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Parental Conversation Styles and Learning Science With Preschoolers

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Keywords
Parental Conversation Styles, Science Learning, Parent Talk, Preschool Students, Developmental Psychology

Subject Categories
Child Psychology | Developmental Psychology

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Abstract:

Preschool children participated in a science-learning event about light in their own classroom. The same day as the event, parents or caregivers were instructed to converse with their children at home in the evening about either the science learning event or another 'special or fun' event that happened to them recently in whatever way was natural for them. One week later, a researcher interviewed children to examine what they remembered about the science-learning event. Analyses focused on the impact of the topic and degree of elaboration of parent-child conversations on children's memory for the science-learning event a week later. The findings have implications for best practices in preschool education.

Introduction:

Children's memory functioning has been studied extensively in the developmental psychology literature. One leading theory for how children remember information is Vygotsky's sociocultural theory (Fivush, Haden, & Reese, 2006). The sociocultural theory examines how parents, caregivers, peers, and the culture surrounding the child are responsible for the development of higher order functions (Fivush et al., 2006). Vygotsky's theory describes this transfer of knowledge and skills to be completed through a method called scaffolding (Haden, 2010). The scaffolding method is when a more skilled member of society such as a teacher, a parent, or older peer, provides temporary support to assist a child to reach a higher level of comprehension that they would not normally be capable of achieving without assistance (Haden, 2010). Once the skill is conquered and comprehended, the child can accomplish the task without assistance and support is slowly removed (Haden, 2010). Researchers in the child development

field have found that scaffolding is extremely effective for learning new skills and information, as well as learning more about the world (Haden, 2010; Fivush et al., 2006).

Another important way children develop memories is from their parents' and caregivers' conversations with them. How parents and caregivers talk with their children varies from situation to situation. When talking about past events however, parents and caregivers tend to use one of two talking styles, high elaborative style or low elaborative style. When parents use a high elaborate talking style, they engage their children in long, detailed discussions about past events by asking many questions (Boland, Haden, & Ornstein, 2003; Haden, Ornstein, Rudek, & Cameron, 2009). The questions high elaborative parents and caregivers usually ask start with "wh-" and use words such as who, what, where, when, and why (Boland et al., 2003; Haden et al., 2009). These highly elaborative parents and caregivers encourage their children to talk about aspects of the events in which the child seems interested in (Boland et al., 2003; Haden et al., 2009).

In contrast, the other popular type of talking style that parents and caregivers is the low elaborative style (Fivush, Halden & Reese, 2006; Haden, Ornstein, Rudek, & Cameron, 2009). Parents and/or caregivers who tend to use the low elaborative talking style ask few questions and the questions they ask tend to be redundant (Fivush et al., 2006; Haden et al., 2009). The questions tend to be more closed-ended questions, meaning questions that limit the response to either "yes" or "no" or one-word responses (Fivush et al., 2006; Haden et al., 2009). Parents and caregivers who use this talking style tend to keep the conversations with their children brief and do not provide as much details about the memory they are discussing (Fivush et al., 2006; Haden et al., 2009). The low elaborative talking style tends to offer the child few opportunities to search their memory and report what has been retrieved (Fivush et al., 2006; Haden et al., 2009).

Research on how high elaborative versus low elaborative talking styles with children and their parents is a well researched and common in the literature today (Fivush et al., 2006; Boland, Haden, & Ornstein, 2003). Studies have found that children who are exposed to more highly elaborative talking styles throughout the day and during activities are able to construct enriched representations of experiences (Fivush et al., 2006; Boland, Haden, & Ornstein, 2003). Not only is it easier for these children to create enriched representations of experiences, they are also better able to draw upon these experiences in later conversations (Fivush et al., 2006; Boland, Haden, & Ornstein, 2003). Research has also found that parents who engage in a high elaborative style of memory talk have children who develop better memory skills overall (Fivush et al., 2006; Boland, Haden, & Ornstein, 2003).

