

The Impact of Multi-Character Story Distribution and Gesture on Children's Engagement

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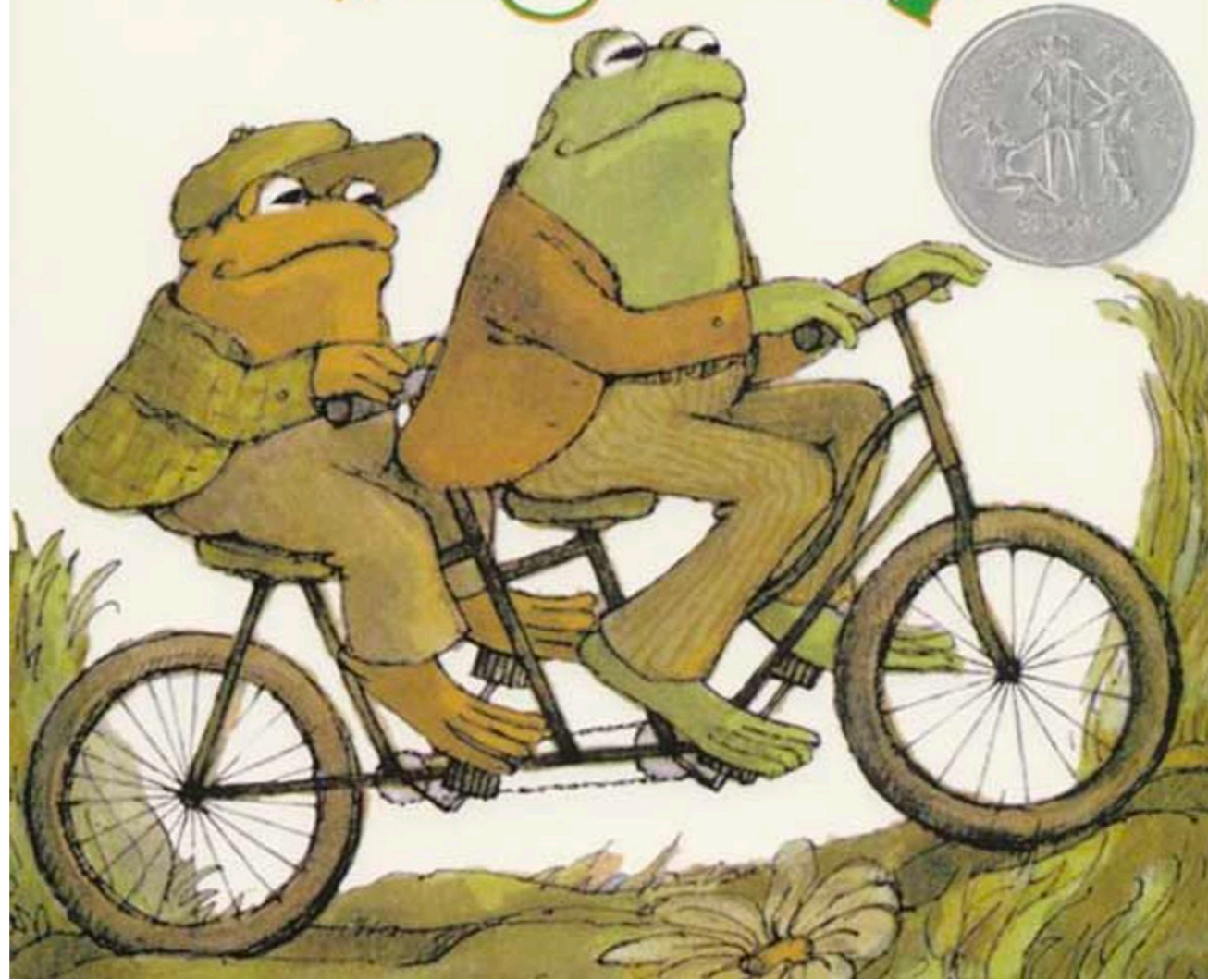
University of California, Santa Cruz²

This work was partially supported through NSF grant IIS 1748058.

An I Can Read
Picture Book

ARNOLD LOBEL

Frog and Toad Together



Storytelling promotes listening,
comprehension, and reading skills....

... strong predictors of future academic
success.

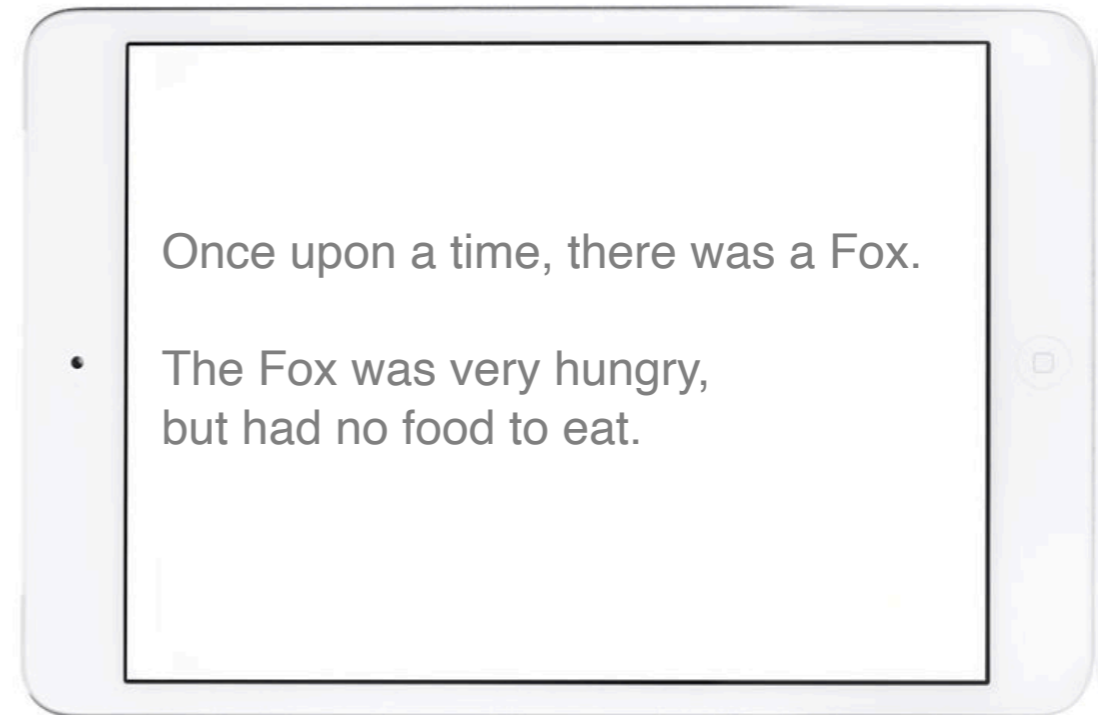
Torgesen, Joseph K. "Preventing early reading failure—and its devastating downward spiral." *American Educator* 28.3 (2004): 6-19.

