

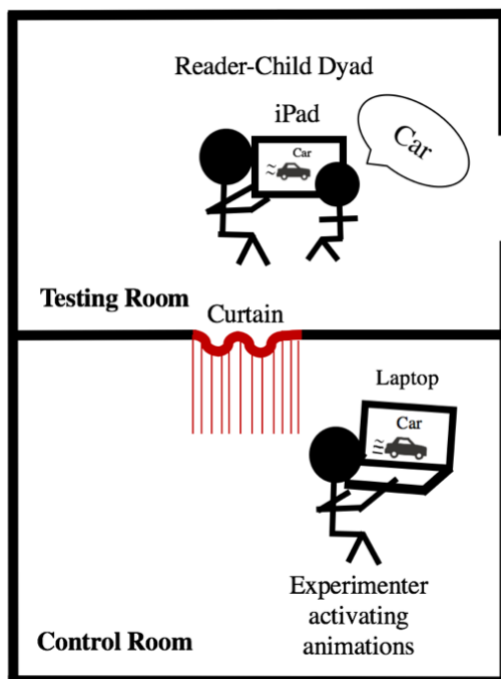
Table S1 vocalized words that produced animations for Zoom City

| Story: Zoom City | | | | |
|------------------|-------|---|-------------|-----------------|
| Pages | Lines | Animations | Total Words | Mean Words/line |
| 1-2 | 3 | 6: go, old, new, zoom, zoom, zoom | 10 | 3.33 |
| 3-4 | 4 | 4: big, little, bop, zoom | 8 | 2.00 |
| 5-6 | 5 | 5: red, stop, green, go, faster | 15 | 3.00 |
| 7-8 | 5 | 3: faster, crash, disaster | 7 | 1.40 |
| 9-10 | 1 | 1: truck | 4 | 4.00 |
| 11-12 | 6 | 7: boom, bang, fix, bumper, headlight, engine, everything | 18 | 3.00 |
| 13-14 | 5 | 6: uptown, downtown, zoom, honk, beep, boom | 13 | 2.60 |
| Total | 29.00 | 32.00 | 75.00 | |
| Mean | 4.14 | 4.71 | 10.71 | |

Table S2 vocalized words that produced animations for Cat's Pajamas

| Story: Cat's Pajamas | | | | |
|----------------------|-------|------------------------------------|-------------|-----------------|
| Pages | Lines | Animations | Total words | Mean Words/line |
| 1-2 | 4 | 4: pajamas, kitties, prowl, two | 10 | 2.50 |
| 3-4 | 4 | 4: cats, meow, streets, chow | 14 | 3.50 |
| 5-6 | 4 | 4: cook, big, fish, yum | 14 | 3.50 |
| 7-8 | 6 | 6: boom, horn, drums, cans, ba-dum | 21 | 3.50 |
| 9-10 | 3 | 5: big, moon, yowl, night, growl | 11 | 3.67 |
| 11-12 | 4 | 4: hey, turn, stop, sound | 12 | 3.00 |
| 13-14 | 6 | 3: horn, drums, land | 18 | 3.00 |
| Total | 31.00 | 30.00 | 100.00 | |
| Mean | 4.43 | 4.57 | 14.29 | |

Figure S1. Layout of how the experimenter activated animations contingently on the child's vocalizations



Reading Sessions Protocol: Experiments 1 and 2

Note: “Wizard” is the experimenter in the control room named after the Wizard of Oz behind the curtain

Reader Script:

Use the study tracking sheet to determine in which order you will test the participant.

- (1) Cat’s Pajamas Contingent Book First, Zoom City Control Book Second.
- (2) Cat’s Pajamas Control Book First, Zoom City Contingent Book Second.
- (3) Zoom City Contingent Book First, Cat’s Pajamas Control Book Second.
- (4) Zoom City Control Book First, Cat’s Pajamas Contingent Book Second.

- **If children make extratextual queries or comments, do not encourage or discourage, and answer with the prompt: ‘That’s interesting, what do you think?’**
- **After each line segment, pause for 5 seconds.**

Order 1

First reading session. Only prompt on the first page.

