

Parent Teaching Focus and Toddlers' Learning from an Infant DVD

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This study examined parents' and toddlers' talk and viewing behaviour while co-viewing an educational infant DVD focused on teaching language. Sixty-four 12- to 25-month-old infants viewed a DVD in a laboratory with their parents. A cluster analysis on parent talk revealed three groups: High, Moderate, and Low Teaching Focus parents. The High Teaching Focus parents presented the greatest variety of words highlighted in the DVD, were most likely to label or describe what was on screen, and had the least amount of non-DVD related talk. Children of High Teaching Focus parents had the highest degree of engagement with the DVD. These children also said the greatest number and variety of target words and were most likely to say new words during the co-viewing session. Furthermore, parent talk significantly mediated the relationship between children's engagement with the DVD and their use of new words while co-viewing. The findings are discussed in terms of implications for how parents use educational infant DVDs to teach their children. Copyright © 2010 John Wiley & Sons, Ltd.

Key words: infants; toddlers; television; language learning; parent-child interaction

Although the presence of background television has been linked with decreases in the quantity and quality of parent-child interaction (Kirkorian, Pempek, Murphy, Schmidt, & Anderson, 2009) as well as decreases in high-quality verbal input from parents (Christakis *et al.*, 2009), only a minimal number of studies have examined infants' and toddlers' ability to learn from foreground presentations of commercially produced infant DVDs (DeLoache *et al.*, 2010; Richert, Robb, Fender, & Wartella, 2010a; Robb, Richert, & Wartella, 2009). Many parents purchase and use educational DVDs with their infants in the anticipation of benefits to their children's learning (DeLoache & Chiong, 2009). However, little

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is known about how parent support impacts infants' learning from screen media. The goal of the current study was to examine the relationship between individual differences in parents' use of DVDs and infants' and toddlers' learning from an educationally focused infant DVD.

Although television screens cannot replace and do not function similarly to live social interaction in the first years of development (Richert, Robb, & Smith, 2010b), recent research has considered how parents might use videos as a tool for interacting with and teaching their young children. Researchers have observed parents scaffolding infants' experiences while engaged in joint DVD viewing in many of the same ways as has been observed when they are engaged in joint picture book reading; parents label, describe, and ask questions (Barr, Zack, Garcia, & Muentener, 2008; DeLoache & DeMendoza, 1987; Fidler, Zack, and Barr, 2010; Namy, Acredolo, & Goodwyn, 2000). Although attributes of a child, characteristics of the screen media, and environmental contexts interact to influence infant and toddler language development (Linebarger & Vaala, 2010), the goal of the present study was to examine the viewing context itself. Specifically, we examined the relationship between parents' use of common reading strategies and toddlers' learning of DVD content, specifically content related to language learning.

The present study builds on recent research outlining strategies parents use when watching DVDs with their young children. In two separate studies, Barr *et al.* observed infants between 6- and 18-months and their parents viewing segments of full-length DVDs in their homes (Barr *et al.*, 2008; Fidler *et al.*, 2010). Parent talk was coded for parents' use of questions, labels, and descriptions, as well as the amount of talk unrelated to video content (Barr *et al.*, 2008). Based on a cluster analysis of this coding, Barr *et al.* (2008) identified high, medium, and low scaffolding parents. In addition to relationships with age and prior exposure, children's attention and responsiveness to the video (as measured by video-focused looking time, vocalizations, verbal responses, pointing, dancing or clapping) increased with higher levels of parent scaffolding through verbal input, shared focus, and turn-taking (Fidler *et al.*, 2010).

Although parents may demonstrate individual differences in their scaffolding practices during co-viewing, parents also vary their co-viewing behaviours depending on the specific content of the DVD. Pempek (in press) assessed parents' behaviours while watching a *Baby Einstein* DVD and a *Sesame Street Beginnings* DVD with their children. The focus of the *Baby Einstein* DVD was on teaching educational content, and the focus of the *Sesame Beginnings* DVD was on increasing positive parent-child interaction. Assessments of parents' behaviours revealed that parents who co-viewed the *Sesame Beginnings* DVD with their children were more likely to actively engage in high-quality interactions with their child (Pempek, in press).

In a recent short-term longitudinal study of 12- to 25-month-olds, Richert *et al.* (2010a) and Robb *et al.* (2009) examined whether young children learned words from an infant-directed DVD while viewing in their home environment. The DVD used in the study was designed to teach 30 house-related words (e.g. bowl, refrigerator, lamp) to infants 9 months and older. Half of the participants were assigned to the DVD group and watched 15 times over 6 weeks. The other half of the infants were assigned to the No DVD group; they were asked to follow their normal routine and not view the DVD. Analyses revealed that children in the DVD-watching group did not learn words from the video during the 6 weeks.