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Cunningham, Anne E., and Keith E. Stanovich. "Early reading acquisition and its relation to reading experience and ability 10 years later." *Developmental psychology* 33.6 (1997): 934.

Alexander, Karl L., Doris R. Entwisle, and Susan L. Dauber. "First-grade classroom behavior: Its short- and long-term consequences for school performance." *Child development* 64.3 (1993): 801-814.

Digital Storytellers



Increasing Engagement



Embodied characters

Change storytelling
point-of-view

Complex gesticulation

Direct interaction
with the child

E.N.I.A. Storyteller


Embodied

Narrating

Interactive

Animated

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  "name": "The Fox And The Crow (First Person)",
  "characters": [
    {
      "name": "Narrator",
      "voice": "Ivy",
      "position": "top-center"
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    {
      "name": "Fox",
      "voice": "Justin",
      "position": "bottom-left"
    },
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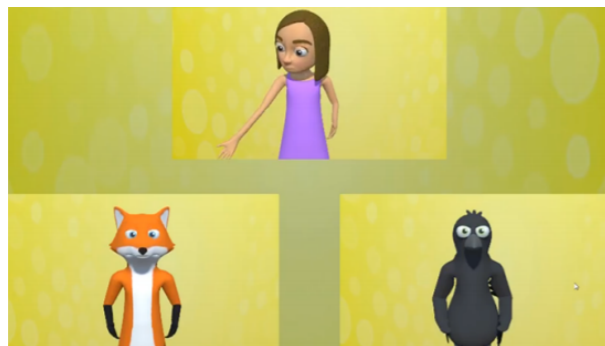
E.N.I.A. Storyteller

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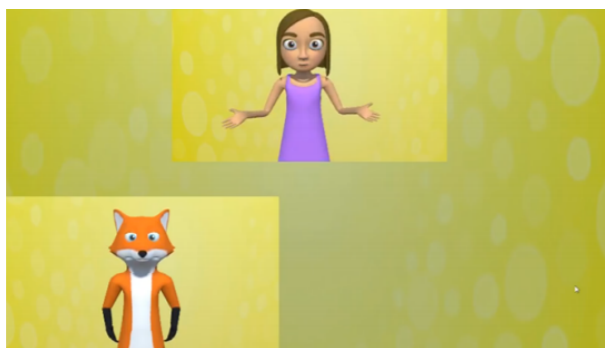


Exploratory Questions

What is the effect of story POV on visual engagement?
(narrator-only vs. narrator and story-characters)



Do conversational turnover gestures help students anticipate the next speaker and more quickly shift their gaze to them?



Will question-asking gestures encourage children to ask more questions?

What sort of questions will students ask to such a system?

Experimental Factors

Story Distribution Factor

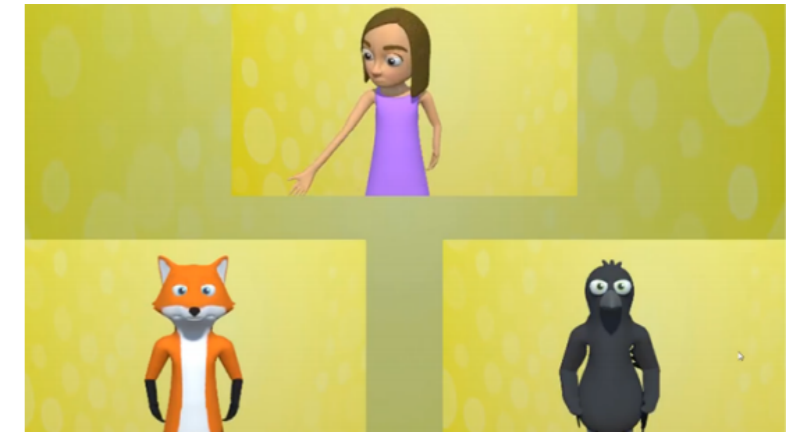
Narrator Only
(Third-Person)

Distributed
(First and Third Person)

