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ABSTRACT

The purpose of this study was to assess developmental differences in children's visual attention to, and comprehension of, a prosocial television program as a function of varying "preplay" formats. (Preplays were defined as advance organizers designed to help a child select, order, and integrate critical televised content into a memory scheme.) To determine which features were most effective as aids to comprehension, preplays varied on two orthogonal dimensions: presence or absence of visual portrayal of story events and concrete or inferential story narration. Examined were (1) developmental differences in visual attention to the preplays and program segments, (2) developmental differences in story comprehension as a function of preplay features, and (3) the relationship between visual attention to preplays and comprehension of story content. Subjects were 160 children equally distributed by sex who attended grades 1 through 4. Pairs of children taken to a mobile laboratory were told they could read, play, and watch television as they did at home. Visual attention was scored "on" when a child looked at the television screen. After viewing, each child completed two comprehension items: picture sequencing and multiple choice. Results are discussed indicating that differences in children's visual attention to, and comprehension of, a prosocial television program were a function of varying preplay formats. (RH)

The Effects of Televised Preplays on Children's Attention and Comprehension

Sandra L. Calvert

Paper presented at the Biennial Meeting of the Society for Research in Child Development, Detroit, April, 1983. The author gratefully acknowledges support of this research by a grant to the Center for Research on the Influences of Television on Children (CRITC) and by a NICHHD training grant (IT32HD0173-01) to the University of Kansas. Requests for reprints should be directed to Dr. Sandra L. Calvert, Family Research Center, Department of Child Development and Family Relations, University of North Carolina at Greensboro, North Carolina 27412.

For a number of years, I have been extremely interested in the effects of technology on children's information processing skills. In particular, media such as television provide visual and verbal symbol systems which parallel iconic and symbolic modes which children can use to represent content. The purpose of this study was to examine ways that televised information can be organized and presented to maximize children's learning of significant content.

That children have difficulty in recalling the central, plot-relevant information from a television program has been widely documented, particularly by Andrew Collins and his colleagues (Collins, 1970; 1975). In 1978, Collins, Wellman, Keniston, and Westby targeted three viewer skills which are essential for mature comprehension: 1) a viewer must select the central content of a program while ignoring the incidental, peripheral content; 2) a viewer must organize this content into a scheme; and 3) a viewer must make inferences about character feelings and motivations which go beyond the information explicitly presented.

Interestingly, my insight into this problem came while I was watching the Super Bowl Game a few years ago. As I watched slow motion "replays" of important football plays, it occurred to me that such rehearsal might benefit young children's comprehension. Of course, replays go backwards instead of forwards because the game is in progress. Programs which already have an outcome do not have this limitation. In fact, if you show children critical events before they occur, a prior structure may be created to incorporate the coming story events. The research in the area of memory schemas (Mandler & Johnson, 1979) and advance organizers (Ausubel, 1968) suggested such a facilitative effect. By presenting critical story content before a program, the viewer might be aided in selecting central information--an activity that

Collins et al. (1978) targeted as a prerequisite skill for understanding television content. For these reasons, I decided to structure information before rather than after significant televised content and coined the word "preplay."

The second viewer skill which Collins et al. (1978) stated as necessary for comprehension was linking important events into a scheme. Thus, in the preplay, important televised events were extracted and placed in temporal proximity, thereby increasing the probability that children might perceive those events as related. Verbal labeling supplied the third viewer activity of supplying the inferences which are necessary for children to understand story messages.

The purpose, then, was to assess developmental differences in children's visual attention to, and comprehension of, a prosocial television program as a function of varying preplay formats. Preplays were advance organizers designed to help a child select, order, and integrate critical televised content into a memory scheme. To present the preplay format, I created a fantasy character, Madame Sees-All-Knows-All, a gypsy who could see the future cartoon events through her crystal ball. She replaced Bill Cosby as narrator in an episode of Fat Albert and the Cosby Kids which was about divorce, and she was inserted before three story sections.