While how conversation styles affect memory of events in children has been extensively researched and is now better understood, there are still areas in memory research and talking styles that are lacking. One area that is in need of more research is how memory and science learning are related. Studies have shown that children have more difficulty learning abstract science concepts than other subjects and that there is a lack of attention to science within schools (Nayfield, Brenneman, & Gelman, 2011). Newer research has started to examine how children learn science and evidence has shown that conversational interactions between adults and children is one of the best mechanisms for learning about science (Haden, 2010). Haden (2010) conducted a study in a museum to see how conversations with parents helped children learn. The study found that the children who heard more talk and richer talk about science exhibits in the museum with their parents or caregivers, remembered more about the exhibits than children who heard less about the exhibits and talked less about the exhibits (Haden, 2010). Most of the studies concerning science and memory in children that are in the literature today are focused on

remembering personally experienced events that have happened involving science not science facts or concepts. For example, current studies often ask children to recall specific events at museums, not facts. Children who participate in these experiments will remember and say things like “I saw an exhibit on dinosaurs and they were big” instead of recalling science facts like “a triceratops has three horns” (Haden, 2010). The current study will further explore how the interactions of memory and science learning facts coincide.

The current study is part of a set of studies that have been examining how children remember science events. In a study conducted last year within a lab at the University of New Hampshire, preschool children talked with their parents after school about a scripted science event that was conducted by a scientist in their classroom. Along with talking about the science event, parents and children were also asked to talk about another event that happened that day that was “special or fun for the child.” Parents’ and children’s conversations were recorded on recording devices provided by the lab and research assistants coded them. One week later, a research assistant went into the classroom and individually interviewed children, asking them to recall objects, activities, and concepts about the science lesson. The results of the study showed that much like the research that was previously discussed, that parents and caregivers with an elaborative talking style had children who contributed more to the parent-child conversation and were able to maintain concepts better one week later in a standardized researcher-child interview. This study helped to support the correlation between elaboration and remembering of a science event but a correlational design rather than an experimental design.

The current study is similar to the past study in terms of many of the procedures. The current study however, is an experimental design that incorporates the use of two conditions and asks three specific research questions to further examine how parental conversation styles and

learning science with preschool students is related. The first research question that was examined was, do children whose parents talk with them about the science event have better memory of that event a week later than children whose parents talk with them about another event? The second research question was, does degree of parents' elaboration-- in the science event and/or other event-- conversation predict what children contribute to the parent-child conversation? And the third research question to further the knowledge of parental conversational styles and learning science was, does degree of parents' elaboration predict what children remember about the science event one week later when talking to a researcher? These research questions will be examined individually and in detail throughout this paper.

Methods:

Participants*:* 19 parent-child dyads were included in this study (11 female children, 8 male children) between the ages of 4.25 and 6 years old (m=57.37 months of age). There were 11 mother interviewers, 5 father interviewers, and 3 mother and father paired interviewers. 14 children identified as Caucasian, 2 as Asian American, and 3 who identified as other, and these participants identified as being from Indian descent. Education level was also accounted for. All parent participants in this study identified as having some college credit, an associate degree, a bachelor's degree, and/or a graduate degree. Of the parents involved in the study, 26.3% of these parents went to college for some form of a science degree and 31.6% of these parents currently work in a job where they use science. Children in this study were enrolled in two different preschools in New Hampshire. Parents were asked at these two schools if they would like to participate in this study through word of mouth from directors and teachers at the schools. The final sample of parent-child dyads were involved in all three stages of the procedure.

There were minimal risks to participants who participated in the study. While there were not direct benefits to the participants in the study, participants seemed to enjoy the study. The light science learning event was scripted with children's pleasure and learning in mind. Children who participated in the study seemed to love participating in the light science-learning event and seemed to have gained knowledge of how light works.

Procedure*:* Approval to conduct this study was obtained from the University of New Hampshire Institutional Review Board. Consent forms were sent home with children and returned by parents. No child participated in the study without prior parental consent.