The Fox and the Grapes



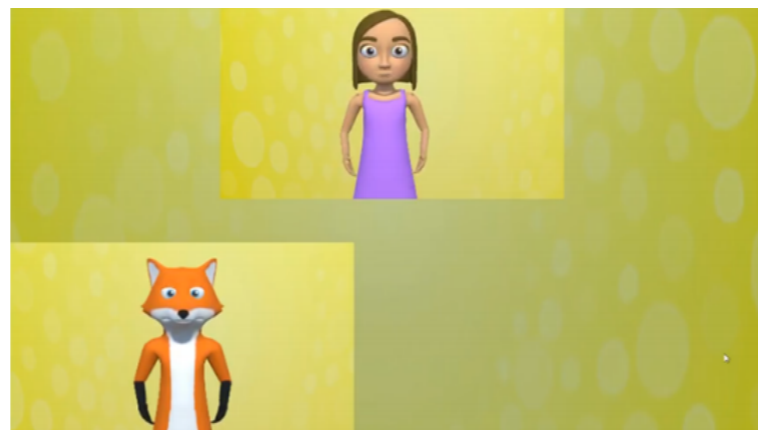
The Fox and the Crow



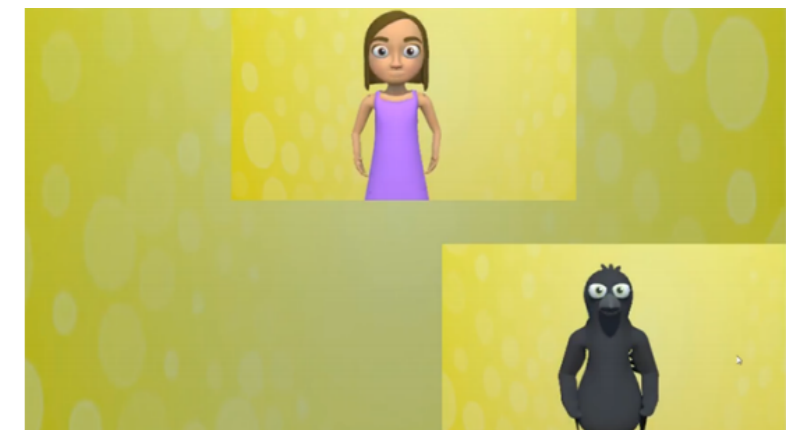
Complex
Gesture

Gesture
Factor

The Fox and His Shadow



The Crow and the Pitcher



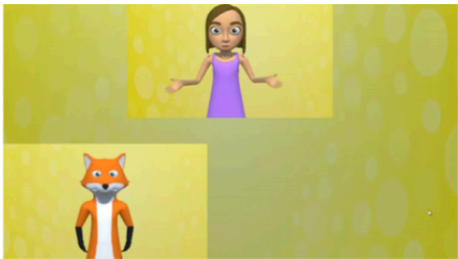
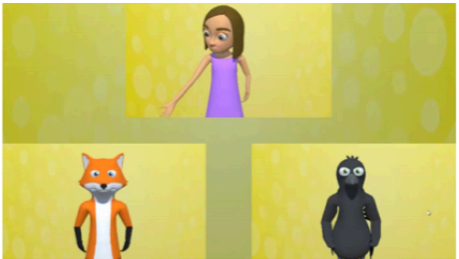


Simple
Gesture

Design & Participants

2x2, within-subjects design
Counterbalanced

33 participants
4 classrooms (K-2)

12F-21M
Ages ranged 5-8

		Story Distribution Factor	
		Narrator Only (Third-Person)	Distributed (First and Third Person)
Gesture Factor	Complex Gesture	<p>The Fox and the Grapes</p> 	<p>The Fox and the Crow</p> 
	Simple Gesture	<p>The Fox and His Shadow</p> 	<p>The Crow and the Pitcher</p> 

