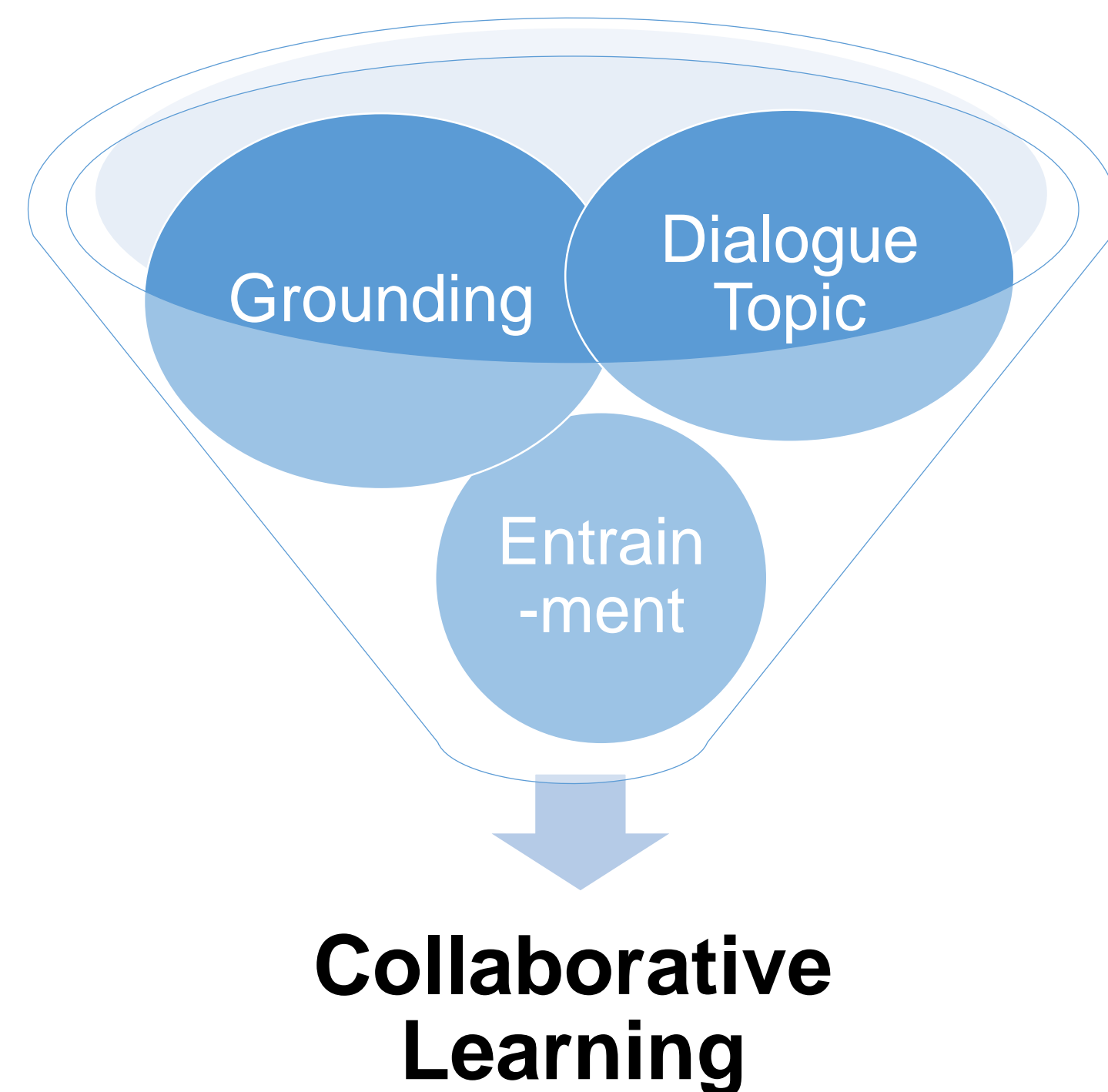


Nichola Lubold
Arizona State University
nlubold@asu.edu

Erin Walker
Arizona State University
erin.a.walker@asu.edu

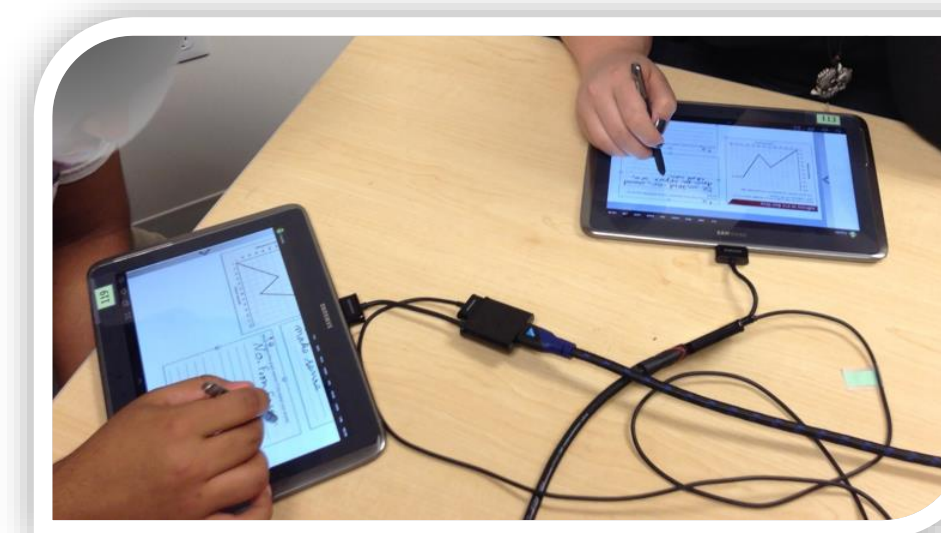
Heather Pon-Barry
Mount Holyoke College
ponbarry@mtholyoke.edu

Introduction



Grounding behaviors and topic of conversation influence the ways in which students entrain on each other's speech?

Hypothesis: Entrainment will significantly differentiate grounding behaviors in on-task / off-task conversation



Corpus: Dialogues from 8 dyads, 16 college-age students. Mathematical reasoning problems on tablet-based application

Results

