



# Mechanisms of Participation to Promote Better Comprehension

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## Introduction

- Interactive book reading has been shown to lead to strong gains in students' vocabulary and other reading outcomes [3].
- Parent-child book reading is most effective when parents actively involved their child with verbal exchanges [1].
- Not only is active involvement important, eliciting responses from open-ended questions helps with learning as well. [2].
- Early individual differences in foundational literacy skills can have longitudinal effects for more advanced reading skills [4].
- "Smart devices" such as Google Home, or Amazon Alexa (also known as conversational agents, hereafter shortened to CA) can provide individualized reading sessions in the absence of one on one parent reading sessions.

Research Question: How do vocalization patterns mediate the relationship between story comprehension and different conditions of storybook reading?

## Methods

### Participants

- N = 118 4-6 year olds
  - ~ 30 participants per group
- Participants recruited from local Irvine pre-schools

### Study Design

- 2x2 Factor Design (Narrator x Dialogue)

Human narrator, no dialogue	CA, no dialogue
Human narrator with dialogue	CA with dialogue

- Expressive One Word Picture Vocabulary Test (EOWPV)
- Google home conversations are pre-programmed and human conversations are identically scripted

### Engagement Coding ( $\alpha = .89$ )

- Each participant's session was coded independently by two researchers
- Video recordings of each session were stopped every 5 seconds and coded for each of these categories and a Global Engagement score

Visual Attention	<ul style="list-style-type: none"> <li>•Book</li> <li>•Narrator</li> <li>•Split</li> <li>•Neither</li> </ul>
Facial Expression	<ul style="list-style-type: none"> <li>•Positive</li> <li>•Negative</li> </ul>
Vocalization	<ul style="list-style-type: none"> <li>•Narrative</li> <li>•Irrelevant</li> </ul>
Global Engagement	•Scored 1 - 5

### Outcome ( $\alpha = .87$ )

- 10 item comprehension assessment of storybook

## Results

Table 1  
Correlations of Engagement Coding Variables and Comprehension Assessment

	Global	Book	Narrator	Split	Neither	Positive	Negative	Narrative	Irrelevant
Global	-								
Book	0.17	-							
Narrator	0.07	-.21*	-						
Split	0.30**	-.37***	.34***	-					
Neither	-.039***	-.77***	-.09	-.29**	-				
Positive	.53***	-.17	.11	.26*	-.01	-			
Negative	.05	-.09	.02	-.08	.15	.05	-		
Narrative	.44***	-.37***	.01	.13	.30**	.40***	.12	-	
Irrelevant	-.20*	-.15	-.05	-.15	.26*	.05	.12	.10	-
Comp Score	.16	.01	-.01	.013	-.01	-.03	.01	.24*	-.21*

Note. N = 118. \*p < .05, \*\*p < .01, \*\*\* p < .001. Visual attention: Book, Narrator, Split, Neither. Facial expression: Positive, Negative. Vocalization: Narrative, Irrelevant

