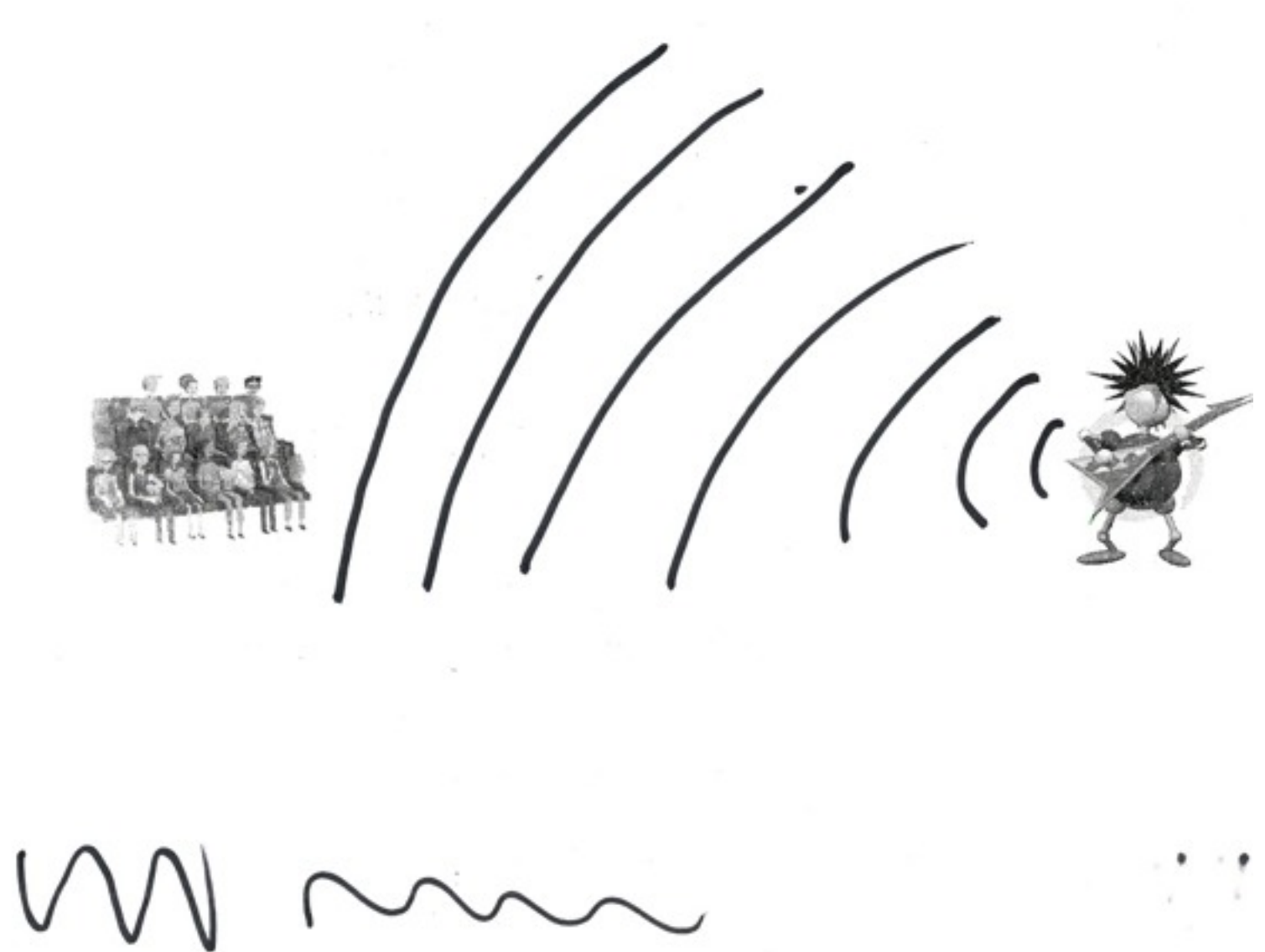# "It looks the same to me:"
Using spontaneous representations to explore student sense-making of sound transmission

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"We must merge our traditional sense of schooling with the real world. What we do in school must not insult the child's past but must build upon his past and encourage future learning." -- Sigmund Boloz

Student Resources in Science Teaching and Learning

(Bang & Medin, 2010; Hammer, 2000; Hudicourt-Barnes, 2003; Nasir, 2005)

- Examines the varying intra and inter-group intellectual and linguistic resources that children bring to science exploration and investigate ways of building upon these understandings and practices.