1. **“I’m going to read you a story.”** **read first line of book**
“Cat’s Pajamas Doodley-doo”
2. **“Now it’s your turn to read!”**

Participant reads first line

~Wizard Activates animations~

3. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.
[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]
After reading Cat’s Pajamas book:

4. **“Great! Now I’m just going to ask you a couple of questions about the story”**

Ask questions from comprehension assessment about the Cat’s Pajamas.

Second reading session. Only prompt on the first page.

1. **“Now I’m going to read you another story.”** **read first line of book**
Zoom City → “Away we go!”
2. **“Now it’s your turn to read!”**

Participant reads first line

3. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading the second book:

4. **“Great! Now I’m just going to ask you a couple of questions about the story”**

Ask questions from comprehension assessment about Zoom City

Order 2

First reading session. Only prompt on the first page.

1. **“I’m going to read you a story.”** **read first line of book**

“Cat’s Pajamas Doodley-doo”

2. **“Now it’s your turn to read!”**

Participant reads first line

3. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading Cat’s Pajamas book:

4. **“Great! Now I’m just going to ask you a couple of questions about the story”**

Ask questions from comprehension assessment about the Cat’s Pajamas.

Second reading session. Only prompt on the first page.

1. **“Now I’m going to read you another story.”** **read first line of book**

Zoom City → “Away we go!”

2. **“Now it’s your turn to read!”**

Participant reads first line

~Wizard Activates animations~

3. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading the second book:

4. **“Great! Now I’m just going to ask you a couple of questions about the story”**

Ask questions from comprehension assessment about Zoom City

Order 3

First reading session. Only prompt on the first page.

1. **“I’m going to read you a story.”** **read first line of book**

Zoom City → “Away we go!”

1. **“Now it’s your turn to read!”**

Participant reads first line

~Wizard Activates animations~

2. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading the second book:

3. **“Great! Now I’m just going to ask you a couple of questions about the story”**

Ask questions from comprehension assessment about Zoom City

Second reading session. Only prompt on the first page.

1. **“Now I’m going to read you another story.”** **read first line of book**
2. “Cat’s Pajamas Doodley-doo”
3. **“Now it’s your turn to read!”**

Participant reads first line

4. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading Cat’s Pajamas book:

5. **“Great! Now I’m just going to ask you a couple of questions about the story”**

Ask questions from comprehension assessment about the Cat’s Pajamas.

Order 4

First reading session. Only prompt on the first page.

1. **“I’m going to read you a story.”** **read first line of book**
Zoom City → “Away we go!”

2. **“Now it’s your turn to read!”**

Participant reads first line

3. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading the second book:

4. **“Great! Now I’m just going to ask you a couple of questions about the story”**

Ask questions from comprehension assessment about Zoom City

Second reading session. Only prompt on the first page.

1. **“Now I’m going to read you another story.”** **read first line of book**
2. “Cat’s Pajamas Doodley-doo”
~Wizard Activates animations~
3. **“Now it’s your turn to read!”**

Participant reads first line

4. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading Cat’s Pajamas book:

5. **“Great! Now I’m just going to ask you a couple of questions about the story”**

Ask questions from comprehension assessment about the Cat’s Pajamas.

Reading Sessions Protocol: Experiment 3

Reader Script:

Use the study tracking sheet to determine in which order you will test the participant.

- (1) Cat's Pajamas Contingent Book First, Zoom City Animated Book Second.
- (2) Cat's Pajamas Animated Book First, Zoom City Contingent Book Second.
- (3) Zoom City Contingent Book First, Cat's Pajamas Animated Book Second.
- (4) Zoom City Animated Book First, Cat's Pajamas Contingent Book Second.

Order 1

First reading session.

1. **"I'm going to read you a story."** **read first line of book**
"Cat's Pajamas Doodley-doo"
2. **"Now it's your turn to read!"**

Participant reads first line

~Wizard Activates animations~

3. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.
[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]
After reading Cat's Pajamas book:
4. **"Great! Now I'm just going to ask you a couple of questions about the story"**

Ask questions from comprehension assessment about the Cat's Pajamas.

Second reading session. Only prompt on the first page.

"Now I'm going to read you another story." **turn to first page**

~Wizard Activates animations~

read first line of book

Zoom City → "Away we go!"

1. **"Now it's your turn to read!"**

Participant reads first line

2. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading the second book:

3. **"Great! Now I'm just going to ask you a couple of questions about the story"**

Ask questions from comprehension assessment about Zoom City

Order 2

First reading session.

