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Effects of animated versus static story stimuli on the narratives of school-age children with typically developing language skills

by

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A thesis

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To the Graduate Faculty:

The members of the committee appointed to examine the thesis of KOLBEE TIBBETS find it satisfactory and recommend that it be accepted.

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Thesis Abstract-- Idaho State University (2022)

Narrative language samples provide meaningful information about children's language skills. The type of stimuli used for elicitation may influence language sample qualities. The purpose of this pilot study was to explore the impact of animated and static story stimuli on the quality of children's narratives and to evaluate the appropriateness of the selected stimuli for future research. Six typically developing children, ages 9 to 12, viewed static and animated stories and retold each story to an examiner. The resulting narratives were analyzed for story structure, productivity, complexity, accuracy, and lexical diversity. Although no significant differences were obtained, the trends in the data indicated that further research on animation and its effects on narratives with a larger sample is warranted and may have clinical implications for children with language disorders. Furthermore, the stimuli were deemed to have adequately similar characteristics to be used in future studies.

Key Words: narrative, language sample, animation, language disorders

Effects of animated versus static story stimuli on the narratives of school-age children with typically developing language skills

For years, narrative language samples have been collected in databases and have made it possible for clinicians to compare language samples of children with potential language impairments to language samples of their peers with typically developing language. Comparing language samples assists in the identification of children with language impairments and allows us to obtain information about their current language skills in comparison to their peers of the same age (Nelson, 1998; Paul, 1995; Scott & Windsor, 2000). In addition to forming a comparison with developmental norms, narratives also provide rich information about children's language in more natural contexts (Heilmann et al., 2010; Klop & Engelbrecht, 2013). Narratives create snapshots of children's abilities in situations that are comparable to the language needs in their school environment because they are closely tied to literacy and pragmatic skills. Due to the link between reading skills and the ability to retell stories (Botting, 2002), narrative language samples can provide information about children's present and potential difficulties with literacy skills. In addition, since narratives and pragmatic skills are correlated (Botting, 2002), narrative samples can serve as a measure for identifying the strengths and weaknesses of children's pragmatic and other language skills in certain contexts. Narrative language sampling provides a wide range of information, making it an excellent tool for evaluating a child's pragmatic, literacy, and expressive language skills in each of its linguistic domains: content, form, and use.

Finding stimuli that elicit samples that are reflective of children's language skills is essential for strengthening narrative language samples as a tool. A variety of dynamic and static stimulus types exist, and there is value in understanding how each of them impact the outcome of narratives. Static stimuli can range from single pictures to wordless picture books. Dynamic

stimuli may incorporate animated videos or real-life videos. Combinations of stimuli can be used and include visual only, visual prompts and verbal models, or verbal models only. Different types of stimuli have been researched and compared in studies focusing on young populations of children. Previous studies (Schneider, 1996; Schneider & Dube, 1997) have examined the effects of using stories presented with pictures versus stories presented verbally as well as stories presented verbally and with pictures. Schneider's study (1996) found that both verbal-only and picture-only stimuli were useful for obtaining different types of samples. Upon being told a story, the children were then asked to retell the story that was presented orally. When they were given pictures without an accompanying verbal model, the children were asked to generate their own stories. Due to the nature of the stimuli, the verbal-only stimuli elicited language reflective of the children's recollection of the story, while the picture-only stimuli elicited a sample reflective of the children's abilities to structure stories by themselves. Schneider and Dube (1997) concluded that stimuli should be selected based on the skill being evaluated.

Technology has opened new doors for literacy exposure by expanding opportunities for language input and output. Children routinely use technology at school and at home. As children reap information and entertainment, they share it with their peers and family. With the accessibility of technology, it is easier to find and use stories that are dynamic either through animation or through real life video. It is possible that the use of dynamic stimuli such as animation may facilitate and improve the characteristics of children's narratives. The purpose of the present pilot study was to explore the impact of animated and static story stimuli on the quality of children's narratives and to evaluate the appropriateness of the stimuli for future research.

Narrative Assessment

Language samples are often analyzed for quality and quantity in elements of macrostructure and microstructure. Macrostructure consists of the story's narrative elements, and microstructure consists of the linguistic forms and content features such as syntactic complexity, vocabulary usage, and the use of literate language (Heilmann et al., 2010). Past studies have shown that children with typically developing language tend to produce narratives that are largely accurate in terms of microstructure (e.g., Windsor et at., 2000; Nippold, 1998) and contain elaborate elements of macrostructure (Colozzo et al., 2011; Duinmeijer, 2012).

Macrostructure

Narrative macrostructure serves as the framework for a story and is composed of several elements. Narrative structure is heavily influenced by culture. Western story grammar elements typically include the setting (time and/or place) and one or more episodes, which consist of an initiating event, internal response, plan, action, and consequence (Stein & Glenn, 1979, Gillam et al., 2017). The initiating event is a problem or other event that needs to be dealt with. The initiating event may lead the storyteller to mention an internal response or a change in the characters' thoughts or feelings. The initiating event or problem is typically presented as a situation that requires the character(s) to create a plan and take action to complete the plan and resolve the problem. Consequences are the result of the action taken by the characters. Narratives are often composed of more than one episode, and the complexity of the macrostructure increases with the number of episodes and any complicating factors that are introduced in the story. Aspects of macrostructure should be knit together by the storyteller, making a cohesive story.

Hughes et al. (1997) has summarized the narrative development process with story structure levels. The narratives of preschool children are largely composed of descriptions of settings and characters. Over time, they incorporate more actions and eventually include action sequences. However, they tend to not focus on goal-directed behaviors. By about age 6, their narratives may include the characters' intentions but do not typically include the characters' plan for achieving their goals. In the 7- to 8-year-old stage there tends to be a great deal of narrative development as their stories develop into episodes that contain more elements of macrostructure such as the characters' plans and actions as well as the resulting consequences. Episode development and sophistication continues from there and by about 11 years of age, children should be able to form more elaborate episodes and create complex episodes that may include multiple problems, plans, attempts and consequences. In early adolescence, narrative development will continue to included embedded episodes and interactive episodes.

Fairly elaborate macrostructure elements are expected of typically developing children by about the age of 7-8. Studies suggest that children who have typically developing language produce more complex stories with more devices that are generally used in written language (Botting, 2002). As children get older, they become more skilled at crafting characters' thoughts, reactions, and difficulties (Nippold, 1998). Macrostructure can be analyzed within generated narratives (Hughes et al., 1997) and used to understand a child's reading skills.

Microstructure

Microstructure elements consist of the linguistic form and content of narratives and includes features such as utterance length, syntactic complexity, vocabulary usage, and the use of literate language (Heilmann et al., 2010). Microstructure also includes grammatical elements such as proper use of pronouns, subject-verb agreement, and proper use of inflectional

morphology. Evaluating each of the elements described above is key in language sample analysis. Cohesive devices are also analyzed as elements of microstructure: referential cohesion, conjunctive cohesion, and lexical cohesion. These cohesive devices pull all of the elements together to make one cohesive narrative. Referential cohesion is used to clearly refer to a person, place, or thing that was referenced earlier in the narrative. Moreover, conjunctive cohesive devices are used to bring sentences together and improve the fluidity of the narrative, and lexical cohesion focuses on vocabulary selection. Cohesive devices are often acknowledged as an aspect of microstructure although they are utilized beyond the utterance level (Heilmann et al., 2010).

Overall, children with typically developing language demonstrate ongoing development in lexical, syntactic, and semantic aspects of language. Between the ages of 9-12, children increase their use of abstract nouns, metalinguistic verbs, metacognitive verbs, adverbs of magnitude, and vocabulary specific to certain areas of academics (Nippold, 1998). Lexical development can be examined in narrative language samples by looking for the usage of later-developing vocabulary and lexical diversity. In addition to producing longer utterances and consistently using inflectional morphemes correctly, school-age children more frequently use complex sentences with features such as relative clauses, adverbial clauses, nominal clauses, passive voice, perfect tense, compound auxiliary verbs, participles, gerunds, and infinitives (Nippold, 1998). Each feature described above adds to the complexity of sentences and can be observed in narrative language samples. Children can also add to the richness of narratives by using figurative language such as metaphors, idioms, and proverbs.

