1962), p. 354.

Ponty goes on to explain that it is our ability to perceive—to observe, to hear, to sense—the other that enables this phenomenon: “In perceiving the other, my body and his are coupled, resulting in a sort of action which pairs them (*action a deux*).”⁹ Complementing Gadamer, then, Merleau-Ponty would agree that in conversation we set aside our illusions of autonomy, allowing a collective consciousness to emerge; in this conversational unity, we become capable of greater insight and deeper understanding, capable even of cutting beneath the conscious intent of the speaker.

The goal of the conversation is to deepen understanding. It “has a hermeneutic thrust: it is oriented to sense-making and interpreting of the notion that drives or stimulates the conversation.”¹⁰ The key to such sense-making, that which enables the interpretation, is listening, itself hermeneutic. It is our ability to listen—that is, our ability to attend to and interpret what is said—that makes conversation possible. Here is what Levin says on this issue:

When listening really echoes and resonates, when it allows the communication to reverberate between the communicants, and to constitute, there, a space free of pressure and constraint, it actively contributes, quite apart from the speaking, to the intersubjective constellation of new meanings, meanings actually born within this intercorporeality; and it promises, because of this, the achievement of mutual understanding—if not also consensus.¹¹

LISTENING—MORE THAN A TECHNIQUE

What he'd told her . . . was valuable if she'd been listening. But she wasn't. She wasn't a listener. She had a set of fixed static patterns of value and if you argued with her, she'd get mad at you.

—Pirsig, Lila: An Inquiry into Morals¹²

Pirsig's statement “She wasn't a listener” is immediately comprehensible. In so describing his title character, Lila, he is suggesting not that she was incapable of hearing, but that she was not normally open to others and to their ideas, limited by her “fixed static patterns.” Listening thus is not primarily an act; it is an orientation. Everyone is capable of listening, but few, it seems, are in the world in a listening way. Listening, then, is a way of being in the world, an “*ontologically oriented capacity*” that is directed toward bringing ourselves and others into being.¹³

⁹Maurice Merleau-Ponty, *The Primacy of Perception* (Evanston, IL: Northwestern University Press, 1964), p. 118.

¹⁰Max van Manen, *Researching Lived Experience* (Toronto: The Althouse Press, 1991), p. 98.

¹¹David Michael Levin, *The Listening Self* (London: Routledge, 1989), p. 181.

¹²Robert Pirsig, *Lila: An Inquiry into Morals* (New York: Bantam Books, 1991), p. 158.

¹³David Michael Levin, *The Listening Self* (London: Routledge, 1989), p. 17.

We are all acquainted with people who are not listeners. When we talk with them, they might ask the correct sorts of questions and perhaps even display the appropriate mannerisms, but our contributions either seem to be ignored or misinterpreted. We get an uneasy feeling because, even though we find ourselves within the interaction, we don't seem to be part of it. We feel rushed, unheard, not listened to, excluded—not present. We quickly become unwilling to “share” even the most mundane thoughts. Sadly, it seems that many mathematics teachers fall into this category when they are in their classrooms.

And so, listening is not a technique that can be reduced to a set of prescriptions or guidelines. It is something that we enter into, something that we are, emerging from our occupation with others, with their meanings, and with the meaning they have for us.

Further, we listen not just with our ears and minds; we listen with our bodies. Listening is an activity of all of the senses, attuned not only to the text of the conversation, but to the subtexts (the tones, the mannerisms) and to the contexts (the setting, the history). It is not strictly or even primarily an academic or intellectual activity; it is a fully human endeavor that also evokes physical and emotional responses. As Merleau-Ponty suggests, “I echo the vibration of the sound with my whole sensory being.”¹⁴ We listen with our ears, with our eyes, with our touch, with our stomachs, with our bodies, bringing the collective weight of our experience to our emerging understandings.

LISTENING AND HEARING—DIFFERENT PHENOMENA

Part of my research has involved making audio-recordings of classrooms. Each time I transcribe the teacher-student interactions from one of these recorded lessons, I am struck by the muddle of sounds the machine has captured—rustling papers, falling pens, and textbook covers slapping against desktops; whispers, sighs, and laughter. But at the time of the interaction, I was unaware of this hum of the classroom. I quite simply did not hear these sounds.