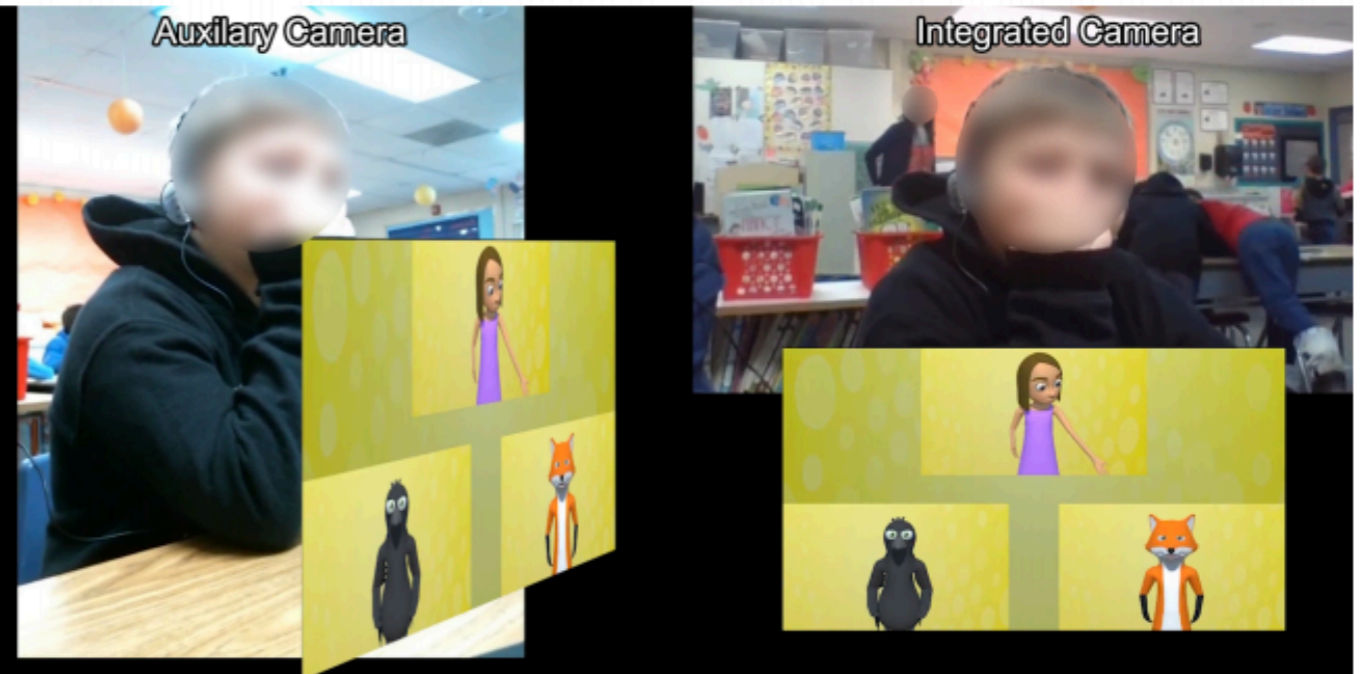
Experiment

Experimental Protocol

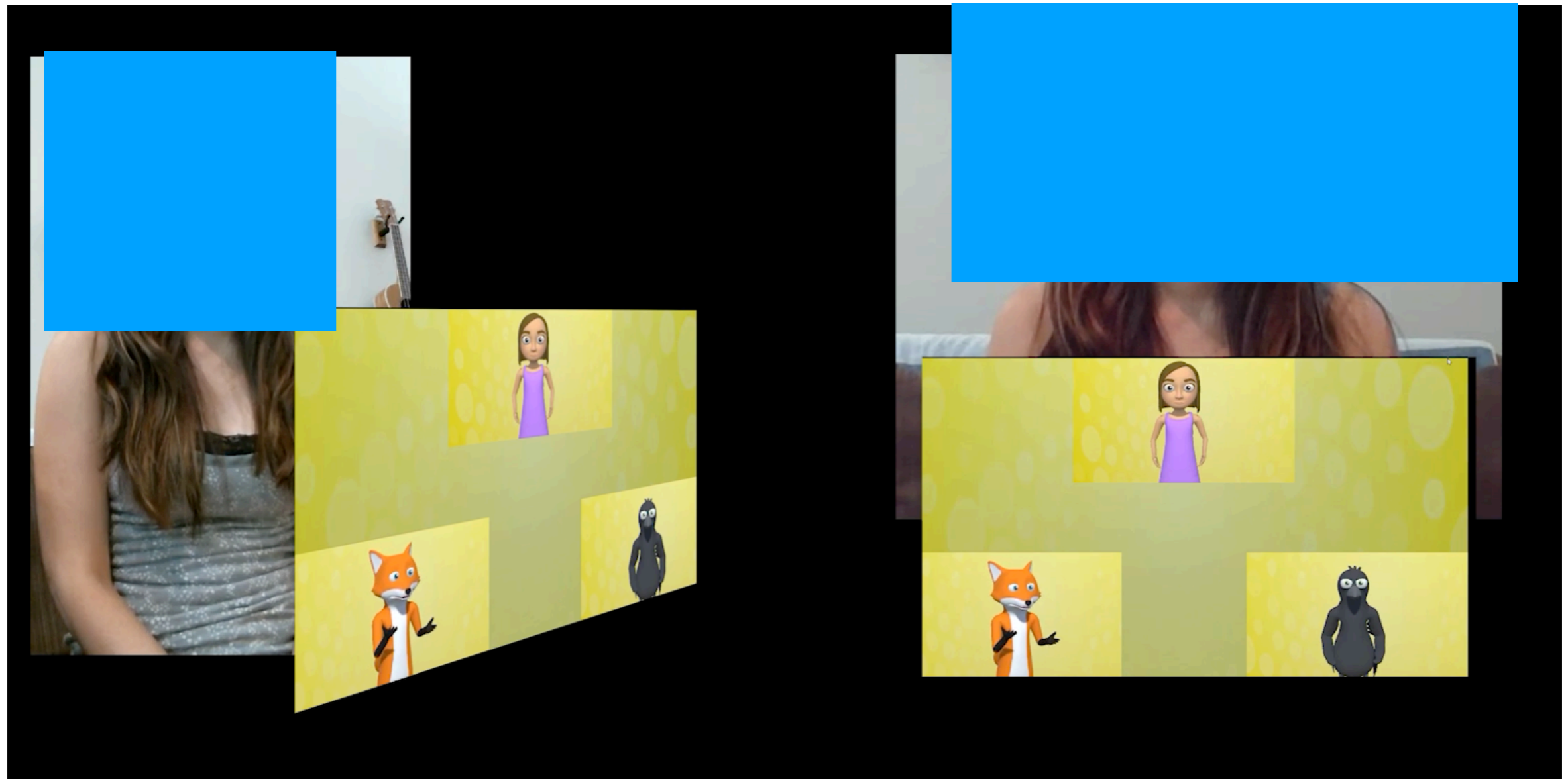