Stage 1- Science Learning Event in the Preschool Classroom: Children whose parents provided permission participated in the initial light lesson along with their teachers as part of classroom work. During the science-learning event, a scientist visited the children's classroom for a special event that took approximately twenty minutes from start to finish. All participating children and their teachers were seated in a circle. The teachers then introduced the scientist and the event began. The scientist explained that she is going to talk with the children about light. She then engaged children in a conversation about light asking questions like "what are some things that make light?" to find out what they already understood. Then she showed children several items that produce light such as a lantern, a candle, and a lamp. She then did four brief demonstrations for children using props to illustrate the two principles: that light travels and that light always travels along a straight path. Children conversed and participated in all of the demonstrations. In the first demonstration, the scientist simply used a flashlight. She shined the flashlight at different places in the room, up, down, left, and right and talked with children about where the light is. In the second demonstration, she used a piece of yarn to illustrate the possibility of a straight path versus a bendy path across the room and discussed with children the

path taken by light. In the third demonstration, she shined a laser beam light on a wall and sprayed a light mist of water in the path of the light with a water bottle, which revealed the path of the light. In the fourth demonstration, she allowed children to look through a bendable piece of black tubing, and illustrated that one can only see down the length of the tubing if it is straight, because of the straight path of light. The event was recorded on video.

Stage 2- Parent-Child Interviews: On the same day as the science-learning event, parents were invited to engage in a brief, approximately ten minute, recorded conversation with their child. Digital tape recorders were sent home with children when they are picked up from school, as explained in the permission slip for parents. Along with the permission slip, parents received instructions on how to converse with their children on the audio recorders. The conversations took place in the participant's homes in the evening of the event, when the parent preferred. Parents were not informed about what occurred, what was brought, or what was taught in the lesson at the preschool that day.

Two different sets of instructions were given out at random and asked parents to talk with children about one event. Half of the parents were instructed, "Today at school, a scientist visited your child's classroom and taught them a lesson about light. We'd like you to talk with your child in whatever way is natural for you." The other half of the subjects were asked "Choose a recent event that was special or fun for your child and talk about that event in whatever way is natural for you. Parents in this group were asked to refrain from talking to their children about the science event to the extent possible. Parents were given no other information about the event.

-*Stage 3- Researcher-Child Interviews:* A final interview was conducted approximately one week after the event and took place on site during the preschool day. Children met individually with a researcher. A research assistant, who was blind to the details of the study, the

conditions, as well as the hypotheses, conducted the scripted interviews. Before the children were questioned, they were asked if they would like to come and talk with the researcher. Each child was asked, "We are asking children some questions today. Would you like to come and talk with me? You do not have to if you don't want to, but we would love to talk with you." Children who said no, or otherwise indicate that they do not wish to participate were not compelled to do so. Children were allowed to stop participating at any time during the interview if they seemed unhappy, or expressed the desire to stop participating.

The interview was started with an open-ended question, and progressed to prompted questions about the details of what occurred during the science-learning event, along with the factual information taught during the event. For each question, the interview provided a scripted prompt and the researcher could repeat the question if necessary. The script for the standard interview is shown in Table 1.

Table 1: Scripted Questions from Researcher-Child Interview

1. A few days ago, a scientist named Carmela came to school to talk with children about light. Do you remember when Carmela came? I wasn't there that day and I'd like to know everything that happened when Carmela came to visit. Please tell me everything you remember about that.
2. Carmela brought some things with her when she visited that day. What did she bring with her?
3. Tell me some things that you know about light.
4. What are some things that make light?
5. When you turn on a flashlight, what happens to the light?
6. What did Carmela do to help children see the path of light?
7. What did Carmela do with a black tube? What did you find out from that?
8. What kind of path does light make when it travels?
9. How long does it take for light from the sun to reach the earth?

Analyses:

In order to analyze the data from this study, both qualitative and quantitative methods were used. Research assistants transcribed audio recordings from both the parent-child interviews and the researcher-child interviews on a computer. Identifying information was removed from the transcriptions and participant numbers were used to differentiate between participants. Once transcribed, research assistants coded each transcription. The coding scheme had been extensively developed and revised for other projects. Parent-child interviews about the light event, parent-child interviews about the special event, and researcher-child interviews all were coded differently.