DeLoache *et al.* (2010) recently provided further evidence of children's difficulty learning new words from a DVD by comparing children's learning of a

personalized set of unknown words. Two groups of children who viewed a language-learning DVD at home over the course of 4 weeks (one group with parent support and another without parental input) did not perform above chance and did not learn any more words than a control group of infants who did not view the DVD. Only a fourth group of children demonstrated language improvement over the 4 weeks; this group did not view the DVD, but instead interacted with parents who were instructed to teach children the set of 25 words during the course of everyday interactions. These findings are in contrast to a set of analyses reported at the conclusion of Richert *et al.* (2010a), in which children who co-viewed a vocabulary-focused DVD with their parents used new words during a joint-viewing session if their parents used those words or drew children's attention to the screen.

The purpose of the present study was to further examine the relationship between parents' teaching behaviours during a co-viewing session with their infants and infants' learning of vocabulary from the DVD. The data reported by Richert *et al.* (2010a) was re-analysed to examine specific associations between parental teaching focus while watching a full-length infant-directed language DVD and infant language outcomes. The reanalysis was based on factors known to increase children's language learning within parent–infant joint book reading (DeLoache & DeMendoza, 1987; Fletcher & Reese, 2005).

Co-viewing DVDs with young children may offer the same opportunities for teaching young children words as a variety of contexts such as joint toy play, book reading, or free play. However, the current analysis focused on comparisons with joint book reading for four main reasons. First, as indicated on the website for the DVD in the current study, parents are encouraged to use the DVD as a 'hands-free book' ('The Baby Einstein Experience,' n.d., (2010)). Second, engagement with a book and a DVD both involve continued focus on one object (e.g. the screen or the book) and the activity typically follows an inherent sequence provided through the structure of the narrative arc or the order of the scenes. Third, research on picture book reading with infants has shown that parents may guide infants' participation in ways that enhance both engagement and learning (e.g. Fletcher & Reese, 2005). Fourth, the contexts of parent–child book reading and DVD co-viewing both provide opportunities that support parents' efforts in teaching new words by providing additional referents to objects that are both in and outside of a child's daily experiences (DeLoache & DeMendoza, 1987; Ganea, Pickard, & DeLoache, 2008).

In a recent review of picture book reading from birth to age 3, Fletcher and Reese (2005) described ways in which parents tailored their scaffolding to provide support that was appropriate to their children's age and language abilities. Although parent talk during book reading with young children often has been described as more complex than parent talk in everyday conversation, the language parents provide very young children during reading is often rather simple, focusing primarily on labels and descriptions with younger infants (DeLoache & DeMendoza, 1987). Book reading thus serves as an important context for expanding vocabulary for younger infants, with labels occurring more frequently in this context than in everyday conversation (Ninio & Bruner, 1978). For example, this research reported that a mother, while engaged in play with her 8-month-old daughter, engaged in significantly more labeling while reading (76%) than other play situations (7%). Labeling in this way can have an immediate impact on children's vocabulary. In a book reading study of 15- to 18-month-old infants, the majority of children were able to learn a novel word and also to generalize the new word to a real referent after just one book reading interaction (Ganea *et al.*, 2008).

As in previous studies of joint book reading, recent research on parent–infant co-viewing of screen media suggests variation in how parents utilize video for interacting with their infants and toddlers (Barr *et al.*, 2008; Fidler *et al.*, 2010). The goal of the current study was to examine learning outcomes related to individual differences in how parents utilize a co-viewing interaction to teach their children the intended instructional content embedded in a DVD.

METHOD

Participants

Eighty-eight 12- to 25-month-old infants visited the laboratory as part of a larger, short-term longitudinal study on infant DVD viewing and word learning (for method, see Richert *et al.*, 2010; Robb *et al.*, 2009). Of those 88 participants, 64 parent–infant dyads completed a DVD co-viewing session during their final visit to the lab. For the original study, children were recruited from two age groups: 12–15 months old ($n = 34$, $M = 13$ months, 19 days, $S.D. = 38$ days) and 18–25 months old ($n = 30$, $M = 21$ months, 11 days, $S.D. = 61$ days). There were 33 female and 31 male infants. The sample was ethnically diverse with 53% Caucasian, 20.3% Hispanic, 9.4% African American, 4.7% Asian, 4.7% other, 4.7% multi-ethnic, and an additional 3.2% unreported. In terms of parent education, 13% completed high school, 36% completed some college or vocational school, 30% had a Bachelor's degree, 20% held advanced degrees, and 1% did not respond. Approximately half of the dyads ($n = 31$) had previously viewed the DVD 15 times prior to the co-viewing session; half had not previously seen the DVD ($n = 33$).

Materials

Participants viewed Baby Einstein's *Baby Wordsworth* DVD, which provides an introduction to 30 words from around the house. Each set of five words is situated within five different rooms or areas of a house; the segments for each area are roughly equal in length. The total DVD running time is 38:30 min. The only language used in the DVD is in the presentation of word labels. Single-word labels are presented via voiceover while a split screen presents both a picture of the object on one side, along with a person presenting the word in American sign-language on the other. The word is also spelled along the bottom of the screen. Following the initial presentation of the words, the 30 target words are individually presented via voiceover and picture a second time, then visually presented within video montages accompanied by classical music. Finally, each set of words from an area of the house are presented for a third time in the voiceover and split screen presentation described above.