Animation

Many studies of narrative involve having children retell stories that are presented auditorily or stories told with visual supports such as pictures or wordless picture books. Most

visual stimuli that have been used involve static pictures. It is possible that animated stimuli can have a beneficial impact on narrative retell (Diehm et al., 2020). Animation may be effective for helping children process dynamic relationships and thus improve the quality of their retells since animation can clearly depict motion and events that occur over time (Bétrancourt and Tversky, 2000). In the early stages of research on animation, Bétrancourt and Tversky (2000) analyzed the effect of computer animation on human education and psychology. Although they did not specifically find an overall benefit of animation, they did find that animation was the most beneficial when it could be used to create a mental model of the relationship between motion and change that occurs over time. Another research review (Tversky et al., 2002) examined several studies of animation and concluded that the effectiveness of animation could be attributed to the addition of interactive elements and information rather than animation itself. This study looked at animated graphics that were not equivalent to the static graphics, which interacted with the overall effect of animation causing the confound in results. Some studies suggested that for some tasks animation may potentially cause cognitive overload due to too much unnecessary detail being presented (Tversky et al., 2002; Sweller, 1994). To decrease any cognitive overload, Sweller (1994) suggested excluding extra details that could disrupt attention throughout animated videos. On the other hand, animation may also prompt schemas that make cognitive processes easier, which may be positive or negative depending on the individual and the situation (Schnotz & Rasch, 2005). However, these studies were from early in animation research and methodological improvements have been made since then.

More recent research contrasts the results from earlier stages of animation research. Hoffner and Leutner (2007) completed a meta-analysis of studies that compared the effectiveness of animated vs. static visual materials on learning to understand the differences between using

animated videos (computer-based and video-based) versus static pictures. The results revealed an overall medium effect size in favor of animated over static pictures for instructional purposes, especially when the animations are representational, highly realistic, or when teaching procedural -motor knowledge. In another meta-analysis, Berney and Bétrancourt's (2016) found that animation had a more positive effect than static images for remembering, understanding, and applying knowledge. It is important to note that these studies are difficult to compare because the meta-analyses examined different studies as well as different factors of methodology. Although the meta-analyses differed, both revealed significant positive differences for the use of animation in comparison to static pictures.

A few studies addressed the issue of using dynamic stimuli versus static stimuli for eliciting narratives from children. Overall, the results in speech-language pathology focused studies examining the effect of animation on narrative-level language are mixed. In a study conducted by Gazella and Stockman (2003), story-retelling tasks were used to evaluate the effect of dynamic stimuli on children's lexical diversity and sentence complexity among preschoolers. The children were randomly assigned to be presented the same story in an audio-visual format or an audio-only format. The audio-visual format provided the children with audio of the narrated story as well as a video narration using animated puppets with human characteristics. After being presented with the story, the children were given instructions to immediately retell the story to an individual who was not present for the story presentation. Then, the children were tasked with answering nine questions about the story. The results revealed no significant differences between story stimuli, which means that the audiovisual stimuli did not have a significant effect on the children's lexical diversity and syntactic complexity. This study did not isolate the effects of animation on language production; the use of audio was a confound.

Diehm et al. (2020) examined the impact of animated video with a narrative script versus a wordless picture book with a narrative script on the narratives produced by young children between the ages of 3 and 5 years old. The researchers created picture books with screenshots from the animated video they used in the study. Then, they created an audio recording to present a narrative script along with the animated video and the picture book. The children completed a narrative retell after being given each stimulus.

The results revealed higher level microstructure and macrostructure in narrative language samples when the children were given the animated video stimulus in addition to the narrative script. After analyzing the data with t-tests, the significant differences in microstructure were revealed. When retelling the narrative presented with the animated video, children produced a greater number of different words, a higher number of total words, greater mean lengths of utterances (MLU), more action verbs, and relied on fewer prompts from the examiner. These differences could potentially be due to the combination of the verbal script and the animated video and may not be due to the animation on its own. The researchers measured macrostructure by comparing the mean scores of story grammar. Although, the results revealed a higher average raw score for macrostructure in response to the animated video stimulus than the static picture book, the difference was not significant with the Bonferroni correction. The descriptive statistics showed that all of the story grammar elements (character, setting, plot, initiating events, reactions, actions, consequences, and ending) received higher average raw scores after children retold narratives given the animated video stimulus. This study suggests that incorporating animation in addition to a verbal script for preschool children can be beneficial for eliciting language samples of higher quality and quantity (Diehm et al., 2020) compared to static pictures with a script. Since this study utilized a verbal script, the effect of animation alone was not

isolated. Berney and Betrancourt (2016) completed a meta-analysis, which revealed that the addition of a narrated script can have a modality effect (Ginns, 2005; Mayer, 2005; Schmidt-Weigand, 2005), which enhances learning. More research is needed to understand how animation alone affects children's language.

Another study (Klop & Engelbrecht, 2013) examined the differences between narrative language samples elicited with soundless animated video presentations versus wordless picture book presentations. In this study, 20 children between the ages of 8 and 9 years old were randomly assigned to a group presented with a soundless animated video presentation or a wordless picture book. The animated video and the wordless picture book depicted the same sequence of events and were similar in size. The primary difference between both stimuli was the animated movement in the video presentation. Each child was given their assigned stimulus presentation and then asked to retell the story that they viewed to the researcher. Ten narrative samples were collected for the wordless picture book presentations, and ten narrative samples were collected for the animated video presentations.

The results of the study revealed no significant differences between narratives elicited with the wordless picture books and animated videos. The researchers calculated and compared the total number of words, total number of T-units, mean length of T-units, and the number of different words for each group of narrative samples. The analyses yielded information that both stimuli groups produced narratives of similar quality as indicated by the microstructure variables described above (Klop & Engelbrecht, 2013). The differences in macrostructure were evaluated by measuring the goal attempt outcomes in the narrative samples. Both groups also produced goal attempt outcomes at a similar level. The researchers explained that the children who received the animated video stimulus may have produced narratives similar to the group that

received the wordless picture book stimulus because children their age do not rely on visual support as much as younger children do. The researchers also explained that the small sample size in this study created a limitation. Further research is needed to explore the differences in the quality and quantity of language samples when an animated stimulus is used for narrative retells among school-age children who may be able to use information from animation to tell even more elaborate or sophisticated stories. Since this study did not contain a verbal script, it is very difficult to compare it to the study by Diehm et al. (2020), which contained a verbal script.

The Present Study

This pilot study begins to explore whether there are differences in the characteristics of narratives elicited using static stimuli in the form of a picture sequence as compared to animated stimuli (video), both without a verbal script, in fourth to sixth grade children with typical language. There are two specific purposes of this study. The first purpose was to conduct a pilot study on the selected stimuli to ensure that they are appropriate for future use in a larger study. When evaluating the quality of narratives, it is important that the language samples themselves are long enough in order to provide an adequate amount of language for analysis. It is typically recommended that language samples be a minimum of 50 utterances for the collection of reliable measures of children's language skills (Lee, 1974; Miller, 1981; Templin, 1957). Other studies have indicated that language samples as short as 25 utterances can be informative (Heilmann et al., 2010; Tilstra & McMaster, 2007). In order to ensure that the language samples would be an adequate length for analysis and would simultaneously limit memory demands on the children, the study incorporated multiple narrative retells of short stories rather than using longer stories. We hypothesized that if stories were carefully selected with regards to theme, length, and content, that they would yield no significant differences in story length across the four stories.

Further, if the narratives generated from the four stories were similar in length, two stories could be combined in the animated condition and two stories in the static condition to provide samples of adequate size for analysis. Piloting the stimuli for this study also served as a foundation for ensuring that the stimuli is appropriate for future studies geared towards understanding the effects of animation on the narrative retells of children with language disorders.

The second specific purpose of this research was to begin to explore the potential effects of animated story stimuli as compared to static stimuli on the macrostructure, productivity, complexity, and semantic characteristics of narratives produced by 9- to 12-year-old children. In order to look specifically at the effect of animation on the quality of narrative retells, this study did not include the use of a script; both the narrative and animated stimuli were made wordless. More information was also needed to understand how animated stimuli affects the narrative language samples of older school age children.

Possible differences in macrostructure and microstructure were evaluated in terms of the stimulus type. Animated stimuli may portray ideas more clearly, making it easier for children to understand the types of actions that took place and the relationships between characters and events. The first hypothesis was that stories retold from wordless animated visual stimuli would elicit stories of higher quality with regard to macrostructure than those elicited with static stimuli. We predicted that the mean of Monitoring Indicators of Scholarly Language (MISL; Gillam et al., 2017) scores yielded from animated story retells would be greater than the mean of MISL scores for stories told in response to static stimuli.

Animated stimuli may reduce cognitive load, making it possible for children to focus cognitive resources on producing more complex language forms. Thus, the second hypothesis was that stories retold from animated stimuli would elicit more productive narratives. We

predicted that the stories elicited with animated stimuli would contain a greater total number of utterances as well as a greater total number of words.