I can induce the same phenomenon at this moment, as I pause from my writing to listen, becoming once again aware of the sounds in which I am immersed. It seems that only when my attention is drawn or directed to particular sounds—such as the rumbling of traffic outside my window—am I able to hear them.

Hearing and *listening*, then, refer to different phenomena. Consider, for example, the difference between these two statements: “I can't *hear*” and “I can't *listen*.” In the former, I seem to be concerned that the sound

¹⁴Maurice Merleau-Ponty, *The Phenomenology of Perception* (London: Routledge and Kegan Paul Ltd., 1962), p. 234.

isn't loud enough. It is something that I say when I want to hear but, for whatever reason, cannot. The concern is strictly sensory.

In the latter, however, it is clear that *I am able* to hear the sound without difficulty. In uttering, "I can't listen," I'm not saying that I *can't* hear but that I *won't* hear. To make this point clearer, the statement "I can't hear" is often followed by "Turn *up* the volume." But the statement "I can't listen" tends to be accompanied by sentences more along the line of "Turn *down* the volume." *Listening* is thus a capacity that is *based* upon hearing but that goes *beyond* hearing. It is intentional (we listen *to* something) and attentive (we listen *for* something). Hearing, in contrast, lacks such intentionality.

A comparison with *seeing* and *looking* might be helpful here. *Sight* is the sensory capacity; *looking* is the intentional act through which we bring particular objects closer. *Hearing* and *seeing*, the sensory capacities, present us only with an undifferentiated background. It is our ability to *listen* and to *look*—that is, to draw something out of that background of experience, to focus on it, and to bring it into ourselves—that enables our perceptions.

The first distinction between hearing and listening is thus made. Hearing is the sensory capacity that underlies our ability to listen. In the classroom, what I heard was determined mostly by what I was listening for. I heard the teacher's questions, I heard the students' answers. I heard the range of pitch and tone in their voices. In one sense, I heard everything, because I was aware of no gaps in my perception; the experience was seamless. But in truth, I heard hardly anything.¹⁵

And so hearing is merely sensory, an awareness of sounds; it is not concerned with interpretation, although it is constrained by our abilities to interpret and to notice. In contrast to the passive, sensorial nature of hearing, listening is *sensual*: active, focusing on, welcoming in, and attending to sounds with a hermeneutic interest. Interestingly, the *Oxford English Dictionary* notes that listening is etymologically related to *lust*, suggesting focused longing, sensual physical contact, and intimate pleasure.¹⁶

¹⁵It is not quite correct to say that our ability to hear is dependent upon our listening. Although what we listen for (what we are anticipating) affects what we hear, many sounds are still heard even though they could never be anticipated. Once aware of these sounds, we can choose to listen—that is, to attend more closely and seek to understand—but until our attention is taken up elsewhere, we cannot choose to not hear. And there are other sounds—those we tend to refer to as "noise," such as the sound of the unmuffled motor in the middle of the night—that thrust themselves into the center of consciousness in a way that collapses listening into hearing. We are coerced into attending to these noises, and we feel violated in this coercion.

¹⁶*The Compact Oxford English Dictionary*, 2nd ed. (New York: Oxford University Press, 1991), p. 982.

A second important distinction to be made between hearing and listening is suggested by the phrases "I hear you" and "I'm listening." At a recent parents' meeting, for example, a school principal responded to each of the parents' concerns with "I hear you." But it did not take long for every parent to realize she was not listening. In uttering "I hear you," she was suggesting that she understood what was being said, that the speakers' meanings were apparent to her, and that there was no need for further listening. Hearing, then, presumes understanding, and when we cannot comprehend someone, "we can't hear a word he's saying."

In contrast, the statement "I'm listening" suggests a recognition of the preeminent role of interpretation in our interactions. It is when our understandings are incomplete that we are compelled to listen. Indeed, when someone challenges or fails to grasp the point we are attempting to communicate, we do not respond with "There is a problem with your hearing," but by saying "You're not listening." This distinction is an important one because much of the interaction that occurs within the classroom, it seems, is based on hearing rather than on listening—that is, on an awareness of the other's presence, but not on an earnest desire to bring that person forward; on knowing, but not on understanding.

LISTENING TO—THE OBJECT OF OUR LISTENING

As suggested above, listening, like looking, is intentional. It is directed toward a particular object—that is, toward bringing it forth out of an undifferentiated background of experience. In listening, I am drawing an object into myself, the subject, and so we are brought forth together; we are intertwined in our being and our becoming. Thus, an orientation to listening brings with it an awareness that there can be no rigid subject-object split.