Measures

Vocabulary and cognitive development

At the final visit, children's vocabulary was assessed through parent report of which of the 30 DVD target words infants understood (WU) and said (WS). To control for differences in cognitive development between children in the DVD and No-DVD conditions, the cognitive subscales of the Bayley Scales of Infant Development, Third Edition (BSID-III) (Bayley, 2006) were administered at the

first visit. The reliability coefficients for the cognitive subscale range from 0.83 to 0.89 for children between 12 and 15 months and between 0.91 and 0.96 for children between 18 and 24 months (Bayley, 2006). One of three trained data collectors administered the BSID-III.

Child affect and engagement

Two trained coders coded videotaped interactions for child affect and engagement with the DVD. Coder A completed two-thirds of the interactions, while Coder B completed one-third; the two coders overlapped on approximately 20% of the interactions to establish reliability. Using a time sampling method, every 30 s an individual coder paused the video and made ratings for positive affect, negative affect, and engagement for that 30-second segment. For engagement, children were given a score of 2 if their attention was completely focused on watching the DVD, 1 if their attention was divided between DVD viewing and another activity (e.g. playing with toys), or 0 if their attention was focused completely on another activity and not DVD viewing at all ($\gamma = 0.95$, $p < 0.001$).

Negative and positive affect were scored on separate scales from 0 (none) to 2 (a lot). Positive affect was rated higher when behaviours that demonstrated enjoyment, such as smiling and laughing, were observed ($\gamma = 0.89$, $p < 0.001$). Behaviours that contributed to the ratings of negative affect included whining, complaining, and crying ($\gamma = 0.96$, $p < 0.001$). To indicate the co-occurrence of high engagement and positive affect, we computed the number of instances in which children were fully engaged in DVD viewing (engagement rated a 2), while at the same time being rated a 1 or 2 in positive affect. Although transcripts were available for all of the parents and children during the co-viewing episodes, children occasionally wandered off-screen. This resulted in complete data on the affect and engagement coding for 53 child participants. These participants were evenly distributed across prior exposure, age, and teaching focus cluster.

Parent and child talk

All co-viewing sessions were transcribed and coded. Coding of parent talk began by parsing talk into individual utterances; each utterance was then determined to be related to DVD or non-DVD content. The measure of non-DVD talk is unique to viewing screen media, and can indicate how parents may or may not embrace the joint-viewing session as an opportunity for establishing joint attention to the video content (Barr *et al.*, 2008). Non-DVD utterances were tallied, but not coded further. Non-DVD talk often consisted of talk relating to diapering, having snacks, playing with toys, reading books, and talk about what the families were doing when they left the lab.

DVD utterances were coded into the categories described below. When percentages are presented for categories of talk related to DVD content, these were calculated by dividing the number of instances of a particular category of talk by the number of DVD utterances made by that parent (as opposed to dividing by overall total utterances). This method of calculating percentages allowed for a clear understanding of when parents were talking about the DVD and how parents divided their talk between the DVD talk categories. Instances of parent talk that could not be understood were indicated in the transcripts and were marked as uncodable. Parent and child use of the 30 target words was also tallied. To compute reliability, 20% of the transcripts were coded by a second

coder and inter-rater reliability using the Kappa statistics for each category of talk are reported below.

Simple directing attention occurred when parents attempted to focus children's attention on the screen without further information, such as 'Look.' or 'Watch the TV,' $k = 0.86$, $p < 0.001$. Use of the target words was coded within two categories: labels and extended labels and descriptions. *Target word labels* were single-word utterances in which a parent used one of the 30 target words, such as 'cup,' 'dog,' or 'swing,' $k = 0.91$, $p < 0.001$. *Target word extended labels and descriptions* were phrases or sentences that directed children's attention to the DVD by talking about what was happening on screen and included a target word, such as 'That dog is really furry!', $k = 0.87$, $p < 0.001$. *General DVD labels and descriptions* included talk that labeled or described what was happening on screen without using a target word, such as 'He spilled the milk!', $k = 0.74$, $p < 0.001$. When coding for use of the target words, variations of the words were counted as instances of target word use (e.g. fridge for refrigerator; phone for telephone) but substitute words were not included (e.g. kitty for cat, light for lamp).

Procedure

Prior to the co-viewing session, families assigned to the DVD group had viewed the *Baby Wordsworth* DVD 15 times. Parents completed a time diary indicating their child had watched the DVD exactly 15 times over the course of 6 weeks. Families in the No-DVD group were asked to maintain their typical routines and did not view *Baby Wordsworth*. All families came into the laboratory for four visits, which were spaced 2 weeks apart.