Animation may increase the amount of detail captured in the visual stimuli, especially as related to movement. Thus, the third hypothesis was that the animated condition would yield greater complexity and accuracy of narrative language, which would be indicated by measures such as mean length of terminal units (MLT), subordination index (SI), and percent grammatical utterances. We predicted that the complexity and accuracy measures, mean length of terminal units (MLT), subordination index (SI), and percent grammatical utterances, would yield higher values for the retells of animated stories.

Animation may increase the amount of detail captured in the visual stimuli, especially as related to movement. Thus, the final hypothesis was that the animated stimuli would facilitate greater specificity in verb selection resulting in greater verb diversity in the animated versus static condition. We predicted that the stories retold from animated stimuli would yield more action verbs. This research was completed to serve as a comparison to children with language disorders. Understanding the effect of animation on narrative language samples has implications for both language assessment and treatment.

Method

Participants

Six children, three males and three females, ages 9-12 were recruited to participate in the study. For inclusion in the study, each participant was required to demonstrate typical language skills as measured by the *Test of Integrated Language and Literacy Skills* (TILLS; Nelson et al., 2016) and the *Clinical Evaluation of Language Fundamentals Fifth Edition* (CELF-5; Wiig et al., 2013). The TILLS Identification Core score and the CELF-5 Expressive Language Index

score were used to determine eligibility. The subtests of the TILLS that were administered to obtain the Identification scores were: 1) Vocabulary Awareness, 2) Phonemic Awareness, 3) Nonword Spelling, 4) Nonword Reading, 5) Nonword Repetition, 6) Listening Comprehension, 7) Reading Comprehension, 8) Reading Fluency, and 9) Written Expression- Discourse, Word, Sentence. The subtests for the CELF-5 Expressive Language Index included 1) Sentence Formulation, 2) Recalling Sentences, and 3) Sentence Assembly. Children were also required to score within 2 SD of the mean on the *Test of Nonverbal Intelligence Fourth Edition* (TONI-4; Brown et al., 2010), as a screening for typical cognitive skills.

One of the participants (103) did not meet the TILLS identification cut off score for her age (her score: 32; cut off score: 34), but this was due to a low score on only one subtest (Written Expression); all of her other scores were in the average range or higher and her Expressive Language Index (ELI) score on the CELF-5 was well within expectations for her age and met the inclusion criteria of the CELF-5 ELI score. Thus, she remained in the pilot study. See Table 1 for more information about the participants. Each child was given a $10 gift card for each session they completed ($40 for the entire study).

Table 1

Participant Characteristics and Test Scores

Participant	Age	Gender	Grade	TILLS Identification Core Score	CELF-5 Expressive Language Index Score	TONI-4 Index Score
101	10;9	F	5	100	120	132
102	10;9	F	5	111	122	119
103	10;0	F	5	86	108	104
104	9;3	M	4	93	105	100
106	12;0	M	6	97	102	110
107	9;9	M	4	114	120	106

Materials

This study included the following stimuli: (a) two wordless animated videos and (b) two static picture sequences presented in a slideshow format.

Stimuli Selection and Development

The researchers searched the internet and viewed a wide range of two-to-eight-minute animated wordless videos. After viewing more than 30 short videos, the researchers selected four videos for the study, which served as the animated stimuli and created a foundation for the static stimuli. The videos were selected based on their similar characteristics. Each video included in the study is less than 5 minutes long and seemed engaging. They contain major story grammar parts including clearly depicted characters, the setting, an initiating event, the plan, multiple actions as well as consequences and outcomes. Short stories with all the major story parts were selected, so that the participants would be able to remember the stories and produce adequate language for analysis. Thus, instead of including one long story, two shorter stories were selected for each condition. A total of four stories were selected: two accomplishment stories and two helper stories. Two of the short films were *Belly Flop* (Dillon, 2018) and *Lifted* (Rydstrom & Sarafian, 2012). The characters in both of these films are trying to accomplish something. The characters try to accomplish their goal multiple times until they appear to be successful. These are referred to as accomplishment stories. The other two films were *Soar* (Tzue & Yu, 2015) and *Dust Buddies* (Tomashek & Wade, 2018). Both of these films contain a character that is trying to help another character accomplish a task. These are referred to as helper stories.

Animated Stimuli

The selected animated videos were edited to exclude the credits and closely match the duration of one of the other videos. The animated videos were also posted on YouTube on an

unlisted channel to ensure that the videos could be accessed by the participants on their own devices in order to reduce any playback issues that could occur when videos are streamed and shared via the teleconferencing software. Both animated and static stimuli were muted to eliminate any story cues that might be communicated through music or other sounds in order to isolate the effects of animation.

Static Stimuli

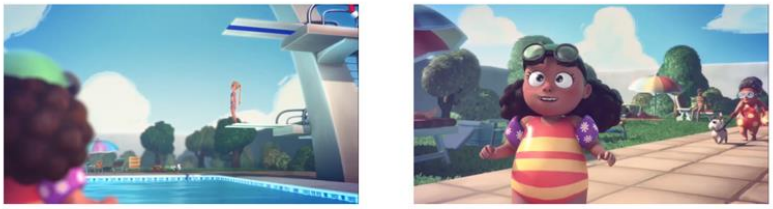
All four animated videos were made into wordless static picture sequences (static stimuli), created with Snagit, a video and image capturing software package. Researchers used Snagit to capture screen shots and place them in PowerPoint presentations, which were automated to be presented within the same time period as the animated video counterparts. According to Berney and Betrancourt (2016), the positive effect of animation over static graphics was found only for system-paced instructional material. Therefore, the static and animated stimuli materials were not controlled by the participants but were automated to play within the same time period as their counterparts. The screenshots were also placed in the PowerPoint presentations according to a set of formatting guidelines for consistency. When possible, single images were placed on the PowerPoint presentations. However, there were several instances when more than one image needed to be placed on a slide to accurately display the relationships between events. For example, frames representing the relationship between an event and the character's perspective needed two-three pictures per slide. Perspective slides with two pictures were displayed horizontally, side by side. Perspective slides with three pictures were displayed with two images stacked vertically either on the left or the right side with the third image centered on the opposite side. For the perspective slides, all of the pictures were formatted to be the same size. In addition, sequential events were presented with three images on one slide, so

that the participant could see the images in chronological order to represent the sequence. All three images were centered and formatted to be the same size. Sequential events and perspective responses were represented with the sequential images on the upper half of the slide in chronological order with each image the same size and the perspective image underneath the sequence at a larger ratio in size than the sequential images. See Figure 1 for formatting examples. In addition to the formatting guidelines displayed in Figure 1, all of the pictures and scenes in the static stimuli were placed in chronological order.

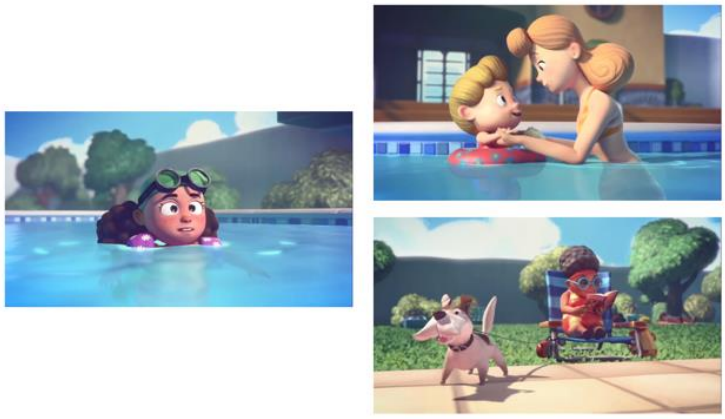
Figure 1

Static Stimuli Formatting Examples from Belly Flop

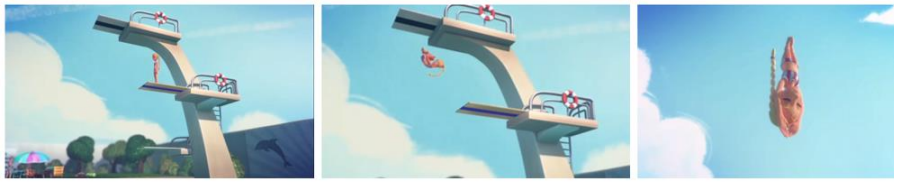
Perspective frames with two pictures



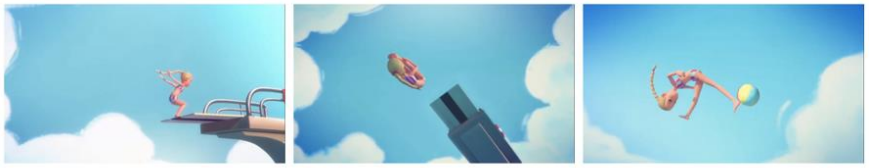
Perspective frames with three pictures

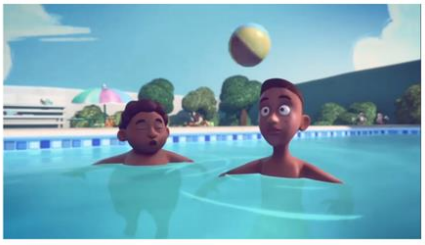


Sequence frames



Sequence and perspective frames





Story Pairs

The stories were paired across story type, one accomplishment story and one helper story, within conditions, so that each participant would see one of each story type regardless of static versus animated condition. See Table 2 for more information about the story stimuli and conditions.