Laptop Used for Data Collection



Example Video Footage Used for Gaze Annotation



Gaze Annotation

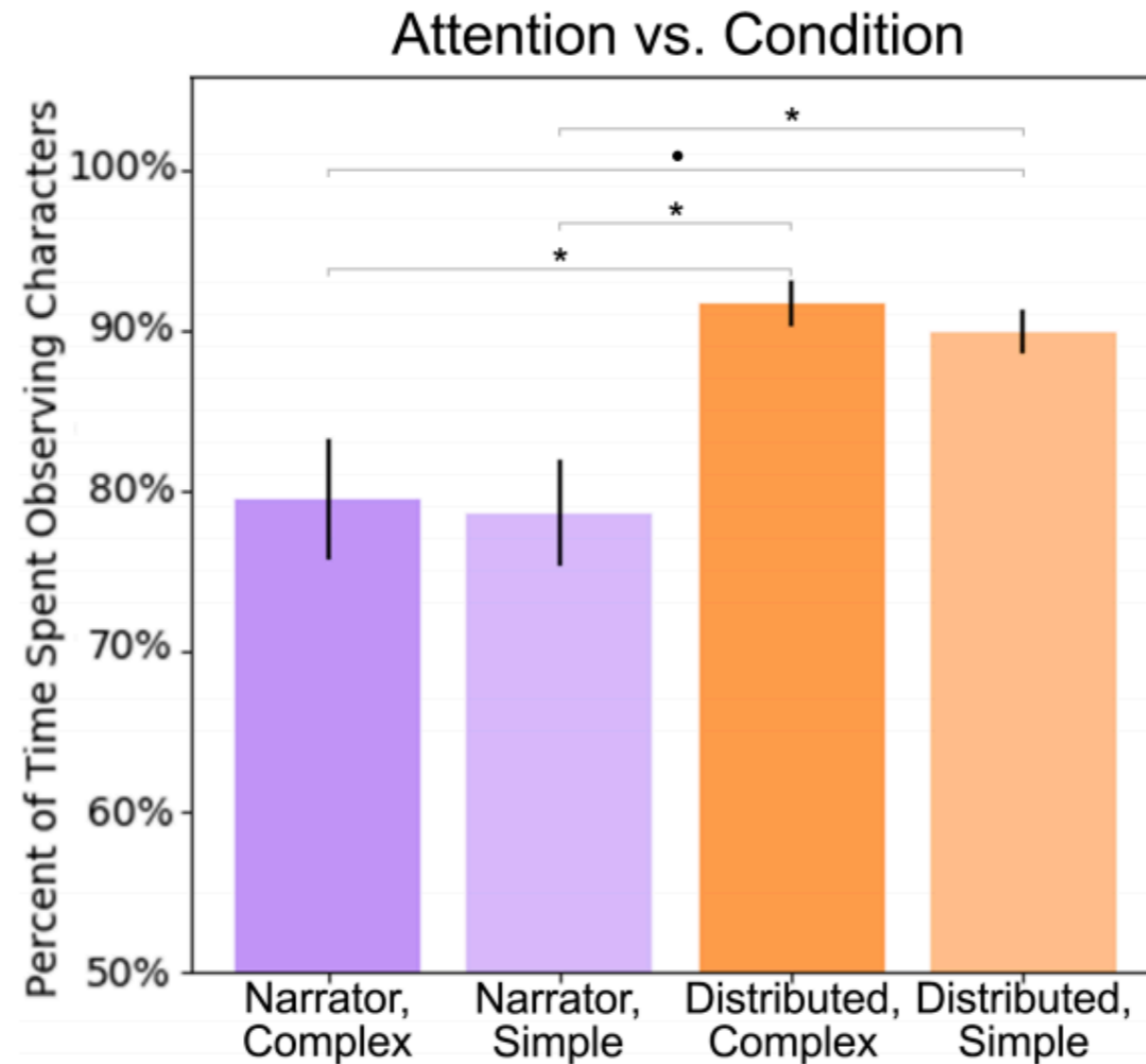