Table 2: Science Event Objects, Activities, & Concepts

Event Object List
• Lamp • Flashlight • Candle/Fire/Flame • Timer/Cellphone • Spray Bottle with Water • Red Laser/ Laser • Picture of Sun • Black Rubber Tubes • Floor/Rug • Wall/Board
Event Activities List
• Shined Flashlight • Set Timer (for 8 minutes) • Sprayed bottle Over a Red Laser Beam • Looked Through Black Rubber Tubes • Lit a Candle/ Fire • Turned the Lamp on • Showed a Picture of Sun • Child walked in a Straight Line/ Curvy Line
Event Concepts List
• Light/ Sun Travels • Light Travels in a Straight Line • Light travels from the sun to the earth • The Sun is Very Far Away • The Sun is 91 Million Miles Away • It Takes 8 Minutes for Light From the Sun to Reach the Earth

Coding of Parent-Child Interviews on Light Event: When coding for the parent-child interviews pertaining to the light event, research assistants coded for the following items by hand for the child dialogue: number of adjectives and adverbs, number of objects mentioned from the event object list, number of other objects that were not on the event object list, number of concepts mentioned from event concept list, and number of activities mentioned from the event activities list, which is shown in Table 2.

Research assistants also coded every sentence of the parent or caregiver dialogue. The number of adjectives and adverbs was coded for as well as the parent or caregiver's sentence structure. Parent or caregiver's sentences could be coded in many different ways. Sentences could be coded as memory questions, which is when a parent asks a child to provide a piece of information from memory about the event. The sentences could be coded as yes/no questions,

meaning when the parent asks a child a question in which the child is only required to confirm or deny information provided by the parent. Sentences could be coded as context statements, which is when there is a statement that does not require a response such as ‘wow’ or ‘okay.’ Finally, they could also be coded as evaluations, which are when a parent confirms or denies the child’s previous statement as correct or incorrect. Repeated memory questions and yes or no questions were also coded for. These repeated questions were questions that had preciously been asked by the parent. Repeated context statements, statements that were contextually very similar or exactly the same as the previous statement were also accounted for.

Research assistants obtained the number of words and the total number for the interview of sentences via the computer for both the child and the parent in the conversation. Elaborativeness and repetitiveness from the parent was a variable that was examined as well. To obtain elaborativeness the composite score of the total number of memory questions, total number of yes or no questions, total number of context statements, and total number of evaluative statements made by the parent. In order to obtain repetitiveness, the composite score of the total number of repeated memory questions, total number of repeated yes or no questions, and the total number of repeated context statements. These variables were composited on SPSS software.

Coding of Parent-Child Interviews on Other Event: When coding for the parent-child interviews pertaining to a special or fun event, research assistants coded for the number of adjectives and adverbs by hand in the child dialogue. Research assistants obtained the number of words and the total number of sentences via the computer for both the child and the parent in the conversation. The coding for the parent or caregiver dialogue was exactly the same in the other event as it was in the light event condition. Research assistants coded for the adjectives and

adverbs, memory questions, yes or no questions, context statements, evaluations, and repeated questions as context statements. The number of words as well as number of sentences was also retrieved via computer for this condition. Elaborativeness and repetitiveness were also calculated the same way using SPSS software.

Coding of Researcher-Child Interviews: When coding the researcher-child interview just the child portion of the interview was coded since the researcher portion was a scripted interview. For each individual question that the researcher asked, a research assistant coded for the number of words, the number of adjectives and adverbs, the number of objects mentioned from the event object list, the number of other objects that were not on the event object list, the number of activities mentioned, the number of concepts mentioned, as well as the number of correct details mentioned, which is the number of objects and concepts listed by the child that were in the event.