Table 2

Story Stimulus Types, Conditions, and Duration

	Accomplishment and helper story pair		Accomplishment and helper story pair	
	Belly Flop	Dust Buddies	Lifted	Soar
Animated condition story duration	4:13	3:51	4:12	3:51
Static condition story duration	4:13	3:51	4:12	3:51

Prior to data collection, preliminary testing was conducted to ensure that variables were adequately controlled and that the static story depicted the key elements of the video versions of the stories. To determine that critical information needed for telling the stories was present in the stimuli, the stimuli were pre-tested with adult undergraduate research lab volunteers before proceeding with the study participants. Completing this preliminary testing confirmed that the static stimuli and the animated stimuli both elicited adequate narratives and that each stimulus has the necessary components for retelling the stories. To ensure optimal viewing of the stories,

each participant was instructed to make the stimuli full screen before watching the static and animated stories.

Procedure

This study (FY2021-224:) was approved by the Idaho State University Institutional Review Board (IRB). All participants and legal guardians were informed of the nature and purpose of the study and agreed to participate. The parents completed and signed a consent form, and children provided verbal assent after being informed about the study and given the option to participate. In addition, the parents also completed a history form with health and developmental information, so that researchers could ensure that the participants met the inclusion criteria. Due to the public health situation, all testing and data collection took place through video conferencing. Parents of the participants agreed to hold the sessions on computers located in quiet rooms.

Each participant in the study participated in four different video conference sessions. Standardized testing with the *TILLS, CELF-5*, and *TONI-4* was mostly completed in the first two sessions with some overflow to the last two sessions. The *TILLS* was administered using *Tele-Tills*, and all the participants' test scores were compared to the standardization samples that were conducted in person. Thus, environmental factors and differences in the format of test administration may have influenced the participants' performance and scores. Any differences in scores due to the online administration were likely minor and did not appear to have a major impact of the participants' performance.

During the final two sessions, any remaining testing was completed, and the children completed the familiarization tasks and experimental tasks. The familiarization tasks were completed across both stimuli conditions. The examiners presented a short, silent animated vide*o*

For the Birds (Dufilho, 2001) to each participant to familiarize them with the experimental tasks. Then, the examiner presented a scripted example of a narrative for each familiarization task story. The familiarization procedures were also completed with a wordless picture story, *A Joy Story* (Kyra et al., 2018), presented via PowerPoint to familiarize participants with the static stimuli experimental tasks. Although examples of spoken narratives were provided during the familiarization tasks, examples were not provided for the videos and wordless static picture sequence forms during the experimental tasks.

Each participant was assigned to the stimuli stories that they viewed first, second, third, and last. They viewed a pair of accomplishment/helper stories in animated form and a pair of both types in static picture sequence form, and the conditions and order of stories were counterbalanced across the subjects. The children viewed each of the videos and static stories once. For the static picture sequence form, the presentation time was controlled by automation of the PowerPoint slides. The presentations of the static picture sequence forms were made to equal the same length of time as the videos. After viewing each story, a second researcher entered the session, and the children were instructed to tell each story from beginning to end with as many details as they could to the second researcher that was not present while the child viewed the story. This was to eliminate any assumptions the child might make about the listener knowing the story, which can affect a child's inclusion of all the story elements. See Appendix A for the specific instructions that were read to the participants. The retells for each of the children were video and audio recorded, for transcription, coding and analysis. This was repeated for each story.

Four research assistants working at the Idaho State University Child Language Lab were trained in transcription and coding using Systematic Analysis of Language Transcripts (SALT;

Miller & Iglesias, 2020). The researchers transcribed and coded the story retells using general SALT conventions and study specific codes. SALT is frequently used to analyze language samples for elements of language such as diversity of words, use of morphemes, and complexity of syntax. For the list of codes that were used, see Appendix B. To ensure consistent and accurate coding, a trained research assistant checked the coding of each story transcript. Any differences in coding were discussed and resolved for 100% agreement.

Furthermore, the researchers used the Monitoring Indicators of Scholarly Language (MISL; Gillam et al., 2017) to primarily assess for elements of macrostructure within participants' narratives. The MISL contains a scoring system, which can be used to rate the various elements of macrostructure and some elements of microstructure. Each element can be rated between zero to three points. A score of zero indicates that the story element was not included, and the points increase as complexity is implemented with each story element (Gillam et al., 2017). The researchers and research assistants were trained on how to score for elements of macrostructure and microstructure using the MISL. Training was completed using stories generated by adult volunteers using the actual study stimuli. In order to ensure score and consistency across examiners, all of the story retells were scored by two researchers. Then, all of the story retells for all participants were checked for MISL score agreement. Any discrepancies were discussed until agreement was reached. See Appendix C for initial percentage of agreement on MISL scores. The researchers then used the MISL to compile total macrostructure scores and the total number of story elements.

The MISL also assesses a variety of microstructure elements. For example, literate language can be assessed by evaluating a child's use of coordinating conjunctions, subordinating conjunctions, adverbs, metacognitive verbs, and elaborated noun phrases. Each of these elements

is given points from zero to three, based on their absence or presence. For example, if one coordinating conjunction is used, then one point is given. If two different coordinating conjunctions are used, then two points are given. This scoring system is also used for subordinating conjunctions, mental verbs, linguistic verbs, and adverbs. Each elaborated noun phrase is given a point for the usage of different modifiers preceding the noun (Gillam et al., 2017). See Appendix D for the MISL rubric. Although both macro- and microstructures scores were calculated for the MISL, the MISL primarily served as a measure of macrostructure, while the more detailed data obtained from SALT was used to examine various aspects of microstructure.

Data Analysis

To analyze the participants' narrative story retells for elements of microstructure, the following SALT reports were generated: Standard Measures, Code Summary, and Word Code Table. Study specific codes were used to assess for verb diversity and were counted using the Word Code Table reports. All of the transcripts were coded, recoded, and checked by trained students to ensure consistency and accuracy of coding. Any discrepancies in coding were discussed and resolved for 100% agreement. The researchers examined the data for possible differences in the types of verbs used across stimuli conditions, verb diversity, and differences in syntactic complexity, productivity, and accuracy between conditions.

Results

The SPSS Statistics program was used for the statistical analysis of the data. A one-way ANOVA test was conducted to determine if there was a significant difference in the total number of utterances yielded from retells across the four stories. After determining there were no significant differences in the total number of utterances, the stories were combined within

conditions, and a series of paired-sample *t*-tests were used to determine if significant differences were present in language produced between the two types of elicitation stimuli: static and animated. Bonferroni corrections were applied to control for Type I errors when multiple paired-sample *t*-tests were used for series of similar data (e.g., two tests were conducted on the construct of productivity).

Overall, it was hypothesized that stories retold from animated stimuli would elicit stories of higher quality with greater quantity of linguistic elements and literate language features with regard to macrostructure and microstructure. Although no significant differences were found, there were notable trends in the data that warrant further research with a larger group of participants that would allow the study to be more adequately powered to identify significant differences. See Appendix E to see all of the paired-sample *t*-test results.

Length of Individual Stories

A one-way ANOVA was conducted to determine if stories retold from the stimuli would yield differences in story length across the four stories. The one-way ANOVA revealed no significant differences between the stories in terms of the total number of utterances, $F(3) = 1.93$, $p = 0.301$. Therefore, the null hypothesis was supported, and the stories were combined within conditions for data analysis of quality and quantity of language.

Macrostructure

As shown in Table 3, the animated stimuli elicited stories with higher macrostructure scores in four out of six of the narratives produced by participants. However, no significant differences were revealed by the paired-sample *t*-test results.

