

# Effects of Viewing the Television Program *Between the Lions* on the Emergent Literacy Skills of Young Children

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Does viewing *Between the Lions*, an educational television series featuring literacy instruction, improve the emergent literacy skills of kindergarten and first-grade children? Do improvements vary as a function of the child's initial reading risk status? In this study, higher word recognition and standardized reading test scores were noted for all viewers compared with nonviewers. In addition, significantly higher means and accelerated slopes for phonemic awareness and letter–sound tasks were found for viewers compared with nonviewers. Even so, improvements in literacy skills (i.e., speech to print, word building, concepts of print) varied, mostly favoring moderately at-risk to not-at-risk kindergarten children who viewed the program. Kindergarten children at great risk and first graders did not benefit as much from the program.

One of the most compelling findings from recent evaluations of reading research is that children who have an inadequate start in reading rarely catch up (National Reading Panel, 2000; National Research Council, 1998). For example, in Juel (1988), 88% of children identified as poor readers at the end of first grade were still identified as poor readers at the end of the fourth grade. Reading trajectories are established early and are difficult to change. Johnson and Allington (1991) observed that “remedial reading is generally not very effective in making children more literate” (p. 1001). Therefore, eliminating the need for remedial reading in the first place may be the most sensible alternative. Finding ways that all children can bolster their early literacy experiences, sustain those gains, and become successful, fluent readers is an important challenge that demands attention.

Whitehurst and Lonigan (1998, 2001) proposed that adequate early reading instruction includes opportunities for children to acquire knowledge of two interdependent domains of information.

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First, children need sources of information that directly support their understanding of the meaning of print (i.e., outside-in processes: vocabulary knowledge, conceptual knowledge, story schemas, comprehension). Children also need to be able to translate print into sounds and sounds into print (i.e., inside-out: phonemic awareness, letter–sound correspondence). Recent intervention research designed to provide young children with the necessary early literacy skills to succeed in school has reported that changes in preschool emergent literacy environments (see, e.g., Neuman & Roskos, 1997) and teacher-directed (see, e.g., O'Connor, 2000; O'Connor, Jenkins, & Slocum, 1995), parent-led (Whitehurst & Lonigan, 1998), and peer-mediated strategies (Mathes, Howard, Allen, & Fuchs, 1998) help children acquire these skills. However, the ability to widely implement such programs will be difficult and costly, and, as a result, the scale of impact on the nation's population of young children learning to read may be slow and small.

Building on their success teaching preschoolers school readiness skills via television (i.e., *Sesame Street*), the producers of a new television program for young children, in collaboration with leading reading experts, created a program that incorporated both outside-in and inside-out emergent literacy processes (Strickland & Rath, 2000). Their goal was to reach all segments of society, especially children who might have little or no access to print resources or few informal literacy opportunities in their homes. The pervasiveness of television (e.g., over 99% of U.S. homes have a television set; *Statistical Abstracts*, 2000) offers a powerful way to address the literacy needs of children who have “low redundancy of educational opportunity” (Mielke, 1994, p. 126).

## Models of Learning From Television

The process of acquiring new information from television is complex, involving attention to and subsequent comprehension of program stimuli. When children interact with television, they integrate the various stimuli into meaningful, comprehensible bits of information by attending to important or interesting aspects of

the stimuli (Huston & Wright, 1989). Although a great deal of knowledge about young children has been gained from past research on traditional print and television, the obvious step of merging print and television to enhance early literacy development is a more recent phenomenon (Linebarger, 2001). Models from the television literature provide the most useful framework for developing testable hypotheses about how print on screen might affect children's attention and learning through television.

Huston, Wright, and their colleagues (Huston & Wright, 1983; Rice, Huston, & Wright, 1982) proposed a model of attention to television where perceptually salient features of the stimulus initially draw a child's attention to the screen. When a child has little experience with television, sounds and unusual visual effects trigger the basic orienting mechanisms of the perceptual system (Miron, Bryant, & Zillman, 2001). These salient features or formal features provide structure and give meaning to the sensory images contained in the programs (Calvert, Huston, Watkins, & Wright, 1982; Campbell, Huston, & Wright, 1987). Comprehension is then improved when formal features are used to denote key moments and critical content for young children's focal attention.

Huston and Wright (1989; Rice et al., 1982) further elaborated this model of attention (see Figure 1). At various points while viewing a program, children make a series of attentional decisions. These decisions are based on cues of perceptual salience, comprehensibility of the program, and interpretability of the content. This model also predicts that attention is a joint function of the stimulus

features, both form and content, and the dispositions of the viewer, including experience with the material, experience with the medium, and general world knowledge. Interest and attention are a function of the stimulus characteristics. A stimulus perceived as "moderately novel, of intermediate complexity, integratable, somewhat regular, partially ordered, and recognizable" (Huston & Wright, 1989, p. 117) should elicit the greatest amounts of interest and attention. When the stimulus characteristics no longer arouse interest or attention because of familiarization and habituation (i.e., familiar, simple, holistic, redundant, repetitive, and expected), children no longer attend to them. Likewise, if the stimulus characteristics fall at the incomprehensible end of these continua (i.e., novel, complex, incongruous, inconsistent, unpredictable, and surprising), children do not attend because the stimulus is immediately perceived as incomprehensible. High-end stimuli become more familiar and hence more comprehensible with repetition and thus gain attention, whereas the low-end stimuli undergo further habituation with repetition and thus lose attention. The resultant of these two kinds of changes over time is that the high points of interest and attention slowly migrate toward the higher end. With age and viewing experience, the child's focus continually moves toward more cognitively challenging stimuli; hence, the stimuli that are initially incomprehensible "gradually move toward and through the child's focal lens of maximum interest, and then lose attention as they are habituated and become old hat" (Huston & Wright, 1989, p. 118).

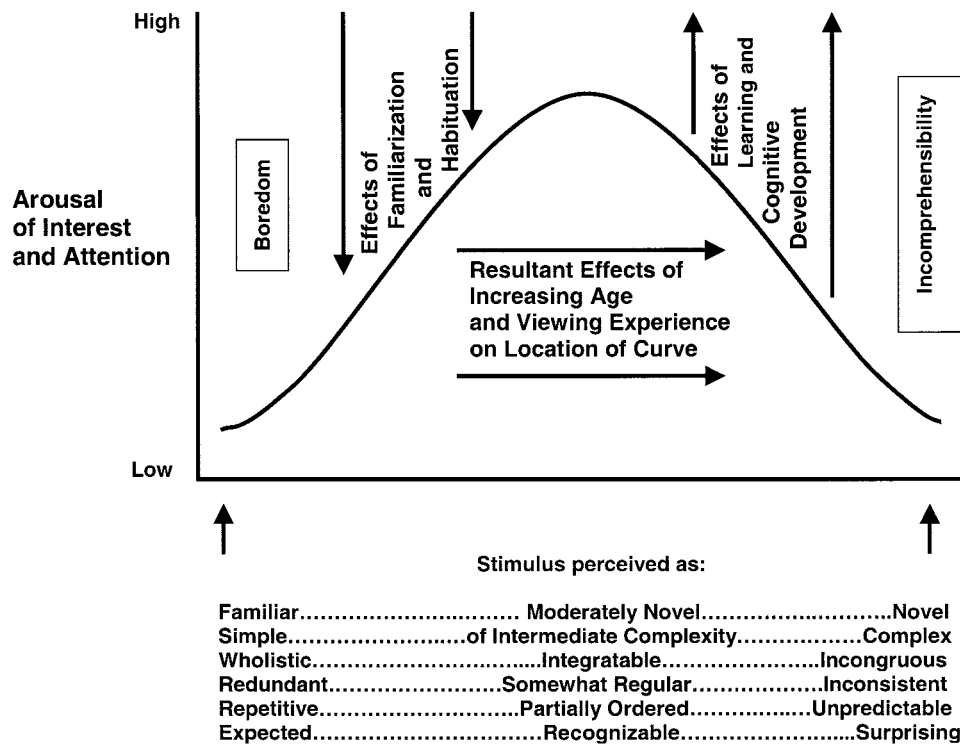


Figure 1. Traveling lens model. Reprinted from "The Forms and Codes of Television: Effects of Children's Attention, Comprehension, and Social Behavior," by M. L. Rice, A. C. Huston, and J. C. Wright, p. 32, in *Television and Behavior: Ten Years of Scientific Progress and Implications for the Eighties*, edited by D. Pearl, L. Bouthilet, and J. Lazar, 1982, Washington, DC: U.S. Government Printing Office. In the public domain.