During their final visit, parents and infants co-viewed the *Baby Wordsworth* DVD. Parents were instructed to watch with their infants as they typically would at home. To support a naturalistic and comfortable living room environment, the families watched the DVD on a television in a carpeted room outfitted with a couch and chair, along with child-size chairs, toys, and children's books. A camera on a high tripod began to capture the interaction from the back corner of the room as the DVD was loaded; it was turned off when families notified the experimenter that the DVD was over, either before, during, or after the credits. Based on slight variation in the start and end of the videotapes of the co-viewing, the average recorded length of the co-viewing session was 37:30 min (S.D. = 3:10).

RESULTS

The results are outlined in four sections. The first section presents both descriptive data of parent talk during co-viewing, followed by an analysis that identifies parents as having one of three levels of teaching focus. The second section examines the connection between level of parent teaching focus and children's word use. The final two sections explore how children's engagement and word use is mediated by parent teaching focus, and how parents adjust their talk based on child knowledge.

Parent Interaction Style: Three Levels of Teaching Focus

Table 1 includes the means and standard deviations for the categories of parent and child talk. As indicated by the standard deviations, there was considerable

Table 1. Descriptive data by level of parent teaching focus

	Level of parent teaching focus			
	High	Moderate	Low	Total
<i>Cluster analysis variables</i>				
Proportion of target words said	78%	44%	27%	51%
Target word labels	25%	11%	19%	19%
Target word descriptions	24%	18%	11%	18%
DVD general labels/descriptions	34%	48%	18%	33%
Talk unrelated to DVD	28%	57%	56%	46%
	<i>Mean (S.D.)</i>	<i>Mean (S.D.)</i>	<i>Mean (S.D.)</i>	<i>Mean (S.D.)</i>
Child age in weeks	79.7 (18.7)	75.6 (15.3)	68.5 (19.1)	74.7 (18.2)
Bayley scaled score	10.8 (2.4)	10.9 (2.4)	9.8 (2.0)	10.5 (2.4)
Gender (% female)	52%	50%	48%	51%
DVD: No-DVD group membership	12/11	10/10	9/12	31/33
<i>Other categories of parent talk</i>				
Total utterances	289 (126)	245 (121)	124 (96)	221 (134)
Instances of target word use	108 (63)	41 (27)	22 (14)	59 (56)
<i>Parent report of child word knowledge</i>				
Number of Words Understood (WU)	20.8 (8.7)	22.4 (6.7)	18.0 (9.2)	20.1 (8.4)
Number of Words Said (WS)	10.8 (8.9)	11.9 (10.5)	7.0 (8.3)	9.8 (9.3)
<i>Child word use during co-viewing</i>				
Number of target words said	5.0 (6.5)	2.9 (3.4)	1.0 (1.9)	3.0 (4.8)
Total instances of target word use	12.0 (16.2)	6.4 (8.4)	2.4 (5.0)	7.1 (11.7)
Percent of children using a new word	43.4%	27.8%	5.6%	25%

variability in quantity and content of parents' language use. For example, the total number of parent utterances ranged from 19 to 550. Additionally, talk unrelated to DVD content ranged from 6% to 95%, whereas target-word talk ranged from 0% to 80% of DVD-related utterances. These ranges were similar for general DVD labels and descriptions (0%–84%). Given the substantial variation in parents' behaviour, the analyses focused on (a) grouping parents based on their use of the video to teach their children the target words, and (b) examining the relationship between the teaching-focus groups and children's learning of the target content from the DVD.

Following Barr *et al.* (2008), we conducted a cluster analysis on parents' talk. Because the infant DVD that parents and infants viewed was designed to teach words, we entered three variables related to parents' use of the 30 target words into a *k*-means cluster analysis: (a) the breadth of target words used (proportion calculated by dividing the number of different target words used by 30), (b) target word labels, and (c) target word extended labels or descriptions. Additionally, parents could choose to talk about the DVD without explicitly using one of the 30 target words, so a fourth variable included in the cluster analysis was a variable that combined non-target word, but DVD-related, labels and descriptions. Verbalizations unrelated to media content are somewhat unique to television viewing; thus, the fifth variable entered into the cluster analysis was the proportion of each parents' non-DVD related talk.

The cluster analysis revealed three distinct teaching focus patterns (Table 1). *High Teaching Focus* parents ($n = 23$) demonstrated high amounts of target word-specific as well as general DVD talk and a low proportion of talk unrelated to the DVD. *Moderate Teaching Focus* parents ($n = 20$) demonstrated moderate amounts of target word-specific and high proportion of DVD general talk, while also

having a high proportion of talk unrelated to the DVD. *Low Teaching Focus* parents ($n = 21$) demonstrated moderate amounts of target word-specific talk, low general DVD talk, and a high proportion of talk unrelated to the DVD.