In order to determine which features were most effective as aids to comprehension, preplays varied on two orthogonal dimensions: presence or absence of visual portrayal of story events and concrete or inferential story narration. Visual preplays were expected to improve temporal integration, encoding, and retrieval of story events because a visual, structural overview was provided, which may be a developmentally appropriate mode for young children to represent content. Inferential narration in preplays was expected to improve

comprehension of implicit content, while concrete narration was expected to improve comprehension of central-concrete content. Three sets of relationships were examined:

1) Developmental differences in visual attention to the preplays and program segments;
2) Developmental differences in story comprehension as a function of preplay features; and
3) The relation between visual attention to preplays and comprehension of story content.

METHOD

Participants

Subjects were 160 children equally distributed by sex in grades one through four. Pairs of children were taken from their classrooms to a mobile laboratory where they were seated opposite one another at a table. Across the room from them was a television monitor under a one-way mirror. On the table were play materials including small toys, comic books, and drawing supplies. Children were told that they could read, play, and watch television as they did at home. An experimenter then activated a videotape recorder which played an edited, color version of "Fat Albert and the Cosby Kids".

Treatments

Children were randomly assigned within age and sex groups to one of five treatments. For all five, the cartoon plot was retained, but verbal summaries by Bill Cosby and commercials were deleted. For the four experimental treatments, narrated "preplays" of central story information were inserted before each of the three program sections. Four different preplays represented the factorial combinations of presence vs. absence of visual portrayals and concrete vs. inferential narration. The control stimulus contained no experimental additions.

Attention

Visual attention was scored "on" when a child looked at the television screen and "off" when a child looked away. Two observers seated behind a one-way mirror continuously scored attention with a Datamyte electronic recorder. Each recorded one child's visual orientation. Interobserver reliability was 97%.

Comprehension

After viewing, each child accompanied an experimenter to separate rooms where each child completed two types of comprehension items: picture sequencing and multiple choice. First, the child sequenced four sets of six photographs taken from the television program to assess temporal integration of the plot line. The first picture set represented central visual events from the entire program. Each of the remaining three picture sets represented one of the program sections summarized by the three preplays.

Each child then answered 42 multiple-choice items which assessed recognition of implicit, central-concrete, and incidental program content. Central questions involved either concretely presented facts or inferences about character feelings and motives whereas incidental questions all concerned concrete information that was peripheral to the plot. Each of the 42 multiple-choice questions consisted of a picture, a question, and two response options presented in verbal and visual form or verbal form only. There were 13 implicit items, 8 central-concrete items, and 21 incidental items.

RESULTS

Analysis of variance was conducted for dependent measures with condition, grade, and sex as between-subjects independent variables. Pairs was the unit of analysis for all effects. The four treatment conditions were

analyzed in a factorial design to compare the effects of visual and narrative variations in preplay format. Then all five conditions, including the control group, were compared to assess the effects of presence or absence of preplays. Finally, regression analyses were calculated using attention to preplays as predictors of comprehension measures.

Duration of attention scores, the percent of time each child looked at the television screen, was computed separately for the three preplays and the three program segments, respectively, and these scores, in turn, became a repeated measures factor in the analysis. For comprehension, a picture sequence score was calculated for each child by computing a rank-order correlation between a child's picture order and the correct order. The three scores which reflected temporal integration of the three program sections became a repeated measures factor while the score reflecting integration across the entire program was analyzed separately. For multiple-choice scores, the correct raw number was computed and analyzed separately for recognition of implicit, central-concrete, and incidental content.

The results are organized around the independent variables, and I will highlight the major findings. The effects of visual presentation were very straightforward. Children attended longer to visual than nonvisual preplays, F (1,32) = 11.89, $p < .01$. Moreover, children who saw visual preplays sequenced more picture sets correctly than did those who saw nonvisual preplays, $F(1,32) = 4.86$, $p < .05$. As you can see in Table 1 of your handout, boys who saw visual preplays sequenced more pictures across the entire program than did boys who saw nonvisual preplays while girls did equally well in both visual and nonvisual conditions, F (1,32) = 4.64, $p < .05$. Finally, visual attention to preplays predicted comprehension of visually presented information.

More specifically, visual attention to each of the three respective preplays predicted comprehension of the three related picture sequencing sets.