But what is the nature of this object of attention in the mathematics classroom? Our first inclination is to suggest that the object must be the speaker or student. Another compulsion suggests that it must be the mathematical concept under study. Arguably, our proclivity to answer in these terms betrays persistent Cartesian perspectives on subjectivity and knowledge, perspectives that are challenged by Gadamer's and Merleau-Ponty's descriptions of the communicative relationship.

We might be able to develop a sense of the object of listening by comparing the different approaches to the study of mathematics in the two classrooms referred to earlier. Wendy began the lesson with an introduction of the formal mathematical concept, presented in a manner that suggested that the "multiplication of fractions" concept had an existence independent of human experience—that it was a pre-existing object discovered in the real world, rather than a uniquely human notion developed to make diverse experience meaningful. After introducing the con-

cept, Wendy applied it to a few situations that may or may not have been familiar to the learners. She then assigned exercises to ensure mastery of the procedure.

Tom reversed the sequence. He began the lesson with exploration and manipulation—the development of a repertoire of common experience—that could then be discussed in a meaningful way using familiar terms.¹⁷ The discussions were, for the most part, informal. When used, formal symbols and operations were not the end products of the learning. Rather, they facilitated interaction and further exploration. Mathematics enacted in this way was more an approach to knowing than a body of established knowledge.

The object of the listening is thus the knowledge—the individual's conceptualizations and the collective realizations—that emerges in a context in which the mathematics is not (and can not) be considered apart from those doing the mathematics. The curriculum thus merges with and emerges from experience. In such a situation, the notion of curriculum involves more than the study of particular ideas: it becomes an integral part of the constantly evolving text of our existence as enacted in classroom relationships. Issues of knowledge and understanding are thus woven into and cannot be considered apart from the notion of identity.

But what of the mandated curriculum and the accepted body of mathematical knowledge? How does one reconcile the demands of a course outline through this "casual" exploration? It would be misleading to suggest there are no tensions between Tom's approach to mathematics and the sequences, structures, and facts outlined in a program of studies. The latter is inevitably interpreted as "target" knowledge that can be evaluated on a standard examination. But in Tom's class, the curriculum objectives became procedural knowledge. As noted earlier in this article, Tom's students were readily using concepts—not because the classroom experiences were targeting these concepts, but because they derived these concepts from experiences. Stated otherwise, the mathematical ideas became a means to an end, not an end unto themselves.

¹⁷It is important to note that the concept being covered in the class is one that might be described as being only a single step away from immediate experience. George Steiner, in *Language and Silence* (New York: Atheneum, 1967), offers a useful distinction between these sorts of concepts and others that were developed around the time of Isaac Newton through a turning of mathematical processes onto mathematical objects, producing a sort of concept that was no longer interpretable in everyday language or on the basis of common experience. These are the concepts found in higher courses of study. In spite of the difference in levels of abstraction, however, I believe that the approach to study need not be different.

LISTENING FOR—HOW LISTENING IS SITUATED

The *listening to* that occurs in a social situation is a complex phenomenon because we are dealing with persons who are never merely individuals; "they are always also representatives of institutional power, bringing with them a multiplicity of vested interests—and many virtually inaudible agendas."¹⁸ Each of us carries with us not only the history of our personal experiences, but the accumulated experience of the culture in which we are embedded. These experiences simultaneously enable and impair our listening, facilitate and limit interpretation.¹⁹

Thus, while we are listening *to*, we must also be listening *from*—that is, we inevitably take a particular stance in our listening. This idea is more commonly (and perhaps more clearly) indicated by the phrase "listening *for*," which hints at the inevitability of approaching interactions with a particular set of expectations or biases. *Listening for/from* is quickly revealed when our background differs markedly from that of the person with whom we are conversing. In the extreme case, when languages differ, listening is reduced to attempts to interpret simple signals. But conflicting interpretive frames present even more imposing barriers to listening, as they bring about a reluctance to adopt the other's stance. Similarly, if the subject matter is not something that commands our interest, our listening becomes labored, more easily distracted, and sometimes resentful. This phenomenon is apparent in countless mathematics classes, and its pervasiveness suggests a need for developing some common repertoire of experience and language that can facilitate interactions. The paper-manipulating activities in Tom's class served this purpose. On the surface, these were simple, and perhaps even mundane, exercises. But there is no disputing that the students were able to develop complex and sophisticated mathematical understandings, largely as a result of their "playing" with and talking about these materials.