- "Focuses on understanding the productive conceptual, meta-representational, linguistic, experiential, and epistemological resources students have for advancing their understanding of scientific views" (Warren et al., 2001, p. 531).

- Resources approach to exploring the range of competencies children demonstrate while **"selecting, producing, using, critiquing, modifying, and designing"** (diSessa & Sherin, 2000) new representations.

Representation as Social Practice

(Danish & Enyedy, 2007; Hall, 1996; Lehrer & Pritchard, 2002; Lehrer & Schauble, 2000; Roth & McGinn, 1998)

- Exploring the construction & development of representations, the transformations they undergo, and the roles they play in social situations (Roth & McGinn, 1998).

- Negotiation process exists that involves developing a shared meaning within a community of people.

- Highlights the importance of representational competence and representational complexities.
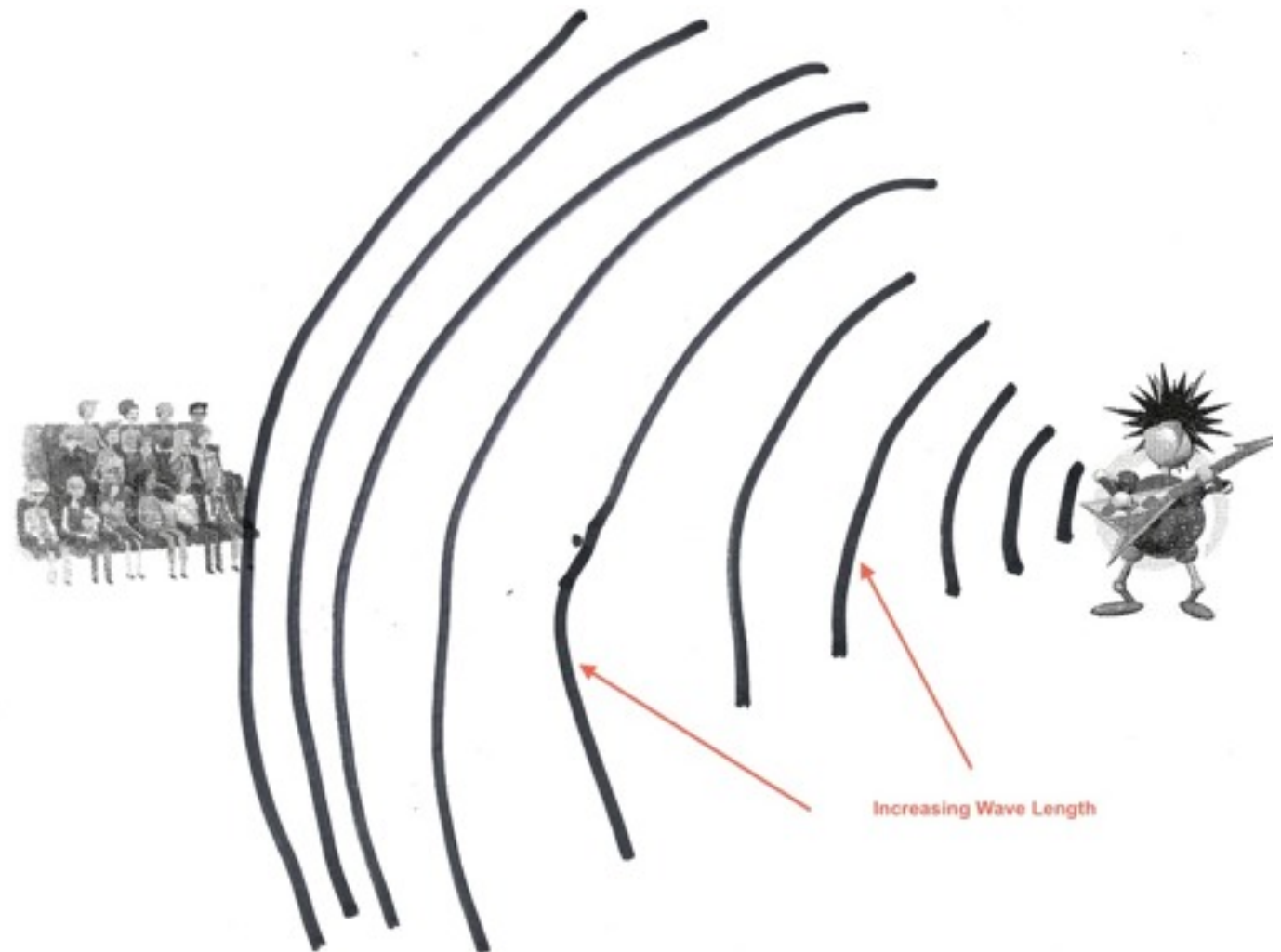
Case Study Methodology: Earl