The effects of narrative presentation were more complex. As you can see in Figure 1 of your handout, with increasing grade there was a developmental shift from an attentional preference for preplays with concrete narration to preplays with inferential narration, F (6,64) = 3.53, $p < .01$. Note especially the fourth graders who are very different in their attentional preference for inferential narration as compared to the other three grades. Moreover, patterns of attention established during preplays were very similar to patterns of attention to the program segments. As seen in Figure 2, a decline in attention to program segments occurred when preplays with inferential narration were presented nonvisually, but when inferential narration in preplays was presented with visual character actions, high attentional interest was maintained across the program segments, F (12,64) = 7.25, $p < .001$. Another striking aspect of Figure 2 is the high levels of attention paid to the program by the control group. This suggests deleting all narration and commercial interruption may also facilitate children's attention, and this condition might be different than viewing the original program with interruptions.

As predicted, children in inferential narrative conditions recognized more implicit program content than did those in concrete narrative conditions, F (1,32) = 4.88, $p < .05$. For picture sequencing across the entire program, there was another sex interaction, F (1,32) = 4.39, $p < .05$. See Table 1. Boys in concrete narrative conditions sequenced more pictures correctly than did boys in inferential conditions while girls did equally well in both concrete and inferential conditions. Finally, visual attention did <u>not</u> predict comprehension of verbally presented information as indexed by the implicit and central-concrete multiple-choice items.

DISCUSSION

Differences in children's visual attention to, and comprehension of, a pro-social television program were found as a function of varying preplay formats. Visual preplays were most attention-worthy, and that attention, in turn, facilitated temporal integration of targeted visual information. These findings suggest that the visual action in preplays facilitated a visual iconic mode of representation, thereby aiding comprehension of visually presented information. Moreover, the concrete representational system provided by visuals benefited children from grades one through four.

Developmental difference were found in children's attentional patterns as a function of narration. The comprehensibility hypothesis, developed by Daniel Anderson and his colleagues, (Anderson, Lorch, Field & Sanders, 1981; Lorch, Anderson & Levin, 1979) seems most applicable as an explanation for these differences. Using the comprehensibility hypothesis, one would predict that those children who can understand inferential narration will attend to it, and in this study, those children are clearly fourth graders. The inferential narration stimulated fourth graders interest to the preplays and to the actual program. However, one must remember the importance of visual presentation with inferential narration as a means to emphasize and accentuate those abstract, verbal messages. The most straightforward effect of the inferential narration was a direct positive effect on children's comprehension of implicit story content.

In conclusion, this study suggests a developmental shift in children's ability to understand and encode inferential narration which is an abstract, symbolic form of representation. The visuals, a concrete representational system, remain interesting, attention-worthy, and provide an iconic mode to

represent visually presented information for children in grades one through four. In addition, the concrete emphasis of visual presentation seems to supplement and support processing of the more abstract forms of language. Production techniques such as preplays can improve children's information processing skills, but effectiveness, of course, depends on children's underlying cognitive skills.

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Preplays were inserted before three sections of a televised story to improve attention and comprehension by providing an overall structure for selecting and integrating important story events. Preplays varied on two orthogonal dimensions: 1) presence or absence of visual cues and 2) concrete or inferential story narration. A control group saw no preplays. In same-sex pairs, 160 first through fourth graders viewed an animated TV story with or without preplays. Each child's visual attention to the television screen was recorded continuously. After viewing, children ordered 4 picture sets and then answered 42 multiple-choice items assessing recognition of inferential central-concrete, and incidental content. Visual preplays facilitated attention which, in turn, predicted comprehension of visually presented information. Older children attended longer to inferential preplays and performed better on the implicit comprehension task while younger children attended longer to concrete preplays. The inferential narration was most effective in facilitating comprehension. Producers of children's television programs can utilize preplays to improve comprehension, but effectiveness, of course, remains limited by children's underlying cognitive skills.