Analysis is performed using regression. Entrainment on voice quality (jitter and shimmer) differentiates grounding behaviors in problem-solving and social dialogues

Modeling Grounding with Entrainment

On-task / Off-task	Coefficient		Model	
	Feature	β	Chi-Square	p
Problem Solving	Dyad	-0.04	7.968	0.16
	Intensity	-0.08		
	Pitch	0.45		
	VQ (Jitter)	-0.09		
	VQ (Shimmer)	-0.67*		
Activity Related	Dyad	-0.01	0.239	0.77
	Intensity	0.10		
	Pitch	0.17		
	VQ (Jitter)	-0.09		
	VQ (Shimmer)	-0.27		
Social Dialogue	Dyad	-0.29*	11.69*	0.04
	Intensity	-1.55		
	Pitch	1.73		
	VQ (Jitter)	-1.75*		
	VQ (Shimmer)	2.35		

Grounding

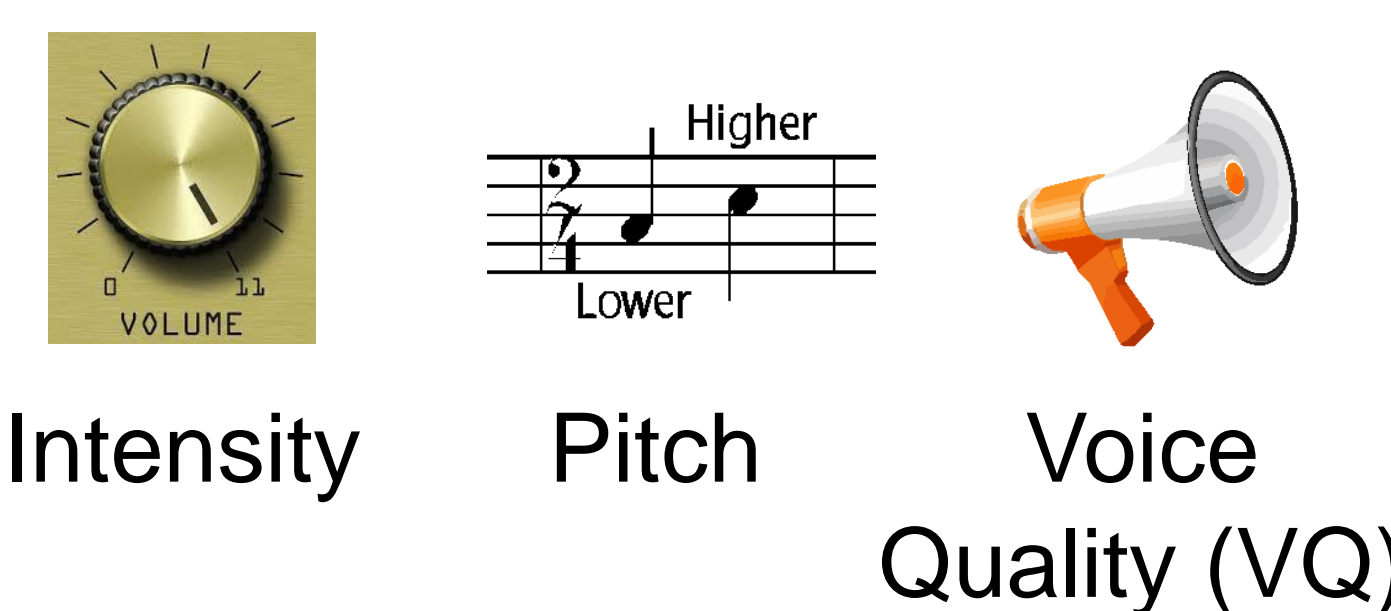
Shared understanding of mutual knowledge, beliefs, and assumptions. Important to learning and rapport