Wright (2001) introduced an adjunct theoretical approach where the

influence of an early condition, intervention, or other basis for predicting diverging individual differences over time will be greater if it produces differences opposite in direction from the developmental changes expected normatively for that outcome. Conversely, if the antecedent produces differences favoring the developmental direction that is normatively expected, its effects will be attenuated, and harder to detect. (Wright, 2001, p. 1)

For instance, in the literature for television viewing and aggression, interventions that would make boys less aggressive and more prosocial (e.g., educational television) or that would make girls less prosocial or more aggressive (e.g., violent television) would be easier to detect than would an intervention that moves the child in a direction he or she is already progressing toward developmentally.

### Application to Literacy

These two theoretical models of learning from television suggest that children with little print experience and, subsequently, poor reading skills may find print overly challenging and not attend to it, whereas children who are fluent readers may ignore print because they have habituated to it. When the curricular content of the program falls into the children's focus because it is appropriately interesting and cognitively challenging (i.e., as described in Figure 1) it would be predicted that this group of children would benefit most from the content. Therefore, those children who are most at risk because they have no or very little familiarity with print are not able to benefit initially from exposure to it via television. Only through repeated exposure (either on or off television, or both) would the print stimuli become accessible for these children. Similarly, children who are fluent readers also might not benefit from print exposure because they already have these skills in their repertoire and are progressing along a positive reading trajectory. The group in the middle, emerging readers who are not yet fluent but do have modest levels of print exposure and reading skill would then be the group evidencing the greatest gains in reading skill development because print is within their traveling lens; however, they may still need significant instruction to attain reading fluency.

Most of the work supporting these models to date has been about comprehension of television content and not about acquisition of literacy skills or the application of reading risk status to learning associated with viewing television. In addition, descriptions of the children's home media environments and subsequent relations to literacy skill acquisition are a new facet of what is known in the literature. Thus, the purposes of this article are to describe the home media environments of young children, to determine whether watching an educational television series featuring literacy content for young children could improve these children's emergent literacy skills, and to examine whether home media environments and emergent literacy skill improvements varied as a function of reading risk status.

## Method

### Participants

Participants were 79 children in kindergarten (mean age = 6.02 years; 41 boys, 38 girls) and 85 children in first grade (mean age = 7.10 years; 41 boys, 44 girls). These children were recruited from 12 classrooms in three elementary schools in the greater Kansas City metropolitan area. Children with parental consent participated in the assessments and viewing sessions at their schools (approximately 75% of all children who were invited to participate). Eighty-one percent of the children were European American, 7% were Hispanic, 6% were African American, and 6% were from other backgrounds. Thirty-six percent of the families reported incomes below \$30,000, 28% reported incomes between \$30,000 and \$45,000, and 36% reported incomes above \$45,000. Eight percent of the children had an identified disability.

### Stimuli

Seventeen episodes from the first season of a new television series, *Between the Lions (BTL)*; Frith, 2000), were used. This series was created with the intent of teaching young children important emergent literacy skills. Emergent literacy consists of the skills, knowledge, and attitudes that are presumed to be "developmental precursors to conventional forms of reading and writing and the environments that support these developments" (Whitehurst & Lonigan, 1998, p. 849). *BTL* presents children with an environment, or set of experiences, designed to foster emergent literacy. These experiences focus on both holistic processes (e.g., understanding different reading and writing contexts, prior knowledge, motivation) and direct instruction comprising visual and auditory stimuli (e.g., print on screen with changing initial or final consonants) that have been specifically designed to teach concepts of print, the alphabetic principle, phonemic awareness, and letter-sound correspondences. Both types of experiences are essential to emergent literacy and, later, fluent reading (Whitehurst & Lonigan, 1998).

### Design

A 2 (viewing vs. control group)  $\times$  2 (kindergarten vs. first grade)  $\times$  3 (at risk, moderately at risk, not at risk) design with repeated measures on all literacy outcomes measures (see below) was used. All children whose parents returned consent forms in 12 kindergarten and first-grade rooms were included in the sample. Random assignment to control or viewing groups was completed using classroom stratified within grade levels. Given existing classroom structures and teacher preferences, random assignment by individual student was not possible.

### Measures

The measurement model in this investigation included (a) demographic information, (b) parent reports of child's ability and interest in print and media access and use, and (c) direct assessment of key emergent literacy skills (i.e., concepts of print, phonemic awareness, and letter-sound correspondence). To tease out the impacts of the television program on children's emergent literacy skills acquisition, we used a three-tiered approach to direct assessment of key emergent literacy skills: specific program content featured in the episodes, transfer of that content to performance on tests measuring growth in emergent literacy, and normative growth using a standardized test of early reading achievement.

*Demographic information.* Information was collected from parents regarding the child's sex, birth date, race, and disability status; parent's education; and family income.

*Parent reports.* Parents were asked to report their child's reading ability and interest, including their child's knowledge of letter sounds (i.e.,

knows all, knows some, knows very few or none), reading ability (i.e., reads books, simple sentences, some words, not reading yet), and enjoyment of reading (i.e., a lot, a little, not at all). Parents also reported whether they received newspapers and magazines regularly, whether they had a dictionary in the home, whether their child had more than 25 books available, and whether they had a computer and cable television. Parents reported the frequency with which their child watched television; read books on his or her own; was read to by the parent; looked at magazines; wrote stories, letters, or notes; and used computers and videogames. Finally, parents also reported the number of books the child had.

**Specific program content assessment.** Direct learning of program content was measured through five different researcher-developed subtests (speech to print matching, word recognition, concepts of print, word meaning, and word building) administered prior to and following the viewing. *Speech to print matching* measured children's phonemic awareness and ability to discriminate initial consonants, final consonants, vowels, and blends. Children were shown cards with three words printed on them and asked to point to the word that the examiner said. *Word recognition* measured the child's ability to accurately read aloud different types of words. Children were asked to read from four lists containing 73 different words taught in the 17 *BTL* programs. These words ranged from common sight words (e.g., *the, of, in, and, is, you, that*), to consonant-vowel-consonant words (e.g., *pop, ram, hug, cap, ten*), to long words (e.g., *butterfly, helicopter, unzipped, restaurant*) and other difficult words (e.g., *antlers, chapter, criminal*). *Concepts of print* were adapted from Clay's (1972) Concepts of Print using stimulus materials taken from the *BTL* program. A screen shot of the opening and of the first four lines of the recurring segment featuring Chicken Jane, Scot, and Dot (using the same font) was shown to the child accompanied by a series of questions including where to begin reading, where to end, word-by-word pointing, identifying two words that were the same, identifying specific words, finding words that rhyme, finding words that began with s or ended with k, pointing to an exclamation point and describing what an exclamation point means, and reading the 18 words from the introduction. *Word building* measured the child's ability to identify and use the word family strategy. Children were given small squares with a letter or two letters printed on them and were asked to identify sounds and put the parts together to form words. The sounds included /s/, /ch/, /u/, /i/, and /o/. Words included *hop, chop, sun, bun, sits, chops, hits, bunch, and hitch*. *Word meaning* measured the child's knowledge of the meanings of new words, an important factor in reading comprehension and subsequent academic success. Children were asked to tell the examiner what they thought a particular word meant. All words were taken from program episodes. Words included *hen, jig, ox, yam, ram, cub, antlers, clam, humongous, and survival manual*. Staff then coded words using a 3-point scale: 0 = *child did not respond or did not know*; 1 = *child gave a limited definition*; 2 = *completely correct answer*. Two raters independently coded 20% of the cases ( $n = 32$ ), and percentage agreement was calculated by taking the total number of agreements for ratings (i.e., 317 out of 320) and dividing by the total number of agreements plus disagreements (i.e., 323). Percentage agreement using this method was 98%.