Observed agreement: 97%

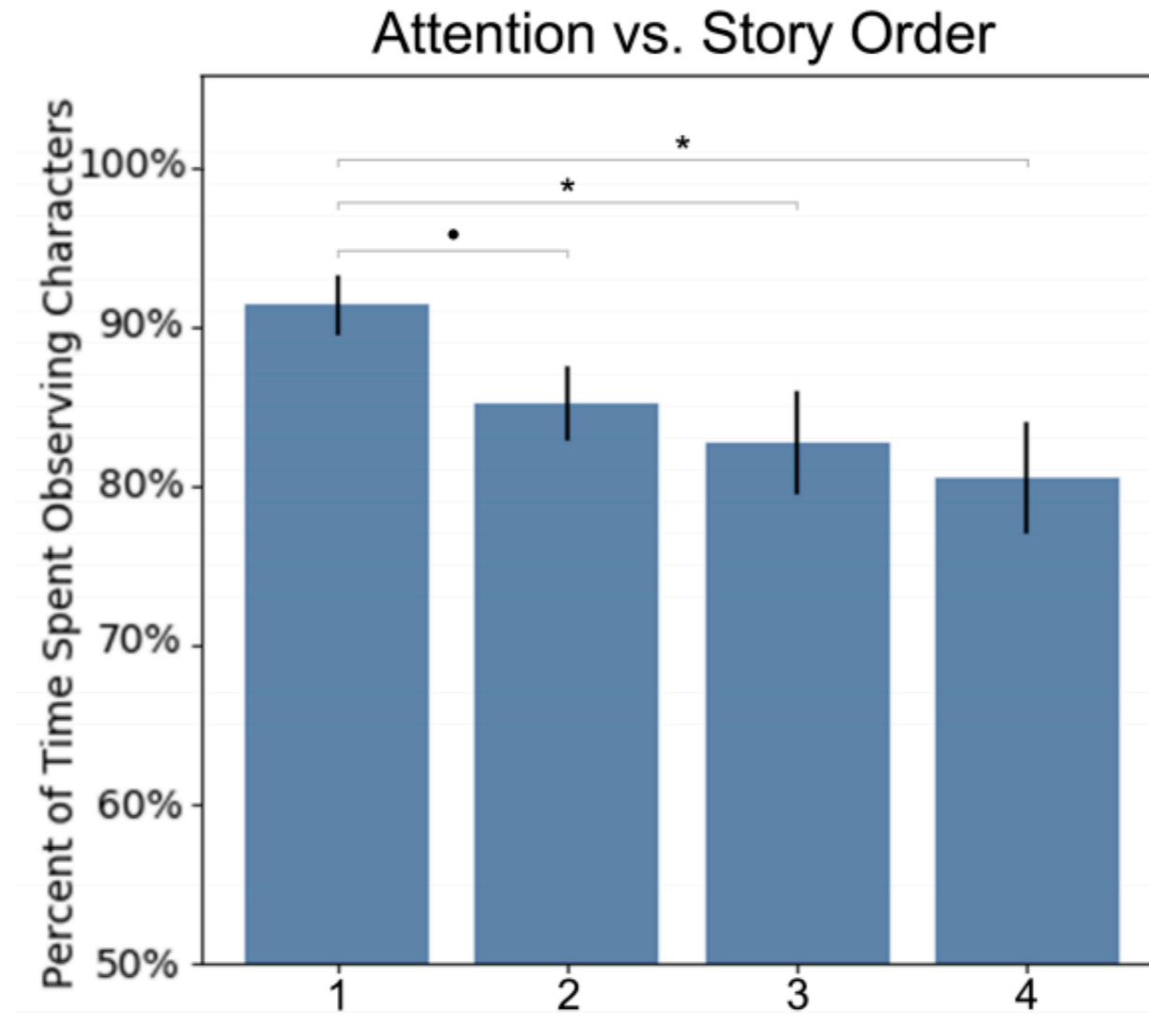
Cohen's kappa: 0.93

Results

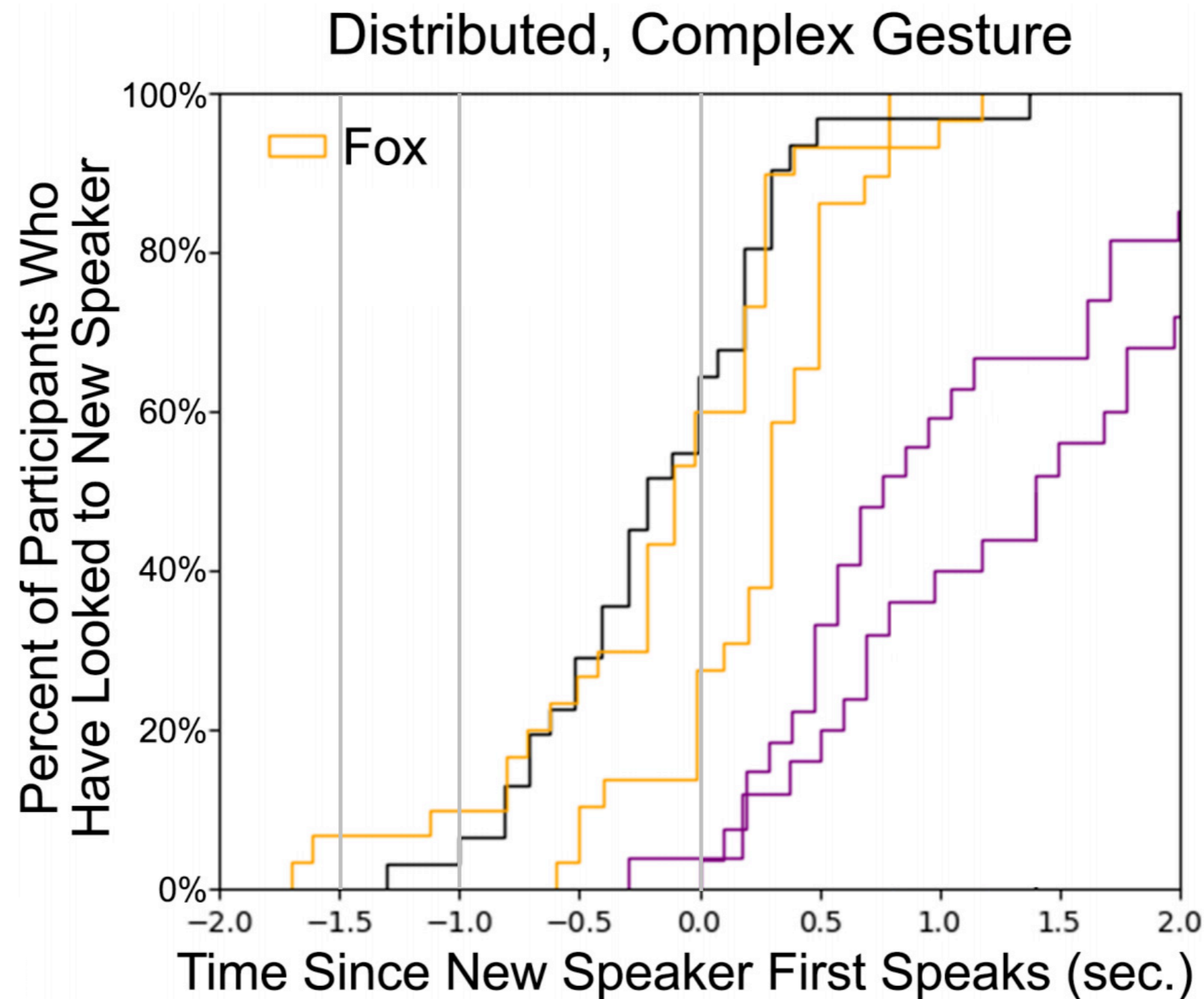