Because listening is interpretive, what we are able to hear (understand) is also largely dependent upon the context in which the listening occurs. The context provides us with clues to interpret the speaker's

¹⁸David Michael Levin, *The Listening Self* (London: Routledge, 1989), p. 111.

¹⁹Philosophers and scientists alike have elaborated upon this point. Gadamer, for example, talks about the "prejudices" we inevitably bring to our listening and observing. Francisco Varela, Evan Thompson, and Eleanor Rosch, in *The Embodied Mind* (Cambridge: The MIT Press, 1991), summarize some provocative research in which it was demonstrated that, when a sensory organ is presented with a stimulus, a far stronger correlation exists between activity in the sensory organ and activity in the brain than exists between the activity in the sensory organ and the qualities of the stimulus. In effect, this result demonstrates that our perception of an object is more the product of what we have "projected" or anticipated than what was actually "sensed." To *listen*, then, is to subject our perceptions to scrutiny, endeavoring to disrupt the "taken for granted" that precedes, constrains, and (in effect) determines those perceptions.

words and actions. This explains how the same statement made in a different setting can take on a new meaning, or perhaps lose meaning entirely.

Often, inappropriate interpretations do not result from our inability to listen, but from a failure to attend to these contextual cues. Such "breakdowns" are common in mathematics classrooms, prone as they are to using familiar terms in unfamiliar and unusually precise ways. Further, because mathematical knowledge is popularly believed to be independent of context, a concerted effort is often needed to attend to the particularities of given situations that may affect learners' conceptualizations.

Our listening is obviously affected by our social and physical relations to one another. Thus, we do not listen to our friends in the same way that we listen to our colleagues, and we listen to children differently than we do adults. These differences in listening are not strictly a consequence of the topics we discuss, the contexts of our conversations, or the unstated rules that govern our interactions. Rather, the type of listening seems primarily determined by the nature of the relationship—in effect, enabled by who we are *listening to* and constrained by what we are *listening for*.

Thus, to explore the ways in which mathematics teachers do or might listen, it is important to consider the nature of the teacher-student relationship and the context of this relationship.

THE PEDAGOGICAL RELATIONSHIP AND LISTENING

A colleague recently interviewed a number of high school English students about a unit of study they had just completed. Although he never intended it to be a central issue, the topic of these discussions inevitably turned to their teacher. Asked what it was that distinguished her from their other teachers, most students responded immediately that it had to do with the way she listened. How did she listen? Perhaps Levin can help us:

In listening to others, accepting them in their irreducible difference, we help them listen to themselves, to heed the speech of their own body of experience, and to become, each one, the human being he or she most deeply wants to be.²⁰

A similar sense is captured by the notion of *pedagogy* as elaborated by van Manen:

Pedagogy refers only to those types of actions and interactions intentionally (though not always deliberately or consciously) engaged in by an adult and a child, directed toward the child's positive being and becoming.²¹

²⁰David Michael Levin, *The Listening Self* (London: Routledge, 1989), p. 88.

²¹Max van Manen, *The Tact of Teaching* (Toronto: The Althouse Press, 1991), p. 18.

Further,

In pedagogical situations the adult and the child do not just happen to be in the same spot; rather, they are together in a special way. They are together in an interactive unity that constitutes a relation, a pedagogical relation.²²

It is not my purpose here to attempt an explication of "pedagogical listening." Van Manen, Bollnow, and others have already explored this issue through their studies of pedagogy. The essential point is that the adult's pedagogical relationship with the child has a particular form that we should be attentive to. A discussion of the virtues associated with listening might clarify this idea.

LISTENING AND THE PRESENCE OF PARTICULAR VIRTUES

She was easier to talk to, too; she did not have a somewhat damping manner of listening only to correct.

—Wyndham, *The Chrysalids*²³

If we believe the learning of mathematics is a process of mastering pre-established and universal truths, then the purpose of listening to learners would be to diagnose and to remediate difficulties—the teacher would "have a somewhat damping manner of listening only to correct." Indeed, altogether too often it seems that if the teacher listens at all in a mathematics classroom, it is in this manner.