**Individual reading skills.** The Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessment tool (Good & Kaminski, 2000; Kaminski & Good, 1996), comprising three individually administered and timed subtests (letter naming [LN], phonemic segmentation fluency [PSF], and nonsense word fluency [NWF]), was administered to track acceleration in rates of growth associated with particular early literacy skills as well as mean differences at the posttest assessment. These tasks were administered three times: prior to the viewing, after viewing eight episodes, and after viewing all episodes. Children were given a set of instructions and a practice item and then were asked to do as much of the particular subtest as they could for 1 min. Each subtest had 20 equivalent forms available.

LN measured a child's ability to rapidly name both upper- and lowercase letters. Children were given a sheet of paper with upper- and lowercase letters printed in rows across the page and were asked to name as many as they could in 1 min. PSF measured a child's awareness of and ability to manipulate the phonological components in words. Children were given a word and then asked to name all the sounds in that word. Credit was based on the number of sounds children were able to name. For example, if the examiner said, "Sled," and the child said, "/s/ /e/ /d/," the child would receive 2 points, or if the child said, "/s/ /l/ /e/ /d/," he or she would receive 4 points. Ability to attain 35 or more segments per minute by spring of kindergarten has been set as the benchmark indicating where reading instruction is maximally effective, whereas segmenting fewer than 10 phonemes is predictive of needing intensive instructional support. NWF consisted of made-up words that follow the rules of English syllable structures (i.e., phonotactics) and orthography. In every language there are restrictions about the patterning of phonemes (or sound combinations) in words. This subtest measured the child's knowledge of English syllable structures, or the alphabetic principle. To complete the task, children need to (a) understand that letters correspond to sounds that, in turn, are blended together to form words and (b) blend them together in a confident manner to obtain a high score on the measure. Achieving 50 letter-sound correspondences by winter of first grade has been set as the benchmark for prediction of successful later reading achievement, whereas reading fewer than 30 letter sounds per minute is predictive of poor reading outcomes in third grade (Good, Simmons, & Kame'enui, 2001). Children were given a sheet of paper with nonsense words printed across the page and were instructed to read or say as many of the sounds as they could in 1 min. The examiner gave credit for any correctly said sounds. For example, a child would see *rij*, say, "/r/ /i/ /j/," and receive 3 points, or say, "/r/," and receive 1 point.

**Normative early reading abilities.** The Test of Early Reading Ability-2 (TERA-2), an individually administered, standardized test (Reid, Hresko, & Hammill, 1989), measured the child's ability to construct meaning from print, the child's knowledge of the alphabet and its functions, and the child's knowledge of print conventions and was included to examine normative growth in early reading ability. Items included reading upper- and lowercase letters, identifying errors in sentence structure or punctuation, reading left to right, and so on. The manual reported adequate psychometric information. Coefficient alphas ranged from .89 to .94 (the criterion for acceptable reliability is .80). Test-retest using alternate forms (i.e., a measure of the test's stability over time) was .89, again well above the criterion of .80. Validity estimates were calculated by correlating the TERA-2 with another standardized measure, the Basic School Skills Inventory—Diagnostic (Hammill & Leigh, 1983), Reading subtest. Significant correlations were obtained, ranging from .52 to .61,  $p < .05$ .

## Procedure

After parental consent was received, children were pretested using the researcher-developed and standardized instruments described above. Once all pretesting was completed and parent questionnaires returned, children assigned to the viewing group watched 17 half-hour episodes of *BTL*, one each day the children were in school from the end of February 2000 to the beginning of April 2000 (there were days off for spring breaks and other district-scheduled vacation days during this time). The viewing group watched the program in their classrooms at the same time each day, generally in the afternoon during their computer free time. Children in the control group maintained their usual schedule during the viewing phase. Teachers were instructed not to discuss any elements of the program prior to, during, or after viewing the episodes. After the viewing group finished viewing 8 episodes, children in both groups were tested using the DIBELS measures. Once all episodes had been viewed, both groups of children were again tested with the same set of measures administered during the pretest.

We used initial reading ability, identified by scores on pretest DIBELS assessments, as a marker of the child's reading risk status. This score was used to form three categories (at risk for poor reading outcomes in third grade, moderately at risk, and not at risk for reading difficulties in third grade) using national benchmarks empirically established by the creators of DIBELS (Good et al., 2001). At-risk performers were those not making satisfactory progress toward learning to read at the start of the investigation. On the basis of benchmarks for children this age, these children were in need of intensive instructional support if they were to achieve desired reading outcomes in third grade. Those whose scores reached the established benchmark were considered not at risk. According to Good et al. (2001), parents and teachers could be confident that these children were making adequate progress toward reading outcomes. The group of children who were moderately at risk had not achieved the benchmark indicating adequate reading progress, yet they were not below the at-risk benchmark. No clear prediction was available for these students; however, these children may have been moving off track in their reading development (Good et al., 2001).

For kindergarten children, phonemic awareness measured by the PSF was used to assign children to a reading risk category. PSF scores for the at-risk group were fewer than 10 phonemes per minute; scores for the moderately at-risk group were 10 to 35 phonemes; and scores for the not-at-risk group were 35 or more phonemes. Risk categorization of the first-grade children was based on initial letter-sound correspondence skills as measured by NWF. Children reading fewer than 30 NWF letter sounds per minute were considered at risk for reading difficulties in third grade, children reading between 30 and 50 letter sounds per minute were considered moderately at risk, and children reading 50 or more letter sounds per minute were not considered at risk (Good et al., 2001).

### Analytical Approach

Because assignment to control and viewing groups was based on a stratified sampling strategy and to be sure that effects of the viewing were the ones reflected in the outcome measures, controls for what the child already knew or did at the pretest were necessary. Next, it was important to separate the cumulative contributions of family characteristics from those associated with the viewing. To that end, two additional controls, parent's level of attained education and home print environment, were included as an index of the family contribution to the child's outcome scores. Home print environment was a composite formed from 11 variables including desire/frequency of print activities (how much does your child like reading? how often does he or she look at books alone? with a parent? write letters, notes, and stories? parent read to child? use computers?), ability to read (can child read? what can your child read? knows what sounds and letters?), and access to print (how many books does your child have?). Finally, because we randomly assigned at the classroom level, we included a control for the classroom's overall level of risk. This index of the contextual environment that the groups of children were learning in helped to provide a stronger control for selection bias (Boyle & Willms, 2001), although it did not rule it out altogether. Exploratory analyses of all outcomes indicated no sex differences; therefore, sex was dropped from further analysis.

Analyses of the effects of risk and viewing were completed using analysis of covariance (ANCOVA) and hierarchical linear modeling (HLM) strategies. ANCOVA was used with pre- and posttest measures to statistically control for initial group differences (as measured by the pretest and control variables). Posttest grouping factors in the ANCOVA included viewing (yes, no), grade (kindergarten, first grade), and risk status (at risk, moderate, not at risk). Multiple planned comparisons were conducted to examine the simple main effects of viewing within each level of risk. Corrections for experimentwise error were performed using modified Bonferroni adjustments of the alpha level (i.e., reducing Type I error rates or

finding a significant difference when one does not exist; Jaccard, 1998). To estimate the practical significance of the outcomes, we computed effect sizes (i.e.,  $\eta^2$ , percentage variance accounted for; Cohen, 1988).