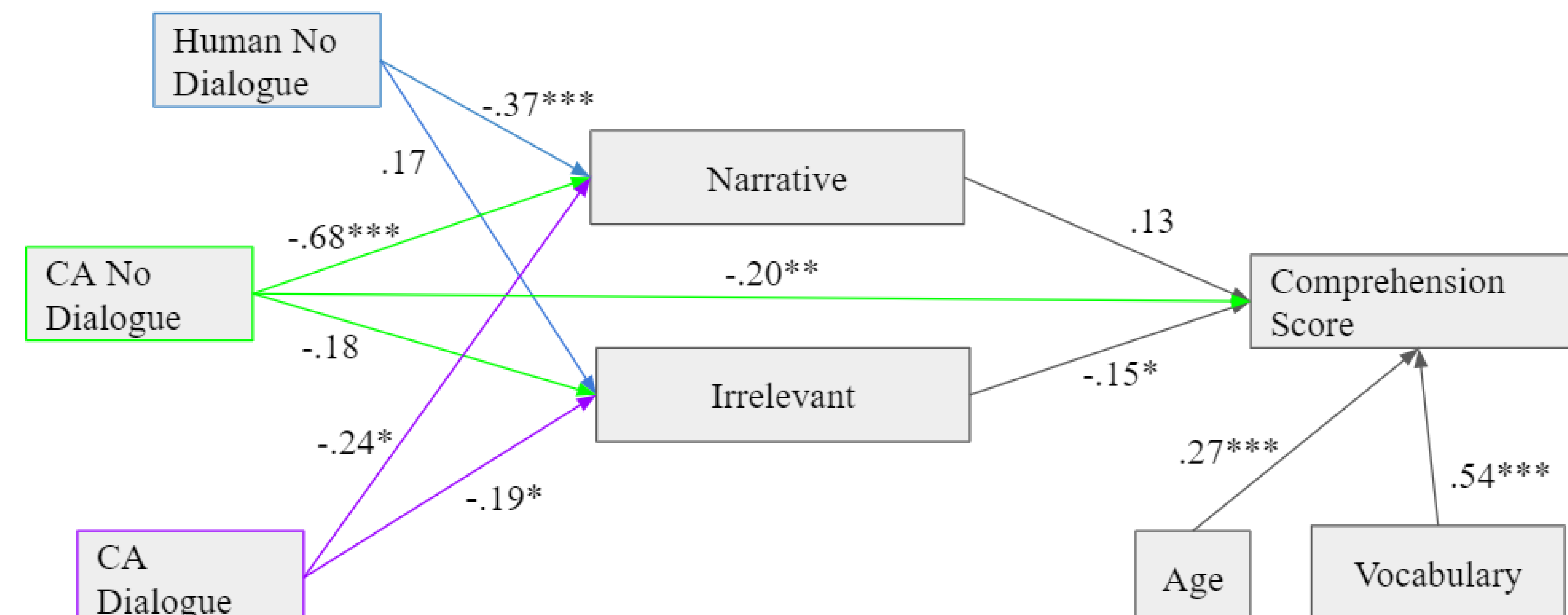


Figure 1.  $\chi^2(7) = 7.60, p = .37, CFI: 1.00, TLI: 0.99, RMSEA = .03, SRMR = .03$ . Human narrator with dialogue is reference group.

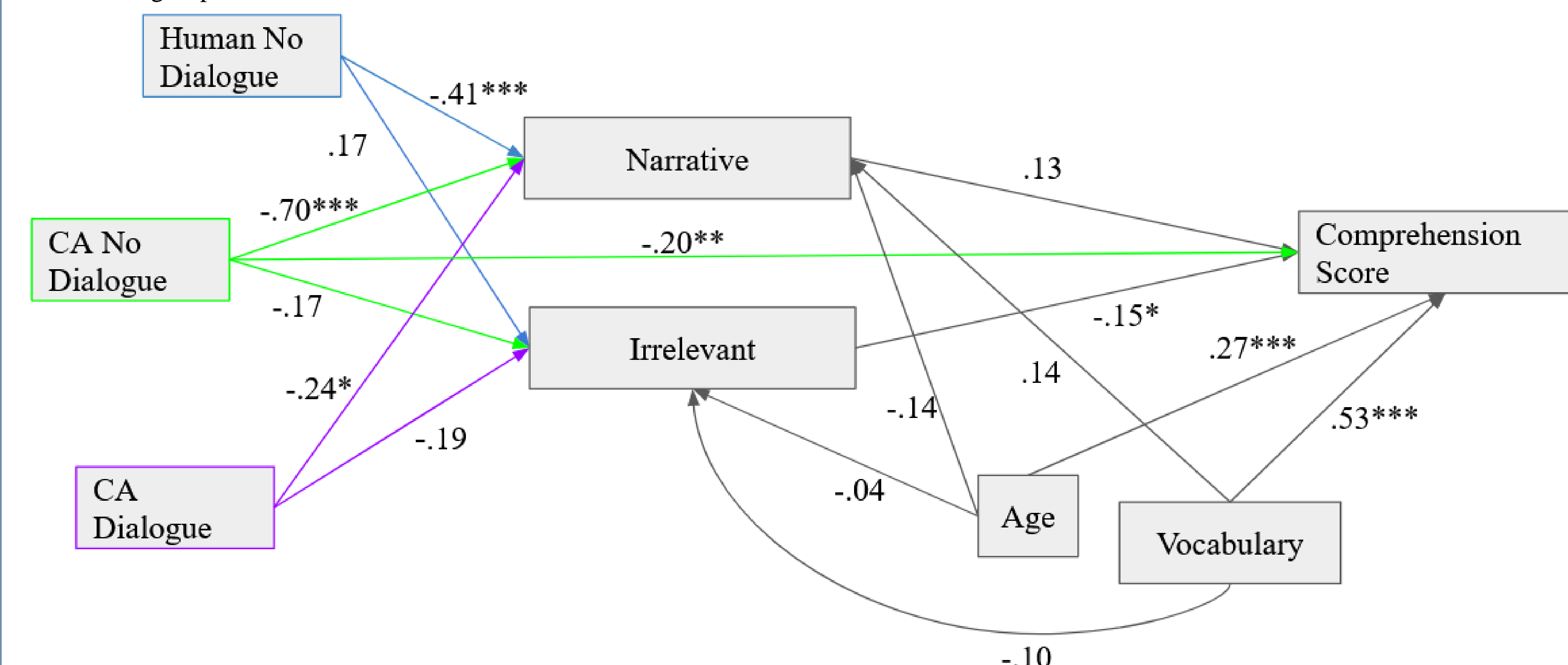


Figure 2.  $\chi^2(3) = 2.28, p = .52, CFI: 1.00, TLI: 1.03, RMSEA = .00, SRMR = .01, \Delta\chi^2 = 5.32, \Delta df = 4, p = .26$ . Human narrator with dialogue is reference group.

## Conclusion

### Discussion

- More parsimonious model preferred based on chi-square difference test results
- "CA no dialogue" was the only condition that maintained a direct effect on comprehension
  - Potential that importance of other student individual differences are emphasized in this condition
- Simultaneously, "CA no dialogue" saw a predicted decreases in relevant comments compared to the reference group
- "Human no dialogue" saw predicted increases in irrelevant comments and decreases in narrative relevant comments
- "CA Dialogue" saw a predicted decrease in narrative relevant comments
- "Human narrator with dialogue" still can be seen as the "gold standard", there are however marginal differences

### Limitations

- Larger sample size would allow for more reliable analyses potentially
- One-on-one sessions with trained researchers does not provide for high external validity

### Future Steps

- Coding of transcribed student responses to comprehension questions
  - Teasing apart the different types of narrative and irrelevant comments
- Replicating experiment with parent-child storybook reading sessions

## References

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