Table 3

Means of MISL Macrostructure Scores Between Static and Animated Conditions

Participant	Static stimuli	Animated stimuli
101	18.5	19.5
102	18	18.5
103	17	18
104	12.5	13
106	17	17
107	16.5	16

Productivity

Table 4 shows that four out of six participants produced stories with a greater total number of utterances, and half of the participants produced a greater total number of words when given the animated stimuli. A Bonferroni correction was used to adjust the alpha to 0.025. The results of the paired-sample *t*-test revealed no significant difference ($t(5) = -1.24$; $p = 0.135$) in the total number of utterances between stories elicited with static stimuli (Mean = 54.5; SD = 19.79) and stories elicited with animated stimuli (Mean = 59.67; SD = 13.44). However, with only six subjects, a *p*-value of 0.135 may warrant exploring more research with a larger group of subjects. When given the animated stimuli, half of the participants produced a greater total number of words, which is shown in Table 4; the paired-sample *t*-test revealed no significant differences.

Table 4

Productivity Measures Between Static and Animated Conditions

	Total number of utterances		Total number of words	
Participant	Static stimuli	Animated stimuli	Static stimuli	Animated stimuli
101	43	55	456	464
102	70	64	607	597
103	76	78	722	639
104	27	37	232	357
106	69	63	628	576
107	42	61	409	563

Accuracy

Table 5 shows that overall the participants produced relatively similar levels of accuracy, and the paired-sample *t*-test revealed no significant differences.

Table 5

Percentage of Accurate Utterances Between Static and Animated Conditions

Participant	Static stimuli	Animated stimuli
101	95%	98%
102	99%	100%
103	100%	97%
104	89%	95%
106	99%	95%
107	98%	98%

Complexity

Table 6 presents the means of complexity measures by participants between both static and animated conditions. The data shows that the participants produced similar levels of complexity between conditions, and this is also reflected in the *t*-test results. A Bonferroni correction was used to adjust the alpha to 0.016; no significant differences were found.

Table 6

Complexity Measures Between Static and Animated Conditions

	Subordination index		Proportion of complex sentences with finite clauses		Proportion of complex sentences with finite and nonfinite clauses	
Participant	Static stimuli	Animated stimuli	Static stimuli	Animated stimuli	Static stimuli	Animated stimuli
101	1.47	1.35	0.44	0.27	0.70	0.53
102	1.32	1.40	0.30	0.31	0.59	0.53
103	1.33	1.21	0.28	0.21	0.41	0.44
104	1.20	1.32	0.26	0.30	0.41	0.59
106	1.14	1.10	0.13	0.08	0.38	0.32
107	1.27	1.17	0.19	0.15	0.33	0.34

Semantics

Table 7 presents the total number for each type of verb that participants produced between conditions. A Bonferroni correction was used to adjust the alpha to 0.016. A paired-sample *t*-test revealed that the difference between the total number of action verbs in stories elicited with static stimuli (Mean = 65.67; SD = 21.71) and animated stimuli (Mean = 70.83; SD = 16.47) was not significant ($t(5) = -1.231$; $p = 0.14$). However, with only six subjects, a *p* value

of 0.14 may suggest a reason to continue exploring research with a larger group of subjects. In addition, although the difference between the total number of mental verbs in stories elicited with static stimuli (Mean = 2.17; SD = 1.94) and animated stimuli (Mean = 5.67; SD = 4.72) was not significant due to the adjusted alpha level of 0.016, ($t(5) = -2.178$; $p = 0.041$), a p value of 0.041 suggests that further research with a larger group of subjects may reveal differences. A paired-sample *t*-test also revealed that there was no significant difference between the total number of state verbs in stories elicited with static stimuli and animated stimuli.

Table 7

Usage of Different Verb Types Between Static and Animated Conditions

	Total number of action verbs		Total number of mental verbs		Total number of state verbs	
Participant	Static stimuli	Animated stimuli	Static stimuli	Animated stimuli	Static stimuli	Animated stimuli
101	60	59	3	13	2	3
102	83	76	5	10	5	6
103	94	99	3	3	5	3
104	33	51	0	3	0	2
106	70	69	0	4	9	2
107	54	71	2	1	2	5

Table 8 displays different measures of lexical diversity for each participants' stories between conditions. A Bonferroni correction was used to adjust the alpha to 0.025, and the paired-sample *t*-test revealed no significant differences in the total number of different verbs and

the total number of different words used between conditions. Table 8 shows that 4 out of 6 participants used a greater total number of different words when retelling animated stories.

Table 8

Lexical Diversity Between Static and Animated Conditions

	Total number of different verbs		Total number of different words	
Participant	Static stimuli	Animated stimuli	Static stimuli	Animated stimuli
101	35	32	154	157
102	40	36	169	166
103	47	37	189	160
104	24	27	102	130
106	41	41	168	177
107	31	36	133	158

Post Hoc Analyses of Semantic Measures

A post hoc analysis was completed to explore additional measures of lexical diversity. The data for each participant is shown in Table 9. Five out of six participants used more adverbs when they retold stories from animated stimuli. A Bonferroni correction was used to adjust the alpha to 0.025, and a paired-sample *t*-test revealed the difference between the total number of adverbs in stories elicited with static stimuli (Mean = 43.17; SD = 18.39) and animated stimuli (Mean = 52.33; SD = 24.93) was not significant ($t(5) = -1.66$; $p = 0.079$). However, with only six subjects, a *p* value of 0.079 suggests that research with more participants may reveal potential differences. This paired-sample *t*-test also analyzed the total number of subordinating conjunctions used between conditions, which revealed no significant differences. A separate

paired-sample *t*-test also revealed no significant differences in the use of elaborated noun phrases (a determiner + a noun + other modifiers) between conditions.

Table 9

Post Hoc Analysis of Semantic Measures Between Static and Animated Conditions

	Total number of adverbs		Total number of subordinating conjunctions		Total number of elaborated noun + phrases	
Participant	Static stimuli	Animated stimuli	Static stimuli	Animated stimuli	Static stimuli	Animated stimuli
101	41	30	6	4	14	20
102	55	71	11	11	18	26
103	42	45	5	4	43	22
104	14	19	1	4	15	18
106	69	82	1	3	36	23
107	38	67	4	3	27	25

Discussion

The first purpose of this research was to conduct a pilot study as the exploratory basis for future studies of a larger scale. Creating static stimuli that accurately presented the story components of animated stimuli was crucial for evaluating potential differences between animated and static stimuli on narrative quality. A previous research review found that some studies of animation examined animated graphics that were not equivalent to the static graphics in the study (Tversky et al., 2002). To ensure that the static stimuli and animated stimuli accurately present equivalent information in terms of the story components, this study was used to pilot the story stimuli. Overall, the story stimuli yielded no significant differences in story lengths, which was revealed by the ANOVA test results. The static stimuli guidelines ensured

consistency across the slides and helped include important details for each stories' events. The guidelines were used to present sequential events and perspective events, which were necessary for the accurate presentation of characters' internal responses as well as conflict-solution episodes that occurred in the storyline. The macrostructure scores yielded from participants' stories between conditions reflect similarity, which suggests that the static stories presented fairly similar information with regard to story elements. The largest difference in scores between conditions for macrostructure was 1 point. See Table 3 for the MISL Macrostructure scores.

The stimuli were also evaluated for functionality for future studies. The stimuli proved to elicit narratives that were of an appropriate length without overtaxing memory. When the narratives were combined within each condition, the total number of utterances for static and animated stories from each participant ranged between 27-76 total utterances for static story retells and 37-78 for animated story retells. The resulting language samples were of an adequate length for language sample analysis (Heilmann et al., 2010; Tilstra & McMaster, 2007). The stimuli also seemed to be engaging for all of the participants, and they were able to attend to the stories and recall important details, which suggests that the stimuli are an appropriate level of difficulty for future studies.

This study also evaluated the use of the stimuli over tele-conferencing. The research team gave instructions to each participant and their parent and sent YouTube links to the participants, so the participants could view the animated stimuli on their own computers. Once the videos were set to play full screen, the researcher then instructed the participant to share their screen. The participant completed this process during the familiarization procedures and continued to do so with the help of a parent as needed for the two experimental stories. These procedures were effective for avoiding limitations that may have occurred with internet connectivity and lagging

of the video. This was necessary to ensure that participants were seeing accurate representations of animated stimuli. Since these procedures were effective for the current pilot study, it suggests that these procedures could be used to effectively administer animated stimuli over teleconference for future studies.

The second purpose of this research was to explore the potential effects of animated story stimuli on the macrostructure and microstructure of children's narratives. Since only six children participated in the study, the research team was interested in identifying trends in the data and looking for areas of potential difference that could continue to be explored in future studies. Although the paired-sample *t*-tests revealed no significant differences between the static and animated conditions, there were some interesting trends in the data.