HLM (Bryk & Raudenbush, 1992; Raudenbush, Bryk, Cheong, & Congdon, 2001) was used to examine growth in key early literacy skills over time. HLM-Level 1 analyses were used to compute slope (rate of growth) and intercept parameter values as a function of individual differences and person-specific growth. HLM-Level 2 analyses were used to examine whether individual differences varied across groups as a function of viewing (no viewing = 0; viewing = 1), grade level (kindergarten = 0; first grade = 1), and reading risk status (at risk = -1, moderate risk = 0, not at risk = 1). Parent's education, home print environment, and overall classroom risk, centered on the grand mean, were also included as control variables. The intercept means in this study were centered at the posttest to evaluate the cumulative endpoint effects of the intervention on the viewing and control groups (i.e., the intercept reflects the final status as opposed to the children's initial status on the outcome variables). Thus, this analytic strategy paralleled the ANCOVA procedures.

As a check on the initial comparability of the two groups, separate comparisons across all demographic characteristics and pretest assessments were completed by individuals and classrooms. Significant differences emerged only on the program-specific task word meanings, and no differences were found at the posttest on this measure; all remaining measures and demographics did not differ across the groups. Descriptive analyses of parent reports are described first, followed by child outcomes.

## Results

### *How Did Parents Describe Their Children's Reading and the Home Media Environment?*

*Child's ability and interest in print.* We calculated 2 (viewing)  $\times$  2 (grade)  $\times$  3 (reading risk status) ANCOVAs on children's knowledge of letter sounds, ability to read, and enjoyment of reading (see Table 1). First graders and not-at-risk children outperformed kindergarteners and at-risk children, respectively, on knowledge of letter sounds and reading ability. Children who were not at risk enjoyed reading more than at-risk children.

*Child's media access.* To evaluate yes-no answers to types of media available in the home according to risk level, we used chi-square analyses. Significant differences were found for computers in the home (more not-at-risk parents had computers than moderately at-risk or at-risk families; 71% vs. 69% vs. 56%, respectively). No significant differences were noted for availability of newspapers (57% vs. 44% vs. 35%), magazines (68% vs. 56% vs. 48%), a dictionary (91% vs. 91% vs. 92%), or cable TV (75% vs. 72% vs. 78%).

*Child's media use.* We calculated 2 (viewing)  $\times$  2 (grade)  $\times$  3 (reading risk status) ANCOVAs on number of hours of television viewed per week, number of books available, frequency of print use (a composite of frequency of looking at books alone and of parent reading to child), frequency of print use suggestion (child asking to be read to and parent suggesting child read a book), frequency of writing, frequency of going to the library or bookstore, frequency of computer use, and frequency of videogame use (see Table 1). At-risk and moderately at-risk children watched more hours of television per week than not-at-risk children. Not-at-risk children had more books and were reading and being read to more than at-risk and moderately at-risk children; however, not-at-risk first graders who did not view were more likely to read

Table 1  
*Pretest Adjusted Means, Standard Errors, and ANCOVAs for Effects of Risk Status and Grade on Print Ability and Interest*

| Outcome                    | At risk  |           | Moderate risk |           | Not at risk |           | ANCOVA <i>F</i> |
|----------------------------|----------|-----------|---------------|-----------|-------------|-----------|-----------------|
|                            | <i>M</i> | <i>SE</i> | <i>M</i>      | <i>SE</i> | <i>M</i>    | <i>SE</i> |                 |
| Letter sounds              | 2.39     | 0.07      | 2.72          | 0.07      | 2.81        | 0.06      | 11.70***        |
| Reading enjoyment          | 2.52     | 0.06      | 2.80          | 0.06      | 2.90        | 0.06      | 10.61***        |
| Reading ability            |          |           |               |           |             |           |                 |
| Kindergarten               | 1.69     | 0.16      | 2.15          | 0.15      | 3.10        | 0.14      | 4.19*           |
| First grade                | 3.22     | 0.14      | 3.60          | 0.14      | 3.87        | 0.14      |                 |
| Hours of TV/week           | 20.65    | 1.54      | 20.84         | 1.55      | 15.98       | 1.51      | 3.18*           |
| Number of books            | 4.47     | 0.09      | 4.71          | 0.09      | 4.83        | 0.09      | 4.32*           |
| Print use                  | 10.68    | 0.26      | 10.41         | 0.26      | 11.23       | 0.25      | 8.79*           |
| Print suggestion           | 10.09    | 0.36      | 9.26          | 0.35      | 10.54       | 0.33      | 21.05*          |
| Writing                    | 5.00     | 0.26      | 4.49          | 0.26      | 5.04        | 0.25      | 1.44            |
| Trips to library/bookstore | 2.62     | 0.16      | 2.69          | 0.16      | 2.85        | 0.15      | 0.58            |
| Computer use               | 3.70     | 0.26      | 3.89          | 0.27      | 4.17        | 0.25      | 0.36            |
| Videogame use              | 3.66     | 0.27      | 3.41          | 0.27      | 3.44        | 0.26      | 0.84            |

*Note.* Results are adjusted for parent's education centered at the grand mean of 13.31 years. Possible and actual range for letter sounds was 1–3. Possible and actual range for reading enjoyment was 1–3. Possible and actual range for reading ability was 1–4. TV hours per week reflects a continuous amount reported by the parent and ranged from 0 hours per week to 11.25 hours per week. Possible scores for number of books: 1 = none; 2 = 1 to 5 books; 3 = 6 to 10 books; 4 = 11 to 25 books; 5 = more than 25 books. Possible range for print use and print suggestions was 0 to 14; actual range was 2 to 14. Possible and actual ranges for writing, trips to library/bookstore, computer use, and videogame use were 1 to 7 (1 = never; 2 = once a month or less; 3 = 2 or 3 times per month; 4 = once or twice per week; 5 = 2 to 3 times per week; 6 = 3 to 4 times per week; 7 = daily). ANCOVA = analysis of covariance.

\*  $p < .05$ . \*\*\*  $p < .00$ .

than their viewing classmates. At-risk and not-at-risk children were asking to be read to and had parents suggesting the child read a book more often than moderately at-risk children. No differences were found for frequency of writing, trips to the library or bookstore, frequency of computer use (among those who had computers), and frequency of videogame use.

#### *Did Children's Emergent Literacy Skills Improve as a Function of Watching BTL, and Did Improvement Vary as a Function of Risk Status?*

*Program-specific content.* Each of five subtests was evaluated using 2 (viewing)  $\times$  2 (grade)  $\times$  3 (reading risk status) ANCOVAs (see Tables 2, 3, and 4). All children who viewed the program outperformed their nonviewing counterparts on the word recognition task ( $\eta^2 = .07$ ). Kindergarten children who viewed the program and who were moderately at risk outperformed their counterparts who did not view on word building ( $\eta^2 = .17$ ) and speech to print matching ( $\eta^2 = .14$ ). Both moderately at-risk and not-at-risk kindergarteners who viewed the program outperformed their classmates who did not view on the concepts of print task ( $\eta^2 = .13$  and  $\eta^2 = .05$ , respectively). No significant differences were noted for the word meaning task.

*Letter naming.* In an examination of a Level 1 model (i.e., no Level 2 predictors were included), we found significant growth over time in LN ability. When Level 2 predictors were modeled, between-subjects variation in intercepts and rates of growth related to these predictors was detected. A Group  $\times$  Grade interaction was present for intercept values, whereas a Risk  $\times$  Grade interaction

was found for slope values. First-grade children and viewers had higher mean values, whereas kindergarten children and those most at risk were accelerating more slowly than first-grade children and those less at risk or not at risk. The final model accounted for 53% of the variance for the intercept and for 0% of the growth rate for children's LN ability (see Figure 2).

*Phonemic segmentation fluency.* We detected significant growth over time in segmenting ability in a Level 1 model (i.e., no Level 2 predictors were included). When Level 2 predictors were modeled, between-subjects variation in intercepts and rates of growth related to these predictors was detected. Risk  $\times$  Grade and Group  $\times$  Grade interactions were present for the intercept, along with main effects for all three. First graders, viewers, and those who were not at risk had higher mean values at the end of the intervention than kindergarteners, nonviewers, and those who were moderately or seriously at risk. Grade, group, and risk main effects predicted growth rates for segmenting ability. That is, kindergarten children, those most at risk, and viewers were accelerating faster than first graders, those less or not at risk, and nonviewers. The final model accounted for 58% of the variance for the intercept and for 36% of the growth rate for children's segmenting ability (see Figure 3).