For all of the questions combined, the research assistant coded for the total number of unique objects and total number of unique concepts. Unique objects and concepts are the total number of unique objects or concepts mentioned from the list when counting each object or concept only once. For example, if a child mentioned light travels in a straight line in multiple questions, for a unique concept, the coder only count light travels in a straight line once. For all of the questions combined, the research assistant also coded for the total number of words, the total number of adjectives and adverbs, the total number of objects mentioned from the event object list, the total number of other objects, the total number of concepts, and total number of correct details.

Results:

In the final sample of 19 parent-child dyads, 9 were assigned to the light event condition and 10 were assigned to the other event condition. This paper will examine results by individual research question.

Table 3: Parental Conversational Styles

Light Event Group: N=9

	Mean	SD	Range
Adjectives/ Adverbs	15.33	10.724	2-34
Memory Questions	15.78	7.678	8-31
Yes/No Questions	25.22	13.358	9-46
Evaluations	3.33	4.583	0-14
Context Statements	10.33	3.571	4-15
Elaborativeness	54.67	26.870	25-105
Repetitiveness	5.89	4.936	0-16

Other Event Group: N=10

	Mean	SD	Range
Adjectives/ Adverbs	20.80	23.981	0-81
Memory Questions	15.50	9.891	6-38
Yes/No Questions	22.60	14.826	7-52
Evaluations	2.00	1.826	0-6
Context Statements	26.40	24.491	0-85
Elaborativeness	66.50	37.397	16-135
Repetitiveness	7.30	6.325	0-22

1. Do children whose parents talk with them about the science event have better memory of that event a week later than children whose parents talk with them about another event?: In order to understand this research question, it was helpful to first examine how parents talked with their children in both the light event condition as well as the other event condition. When looking at Table 3, at the differences between the light condition as well as the other condition, it is clear the

Table 4: Parental Conversational About Light Event

Light Event Group: N=9

	Mean	SD	Range
Adjectives/ Adverbs	15.33	10.724	2-34
Objects	7.56	6.227	0-21
Activities	2.78	7.468	0-19
Concepts	1.11	1.167	0-4
Correct Details	11.44	10.370	0-31

generally parents talked with children in both conditions. T-tests evaluating mean differences between the two conditions indicated no statistically significant differences between the two conditions (all $p > .05$). This suggests that there were no differences between the two conditions that could have affected the outcomes of the results.

When looking at Table 4, the results of what children in the light condition said to their parents during the parent-child conversation about the science lesson, we can see that children recalled many of the objects, concepts, and activities from the science lesson. On average, children remembered 7.56 objects, 2.78 activities, and 1.11 concepts.

When looking at the first research question, do children whose parents talk with them about the science event have better memory of that event a week later than children whose parents talk with them about another event, it was helpful to examine the relationships and correlations between the objects, activities, concepts, and correct details that were mentioned in the researcher child interview and both the light event condition as well as the other event condition. After the correlations were calculated, both conditions were compared for what the children remembered. As examined in Table 5, there are no significant differences between the light event condition and the other event condition. For objects (r=-1.38, p=.27), for activities (r=-1.37, p=.19), for concepts (r=.66, p=.51), and for correct details (r=-2.16, p=.40). In fact, for recalling objects, activities, and correct details, children who were in the

Table 5: Parental Conversational About Light Event

	Mean	SD	t(7)
Objects Light: Other:	 4.89 7.00	 2.57 4.99	-1.38, p = .27
Activities Light: Other:	 .78 1.30	 .97 .68	-1.37, p = .19
Concepts Light: Other:	 1.78 1.30	 1.20 1.83	.66, p = .51
Correct Details Light: Other:	 7.44 9.60	 3.78 6.59	-2.16, p = .40

Light Event Group: N=9; Other Event Group: N=10

other event condition actually remembered, on average, more than children who were in the light event condition.