Visual Engagement



Visual Engagement

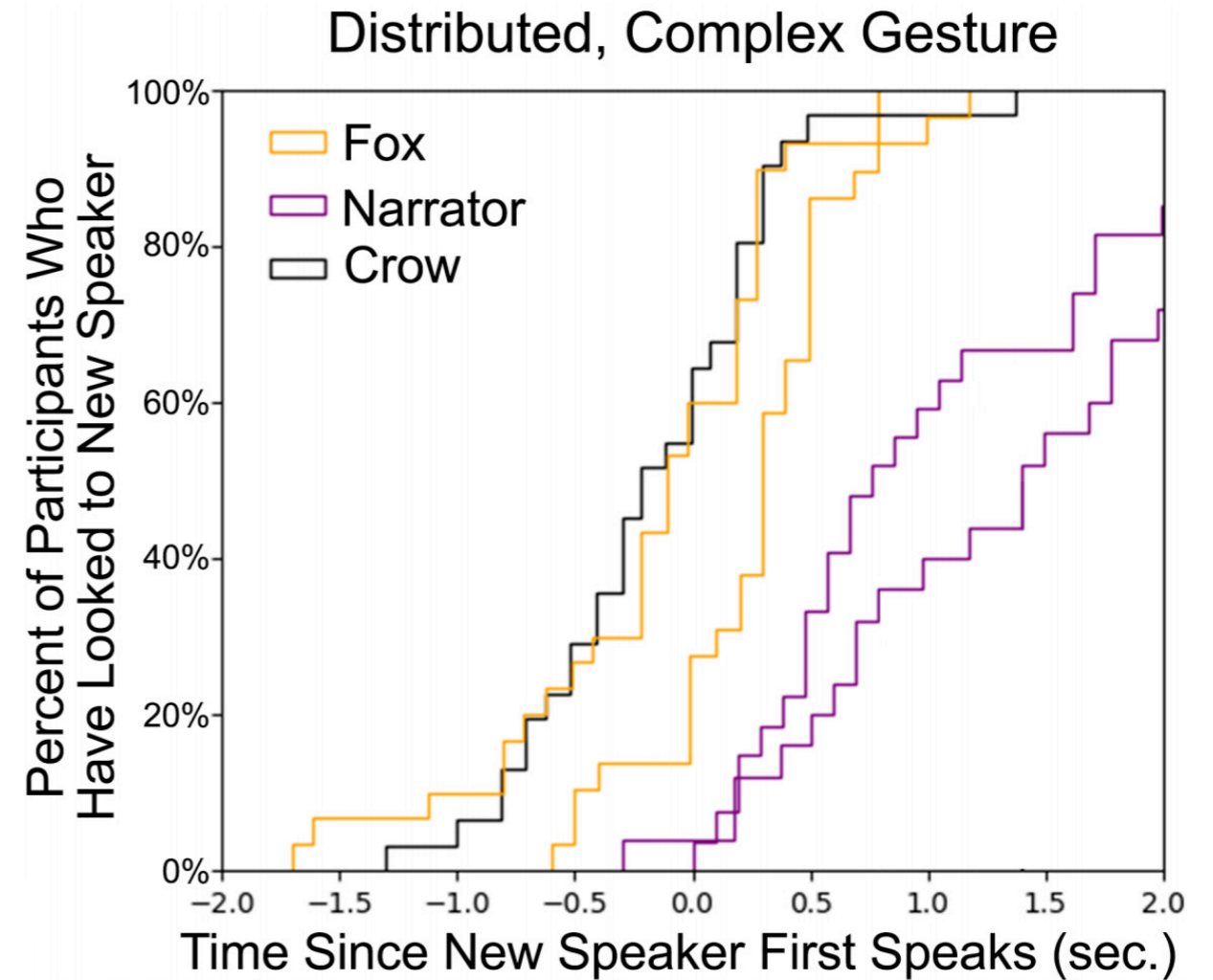
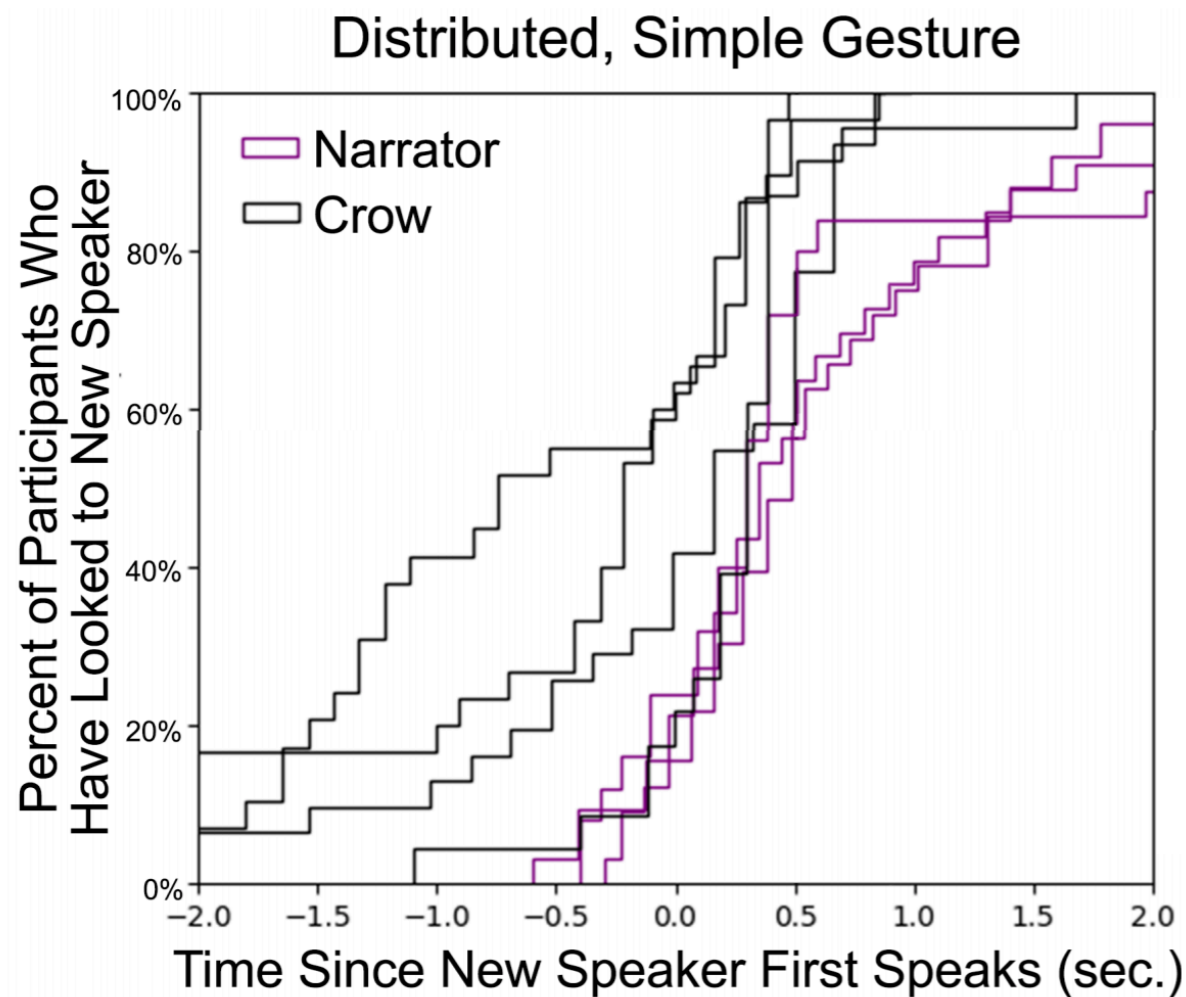