- Data collected within an out-of-school context within a mid-Atlantic city.

- Participated in a four-day exploration into ideas regarding sound.

- Drawings were from various sessions during the 4 production and critique sessions.
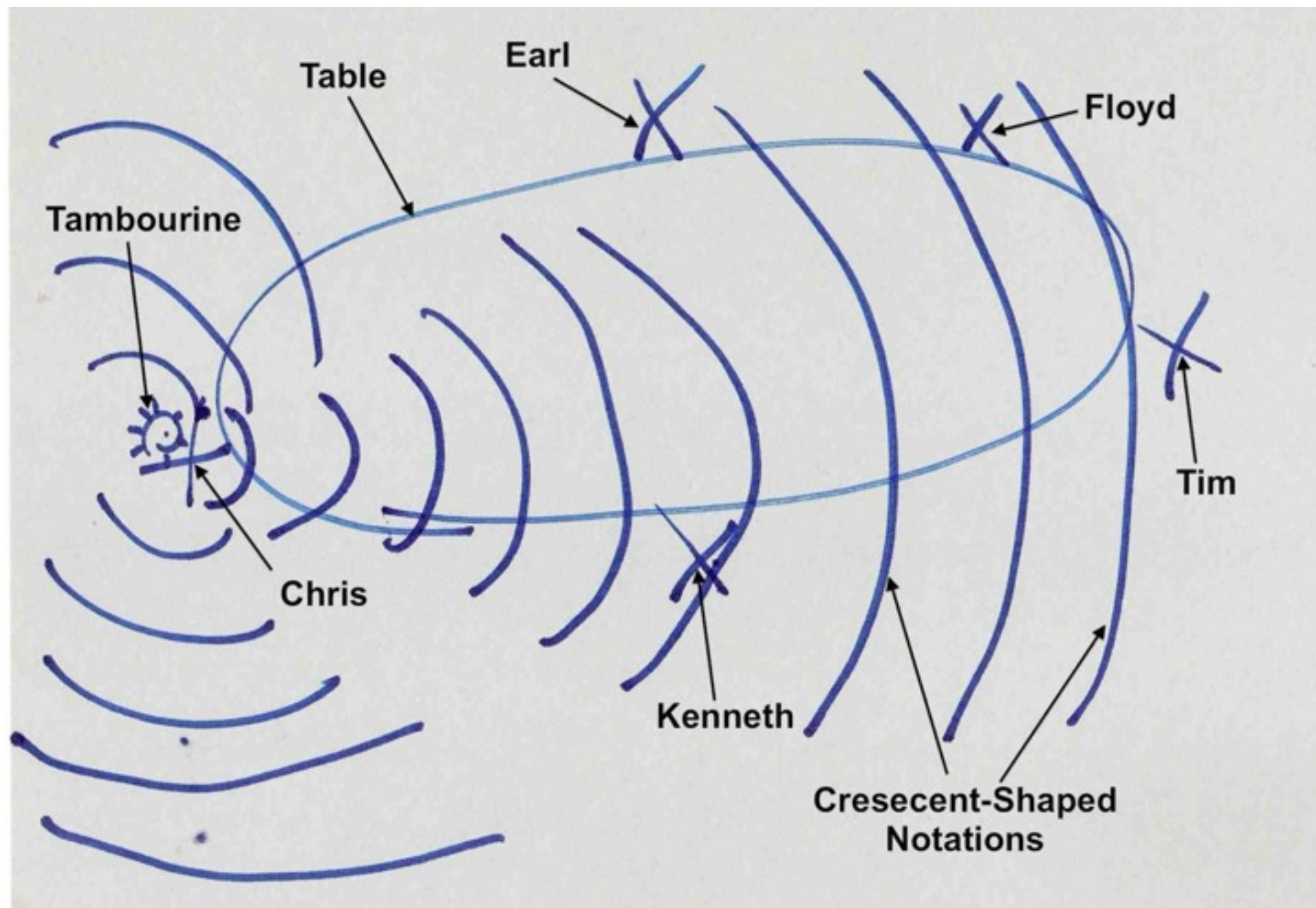
Representing the Change in Volume Over Distance through a Change in Crescent Length
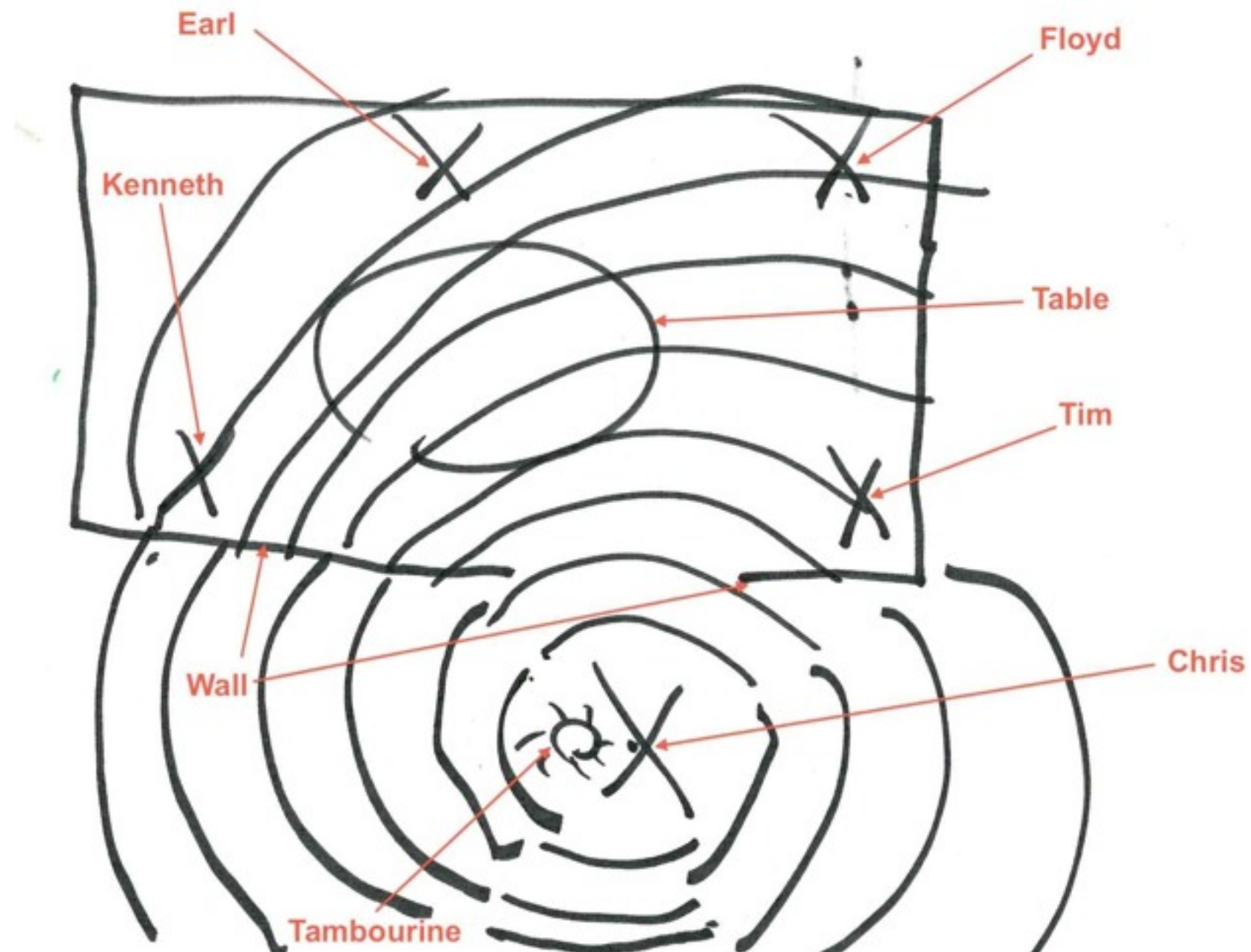
- Sound waves become less intense as the waves propagate through space in three-dimension.