2. Does degree of parents' elaboration, in the science event and/or other event, conversation predict what children contribute to the parent-child conversation?: When examining the second research question, it was helpful to examine the sample as a whole (n=19), instead of separated by light event condition versus other event condition. Examining the whole sample was a possibility because, as seen in Table 5, the pattern of effects was similar across the two conditions. Combining the conditions also allowed the opportunity to look at a larger group of participants. After combining the samples, we found that overall elaborativeness and overall repetitiveness were marginally correlated (r=.392, p=.097). This is consistent with literature in the field stating that parents who are more elaborative tend to also be more repetitive in how they talk with their children. Using the whole sample, it was also found that elaborativeness, of the parent in the parent child conversation, and the child's use of adjectives and adverbs within the parent-child conversation were statistically significant (r=.535, p=.018). This means that parents who were more elaborative with their children in the parent-child conversation had children who contributed more adjectives and adverbs to the parent-child conversation as well.

3. Does degree of parents' elaboration predict what children remember about the science event one week later when talking to a researcher? When examining our third, and final research question, we continued to look at the entire sample of 19 parent-child dyads. For this question, it was helpful to look at how elaborativeness was related to the recall of objects, activities, and concepts within the parent child interview. As you can see in Table 6, it was found that elaborativeness on the part of the parent within the parent child conversation, contributed to the child's recall of the objects in the first question (open-ended question) (r=.47, p=.044) , the

second through ninth questions (questions prompting child to remember specific objects, activities, and concepts) (r=.47, p=.045), and the total for all questions (r=.55, p=.016) in the researcher child interview. Elaborativeness also contributed to the number of correct details in the first question (r=.42, p=.071) as well as the total for all questions (r=.43, p=.066) in the researcher-child interview. This generally means that the more elaborative a parent was during the parent child conversation, the more objects and correct details the child was able to remember during the researcher-child interview.

When considering how parents' conversational styles during the parent-child conversation related to the recall of information within the researcher-child interview one week later, we also examined how repetitiveness on the part of the parent impacted recall of information. Most of the interactions between recall and repetitiveness were non-significant, but interestingly repetitiveness and the number of activities in the second through ninth questions within the researcher-child interview were marginally negatively correlated (r=-.41, p=.079). This means that children who were exposed to more repetitive styles of talk from their parents actually recalled fewer activities within the researcher-child interview one week later than kids who did not hear as much repetitiveness from their parents.

Table 6: Parent's Elaboration and Child/ Researcher Interview

	Elaborativeness	Child's Adjectives/Adverbs
Objects Q1:	r = .47, p = .044	r = .64, p = .003
Q 2-9:	r = .47, p = .045	n.s.
Total:	r = .55, p = .016	r = .55, p = .015
Activities Q1:	n.s.	n.s.
Q 2-9:	n.s.	n.s.
Total:	n.s.	n.s.
Concepts Q1:	n.s.	r=.54, p=.018
Q 2-9:	n.s.	n.s.
Total:	n.s.	n.s.
Correct Details Q1:	r = .42, p = .071	r = .70, p = .001
Q 2-9:	n.s.	n.s.
Total:	r = .43, p = .066	r = .49, p = .034

Whole Sample: N=19

When examining the third research question, we also found a significant correlation between the child's use of adjectives and adverbs within the parent child conversation and their recall of objects in the first question (r=.64, p=.003), objects in the total of all of the questions (r=.55, p=.015), concepts in the first question (r=.54, p=.018), correct details in the first question (r=.70,p=.001), and correct details in the total of all of the questions (r=.49, p=.034). This significant correlation means that children who used more adjectives and adverbs in the parent-child conversation actually remembered more objects, concepts, and correct details one week later in the researcher-child interview than children who used fewer adjectives and adverbs.

Discussion:

The present study focused on three research questions, 1. Do children whose parents talk with them about the science event have better memory of that event a week later than children whose parents talk with them about another event?, 2. Does degree of parents' elaboration-- in the science event and/or other event-- conversation predict what children contribute to the parent-child conversation?, and 3. Does degree of parents' elaboration predict what children remember about the science event one week later when talking to a researcher? We treat the implication of each in turn below.