But if we hold that the learning of mathematics involves something other than the acquisition of knowledge, then listening takes on quite a different relevance. We become interested in student interpretations of ideas, and we are more aware of how these interpretations are tangled in the web of the students' existence. Thus our listening becomes a truly hermeneutic activity, one that requires the virtues of openness, humility, caution, and trust.

The listener must always be oriented toward gaining a fuller understanding, always vigilant to the fallibility of interpretation. This is why listening cannot be silent; it is itself a kind of speaking, a means of probing and checking emerging understandings. In Gadamer's terms, one "tests" or "questions," "one does not try to argue the other person down but . . . one really considers the weight of the other's opinion."²⁴ Within the conversation, this manner of "speakingly-listening" is expected. Indeed, we can only know if the other is listening if she responds in some way, and we worry that she is daydreaming or lost

²²Ibid., pp. 72–73.

²³John Wyndham, *The Chrysalids* (London: Penguin Books, 1955), p. 69.

²⁴Hans-Georg Gadamer, *Truth and Method*, 2nd rev. ed. (New York: Crossroad, 1990), p. 367.

when she falls silent. So listening is not a solitary act, it is a reciprocal engagement.

The ability to listen also depends upon a certain trust that the speaker has something to say. Comparing Tom's and Wendy's classes once again, Wendy appears to have little faith that students will have much to offer the lesson, whereas Tom endeavors to develop the interactions around student contributions. This attitude of trust includes a belief that the learner is justified in what he is doing or saying, that there is *reason* (whether mathematical or otherwise) in his actions. If the teacher lacks this trust, then the temptation will be merely to correct, forcing the learner to suppress the thought, belief, or intuition that lay beneath the original "error."

The converse to this notion is also true. The student must trust that the teacher or fellow learner is willing and able to listen before investing much effort in articulating certain ideas. This willingness to listen is an ability that can be developed, in part through accumulated teaching experience, in part through attempting to anticipate possible student responses. In any given context, we are compelled to listen *for* certain things. Stated otherwise, we cannot avoid bringing particular expectations to our teaching—and hence to our listening—and in this way the process of thinking through possibilities can open one's hearing.

PROBLEMS WITH THE CURRENT CONTEXT

The discourse surrounding mathematics education reveals an alarming absence of reference to the pedagogic nature of the relationships between teachers and students. Somehow we have forgotten that all "our pedagogical being with children is a form of speaking with them," in favor of a conception that at times seems more consistent with speaking *at* them.²⁵

This notion was confirmed in a mathematics curriculum and instruction course that I took some time ago. Midway through the term, the professor asked the participants, all of whom were practicing teachers, to "listen" to their students for one week and to bring some examples of what they had heard to the next class. They returned the following week with comments such as, "I listened but couldn't pick anything out," and "My lessons just weren't conducive to doing that sort of thing this week." These teachers apparently perceived no need to listen.

The participants in that course are not the only ones unable to conceive of a mathematics classroom as a place for listening. My nonteaching friends usually react with laughter when I raise the issue of how mathematics teachers listen. Consistent with the above story, teaching in

²⁵Max van Manen, *The Tact of Teaching* (Toronto: The Althouse Press, 1991), p. 31.

general—and mathematics teaching in particular—is seen to be about *not* listening. What is it about the mathematics classroom or our histories with mathematics teachers that evokes this reaction? An answer to this question is not difficult to find. If Wendy were asked to report on her listening during the lesson described, she would likely respond, like the teachers in the curriculum course, that her lesson was just “not conducive to doing that sort of thing.”

What are the implications of this orientation for the relationships between teacher and student in Wendy's classroom? We cannot suggest that she lacks a pedagogical concern for her students. Indeed, in discussing her approach to teaching, she suggests that it emerges out of just such a concern. But her approach to learning and knowing seems painfully unpedagogical. It shows no sense of individual difference, of historicity. There is no awareness of intercorporeality or even of mutual affect. Indeed, the dominant perception is quite the opposite: separated, autonomous, insulated beings that do not affect and who are unaffected by those around them and by the subject matter that brings them together. These relationships appear not only to lack meaning, they seem demeaning.

In particular, the subject matter in this context is clearly not something that enables relationships; rather, the pedagogic relationship between teacher and students exists *in spite of* the mathematics, a problem exacerbated by the particular culture of the mathematics classroom. The mathematics teacher has been charged with imparting information, a task that would appear at first glance to obviate the need for listening. As noted in Wendy's case, the result is a sort of teaching that might be best characterized as *telling*, which in turn leads to interactions that require *hearing* but little *listening* on the parts of teacher and students alike.