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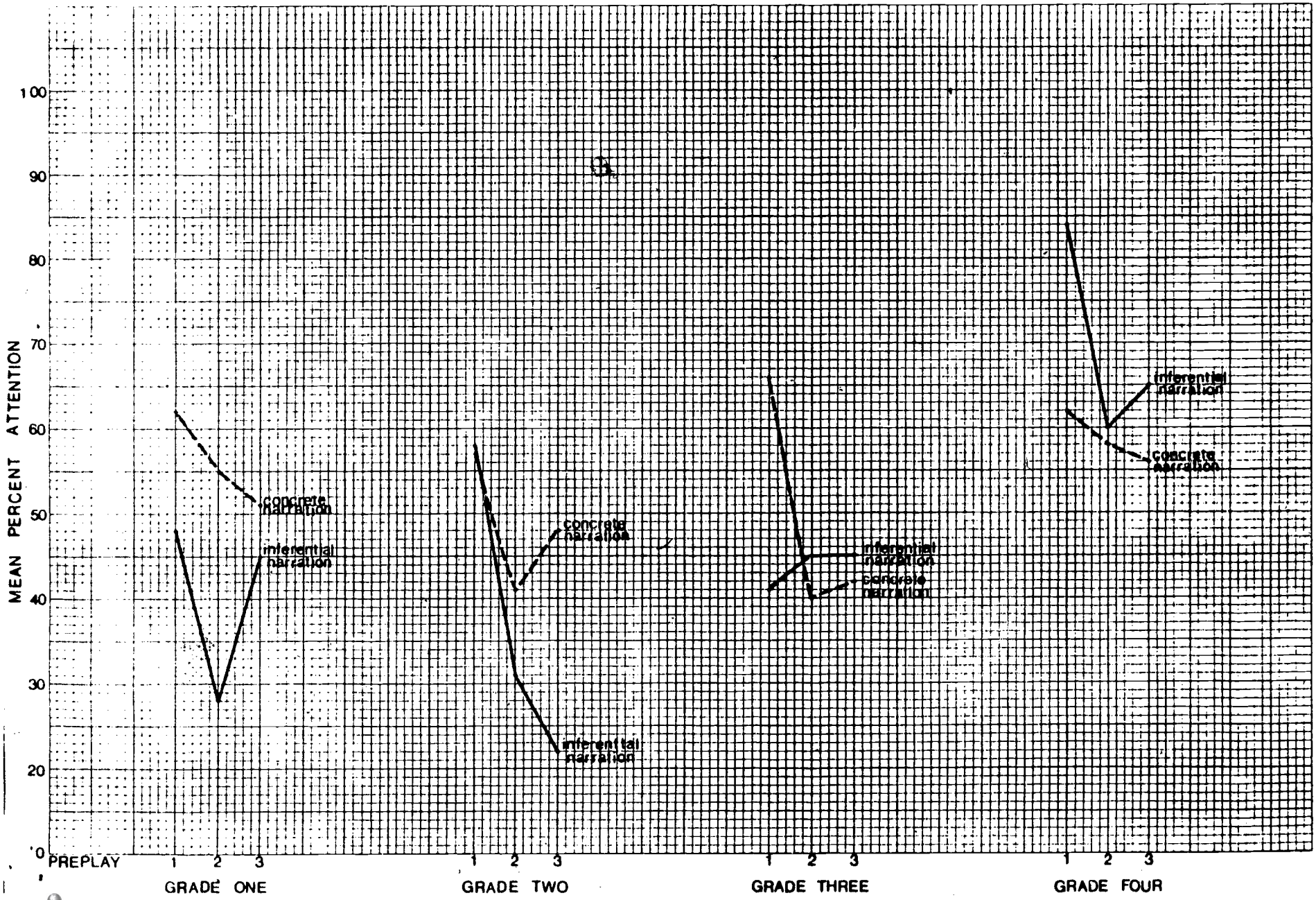
Table 1. Comprehension: Picture sequence scores across whole program.

Visual Presentation	Boys	Girls	Both Sexes
Concrete	18.00	16.75	17.38
Inferential	17.00	18.31	17.66
Combined	17.50	17.53	17.52
Nonvisual Presentation			
Concrete	16.75	18.13	17.44
Inferential	14.31	17.75	16.03
Combined	15.53	17.94	16.74
Combined (V & NV)			
Concrete	17.38	17.44	17.41
Inferential	15.66	18.03	16.85
Combined	16.52	17.74	17.13
Control	17.69	15.25	16.47

Figure 1. MEAN PERCENT ATTENTION to PREPLAYS as a function of VERBAL NARRATION and GRADE



MEAN PERCENT ATTENTION to PROGRAM SEGMENTS as a function of VERBAL NARRATION and VISUAL PRESENTATION Figure 2.