- Whatever energy is created by the waves at the source is diluted with increasing distance from the source (Parker, 2009).

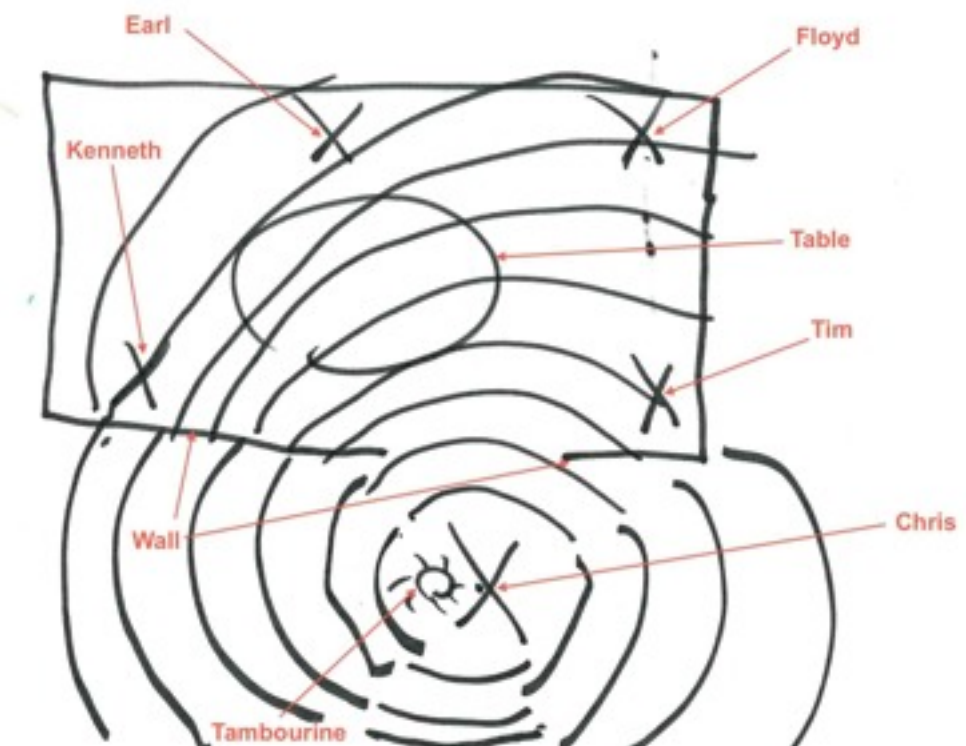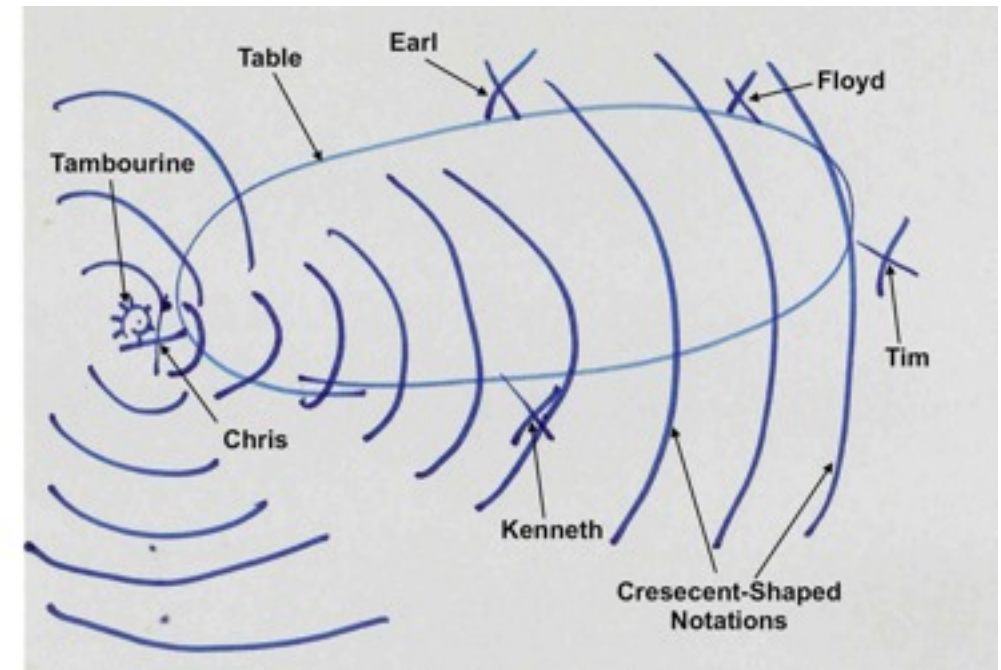Increasing Wave Length