Descriptive data from the macrostructure scores between conditions reflected a positive influence of animation on four out of six children's narrative retells. Although the difference was not significant, it would be interesting to explore a larger set of data from more participants to understand if animated stimuli can cause a significant difference in narrative retells for children with typical language skills.

In terms of productivity, the children's animated story retells yielded a greater total number of utterances. Previous research on animation revealed benefits for remembering, understanding, and applying knowledge (Berney & Betrancourt, 2016). Thus, children may have produced more utterances for animated stories because of animation's positive effect on remembering and understanding. The animated stimuli may also provide more nuanced details than the static stimuli, which could have led the children to include more nuanced details in their retells. This interesting trend in the data warrants further exploration. With regard to accuracy and complexity, the stories between conditions presented similar scores. It would be interesting

to continue exploring this data with a larger scale to see if these measures remain consistent between conditions. Concerning semantics, there were many interesting trends in the data: the children appeared to produce more action verbs, mental verbs, and adverbs when retelling animated stories. Betrancourt and Tversky (2000) found that animation was beneficial when it was used to create a mental model between motion and change. Thus, children may have used more action and mental verbs because of the mental model that animation depicts of verbs. The children may have used more adverbs due to the nature of animation and the details provided by animated stimuli as compared to static stimuli. Overall, the positive effect of animation on the use of action verbs, mental verbs, and adverbs provides reason to continue exploring data in future studies. It would be interesting to understand if animated narrative stimuli are useful for instructional purposes for teaching semantic aspects of narrative.

In comparison to other narrative stimuli studies, this research yielded results similar to another study looking at the effect of animated versus static stimuli on the language of 20 typically developing third graders (Klop & Engelbrecht, 2013). Klop and Engelbrecht (2013) found no significant differences between conditions for the total number of words, total number of T-units, mean length of T-units, number of different words, and goal attempt outcomes. Although this study also did not find significant differences, the present study did find notable trends in productivity and semantics data that were not identified in Klop and Engelbrecht. Klop and Engelbrecht explained that a limitation in their study was the use of the same examiner for the administration of the stimuli and the elicitation of the narrative. To control for the effect of assumed shared knowledge, the present study did not have the participant tell the story to the primary examiner (Gazella & Stockman, 2003; Schneider & Dube, 2005). Rather, a second researcher, who did not see the visual story stimulate, elicited the narrative retells in the present

study. This may be an important improvement to the research paradigm for narrative retell. Although the results were similar to (Klop and Engelbrecht, 2013), it is possible that this methodology may yield different results if it is adequately powered by having a greater number of participants in future studies.

Diehm et al. (2020) found several benefits of using animated stimuli over static stimuli with 73 children between the ages of 3 and 5. In terms of macrostructure, they did not find significant differences; however, their descriptive data indicated that children produced more descriptive retells with more of each story element. In addition, they found significant differences in the length of narrative retells in terms of the total number of words, and animation enhanced their total number of different words and use of action verbs. Although significant differences were not found in the present study, trends in data support Diehm et al.'s finding that animation may lead children to produce longer descriptive narratives with more action verbs. The present study's results may differ from Diehm et al.'s study because six participants may not have generated enough power to find significant differences. On the other hand, it is critical to note that Diehm et al.'s use of a verbal narrative script that was combined with both the animated and static conditions presents a critical confound for determining whether or not the animation itself was responsible for the differences they found. The combination of the verbal model and the animated stimuli may have interacted and resulted in the differences they found. Therefore, more research is needed to determine if the results of Diehm et al.'s study were due to animation alone or the interaction of the verbal model in combination with the animated stimuli.

Limitations and Future Directions

This pilot study represents an important first step in this line of research. However, the ability to draw conclusions was certainly limited by its small sample size of six participants.

With a larger sample size, the study could be more adequately powered and be capable of finding differences between the static and animated conditions if they exist. A larger and more diverse sample should be explored to yield more information about the effect of animated stimuli versus static stimuli on the language of school-age children. An additional limitation of this research is the use of commercially available films for the creation of animated and static videos. It is possible that the children weren't seeing these stories for the first time.

Future research should focus on completing this study with more children in order to better evaluate whether or not the static and animated conditions result in differences in the narratives produced. If no statistically significant differences occur in the data, then research should be conducted to determine if differences occur when animation is combined with a verbal model. This should be conducted to understand if combining a verbal model with animated stimuli interacts to cause differences rather than animated stimuli alone. It is possible that children with typical language skills may not be impacted by animated stimuli. However, it is also possible that children with language impairments may receive more support for language production from animated stimuli. Therefore, future research in a larger study with more children should also be conducted to understand the effect of animated stimuli on the narrative retell quality of children with language disorders. Language samples can be used as a tool for assessing children's language, and narratives are frequently used for instructional purposes. Thus, there is sufficient reason to conduct research in order to understand if animated stimuli have an impact on the language of children with language disorders.

Clinical Implications

This study's procedures and methodology can be used for future research at a larger scale, including research over teleconferencing. The stimuli proved to elicit language samples of

an appropriate length, and the stimuli were also engaging for children ages 9-12. It was hypothesized that children would produce narrative retells of greater quality and quantity in terms of macrostructure and microstructure. Although no significant differences were found, trends in the data suggest that animated stimuli possibly elicit longer language samples with more action verbs, mental verbs, and adverbs. If further research with more children reveals no significant differences in macrostructure and microstructure scores, then clinicians can use either static and animated stimuli for narrative assessment and potentially receive similar results. However, if further research reveals significant differences in support of the data trends from this study, it is possible that animation may be beneficial for eliciting longer narrative retells with important information about children's semantic skills, specifically relating to the use of action verbs, mental verbs, and adverbs. Furthermore, it is possible that animation may be useful for supporting the instruction of action verbs, mental verbs, and adverbs. However, further research must be completed with more children to determine if animated stimuli have significant effects on children's narrative retells.

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Appendix A

Instructions that Participants Received for Narrative Retells

Initial instructions for stories given in the static condition	I'm going to show you a set of pictures. I want you to look at the pictures on the screen while the slide show plays. Pay very close attention to the story because after you watch it, you're going to retell the story. A friend of mine is going to join us and you are going to retell the story to my friend who didn't watch it. We'll only be able to see the story one time, so you'll need to watch carefully. I'm going to show you what I mean with an example story. Now it is your turn to tell the story of Belly Flop/Lifted/Soar/Dust Buddies. Do your best to tell my friend everything that you remember from the story.
Initial instructions for stories given in the animated condition	I'm going to send you the link to the video in the chat. Here are the instructions for opening the video… Now we're going to watch some short, animated videos. Pay very close attention to the story because after you watch it, you're going to retell the story. A friend of mine is going to join us and you are going to retell the story to my friend who didn't watch it. We'll only be able to watch it once, so you'll need to watch closely. I'm going to show you what I mean with an example story. Now it is your turn to tell the story of Belly Flop/Lifted/Soar/Dust Buddies. Do your best to tell my friend everything that you remember from the story.
Introduction to *Belly Flop*	This story is called *Belly Flop*. It is a story about playing at the pool and diving. Do you like to dive? [I don't dive but I like to watch people who are good at it.] That's what this story is about. Remember to pay close attention to the story because I'm going to have you tell this story to [insert name] after we are done watching it. We will only watch the story once. Do you have any questions before we begin? Okay, let's begin.
Introduction to *Dust Buddies*	This story is called *Dust Bunnies*. It is about dust bunnies. What do you know about dust bunnies? [Dust bunnies are little clumps of dust and other stuff that get bunched together on the floor. Some people think they look like fluffy bunny rabbits, that's why they are called dust bunnies. You might be able to find some under furniture.] That's what this story is about. Remember to pay close attention to the story because I'm going to have you tell this story to [insert name] after we are done watching it. We will only watch the story once. Do you have any questions before we begin? Okay, let's begin.
Introduction to *Lifted*	This story is called *Lifted*. It's about aliens. What do you know about aliens? [In movies, aliens come from outer space in spaceships.] That's what this story is about. Remember to pay close attention to the story because I'm going to have you tell this story to [insert name] after we are done watching it. We will only watch the story once. Do you have any questions before we begin? Okay, let's begin.
Introduction to *Soar*	This story is called *Soar*. It is about flying planes. Do you like flying? [Well I've been in a plane a couple of times and I thought it was fun.] That's what this story is about. Remember to pay close attention to the story because I'm going to have you tell this story to [insert name] after we are done watching it. We will only watch the story once. Do you have any questions before we begin? Okay, let's begin.
Instructions prior to narrative retell	Thank you for paying attention to the story. This is my friend [insert name]. They are here to listen to you tell them the story you just watched, so now you are the storyteller. When you're ready, tell them the story and include as many details from the story that you can. Remember that a story has a beginning, a middle, and an end. I'm going to go away for a little bit, but I'll be back when you're done telling the story to [insert name].