This point becomes clearer as we return to the comparison of Wendy's mathematics lesson and a conversation. An important distinction between the two situations is revealed by examining their uses of the terms *questioning* and *testing*. Recall that Gadamer used these terms when describing the probing that is needed when one is seeking a deeper understanding within a conversation. For him, questioning and testing have a hermeneutic intent, and they thus facilitate listening. But in this mathematics classroom, questioning tends to be interpreted as the elicitation of rote responses, and testing has become strictly a means of converting mathematical understandings into a summative grade. The teacher is not genuinely attending to the answers given in a way that helps her understand the sense the students are making; neither do the students' answers generally affect the course of the lesson. In this mathematics classroom, rather than facilitating listening, questioning and testing have become substitutes for listening.

Other factors militate against listening in the mathematics classroom: the desks are arranged for quiet individual work, intended to create distance rather than to foster relationships; the prescribed topics are often of little interest, not the sort that "conduct" participants; the mathematics concepts presented are rigid and defined, offering little space for personal negotiation. Further, in the current context, the teacher holds a position of authority, expected to "control" learners and to demonstrate expertise in the discipline. The metaphors guiding this interaction, which tend to be management-oriented and mechanistic, have a profound constraining effect on listening.

But to leave the discussion here would be to suggest that it is impossible to transcend these constraints. As demonstrated by Tom, other patterns of interaction are possible, if more difficult to enact in the current context. In particular, an orientation toward listening, supported by and bringing with it a sense of pedagogy, suggests a promising alternative.

LISTENING—A FUNDAMENTAL COMPETENCY OF THE MATHEMATICS TEACHER

The question of how teachers listen is not an easy one to answer because it depends upon a form of research that is itself an act of listening. Arguably, this question is not the important one, concerned as it is with what exists and not with what might be. It loses sight of the transformative potential of a listening orientation. Further, in the process of listening for listening, one runs the risk of neglecting what precedes and enables it.

It would thus be misleading and reductionist to suggest that the underlying difference between Tom's and a more conventional classroom has to do with his orientation to listening. His sense of pedagogy, his views on the nature of mathematical knowledge, and his awareness of current theories of learning have all played important roles in determining his teaching style.

Nevertheless, comparing the interactions and relationships in Tom's classroom with those in Wendy's, the differences seem to rest largely on the contrasting ways the teachers listen—that is, on the different ways that they relate to their students. In Wendy's class, the mathematics is an unavoidable hindrance to relationships, a necessary evil. In Tom's class, the mathematics is much more like the "subject matter" of Gadamer's conversation, offering a space to foster relationships and to model listening. Unlike the stark separation of teacher and students seen in many classrooms, Tom's classroom displays a true triad, a genuine potential for fusing of horizons, in part because the mathematical concepts are

emerging from collective experiences, not being imposed on individual understandings.²⁶

The consequences of this orientation are profound and immediately obvious in the students' engagement with the task. In particular, comparing Tom's students with Wendy's, they too have become better listeners, more interested in and capable of attending to the insights of others and to "the speech of their own body of experience."²⁷ The questions in this class are authentic, oriented toward developing deeper understandings, affecting the course of classroom events.

Tom's teaching, then, is not merely informed by his listening; his teaching is itself an act of listening.²⁸

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²⁶In recent years, mathematics education research has been undergoing something of a Kuhnian revolution, driven by the increasing acceptance of constructivism as an epistemological framework for understanding learning. Among the consequences of the movement are a greater awareness of the ungroundedness of mathematical knowledge and a newly legitimated interest in attending to learners as they "construct" their own sense of mathematical concepts. But it is becoming increasingly clear that the impact of constructivism on the classroom has been limited. Perhaps this is because it concerns itself strictly with epistemological issues—with knowing—whereas teaching is more ontologically oriented—concerned with being and becoming. It is thus that I have posited listening not only as an orientation for teaching but as the basis of teaching action. As an ontologically oriented capacity, listening subsumes the insights offered by constructivism and moves beyond those insights, locating the teacher and learner within the dynamic complexity of their respective and their combined worlds.

²⁷David Michael Levin, *The Listening Self* (London: Routledge, 1989), p. 88.

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