1. **"I'm going to read you a story."** **turn to first page**
~Wizard Activates animations~
read first line of book
"Cat's Pajamas Doodley-doo"
2. **"Now it's your turn to read!"**

Participant reads first line

3. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading Cat's Pajamas book:

4. **"Great! Now I'm just going to ask you a couple of questions about the story"**

Ask questions from comprehension assessment about the Cat's Pajamas.

Second reading session. Only prompt on the first page.

1. **"Now I'm going to read you another story."** **read first line of book**

Zoom City → "Away we go!"

2. **"Now it's your turn to read!"**

Participant reads first line

~Wizard Activates animations~

3. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading the second book:

4. **"Great! Now I'm just going to ask you a couple of questions about the story"**

Ask questions from comprehension assessment about Zoom City

Order 3

First reading session. Only prompt on the first page.

2. **"I'm going to read you a story."** **read first line of book**

Zoom City → "Away we go!"

4. **"Now it's your turn to read!"**

Participant reads first line

~Wizard Activates animations~

5. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading the second book:

6. **"Great! Now I'm just going to ask you a couple of questions about the story"**

Ask questions from comprehension assessment about Zoom City

Second reading session. Only prompt on the first page.

1. **"Now I'm going to read you another story."** **turn to first page**

~Wizard Activates animations~

read first line of book

2. "Cat's Pajamas Doodley-doo"

3. **"Now it's your turn to read!"**

Participant reads first line

4. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading Cat's Pajamas book:

5. **"Great! Now I'm just going to ask you a couple of questions about the story"**

Ask questions from comprehension assessment about the Cat's Pajamas.

Order 4

First reading session. Only prompt on the first page.

1. **"I'm going to read you a story."** *turn to first page*

~Wizard Activates animations~

read first line of book

Zoom City → "Away we go!"

2. **"Now it's your turn to read!"**

Participant reads first line

3. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading the second book:

4. **"Great! Now I'm just going to ask you a couple of questions about the story"**

Ask questions from comprehension assessment about Zoom City

Second reading session. Only prompt on the first page.

1. **"Now I'm going to read you another story."** **read first line of book**

2. "Cat's Pajamas Doodley-doo"

~Wizard Activates animations~

3. **"Now it's your turn to read!"**

Participant reads first line

4. Continue reading each line in the book and if the participant does not read after you for 5 seconds, move to the next line.

[Full transcriptions of books not shared publically to avoid violation of the copyright holder's right of public distribution]

After reading Cat's Pajamas book:

5. **"Great! Now I'm just going to ask you a couple of questions about the story"**

Ask questions from comprehension assessment about the Cat's Pajamas.

COMPREHENSION ASSESSMENTS

ID _____

Test Date _____

Cat's Pajamas Questions:

1. **Can you tell me what Cat's Pajamas was about?**
1 pt
2. **What were the cats wearing?**
1 pt
3. **What types of cats were there?**
2 pts
4. **What were the cats bopping down dark streets looking for?**
1 pt
5. **What do the cats put away when they go off to sleep in Pajama Land?**
2 pt
6. **What do the cats catch and cook?**
1 pt
7. **Was the moon big or small?**
1 pt
8. **Why do the dogs yell at the cats?**
1 pt
9. **Was the night cold or hot?**
1 pt
10. **What do the cats use to make music?**
3 pt

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Zoom City Questions:

1. **Can you tell me what Zoom City was about?**
1 pt
2. **Where did the story take place?**
1 pt
3. **What types of cars were there?**
2 pts
4. **What color light did the cars stop at?**
1 pt
5. **What kind of sounds did the cars make in the book?**
2 pt
6. **What did the cars do at the green light?**
1 pt
7. **What was the disaster?**
1 pt
8. **Why did the cars crash?**
1 pt
9. **What kind of truck helped the broken car?**
1 pt
10. **What parts on the car were fixed?**
3 pts

___/14

Vocalizations Data Protocol

To ensure child vocalizations were similar between conditions, vocalizations were coded as the total number of words the participant said aloud out of the total words in the story. Extraneous words children expressed from questions or comments (e.g., “Oh, I like that car”) separate from the narrative were not counted as vocalizations. Coding began when the first word of the first line of the book was read aloud by the reader and continued until the book was finished. A “1” was coded for each word vocalized, and a “0” was coded for each word not vocalized or incorrectly said aloud (e.g., vocalized “cart,” instead of “car”). All coders received extensive training of coding vocalizations using the audio recordings of each session. If an audio recording is not available due to a corrupt file, the video recording should be used. Inter-rater reliability (Cohen's Kappa = .99) was established for at least 20% of the entire sample.