Appendix B

List of Codes Used for Coding Transcriptions

Omissions

Omissions were marked with * before the omitted word or morpheme.

Verb Morphology

[IRR_PAST] =irregular past

[Cop]=copula be form

[Aux]=auxiliary be or do

/ed=regular past

/3s=third person singular

/ing=progressive

[EO:__]=overgeneralization

[TAE:__]=tense and/or agreement error: error type or corrected agreement form

Noun Morphology

[DET:IART]=determiner: indefinite article

[DET:DART]=determiner: definite article

[DET:QUANT]=determiner: quantifier

[DET:PRO]=determiner: pronoun

[DERR:__]=determiner error: correction

[DERR:ADD]=determiner error: addition

/s=plural

/z=possessive

Pronoun Case

[PCE:__]=pronoun case error

[PCE:S-O]=Objective for Subjective

[PCE:O-P]=Objective for Possessive

[PCE:S-P]=Subjective for Possessive

[PCE:P-O]=Possessive for Objective

[PCE:P-S]=Possessive for Subjective

[PRO:DI]=dialect difference in pronoun use

Participles

[PAST_PART]=past participle

[PRES_PART]=present participle

Other

[EW:__]=word-level error: correction

[PE]=preposition error

[Scon] – Subordinating conjunction (make sure that it is not a preposition)

Clauses/VPs

[SI-#]= subordination

[NFCL-#]= number of nonfinite clauses

[VP-#] = total number of verb phrases

Clause Types

[RELCl-S]=Subject Relative Clause

[RELCl-0]=Object Relative Clause

[NCL-S]=Subject Noun Clause

[NCL-O]=Object Noun Clause

[NCL-O/Q]=Object Noun Clause/Quote

[NCL-C]=Complement Noun Clause

[ADVCl]=Adverb Clause

[INFCl]=Infinitive Clause

[PARTCl]=Participle Clause

[COMPCl]=Comparative Clause

MISL SALT codes for Macrostructure

Character = [CH]
Setting = [S]
Initiating Event = [IE]
Internal Response = [IR]
Plan = [P]
Action/Attempt = [A]
Complication = [C]
Consequence [CO]

MISL SALT codes for Microstructure

Mental Verb = [MV]
Linguistic Verb = [LV]
Action Verb = [AxV] (not part of G & G 2010)
Stative Verb = [SV] (not part of G & G 2010)
Other Verb = [OV] (not part of G & G 2010) – use this only for verbs that you can't identify as state or action/process. We will discuss those and assign a category if possible.
Adverbs = [ADV]
Elaborated Noun Phrase = [ENP] (determiners + noun)

Elaborated Noun Phrase Plus [ENP+] (includes more elaboration than just determiners, i.e. includes adjectives, post nominal modification as with participles or prep phrase).

Appendix C

Percentage of Initial Agreement on Scoring of MISL Macrostructure as Measured by the Number of MISL Categories Scored Identically Divided by the Total Number of MISL Categories (7)

Participant	Belly Flop	Dust Buddies	Lifted	Soar
101	86%	86%	100%	100%
102	100%	100%	86%	86%
103	86%	86%	100%	100%
104	57%	100%	86%	100%
106	86%	86%	100%	86%
107	100%	100%	100%	100%
Mean	86%	93%	95%	95%

Appendix D

Monitoring Indicators of Scholarly Language
Gillam & Gillam (2010)

Story Grammar Element	Description	Examples	Description	Examples	Description	Examples	Description	Examples
Character **Salt Code = CH**	**0 Points:** No character is included, or only **ambiguous pronouns** are used.	They were walking. She and him were walking.	**1 Point:** Includes at least one character using **non-specific labels** (pronouns, nouns) **WITH a determiner** "the" or "a").	Once there was a boy walking. **The boy was** walking.	**2 Points:** Includes at least 1 character using a **"name"** for the character **Note:** *Only code each character one time.*	Once there was a boy named Charles.	**3 points:** Includes **more than 1** character using specific name	There was a boy named Charles, a girl named Connie, and a mom named Jody.
Setting **Salt Code = S**	**0 Points:** No reference to a specific time or place.	The boy and girl were walking.	**1 Point:** Includes reference to a general place **or** time (*not necessarily related to a "story")	The boy and the girl were outside. The space ship came from outer space.	**2 points**: 1 reference to a **specific** place **or** time in the same story. (*must be related specifically to the story).	Once there was a boy and a girl walking in Central Park.	**3 points:** Includes 2 or more references to **specific** places and/or times (in the same story).	Last week there was a boy and a girl walking in Central Park. They lived in Logan.
Initiating Event **Salt Code = IE** **Event that motivates/elicits action "starts the story"** *Note: The IE must be explicitly stated by the child, not inferred by the scorer.	**0 Points:** A problem or "starting" event is not stated.	The girl looked at the boy. The boy and girl were walking in the park. The boy is next to a car. There is a tree.	**1 Point:** Includes at least one event or problem that **does not** motivate/elicit an action from the character	A spaceship landed in the park (potential **initiating event**). There were aliens laughing and a dog running and a table…(no action/attempts related to potential IE)	**2 points:** Includes at least one event or problem that **elicits** an active response from the character(s).	A spaceship landed in the park (**IE**). The girl ran (**A**) out to say "hi" to the aliens.	**3 points:** 2 or more IE's in one story (complex episode)	A spaceship landed in the park (**IE**) The girl ran (**A**) out to say "hi" to them. They became friends (**C**). Then, the spaceship caught on fire (**IE**). They ran to get some water.

Internal Response **Salt Code = IR** (eg., afraid, surprised, happy, excited, sad; NOT "liked" "had fun") *Note: Adjective or adverb that expresses a mental state related to emotion	**0 Points:** There are no feelings, desires or thoughts explicitly stated	The girl and boy saw the aliens land and they ran out to meet them.	**1 Point:** Words are used that describe feelings that are not directly related to the IE.	The boy saw a spaceship land in the park (IE). There was a happy dog.	**2 points**: The feelings, desires or thoughts of the character are explicitly stated and relate to the IE (One stated IR)	The spaceship landed (IE). The girl was afraid (IR) of meeting the aliens.	**3 points: Two or more** feelings, desires or thoughts are explicitly stated and relate to the IE (2 or more stated IRs)	The spaceship landed. The girl was excited to meet the aliens. She was happy when they greeted her nicely.
Plan **Salt Code: P** *Key words:* wanted, thought, decided, pondered, considered	**0 Points:** No statement or wording that relates to planning to take action that can be directly tied to the IE. Decided, wanted, thought are **NOT included**	The aliens landed. The girl ran out to meet them.	**1 point:** Terms are used or statements are made that use "gonna, going to" or a cognitive/mental state verb NOT related to how the character may react to the IE. The statement is NOT directly related to the IE.	The girl decided to have a picnic with her brother.	**2 points:** There is a statement about planning to act and it is tied directly to the IE. Must be made by the main character.	The spaceship came down (IE). The aliens came out (A). The girl wanted to go (P) meet them.	**3 points:** There is more than one statement about planning to act and it is tied directly to the IE. Must be made by the main character.	The aliens landed. The girl decided to go meet them. She ran over and said, "Hi." The boy thought he would sneak away. He went home and no one saw him go.
Action/Attempt **Salt Code = A** Note: Cognitive state verbs NOT included (thought, decided, wanted , said, saw)	**0 Points:** No actions are taken by the main character(s) (no action verbs contained in the story). Basically, a series of random descriptions.	There is a girl. There is a boy. It is sunny.	**1 point:** Actions are taken by the main character(s) that are not directly related to the IE. Descriptive actions	The spaceship landed. The boy and the girl were going to a park.	**2 Points:** One or more actions is taken by the main character(s) that **IS** directly related to the **IE**.	The spaceship of aliens landed in the park **(IE).** The girl ran out to meet them. She went up and said, "Hi."	**3 Points:** The addition of a complicating action that interferes with the character's actions in response to the IE.	The aliens landed in the park (IE). The girl wanted to be their friend (P). She walked over to say hi (A). They snarled at her (Complication). She ran home to tell her parents what happened (C).