*Nonsense word fluency.* When running a Level 1 model (i.e., no Level 2 predictors were included), we found significant growth over time in knowledge of the alphabetic principle. When Level 2 predictors were modeled, between-subjects variation in intercepts and rates of growth related to these predictors was detected. Two interactions, Risk  $\times$  Grade and Group  $\times$  Grade, were found for

Table 2  
*Pretest and Posttest Means and Standard Deviations and Adjusted Posttest Means for Effects of Treatment × Reading Risk Status × Grade on Program-Specific Content*

| Group and outcome          | At risk  |           |          |           |               | Moderate risk |           |          |           |                    | Not at risk |           |          |                   |               |  |
|----------------------------|----------|-----------|----------|-----------|---------------|---------------|-----------|----------|-----------|--------------------|-------------|-----------|----------|-------------------|---------------|--|
|                            | Pretest  |           | Posttest |           |               | Pretest       |           | Posttest |           |                    | Pretest     |           | Posttest |                   |               |  |
|                            | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | Adj. <i>M</i> | <i>M</i>      | <i>SD</i> | <i>M</i> | <i>SD</i> | Adj. <i>M</i>      | <i>M</i>    | <i>SD</i> | <i>M</i> | <i>SD</i>         | Adj. <i>M</i> |  |
| Kindergarten control group |          |           |          |           |               |               |           |          |           |                    |             |           |          |                   |               |  |
| Speech to print            | 4.60     | 1.35      | 5.20     | 1.48      | 6.32          | 5.67          | 2.18      | 5.33     | 2.29      | 6.09 <sub>a</sub>  | 8.61        | 1.09      | 8.28     | 2.24              | 7.77          |  |
| Word building              | 4.00     | 2.05      | 6.90     | 3.54      | 9.16          | 5.33          | 3.67      | 5.78     | 4.84      | 7.58 <sub>b</sub>  | 10.83       | 2.77      | 13.06    | 2.15              | 12.54         |  |
| Word meanings              | 1.50     | 1.65      | 4.40     | 3.44      | 7.14          | 4.56          | 3.57      | 5.56     | 3.21      | 6.54               | 5.11        | 2.68      | 8.28     | 3.80              | 7.94          |  |
| Concepts of print          | 6.90     | 3.63      | 10.30    | 3.71      | 16.91         | 10.56         | 6.21      | 11.22    | 5.63      | 15.74 <sub>c</sub> | 18.06       | 5.54      | 22.00    | 5.94 <sub>d</sub> | 21.09         |  |
| Kindergarten viewing group |          |           |          |           |               |               |           |          |           |                    |             |           |          |                   |               |  |
| Speech to print            | 3.92     | 2.07      | 4.46     | 1.66      | 5.63          | 6.00          | 3.20      | 8.35     | 1.27      | 8.97 <sub>a</sub>  | 8.67        | 1.44      | 8.50     | 2.07              | 8.11          |  |
| Word building              | 3.67     | 2.27      | 5.46     | 3.84      | 7.94          | 7.88          | 4.28      | 12.35    | 2.96      | 13.18 <sub>b</sub> | 11.25       | 3.60      | 13.33    | 1.56              | 12.86         |  |
| Word meanings              | 2.17     | 3.21      | 4.15     | 5.03      | 6.37          | 7.12          | 4.86      | 8.53     | 4.42      | 7.84               | 7.33        | 3.82      | 9.00     | 5.34              | 8.05          |  |
| Concepts of print          | 4.83     | 3.56      | 7.92     | 5.81      | 16.27         | 12.76         | 6.89      | 22.24    | 9.01      | 25.35 <sub>c</sub> | 17.08       | 9.06      | 26.50    | 7.20 <sub>d</sub> | 26.87         |  |
| First-grade control group  |          |           |          |           |               |               |           |          |           |                    |             |           |          |                   |               |  |
| Speech to print            | 8.14     | 2.18      | 8.86     | 1.61      | 8.72          | 9.20          | 1.32      | 9.50     | 0.63      | 9.00               | 9.45        | 0.82      | 9.91     | 0.30              | 9.25          |  |
| Word building              | 12.00    | 3.84      | 12.50    | 3.20      | 11.84         | 12.87         | 2.72      | 13.19    | 2.17      | 12.45              | 12.82       | 2.60      | 14.45    | 0.93              | 13.42         |  |
| Word meanings              | 6.50     | 4.13      | 7.64     | 3.69      | 7.59          | 6.67          | 2.53      | 7.75     | 2.70      | 7.73               | 8.09        | 2.91      | 9.73     | 2.65              | 8.43          |  |
| Concepts of print          | 17.79    | 6.73      | 21.86    | 8.23      | 22.13         | 24.47         | 5.78      | 27.81    | 5.80      | 24.06              | 28.64       | 6.56      | 29.91    | 5.54              | 23.35         |  |
| First-grade viewing group  |          |           |          |           |               |               |           |          |           |                    |             |           |          |                   |               |  |
| Speech to print            | 7.62     | 1.86      | 8.53     | 2.48      | 8.80          | 9.17          | 1.19      | 9.42     | 0.90      | 8.89               | 9.80        | 0.56      | 10.00    | 0.00              | 9.21          |  |
| Word building              | 10.63    | 3.20      | 12.12    | 3.30      | 11.96         | 12.58         | 2.43      | 14.42    | 1.78      | 13.52              | 13.53       | 1.19      | 14.53    | 0.83              | 13.24         |  |
| Word meanings              | 5.31     | 3.93      | 7.00     | 4.02      | 8.29          | 7.25          | 3.11      | 10.83    | 3.10      | 10.24              | 9.33        | 4.75      | 10.13    | 5.69              | 8.09          |  |
| Concepts of print          | 17.31    | 7.12      | 23.41    | 8.19      | 24.88         | 25.58         | 6.16      | 28.33    | 4.70      | 23.79              | 26.33       | 6.53      | 30.73    | 4.20              | 25.60         |  |

*Note.* Means in a column sharing subscripts were significantly different when examining simple main effects; that is, differences between the viewing and control groups were significant within that level of risk. Possible range for speech to print matching is 0–10; actual range for speech to print matching was 0–10. Possible range for word building is 0–15; actual range for word building was 1–15. Possible range for word meaning is 0–12; actual range for word meaning was 0–12. Possible range for concepts of print is 0–32; actual range for concepts of print was 1–32. Adj. *M* = adjusted mean.

both intercept and slope values, along with main effects for grade and risk. A group main effect was also found for the intercept. First graders and those who were not at risk had higher mean values at the end of the intervention. Kindergarten children, those most at risk, and viewers were accelerating faster than first graders, those less or not at risk, and nonviewers. The final model accounted for 47% of the variance in the intercept and for 0% of the growth rate for children's knowledge of the alphabetic principle (see Figure 4).

*TERA-2.* Performance on the TERA-2 was evaluated using a 2 (viewing) × 2 (grade) × 3 (reading risk status) ANCOVA (see Tables 4 and 5). As with many of the patterns previously described, kindergarten children who were moderately at risk and

viewed the program scored significantly higher than similarly classified children who did not view ( $\eta^2 = .10$ ).

## Discussion

The most prominent findings of this emergent literacy intervention are that improvements in emergent literacy skills occurred for kindergarten children who watched *BTL* and that these improvements were moderated by the child's reading risk status, supporting both Huston and Wright's (1989; Rice et al., 1982) traveling lens model and Wright's (2001) diverging trajectories phenomena.