Conversational Turnover Gesture Effect on Gaze Behavior



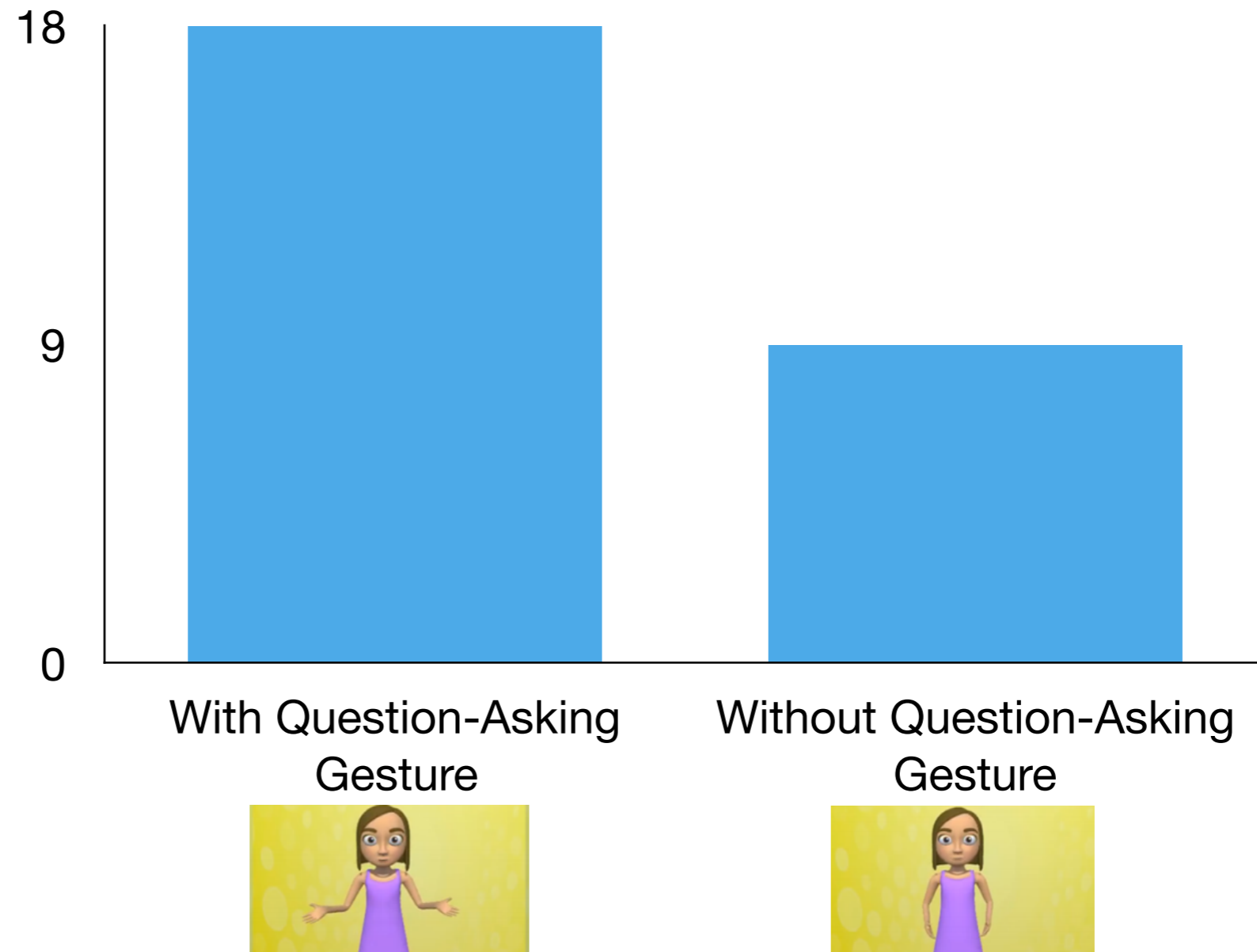
Conversational Turnover

Gesture Effect on Gaze Behavior



	Mean	Standard Deviation	P Value	T Statistic
Distributed, Complex Gesture	0.71	1.47	0.004	2.88
Distributed, Simple Gesture	0.19	1.86		
Turnover to Narrator	1.15	1.64	<0.001	7.72
Turnover to Fox or Crow	-0.08	1.55		

Question Frequency



	Question Asked	No Question Asked	P Value	Chi Squared Statistic
Complex Gesture	18	48	0.052	3.77
Simple Gesture	9	57		

Question Types

12 Why, Causal Chain

Why did the Fox try to get the grapes?

5 Why, Backstory

How did the Crow get the cheese?

5 What Next

The Fox will eat the bird?

2 Why, Storyline

Why wouldn't the Fox know it was his reflection?

1 Comprehension

What is a vine?

Conclusion

Effect of storytelling distribution on visual engagement?

Storytellings split between the narrator and story characters are more visually engaging than stories told by the narrator only.

Do conversational turnover gestures help students anticipate the next speaker and more quickly shift their gaze to them?

We did not find evidence that gazes shifted more quickly due to turnover gestures. It may be helpful in more complicated contexts, though.

Will question-asking gestures encourage children to ask more questions?

Using a question-asking gesture tended to elicit more questions from the child.

What sort of questions will students ask to such a system?

Children asked several different types of questions, most frequently causal chain.

Thank you!

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