Consequence **Salt Code = CO** Outcome of attempt/action related to IE; Action that "ends" the episode or brings it to a logical conclusion (may also be the IE for a following episode).	**0 Points:** No outcome of the action/attempt is explicitly stated.	The spaceship landed (IE). The aliens go out (A). The boy was afraid (IR). *An internal response may not serve as a consequence.	**1 point**: One consequence with no IE. *The consequence is linked only to an action.	The girl ran over there (A). She fell and got hurt (C).	**2 Points:** One consequence directly linked to IE.	The spaceship came from space and landed (IE) in the park. The aliens got out to (A) look at the earth (A) and then they flew back to their home (C).	**3 Points:** Two or more consequences. To get a 3: IE #1 must match up with Conseq #1; IE #2 must match up with Conseq #2	The spaceship landed (IE). The aliens got out (A) and looked at the earth (A) and flew home (C/IE). On the way they hit a meteor (A). They fixed the hole (A) and flew on home (C).

Literate Language	**Description**	**Example**	**Description**	**Example**	**Description**	**Example**	**Description**	**Example**
Coordinating Conjunctions **FANBOYS** *(for, and, nor,* but, *or, yet, so)* Can coordinate nouns, verbs, or clauses. 'so excited' = adverb	**0 points**	No coordinating conjunctions in story For, an, nor, but, or, yet, so NOT included	**1 point**: One coordinating conjunction used in story.	The girl was afraid and the boy ran away as fast as he could.	**2 points**: Two different coordinating conjunctions used in story.	John walked to the store but it was closed.	**3 points**: Three or more different coordinating conjunctions used in story.	Sally ran home but their mom wasn't there, so they went back to the park.
Subordinating Conjunctions *(when, while, because, after, if, since, before)* 'that day' = adjective	**0 points**	No subordinating conjunctions	**1 point**: One subordinating conjunction used in the story	When the aliens landed the girl ran.	**2 points**: Two different subordinating conjunctions used in the story	The girl saw the aliens while she was playing in the park. She ran home because she was afraid.	**3 points**: Three or more different subordinating conjunctions used in the story	After the aliens landed, they walked out of the spaceship. John said, if they have ray guns they will kill us. Sally said, I don't think they do since they look so nice.

Mental verbs **Salt Code: M** Mental Verbs: decided, thought, wanted	**0 points**	No mental verbs.	**1 point:** 1 mental verb.	The boy thought it was hot.	**2 points:** 2 DIFFERENT mental verbs explicitly stated.	He decided to go and meet the aliens. He planned to get to them.	**3 points**: 3 or more different mental verbs explicitly stated.	He decided to go and meet the aliens. The girl thought he was brave and he decided to act that way.
Linguistic verbs **Salt Code: L** Linguistic Verbs: said, told, yelled	**0 points**	No linguistic verbs.	**1 point:** 1 linguistic verb.	The boy said, "NO!"	**2 points:** 2 DIFFERENT linguistic verbs explicitly stated.	The boy said, "no," and the girl yelled, "stop!"	**3 points**: 3 or more different linguistic verbs explicitly stated.	The girl told him he was brave. He said, "thanks," and she said, "you are welcome."
Adverbs **Salt Code: ADV** Note: Additional examples below chart.	**0 points**	No adverbs	**1 point**: One adverb that conveys tone, attitude, time, or manner, degree or reason and modifies a verb, adjective, negation, or another adverb.	Sometimes, they like to watch aliens. He is very good.	**2 points:** Two different adverbs	The boy and the girl were very scared. They left quickly.	**3 points**: 3 or more different adverbs.	The aliens yelled loudly, "Don't come over here." Surprisingly, the kids went anyway. After that, they were all friends.
Elaborated Noun Phrases **Salt Code: ENP** (articles, possessives, determiners, quantifiers, wh-words, big, black, funny) **Note: Additional Examples below chart**	**0 points**	No noun phrase elaboration. He saw spaceship.	**1 point**: A noun phrase contains one modifier that precedes the noun	Her brother saw the spaceship. The dog is happy. Two aliens came out.	**2 points:** A noun phrase that contains **2 different modifiers** that precedes the noun.	The black dog saw the spaceship.	**3 points:** Noun phrases in which 3 or more different modifiers precede the noun.	The old, black dog was sick.
Grammaticality	**0 points**	3 or more grammatical errors	**1 point**	2 grammatical errors	**2 points**	1 grammatical error	**3 points**	No grammatical errors
Tense	**0 points**	3 or more tense changes	**1 point**	2 tense changes	**2 points**	1 tense change	**3 points**	No tense changes

Based on the research and contributions of many including: Anderson, 2010; Curenton &Justice, 2004; Greenhalgh & Strong, 2001; Hughes, McGillivray & Schmidek, 1997; Petersen, Gillam & Gillam, 2008; Pellegrini, 1985.
*Contributions from Michelle Merrill, Karen Turnbow, Brittney Lamb, Sara Hegsted, Julise Jager, Allison Hancock, Abbie Olszewski.

Date_____
Story used to elicit narrative_____
Total macrostructure score_____
Total microstructure score_____

Additional Examples of Microstructure elements (not an exhaustive list)

Coordinating conjunctions may include and, and then, then, for, or, yet, but, nor, and so. They are used to coordinate clauses (The boy ran back home but he got there too late). We do not give credit when they are used to coordinate nouns in a noun phrase (The boy and the girl) or verbs in a verb phrase (They were running and playing).

Subordinating conjunctions include *after, although, as, because, if, for, like, once, since, that (but that, in that, in order that, such that), unless, when, where, while.* These words set up a hierarchical relationship between clauses. You must have 2 clauses to have a subordinating conjunction. "That" in the sentence, "I saw that." is not subordinating. "That" in the sentence, "I saw that you really liked him," is subordinating.

Adverbs may relate to time (e.g., *all of a sudden, suddenly, again, now, tomorrow, yesterday, then)*, manner (e.g., *somehow*, *well*, *slowly*, *accidentally*), degree (e.g., *very, each, some, almost, barely, much*), number (e.g., *first*, *second*), affirmation or negation (e.g., *definitely*, *really*, *never*, *not*).

Elaborated Noun Phrases are a group of words comprising of a noun with one or more modifiers providing additional information about the noun. Modifiers may include articles (e.g., *a, an, the*), possessives (e.g., *my, his, their*), demonstratives (e.g., *this, that, those*), quantifiers (e.g., *every, each, some*), wh-words (e.g., *what, which, whichever*), and true adjectives (e.g., *tall, long, ugly*).

Simple Elaborated Noun Phrases consist of a single modifier and a noun. Examples include *one* day, big *doggy* (adjective + noun), *that girl* (determiner + noun), and *those ones* (demonstrative + noun). **Complex Elaborated Noun Phrase** (CENP) consist of two or more modifiers and a noun. Examples include *big red house* (adjective + adjective + noun), *a tall tree* (article + adjective + noun), and *some mean boys* (quantifier + adjective + noun).

Mental Verbs are a type of verb that are used differently than active verbs and are not used in progressive tenses. Mental verbs may include *think, know, believe, imagine, feel, consider, suppose, decide, forget, see, hear,* and *remember.*

Linguistic Verbs target the verbs that relate to the acts of writing and speaking which may include *read, write, say, tell, speak, shout, answer, call, reply, whisper,* and *yell.*

Appendix E

Static and Animated Retell Means and Paired T-Test Results

Measure	Static Mean (SD)	Animated Mean (SD)	*t* (5)	*p*
Productivity				
Total number of utterances	54.5 (19.79)	59.67 (13.44)	-1.24	0.135
Total number of words	509 (178.14)	532.67 (103.75)	-0.606	0.285
Accuracy				
Percentage of accurate utterances	0.96 (0.04)	0.97 (0.02)	-0.591	0.29
Complexity				
Subordination Index	1.29 (0.11)	1.26 (0.12)	0.696	0.259
Proportion of Complex Sentences with Finite Clauses	0.27 (0.11)	0.22 (0.09)	1.597	0.086
Proportion of Complex Sentences with Finite and Nonfinite Clauses	0.47 (0.14)	0.46 (0.11)	0.199	0.425
Semantics				
Total Number of Action Verbs	65.67 (21.71)	70.83 (16.47)	-1.231	0.137
Total Number of Mental Verbs	2.17 (1.94)	5.67 (4.72)	-2.178	0.041
Total Number of State Verbs	3.83 (3.19)	3.5 (1.64)	0.222	0.416
Total Number of Different Verbs	36.33 (8.14)	34.83 (4.79)	0.681	0.263
Total Number of Different Words	152.5 (30.91)	158 (15.58)	-0.647	0.273
Post Hoc Analysis of Lexical Diversity				
Total Number of Adverbs	43.17 (18.39)	52.33 (24.93)	-1.66	0.079
Total Number of Subordinating Conjunctions	4.67 (3.72)	4.83 (3.06)	-0.21	0.421
Total Number of Elaborated Noun + Phrases	25.5 (11.98)	22.33 (3.01)	0.674	0.265