Notes on Data Collection:**Experiment 1:**

Data from one audio recording was not available due to a corrupt file, and in this case the video recording was used. Although the research assistants were not condition-blind for this one file, they were still blind to the hypotheses.

Engagement was measured as the percentage of time children spent looking at the book conditions out of total reading time.

Experiment 1 Data from two participants were not available due to corrupt video files. A mixed factorial ANOVA on engagement, factoring order and sex as between-subjects variables and book condition as the within-subject variable showed no main effect of book condition, $F(1, 28) = 2.84$; $p = .10$; $\eta_p^2 = .09$. Children's engagement did not significantly differ between the contingent book condition ($M = 99.01\%$, $SE = .50\%$) and the noncontingent board book condition ($M = 97.89\%$, $SE = .79\%$). There was also no main effect of order, $F(3, 28) = 1.12$, $p = .36$, sex, $F(1, 28) = .15$, $p = .71$, nor any significant interactions between any of these factors and engagement (all $ps > .30$). These results indicate a ceiling effect: children attended to the book throughout the entire reading session for both conditions.

Experiment 2 Data from three participants were not available due to corrupt video files. A mixed factorial ANOVA on engagement, factoring order and sex as between-subjects variables and book condition as the within-subject variable, showed no main effect of order, $F(3, 25) = .38$, $p = .77$, or sex, $F(1, 25) = .33$, $p = .57$. There were also no significant interactions between any of these factors and engagement (all $ps > .19$). Similar to the results found in Experiment 1, there was no main effect of book condition, $F(1, 25) = 2.41$; $p = .13$; $\eta_p^2 = .09$. Children's engagement did not significantly differ between the contingent book condition ($M = 98.18\%$, $SE = .39\%$) and the noncontingent static book condition ($M = 97.10\%$, $SE = .67\%$). These results reproduced the findings from Experiment 1 of a ceiling effect: children rarely disengaged from attending to the books for both conditions throughout reading sessions.

Table S3 Correlations Between Attention, Comprehension, Engagement and Verbal Ability

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------------------------|--------|-------|--------|-------|-------|------|-----|
| 1. Distractibility | | | | | | | |
| 2. Comprehension Difference Scores | .57*** | | | | | | |
| 3. Contingent Book Comprehension | .26 | .42* | | | | | |
| 4. Board Book Comprehension | -.12 | -.26 | .77*** | | | | |
| 5. Contingent Book Engagement | -.18 | -.28 | .08 | .28 | | | |
| 6. Board Book Engagement | -.29 | -.05 | .43* | .49** | .48** | | |
| 7. Verbal Ability | -.36 | -.42* | -.17 | .12 | .06 | -.03 | |
| 8. Age | -.09 | .03 | .18 | .17 | -.02 | .28 | .05 |

Note. For correlations with verbal ability, $n = 26$. For correlations with Engagement, $n = 33$. For all other correlations, $n = 35$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table S4 Correlations Between Attention, Comprehension, Engagement and Verbal Ability

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------------------------|---------|--------|------|------|-----|-------|------|
| 1. Distractibility | | | | | | | |
| 2. Comprehension Difference Scores | .71*** | | | | | | |
| 3. Contingent Book Comprehension | .34 | .43*** | | | | | |
| 4. Static Book Comprehension | -.56*** | -.47** | .26 | | | | |
| 5. Contingent Book Engagement | .03 | .22 | .35 | .01 | | | |
| 6. Board Book Engagement | -.10 | .24 | .39 | .05 | .25 | | |
| 7. Verbal Ability | -.03 | .04 | -.06 | -.13 | .13 | -.25 | |
| 8. Age | -.48** | -.14 | .16 | .40* | .15 | .48** | -.13 |

Note. For correlations with verbal ability, $n = 32$. For correlations with Engagement, $n = 30$. For all other correlations, $n = 33$. * $p < .05$. ** $p < .01$. *** $p < .001$.