One-way ANOVAs with teaching focus cluster (high versus moderate versus low) as the between-subjects variable showed that groups did not differ based on infants' age, $F(2, 61) = 2.18$, $p = \text{n.s.}$, or cognitive ability, $F(2, 58) = 1.52$, $p = \text{n.s.}$ Chi-square analysis showed that groups did not differ based on gender, $\chi^2(2, N = 63) = 0.41$, $p = \text{n.s.}$, or prior exposure to the DVD, $\chi^2(2, N = 63) = 0.38$, $p = \text{n.s.}$ Not surprisingly, one-way ANOVA and Scheffe post-hoc analyses indicated that children of High Teaching Focus parents heard significantly more of the DVD target words than children of Moderate and Low Teaching Focus parents, who did not differ significantly from each other, $F(2, 61) = 26.06$, $p < 0.001$.

The Impact of Parent Teaching Focus

Parent report of child word knowledge

Given that systematic differences emerged in parents' teaching focus, we examined the relationship between teaching focus and children's use of target words. The first analyses were based on parents' reports of the words children could understand (WU) and say (WS), which parents had reported immediately preceding the co-viewing session (Table 1). First, it is possible that the three groups of parents focused on teaching in varying amounts because they believed their children had more or less knowledge of the target words prior to engaging in the joint-viewing session. To assess this possibility, we conducted separate one-way ANOVAs on the number of DVD target words parents reported their child could understand (WU) and say (WS) at Time 4, with cluster (high versus moderate versus low) as the between-subjects variable. There was no significant main effect of cluster for either variable; parents in the three teaching focus groups reported prior to the co-viewing session that their children understood and could say similar numbers of words.

Observed child word use

To examine evidence of children's word learning from the DVD, a one-way ANOVA was conducted on the number of different target words children said while watching the DVD with a parent (Table 1). There was a significant main effect of cluster, $F(2, 61) = 25.64$, $p < 0.001$. Scheffe post-hoc analyses indicated children of High Teaching Focus parents used significantly more of the target words than children of parents in the Moderate and Low Teaching Focus groups. A separate one-way ANOVA on children's repetition of the target words revealed another significant main effect of cluster, $F(2, 61) = 4.13$, $p < 0.05$. Scheffe post-hoc analyses indicated children of High Teaching Focus parents were more likely to repeat the target words than children of Moderate and Low Teaching Focus parents.

As a more stringent test of learning during the co-viewing session, we assessed whether children used new words while watching the DVD based on the parent-report of words children could say prior to the co-viewing (Table 1). A one-way ANOVA on the numbers of new words said by children during the joint-viewing session indicated a significant effect of teaching focus cluster, $F(2, 56) = 3.66$, $p < 0.05$. Scheffe post-hoc comparisons indicated children who said new words were significantly more likely to have parents in the High Teaching Focus group than parents in Low Teaching Focus group.

In summary, regardless of teaching focus group, parents reported children could understand and say similar numbers of target words. However, differences were observed in children's use of the target words during the co-viewing session, depending on parents' teaching focus. Children of High Teaching Focus parents used an average of five of the target words during the co-viewing session, compared with approximately two words by children in the Moderate Teaching Focus group and one word by children in the Low Teaching Focus group. In addition, children of parents in the High Teaching Focus group were most likely to repeat the target words while viewing and to say a new word they had not said before in the co-viewing session.

Children's Engagement and Word Use Mediated by Parent Teaching Focus

Although parent teaching focus was related to children's use of words during the co-viewing session, the mechanisms for this connection remain unclear. Parent teaching focus could be related to children's learning indirectly simply by increasing children's attention to the screen and the DVD content, or parent teaching focus could be related directly to children's learning through parents' use of the target words. Thus, we examined the relationship between parents' teaching focus and children's engagement and affect while watching the DVD. An ANOVA on the proportion of segments in which children were coded as being fully engaged indicated children with parents in the High Teaching Focus group were fully engaged in a significantly greater proportion of 30-second segments ($M = 40.2\%$, $S.E. = 0.04$) than children with parents in the Moderate ($M = 17.5\%$, $S.E. = 0.05$) and Low ($M = 22.4\%$, $S.E. = 0.04$) Teaching Focus groups, which were not significantly different from each other, $F(2, 50) = 7.58$, $p < 0.001$. There were no significant differences in affect ratings based on parents' teaching focus.

As individual 30-second segments were rated simultaneously for affect and engagement, we examined the proportion of segments in which children were fully engaged (rated a 2 on engagement) and displayed overall positive affect (rated a 1 or 2 on affect). A one-way ANOVA on this proportion with teaching focus cluster as the between-subjects variable revealed a main effect of cluster, $F(2, 50) = 5.63$, $p < 0.01$. Scheffe post-hoc analyses indicated the children with parents in the High Teaching Focus group ($M = 4.9\%$, $S.E. = 0.01$) were significantly more likely to display positive affect while fully engaged in viewing the DVD than children with parents in the Moderate ($M = 1.9\%$, $S.E. = 0.01$) or Low ($M = 1.0\%$, $S.E. = 0.01$) Teaching Focus groups, which were not significantly different from each other. Thus, although engagement varied based on parents' level of teaching focus, affect did not. However, children with High Teaching Focus parents were most likely to display positive affect during periods of high levels of engagement with the DVD.