Table 3  
*Pretest and Posttest Means and Standard Deviations and Adjusted Posttest Means for Effects of Viewing on Word Recognition Outcomes*

| Outcome          | Control  |           |          |           |               | Viewing  |           |          |           |               |
|------------------|----------|-----------|----------|-----------|---------------|----------|-----------|----------|-----------|---------------|
|                  | Pretest  |           | Posttest |           |               | Pretest  |           | Posttest |           |               |
|                  | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | Adj. <i>M</i> | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | Adj. <i>M</i> |
| Word recognition | 27.81    | 19.75     | 31.82    | 20.70     | 30.51         | 25.43    | 22.00     | 33.28    | 23.28     | 34.35         |

*Note.* Possible range for word recognition is 0–73; actual range for word recognition was 1–63. Adj. *M* = adjusted mean.

Table 4  
Results of ANCOVAs for Program-Specific and TERA-2 Outcomes

| Outcome           | ANCOVA Fs |          |          |                  |                   |              |                          |
|-------------------|-----------|----------|----------|------------------|-------------------|--------------|--------------------------|
|                   | Condition | Risk     | Grade    | Condition × Risk | Condition × Grade | Risk × Grade | Condition × Risk × Grade |
| Speech to print   | 2.96†     | 6.31**   | 37.11*** | 4.38*            | 3.32†             | 3.88*        | 5.38**                   |
| Word building     | 5.36*     | 11.50*** | 14.81*** | 8.44***          | 2.23              | 3.53*        | 4.38*                    |
| Word meaning      | 1.28      | 0.85     | 3.84†    | 1.66             | 0.53              | 0.78         | 0.37                     |
| Concepts of print | 14.69***  | 5.53**   | 9.24**   | 1.71             | 3.90*             | 4.93**       | 5.05**                   |
| Word recognition  | 11.89**   | 1.95     | 0.98     | 2.57†            | 3.69†             | 5.33**       | 2.32                     |
| TERA-2            | 2.88†     | 9.75***  | 7.81**   | 4.28*            | 3.01†             | 1.81         | 2.41†                    |

Note. ANCOVA = analysis of covariance; TERA-2 = Test of Early Reading Ability-2.  
†  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

*How Did Parents Describe Their Children’s Reading and the Home Media Environment?*

Differences were found in the type and amount of media use in homes of children from varying reading risks. Specifically, kindergarten children who were most at risk spent less time reading, enjoyed it less, had fewer books available, knew fewer letter sounds, and watched more television than their classmates who were moderately or not at risk. First-grade children who were most at risk also knew fewer letter sounds and had fewer books available. Having multiple opportunities for literacy practice is critical to learning to read (National Research Council, 1998). Unfortunately, those children in this sample who were already at significant risk for later reading failure and referral to special education enjoyed reading less and had home environments with fewer books available.

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Children who were most at risk for reading failure improved on concepts of print tasks (first graders) and word recognition tasks (both grades). Lack of improvement in other areas, as the traveling lens model predicts, may have occurred because the children had not yet obtained a level of print exposure or knowledge sufficient to overcome the incomprehensibility of the print and benefit from it. Evidence from their home environment also supports print unfamiliarity; these children had fewer books and spent more time viewing television than children whose risk was moderate or children who were not at risk. However, the viewing situation in this study was not designed to provide supports for the children who were most at risk. Teachers were asked not to discuss or refer

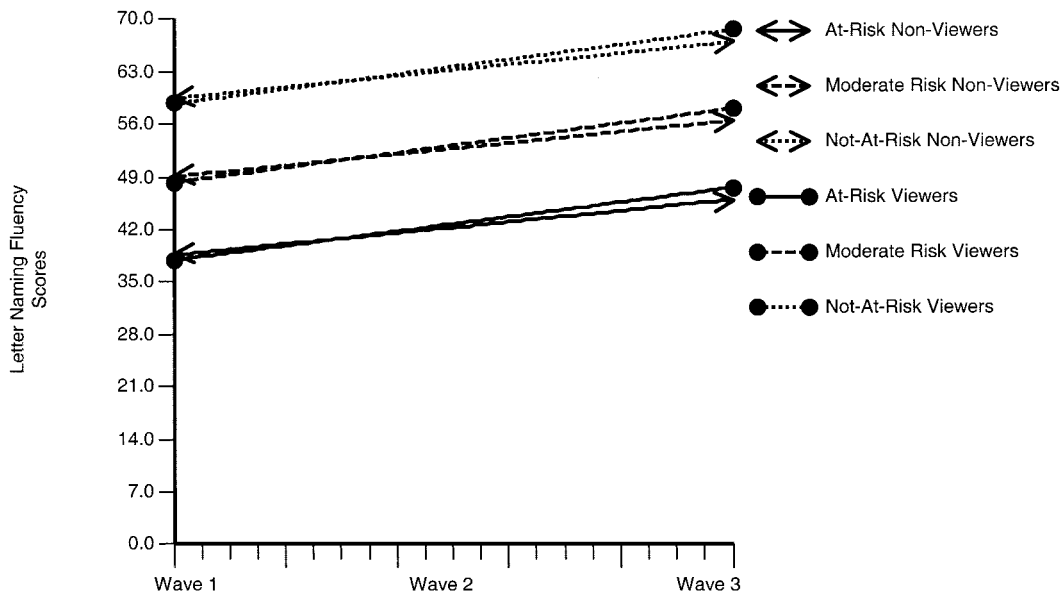


Figure 2. Growth curves describing letter naming patterns associated with risk status and condition.

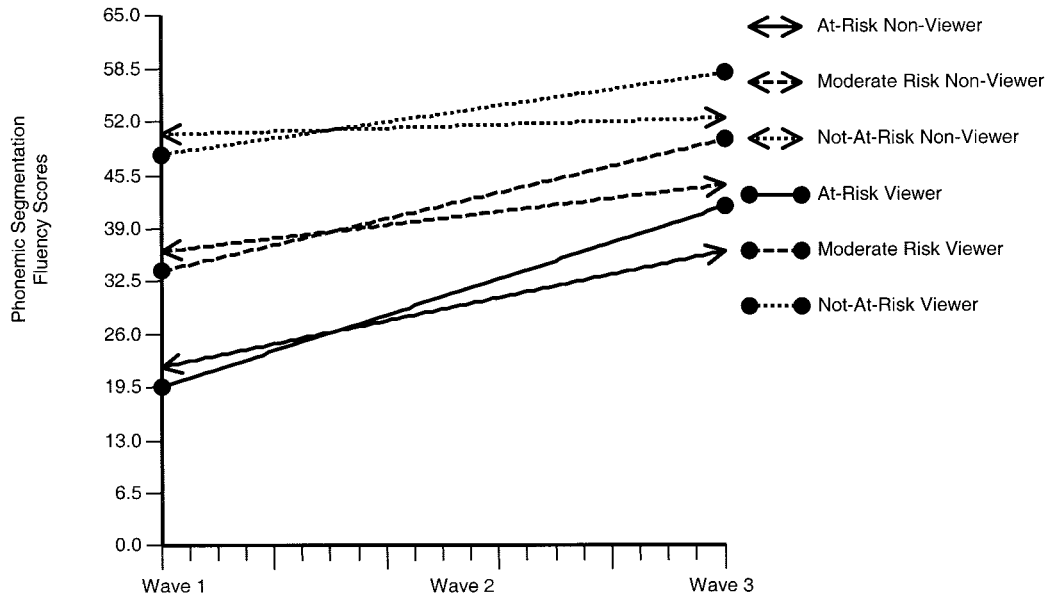


Figure 3. Growth curves describing phonemic segmentation patterns associated with risk status and condition.

to the show, link it to other classroom activities, or otherwise integrate it into the day-to-day curriculum. Without these additional supports, the most at-risk children in this sample were most likely unable to make connections and become involved. Prior television research contrasting viewing alone and viewing with teacher follow-up has demonstrated that providing follow-up is more effective than not (Singer & Singer, 1995).