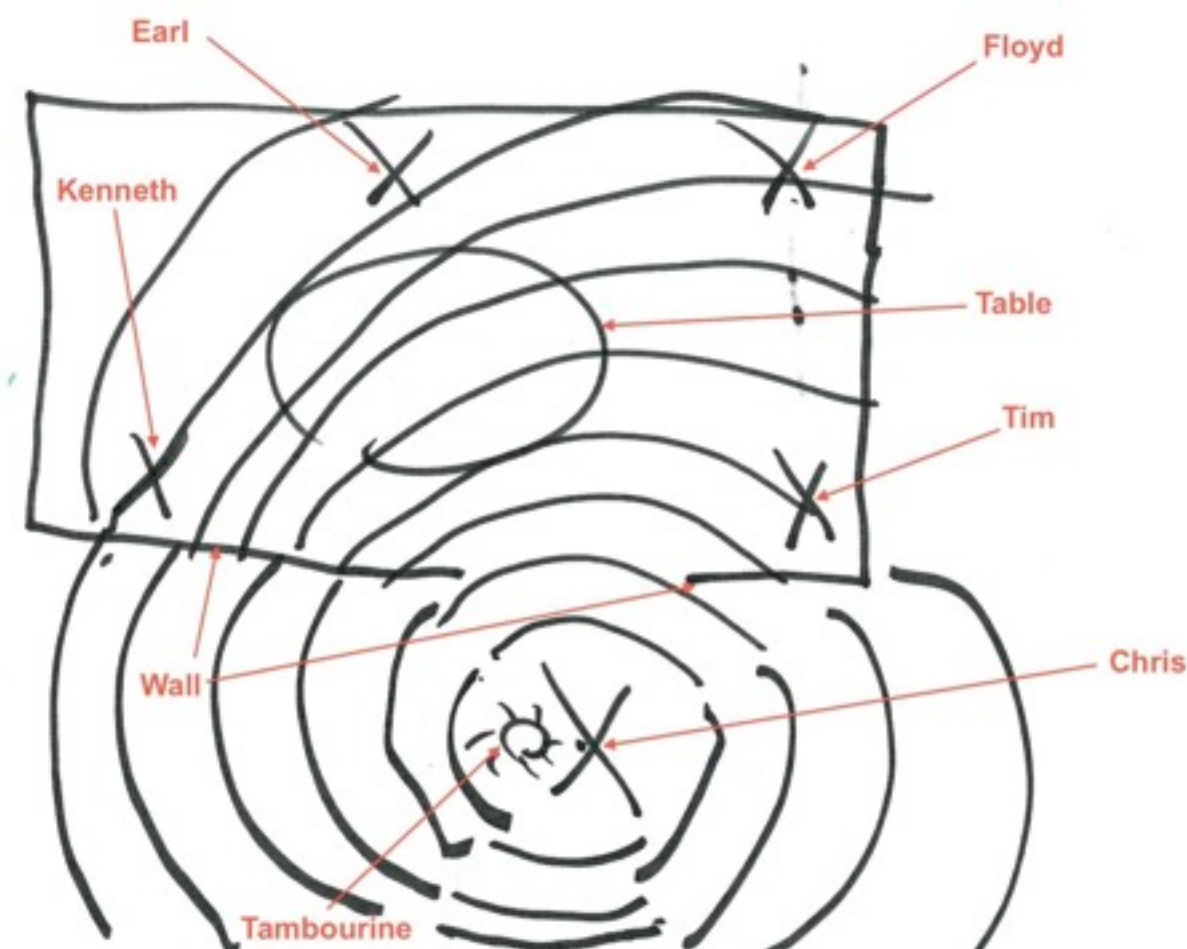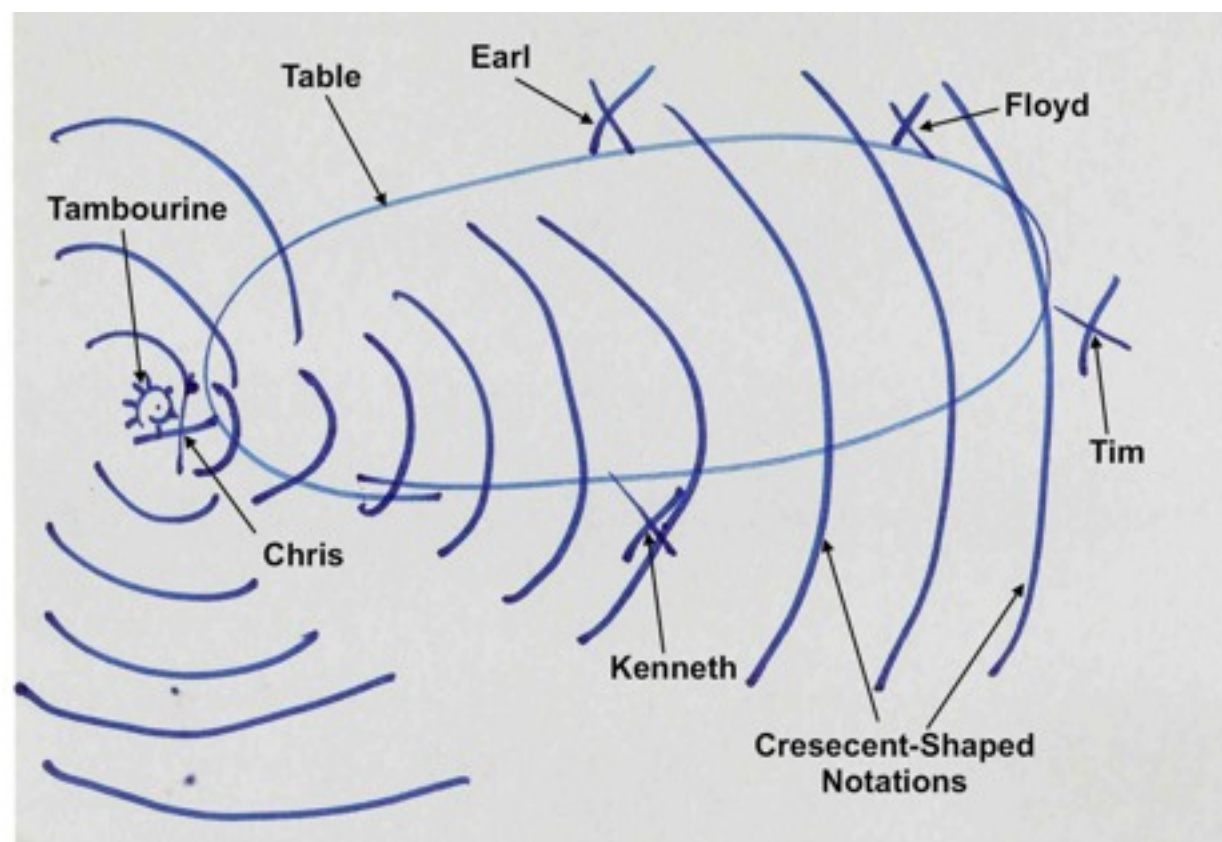
Context for Drawing #1