This finding implies children may have used more new words in the co-viewing session, not because of parents' use of those words, but because of their increased engagement during the co-viewing session. Using Baron and Kenny's (1986) method, we conducted mediation analyses examining whether parents' use of the target words mediated the relationship between children's engagement and children's use of the target words during the co-viewing session (Figure 1). Correlation analyses revealed children's proportion of high engagement codes was significantly correlated with parents' use of the target words ($r = 0.48$, $p < 0.01$) and children's use of the target words ($r = 0.34$, $p < 0.01$). Children's use of the target words was significantly correlated with parents' use of the target words ($r = 0.38$, $p < 0.01$).

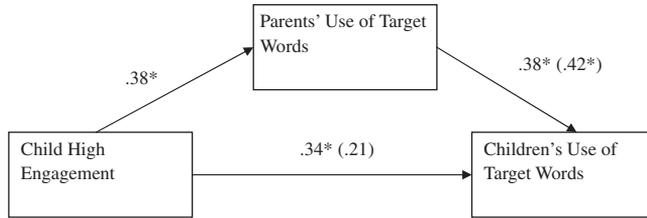


Figure 1. Mediation analysis for the relationship between child engagement, parents' use of the target words, and children's use of the target words.

In the first step of the mediation analyses, simple regression analyses indicated children's proportion of high engagement codes significantly predicted the number of different target words children said in the co-viewing session, $R^2 = 0.12$, $\beta = 0.34$, $p < 0.05$; and children's proportion of high engagement codes significantly predicted parents' use of the target words, $R^2 = 0.14$, $\beta = 0.38$, $p < 0.01$. In addition, parents' use of the target words significantly predicted children's use of the target words, $R^2 = 0.14$, $\beta = 0.38$, $p < 0.01$. In the second step of the analyses, a regression model predicting children's use of the target words from children's proportion of high engagement codes, while controlling for parents' use of the target words, was significant, $R^2 = 0.18$, $p = 0.001$. In this case, the effect of parents' use of the target words remained significant, $\beta = 0.42$, $p < 0.01$; however, the effect of children's proportion of high engagement codes became insignificant, $\beta = 0.21$, $p = \text{n.s.}$ The addition of parents' use of the words resulted in a significant change, $\Delta R^2 = 0.15$, $p < 0.01$. A Sobel test confirmed that parents' use of the target words was a significant mediator of the relationship between children's engagement and use of the target words, Test Statistic = 2.16, $p < 0.05$. In other words, engagement with the DVD itself could not account for children's increased use of the target words; children used the target words when their parents also used the target words.

Parent Talk Based on Children's Knowledge

Although the above findings suggest a relationship between parent teaching focus and children's learning, the previous analyses separately examined the data for observed parent target word use and parents' report of children's target word knowledge. For a deeper understanding of the relationship between parents' teaching focus and children's learning, we matched these two sources of data word-by-word to explore the instances in which parents *did* say the target words while co-viewing the DVD based on whether parents believed infants *did* or *did not* have the ability to understand and say specific words. To clarify, when a parent was observed saying a target word, we recorded whether parents had previously reported children *did* or *did not* yet understand or say that particular word. These patterns were then analysed for whether parents with High, Moderate or Low Teaching Focus used the target words when their children already knew and said target words, as well as whether the pattern was different for the target words children *did not* yet know or say (Figure 2).

A one-way ANOVA revealed a significant main effect of Parent Teaching Focus regarding how many words parents used that they reported their children *could understand*, $F(2, 59) = 19.23$, $p < 0.001$, and *could say*, $F(2, 59) = 6.91$, $p < 0.01$. Scheffe post-hoc analyses revealed that when parents had reported their child

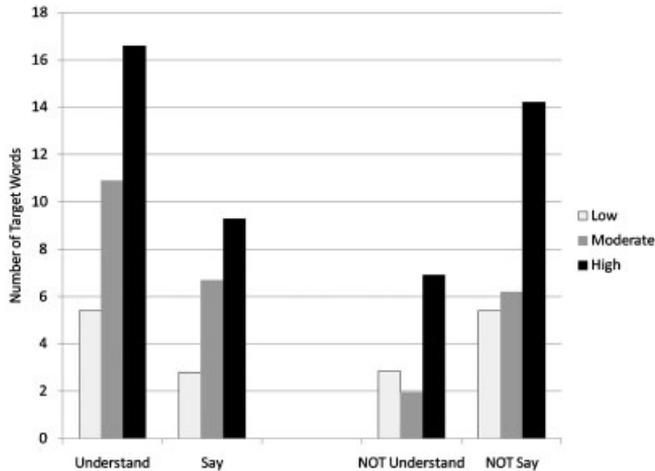


Figure 2. Parent target word use by Teaching Focus group when parent reported child *could* understand and say, and when child *could not* understand and say particular target words.