For the group of children whose risk was moderate, especially kindergarten children, gains across almost all areas of emergent

literacy featured in the program were seen. As noted by Good et al. (2001), a clear prediction about later reading performance for children whose scores fall into this category is not possible. These children shared some characteristics with those children who were at most risk and some characteristics with those children who were not at risk (e.g., some literacy resources were available to them in the home, yet they watched a lot of television). The traveling lens model predicts that children attend most to engaging, moderately novel, and cognitively challenging content. Using their overall

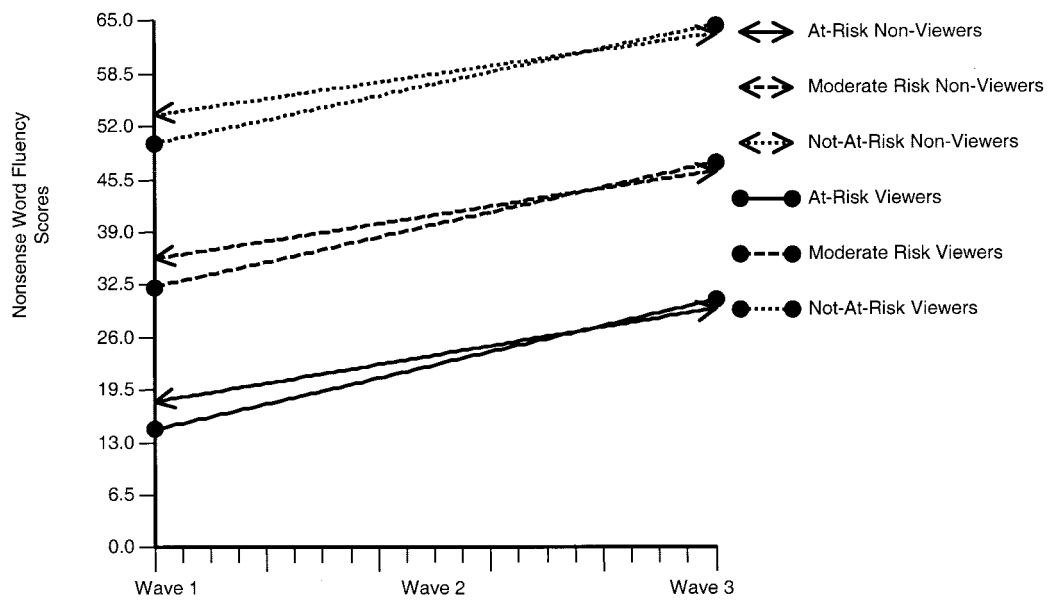


Figure 4. Growth curves describing letter-sound correspondence patterns associated with risk status and condition.

Table 5

*Pretest and Posttest Means and Standard Deviations and Adjusted Posttest Means for Effects of Viewing by Risk Status on TERA-2 Outcomes*

| Group   | At risk  |           |          |           |               | Moderate risk |           |          |           |               | Not at risk |           |          |           |               |
|---------|----------|-----------|----------|-----------|---------------|---------------|-----------|----------|-----------|---------------|-------------|-----------|----------|-----------|---------------|
|         | Pretest  |           | Posttest |           |               | Pretest       |           | Posttest |           |               | Pretest     |           | Posttest |           |               |
|         | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | Adj. <i>M</i> | <i>M</i>      | <i>SD</i> | <i>M</i> | <i>SD</i> | Adj. <i>M</i> | <i>M</i>    | <i>SD</i> | <i>M</i> | <i>SD</i> | Adj. <i>M</i> |
| Control | 26.21    | 5.73      | 28.46    | 6.11      | 29.10         | 29.40         | 6.75      | 31.56    | 7.88      | 29.84         | 29.52       | 7.55      | 35.41    | 5.26      | 34.31         |
| Viewing | 22.57    | 8.10      | 27.60    | 7.13      | 30.45         | 28.07         | 6.34      | 33.03    | 6.46      | 32.93         | 31.15       | 6.42      | 35.19    | 5.36      | 33.03         |

*Note.* Possible range for TERA-2 is 0–46; actual range for TERA-2 was 7–44. Adj. *M* = adjusted mean; TERA-2 = Test of Early Reading Ability–2.

improved performance as a marker for attention (see, e.g., Anderson et al., 1981; Calvert et al., 1982), this group of children was able to benefit from the print on screen in fairly dramatic ways across most of the emergent literacy skills tested in this study.

Children not considered at risk for later reading difficulty outperformed their counterparts who did not view on measures of reading that featured higher level skills including word recognition, concepts of print, and letter–sound correspondence. This finding is consistent with Huston and Wright’s (1989; Rice et al., 1982) traveling lens model and Wright’s (2001) diverging trajectories phenomena. These children (who were new readers) probably paid attention to and benefited from print features in the program that were moderately novel and challenging: actual word recognition and letter–sound correspondences.

For first-grade children, lack of additional findings related to viewing may have been due to a ceiling effect; that is, these children generally performed at or near the top of our scale with little room to measure improvement. However, we did a series of nonparametric analyses of the first-grade data (which allowed us to analyze for differences regardless of the truncation of the scale), and the results were unchanged. Therefore, we believe, as did many of the first-grade teachers, that the children already had many of the skills featured in the show and were demonstrating mastery of these skills (e.g., blending, segmenting, letter–sound correspondences, word recognition of sight words, consonant–vowel–consonant words). In addition, these data were collected during the last part of the school year, after nearly a full year of instruction in reading, supporting our mastery conclusion. Results may have been different if the data had been collected in the fall of first grade. Each of these reasons is consistent with Huston and Wright’s (1989; Rice et al., 1982) traveling lens model. Children probably tuned out the print on screen because they perceived it as familiar, redundant, and easy to process (Rice et al., 1982).

*Implications.* These results suggest that a program infused with a reading curriculum specifically designed to teach early reading skills has been successful in meeting its goals. Other research also supports the specificity of educational programming goals (Anderson, Huston, Schmitt, Linebarger, & Wright, 2001; Linebarger, 2001). For instance, Anderson et al. (2001) found that programs with goals and content designed to enhance creativity (e.g., *Mr. Rogers’ Neighborhood*) or to increase school readiness (e.g., *Sesame Street*) resulted in higher creativity scores and better school readiness, respectively. These results do not imply that subgroups of children may selectively benefit from programming

(i.e., at-risk children will not benefit from watching *BTL*). Instead, the traveling lens model, with its dynamic, constantly changing focus of attention, suggests that repeated exposure to the program will eventually bring the content into the child’s interest and ability level. Because television is a preferred activity and young children enjoy watching programs repeatedly, the likelihood that they will view programs repeatedly is high, giving them the repetition necessary to help even the most at-risk children learn. Children in the at-risk group (both kindergarten and first grade) did demonstrate significant gains over their nonviewing counterparts on some early literacy skills.

*Limitations.* There are two limitations that affect these findings. First, because of teacher preferences and logistics, it was necessary to randomly assign children to control and viewing groups by classroom. Although unlikely, given teacher instructions not to discuss the program and frequent observation by our staff, it is possible that teachers in the viewing group differed in their instructional approach either as a result of the show or because of differences in teaching, or both. We did include controls for pretest abilities that served to reduce classroom differences and overall classroom level of risk. However, we may not have been able to eliminate all of this potential bias. Moreover, there may be other third variables (e.g., parental attitudes toward reading) that we did not measure but that could account for the observed differences.

Second, the children who participated in this project were, for the most part, European American children from lower-middle-class to middle-class families with access to many types of media: books, computers, cable television. Therefore, the effectiveness of this program may not generalize to children from other backgrounds (e.g., minority or economically disadvantaged). More research is needed to address both these issues.