Back-channels Student 1: So we've $8x + 10y$ and we ...
Student 2: Right

Grounding Contributions Student 1: She decorates 10 boomerangs
Student 2: I think it is 10 boomerangs total

Entrainment

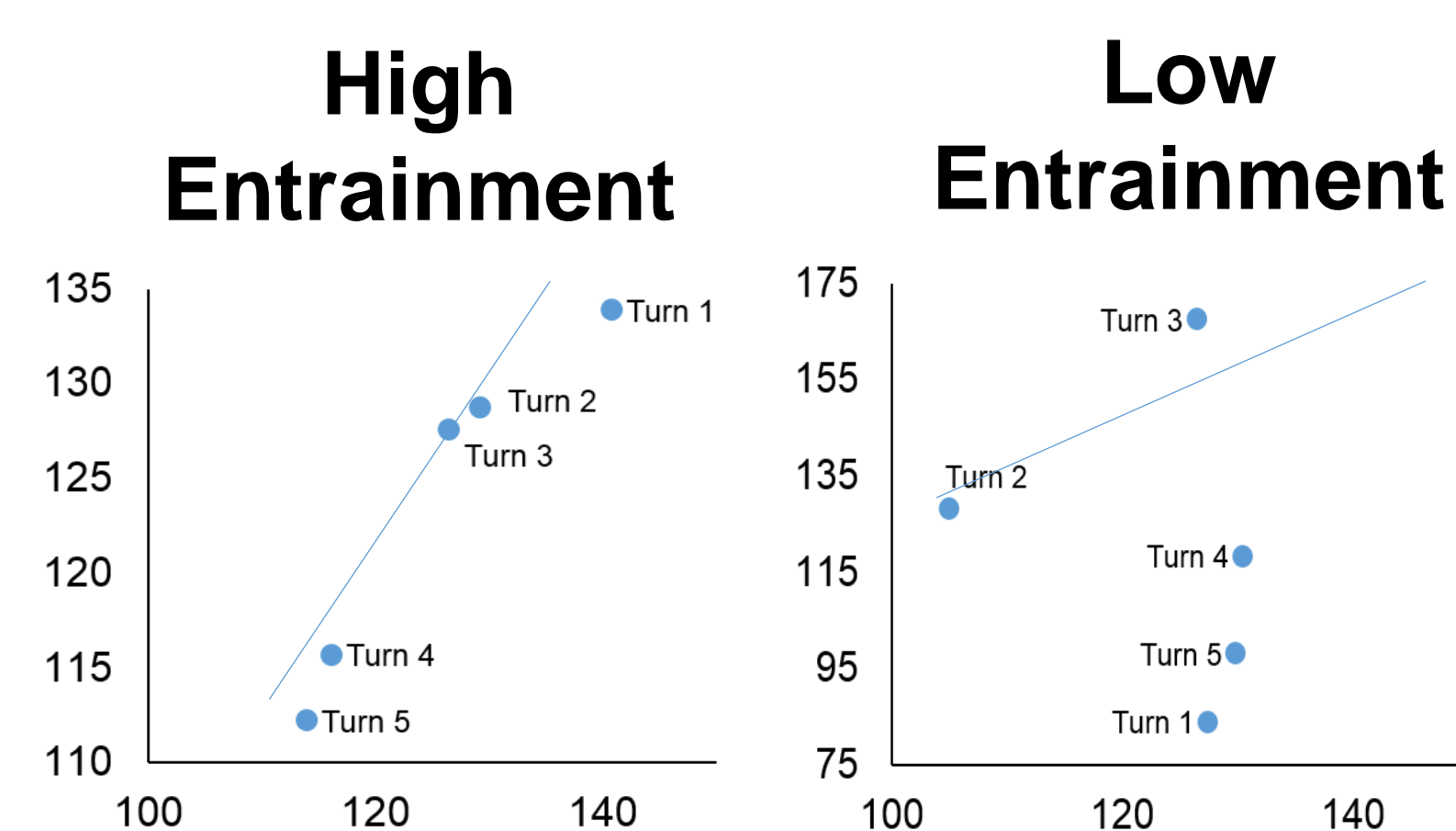
Acoustic-prosodic: adapt pitch, loudness, or voice quality. Correlated with cognitive and social processes



Dialogue Topic

On-task: Grounding mutual problem knowledge
Off-task: Rapport-building potential

Problem	"Because if you add 7 to it, yeah"
Activity	"Yeah, see mine [screen] froze"
Social	"What are you studying [major]?"



X-axis: Speaker A Pitch Mean (Hz)
Y-axis: Speaker B Pitch Mean (Hz)

Conclusions

Results suggest dyads entrain more when engaging in social dialogue and that grounding turns have higher entrainment on voice quality

Future work: Analyze dynamic vs. linear entrainment and its relationship to learning & collaborative processes to build an automated detector capable of assessing student interaction