could understand specific target words, High Teaching Focus parents said significantly more of those target words than the Moderate Teaching Focus parents, who said significantly more of those target words than the Low Teaching focus parents. Similarly, Scheffe post-hoc analysis revealed the parents in the High and Moderate Teaching Focus groups said significantly more of the specific target words their child already could say than parents in the Low Teaching Focus group. These analyses confirmed the word-use patterns that were used to create the teaching focus clusters; when children *did* know specific target words, parents in the three teaching focus groups used those specific target words in high, moderate, and low amounts.

Given that the clusters were an index of parental scaffolding, however, we predicted that parents should also use target words that they reported their children could not understand or say. A one-way ANOVA revealed a significant main effect of Parent Teaching Focus regarding how many words parents used that they reported children *could not understand*, $F(2, 59) = 5.59$, $p < 0.01$, or *say*, $F(2, 59) = 5.59$, $p < 0.01$. Scheffe post-hoc analyses revealed that parents with a High Teaching Focus were significantly more likely than parents with a Moderate or Low Teaching Focus, who did not differ significantly from each other, to use the specific target words from the DVD that they had reported their child could not understand or say. This pattern of target word use further illustrated that the High Teaching Focus parents were aware of their children's knowledge of the target words and actively presented words that children did not yet understand or say during the co-viewing session.

DISCUSSION

Given evidence suggesting children under 20 months are unable to learn vocabulary from solitary exposure to screen media, parent input is essential for infants to learn while viewing (Krcmar, Grela, & Lin, 2007; Richert *et al.*, 2010a,b). Based on recent research examining the strategies parents use while co-viewing

with their infant children (e.g. Barr *et al.*, 2008; Fidler *et al.*, 2010), the goal of the current study was to examine whether these strategies are successful in scaffolding infants' learning of new words while co-viewing with their parents. We observed parents and infants co-viewing an infant DVD designed to teach words. Analysis of parent talk revealed parents could be categorized as employing a high, moderate or low teaching focus.

High Teaching Focus parents reinforced the learning goal of the DVD by labeling over three-quarters of the 30 target words highlighted in the DVD. The High Teaching Focus parents differed from the Moderate Teaching Focus parents in that they tailored their DVD use specifically to their perceptions of the child's knowledge. The High Teaching Focus parents presented more words they believed their children did not already know. Importantly, teaching focus was related to specific learning outcomes. The majority of the children who said new words were engaged in co-viewing with High Teaching Focus parents; children's use of new words was specifically related to parents' use of the words, and not simply to increased attention to and engagement with the DVD.

These findings contribute to our understanding of the factors involved in infants' and toddlers' learning from DVDs. Although infants' developing attention to and perception of the television screen play an important role in their ability to learn from DVDs (Barr, 2008), in the current study, attention to the screen was not sufficient for learning content. Language learning only occurred when parents were actively engaging their children with the DVD content. Although parents use infant DVDs for a variety of non-educational purposes (DeLoache & Chiong, 2009), parents should know that learning from educational DVDs at these young ages requires active parent involvement (Richert *et al.*, 2010a,b).

In terms of specific strategies, High and Moderate teaching focus parents were likely to prompt children to say words they already knew, similar to joint-book strategies that have been previously documented (DeLoache & DeMendoza, 1987). However, in contrast to this past research on book reading, High Teaching Focus parents also prompted the children to repeat words they previously did not know during the co-viewing session. One explanation for this finding is that the parents in the High Teaching Focus group were just saying more words overall. Although significantly greater DVD word use is one of the defining characteristics of the High Teaching Focus group, it is important to note that the focus of those words is the key difference between the High and Moderate Teaching Focus parents. The Moderate Teaching Focus parents provided labels for a moderate amount of words they thought their children already knew, however, their use of the target words children did not know dropped to the level of the Low Teaching Focus parents. The High Teaching Focus parents were significantly more likely to use words they thought their children could not understand or say.

Another possible explanation for the use of different strategies during book reading and DVD viewing is that the televised nature of the DVD afforded different kinds of scaffolding and teaching opportunities. A common goal of a book reading interaction is to create a conversation-like interaction between parents and children (DeLoache & DeMendoza, 1987). With this goal, parents attempt to create a schema for book reading talk by asking questions for which children know the correct response. The joint-viewing of the DVD may have elicited a different goal from parents. Rather than providing an opportunity for conversation, this specific DVD was structured clearly as a platform for teaching children new words. Thus, the High Teaching Focus parents reflected

the pedagogical goal of the DVD by attempting to elicit new words from their children.