-1. Do children whose parents talk with them about the science event have better memory of that event a week later than children whose parents talk with them about another event?:
When looking at the data about how much children remembered in the researcher child interview, it is important to remember that parents did not know what occurred, what was brought, or what was taught in the lesson at the preschool that day. Parents were just asked permission for their child to participate in a science lesson regarding light. All of the objects, activities, concepts, and correct details that were discussed were recalled by the child themselves

without much assistance from the parent. As discussed above, there were no significant differences in the predicted direction between the light event condition and the other event condition. In fact, for recalling objects, activities, and correct details, children who were in the other event condition actually remembered, on average, more than children who were in the light event condition which is a finding in the opposite direction of what was hypothesized. These data were surprising. It was hypothesized that children who talked with their parents about a light event at home would have an advantage in the researcher child interview when asking to recall information about objects, activities, and concepts that were involved in the science lesson, compared to children who did not talk about the science event but this was not the case.

2. Does degree of parents' elaboration, in the science event and/or other event, conversation predict what children contribute to the parent-child conversation?: Looking at the second research question, it was beneficial to look at the entire sample in order to determine whether parents' elaboration affected the children's contribution to the parent-child conversation. It was found that elaborativeness and repetitiveness were marginally correlated, meaning that the more elaborative a parent is the more repetitive they tend to be as well. It was also found that parents who were more elaborative with their children in the parent child conversation had children who contributed more adjectives and adverbs to the parent child conversation as well. These results suggest that what the parent says and how the parent talks with their child influences how the child talks later on in conversations with others.

3. Does degree of parents' elaboration predict what children remember about the science event one week later when talking to a researcher?: Finally, when examining the third research question, it was very interesting to discover from the results that parent's elaborativeness contributed to children's recall of objects and correct details in some questions of the researcher

child interview. This suggests that frequent elaboration on the part of the parent could be an advantage for children's episodic memory and could help aid in recall of information about past events. It was also interesting to learn that repetitiveness on the part of the parent actually decreased the number of activities that a child could recall during prompted questions in the researcher child interview. Finally, it was interesting to also see the interactions between the child's own adjective and adverb production in the parent child conversation and how it relates to recall in the researcher child interview. The results of this study found that children who produced more adjectives and adverbs within the parent child conversation actually recalled more objects, concepts, and correct details during the researcher child interview than children who produced fewer adjectives and adverbs. These results suggest that it is not only how parents talk to their child and what style they use, it is also how the child talks themselves and what they produce during the parent child conversation that aids in their memory recall.

Most studies examining how learning science and memory in children are related typically look at how children remember specific, personally experienced memory events relating to science. As aforementioned, Haden (2010) conducted a study in a museum to see how conversations with parents helped children learn. The study found that the children who heard more talk and richer talk about science exhibits in the museum with their parents or caregivers, remembered more about the exhibits than children who heard less about the exhibits and talked less about the exhibits (Haden, 2010). Unlike Haden (2010), the current study examined how children remembered not personally experienced events about science, but actually concepts and facts about a science lesson that they were taught.

There are several limitations to this study, first was the small sample size. The study only consisted of 19 parent-child dyads, 10 in the other event condition and 9 in the light event

condition. This small sample size limited the power to detect small differences across conditions. This study being an ecological study was also a limitation. Collecting data from participants' natural environments was interesting and beneficial for this study. Ecological studies provide the opportunity for data to be collected within the subject's natural environments. While these experiments provide interesting information, it is difficult to control what children and their parents actually do or say in the home without a researcher present. For the other event condition, parents were asked to refrain from talking to their children about the science event to the extent possible, but it is uncontrollable what parents and children actually talk about at home. For example, children could have been very excited or enthusiastic about the material presented during the science lesson and parents could have engaged in conversations with their children regardless of the instructions. While there are limitations, the study still found interesting information about children's memory and learning science.

In conclusion, this study helped to provide more insight into how more frequent elaborativeness in parent talk could contribute to better memory of concepts and facts about science regardless of what event the parent and child discussed at home. The data from this study is just a small part of other and larger studies that are studying even further how memory and science in children are related.

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