Context for Drawing #2

"What's different about your two drawings?"

- Earl: They're (crescents) saying in this one (Drawing #1), **it (volume) got louder and louder.** But when it (sound) got to me, it was loud. But in this one (Drawing #2), as it (sound) got to me, **the sound got lower** (quieter volume).

- Kenneth: It looks the same to me!

"It sounded like it was a low sound (volume) to it. Because, by me sitting right here closer to you, it sounded lower; I mean, being the farthest." -- Earl

Sound waves for a "quiet" sound and a "loud" sound

- E: It's like... I think that like **the smaller it is the smaller the sound is, but as it gets bigger, that's how the sound gets louder**.

- C: So, because it gets louder; so, because it's getting louder //

- E: It **starts out small and then the sound gets loud.**

- C: And so this one is showing a quiet sound?

- E: **It (volume) starts out loud and then it gets quiet.**

(A)

(B)

Sound waves for a "quiet" sound and a "loud" sound

- E: It's like... I think that like **the smaller it is the smaller the sound is, but as it gets bigger, that's how the sound gets louder**.

- C: So, because it gets louder; so, because it's getting louder //

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- C: And so this one is showing a quiet sound?

- E: **It (volume) starts out loud and then it gets quiet.**

(A)

(B)

Conclusion

- Representational competence was characterized by the boys' awareness and abilities in designing multiple uses for various representational elements (i.e., change in crescent length, compactness, & line weight or line type)

    - Competencies demonstrated through individual use of representational elements, as well as the combination of elements to further emphasize aspects change in volume.

- Complexities in engaging in the practice of representation

    - Context often played a role in the use of representational elements

Discussion

- The act of spontaneously representation provided opportunities for further exploration of ideas regarding sound transmission and ways to represent these ideas.

- Development of meaning for representational elements filled with complexities.

    - The negotiation process highlighted complexities in developing associated meanings, for groups and for self.

    - The act of representation is not practiced within a vacuum -- other interpretations are also relevant.

    - Context is important and highlighted individual complexities.

Thank you and questions?