Another important factor is the structure of the DVD presentation. Given the conversational goals of a book reading interaction (DeLoache & DeMendoza, 1987), parents and children may move on from a given topic if the conversation stalls because the child does not know a particular word. In the case of the DVD used in this study, the target words themselves were repeated multiple times in the course of the DVD viewing. In contrast to a book reading interaction, in which the parent and/or child can set the pace of the interaction, the DVD presentation followed a set pace and sequence. This structure could have provided High Teaching Focus parents with more opportunities for focusing on words their children did not yet know, rather than moving to topics of shared knowledge (which may happen more often in joint book reading).

It is equally important to consider why the Low Teaching Focus parents used so few teaching strategies during the co-viewing session. It is certainly possible that the Low Teaching Focus parents are generally non-involved parents even when a DVD is not playing, however, other explanations are possible. Low Teaching Focus parents may not use many teaching strategies with their children because they may not believe parent support is necessary for children's learning from a DVD. These parents may believe that viewing the DVD on its own is sufficient for learning, especially because the DVD provided much of the input the parents might have provided (i.e. a verbal label accompanied by a related image, highlighting the text, providing multiple exemplars.) If parents perceived the DVD to be providing effective scaffolding, or even better scaffolding than the parents themselves could provide, the parents may have been trying to avoid interfering with the educational strategies embedded in the DVD presentation. Regardless of the impetus for the differences in parents' teaching focus, children learned more when they co-viewed with High Teaching Focus Parents. Thus, additional studies should examine whether parents in the Low Teaching Focus group could be either cued or trained to use effective co-viewing strategies with their infants.

Another important consideration is the context in which co-viewing occurred. The parent–child co-viewing sessions described in the present study were conducted in a laboratory setting in which parents knew they were being videotaped. This knowledge of videotaping could have resulted in an artificially high or low teaching focus from parents that they would not otherwise use in home-viewing. Additionally, viewing in the laboratory may have resulted in increased non-DVD talk as parents might have focused on keeping children engaged and happy for the required time more than they would have needed to in the home setting. In this case, the parent clusters would reflect an artifact of the lab setting rather than naturally occurring differences in parents' viewing practices.

In consideration of this caveat, it is important to note that the types and quantities of parent talk presented in this study did not differ greatly from findings from other co-viewing research conducted in children's homes (Barr *et al.*, 2008; Fidler *et al.*, 2010). Considerable variability in parent talk has been observed in both the home and laboratory settings. In the home, nearly one-third of parent utterances were unrelated to the DVD (Barr *et al.*, 2008; Fidler *et al.*, 2010), whereas in the laboratory, non-DVD related talk approached 50%. It does not appear that asking parents to co-view in the laboratory artificially or substantively changed their scaffolding of children's viewing or the content of the support provided when parent talk was focused on the DVD.

An additional consideration relates to the nature of the DVD used in this study. As Robb *et al.* (2009) noted, this DVD does not mimic the teaching

strategies known to facilitate language learning in the early years, strategies such as establishing joint attention. Recent research has suggested that having a person on screen establish social contingency with an infant may be more successful at teaching children new words than a non-contingent person (Krcmar *et al.*, 2007). However, for children in this age range, social contingency may be more successful at scaffolding imitation than word learning; repetition may be more successful at increasing word learning from video (Krcmar, 2010). Further research should examine whether an on-screen character who used effective strategies like establishing social contingency and joint attention, while also providing enough repetition, could achieve similar benefits as having a physically present, High Teaching Focus parent.

Finally, although prior exposure to a specific DVD over time may change how parents talk about the DVD with infants and toddlers, in this study, the three levels of teaching focus were composed equally of first-time viewers and those watching for the 16th time. This provides some evidence that the level of teaching focus may be a characteristic of particular parent-child dyads and that these patterns are not influenced by prior exposure. Building on the present study, future research should examine whether levels of parent teaching focus remain consistent within dyads across contexts and how parents' teaching focus is related to other aspects of children's interactions with media such as parents' perceptions of infant media, long-term media use patterns, and the specific shows children view.

In conclusion, the findings presented here provide further evidence that adult-child interaction is an essential element in young children's learning from DVDs (Richert *et al.*, 2010a,b). When parents explicitly used the DVD to teach their children new words, children used those words. Although DVDs may try to replicate parental labeling behaviours, children under 2 may not benefit without adult intervention. As many parents and childcare centres use screen media on a daily basis with infants and toddlers, it is important to communicate the ways these media can be used to promote learning. Based on the findings reported above, although children under 2 are unlikely to learn content from a DVD without adult scaffolding, adults can effectively use infant media to teach children by engaging them in the intended educational content while co-viewing.

ACKNOWLEDGEMENTS

This research was funded by Grant #0623821 from the National Science Foundation to Wartella (PI) and Richert (affiliated faculty). We would like to thank the research assistants who contributed to transcribing and coding. We especially thank the parents and toddlers who made this research possible.

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