In sum, Huston and Wright’s (1989; Rice et al., 1982; Wright, 2001) theories of attention and comprehension suggest that, initially, children need to find print on screen interesting, somewhat difficult, but not entirely incomprehensible (Bickham, Wright & Huston, 2001). As a child watches more television with print or participates in print activities at school and home, his or her familiarity with print increases (see Figure 1). As this familiarity grows, the child’s perceived comprehensibility of the print is enhanced, and overly complex materials become challenging and then interesting. Children in the moderate risk group were maximally ready to benefit from nearly all of the print featured in *BTL*. Children who were not at risk attended to aspects of the print that were more challenging, whereas children in the sample who were

considered at risk for reading failure had not yet achieved a sufficient level of familiarity or interest to attend to and benefit from all aspects of the print. Continued exposure over time should bring the print stimuli into these children's zones of interest and accessibility. It is possible that children experiencing difficulties learning to read may perhaps find print aversive because repeated attempts with traditional print activities have failed to help them learn to read. One advantage of presentation via television may be that children find learning from television easy and more accessible (Salomon, 1979). Perhaps these beliefs may function to make the child more receptive to the print over time. More research is needed to determine if continued exposure can change these children's expected reading trajectories.

Taken as a whole, however, these results are promising, suggesting that print via television does lead to positive changes or growth in key early literacy skills predictive of later fluent reading. Given that television is a universally available, free technology with enormous potential to reach all children, having children view a program like *BTL* will help a significant portion of students by reinforcing, motivating, and extending early literacy instruction, both in the classroom and within the child's home.

### References

- Anderson, D. R., Huston, A. C., Schmitt, K. L., Linebarger, D. L., & Wright, J. C. (2001). Early childhood television viewing and adolescent behavior: The recontact study. *Monographs of the Society for Research in Child Development*, 66(1).
- Anderson, D. R., Lorch, E. P., Field, D. E., & Sanders, J. (1981). The effects of TV program comprehensibility on preschool children's visual attention to television. *Child Development*, 52, 151–157.
- Bickham, D. S., Wright, J. C., & Huston, A. C. (2001). Attention, comprehension, and the educational influences of television. In D. G. Singer & J. L. Singer (Eds.), *Children and the media* (pp. 101–120). Thousand Oaks, CA: Sage.
- Boyle, M. H., & Willms, J. D. (2001). Multilevel modelling of hierarchical data in developmental analysis. *Journal of Child Psychology and Psychiatry*, 42, 141–162.
- Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models: Applications and data analysis methods*. Newbury Park, CA: Sage.
- Calvert, S. L., Huston, A. C., Watkins, B. A., & Wright, J. C. (1982). The relation between selective attention to television forms and children's comprehension of content. *Child Development*, 53, 601–610.
- Campbell, T. A., Huston, A. C., & Wright, J. C. (1987). Form cues and content difficulty as determinants of children's cognitive processing of televised educational messages. *Journal of Experimental Child Psychology*, 43, 311–327.
- Clay, M. M. (1972). *Sand: The Concepts About Print Test*. Auckland, New Zealand: Heinemann Educational Books.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Mahwah, NJ: Erlbaum.
- Frith, M. K. (Producer). (2000). *Between the lions* [Television series]. Boston: WGBH.
- Good, R. H., & Kaminski, R. (2000). *Dynamic indicators of basic early literacy skills (DIBELS)*. Retrieved March 31, 2004, from <http://dibels.uoregon.edu/>
- Good, R. H., III, Simmons, D. C., & Kame'enui, E. J. (2001). The importance and decision-making utility of a continuum of fluency-based indicators of foundational reading skills for third-grade high-stakes outcomes. *Scientific Studies of Reading*, 5, 257–288.
- Hammill, D. D., & Leigh, J. E. (1983). *Basic School Skills Inventory—Diagnostic*. Austin, TX: Pro-Ed.
- Huston, A. C., & Wright, J. C. (1983). Children's processing of television: The informative functions of formal features. In J. Bryant & D. R. Anderson (Eds.), *Children's understanding of TV: Research on attention and comprehension* (pp. 37–68). New York: Academic Press.
- Huston, A. C., & Wright, J. C. (1989). The forms of television and the child viewer. In G. Comstock (Ed.), *Public communication and behavior* (Vol. 2, pp. 103–158). San Diego, CA: Academic Press.
- Jaccard, J. (1998). *Interaction effects in factorial analysis of variance*. Thousand Oaks, CA: Sage.
- Johnson, P., & Allington, R. (1991). Remediation. In R. Barr, M. Kamil, P. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp. 984–1012). New York: Longman.
- Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fourth grades. *Journal of Educational Psychology*, 80, 437–447.
- Kaminski, R., & Good, R. H. (1996). Towards a technology for assessing basic early literacy skills. *School Psychology Review*, 25, 215–227.
- Linebarger, D. L. (2001). Learning to read using television: The effects of captions and narration. *Journal of Educational Psychology*, 93, 288–298.
- Mathes, P. G., Howard, J. K., Allen, S. H., & Fuchs, D. (1998). Peer-assisted learning strategies for first-grade readers: Responding to the needs of diverse learners. *Reading Research Quarterly*, 33, 62–94.
- Mielke, K. (1994). *Sesame Street* and children in poverty. *Media Studies Journal*, 8, 125–134.
- Miron, D., Bryant, J., & Zillman, D. (2001). Creating vigilance for better learning from television. In D. G. Singer & J. L. Singer (Eds.), *Handbook of children and the media* (pp. 153–181). Thousand Oaks, CA: Sage.
- National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. Retrieved February 24, 2004, from <http://www.nichd.nih.gov/publications/nrp/smallbook.htm>
- National Research Council. (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.
- Neuman, S., & Roskos, K. (1997). Literacy knowledge in practice: Contexts of participation for young writers and readers. *Reading Research Quarterly*, 32, 10–32.
- O'Connor, R. E. (2000). Increasing the intensity of intervention in kindergarten and first grade. *Learning Disabilities Research and Practice*, 15, 43–54.
- O'Connor, R. E., Jenkins, J. R., & Slocum, T. A. (1995). Transfer among phonological tasks in kindergarten: Essential instructional content. *Journal of Educational Psychology*, 87, 202–217.
- Raudenbush, S. W., Bryk, A. S., Cheong, Y. F., & Congdon, R. (2001). *HLM 5: Hierarchical linear and nonlinear modeling* (2nd ed.). Lincolnwood, IL: Scientific Software International.
- Reid, D. K., Hresko, W. P., & Hammill, D. D. (1989). *TERA-2: Test of Early Reading Ability* (2nd ed.). Circle Pines, MN: American Guidance Service.
- Rice, M. L., Huston, A. C., & Wright, J. C. (1982). The forms and codes of television: Effects of children's attention, comprehension, and social behavior. In D. Pearl, L. Bouthilet, & J. Lazar (Eds.), *Television and behavior: Ten years of scientific progress and implications for the eighties* (pp. 24–38). Washington, DC: U.S. Government Printing Office.
- Salomon, G. (1979). Media and symbol systems as related to cognition and learning. *Journal of Educational Psychology*, 71, 131–148.
- Singer, J. L., & Singer, D. G. (1995). *Barney & Friends as education and entertainment: Phase 3—A national study: Can children learn through preschool exposure to Barney & Friends?* New Haven, CT: Yale University Family Television Research and Consultation Center.

- Statistical abstracts*. (2000). Washington DC: Government Publishing Office.
- Strickland, D. S., & Rath, L. K. (2000, August). *Between the Lions*: Public television promotes early literacy. *Reading Online*, 4(2). Retrieved February 24, 2004, from [http://www.readingonline.org/articles/art\\_index.asp?HREF=/articles/strickland/index.html](http://www.readingonline.org/articles/art_index.asp?HREF=/articles/strickland/index.html)
- Whitehurst, G. J., & Lonigan, C. J. (1998). Child development and emergent literacy. *Child Development*, 69, 848–872.
- Whitehurst, G. J., & Lonigan, C. J. (2001). Emergent literacy: Development from prereaders to readers. In S. B. Neuman & D. K. Dickinson (Eds.), *Handbook of early literacy research* (pp. 11–29). New York: Guilford Press.
- Wright, J. C. (2001, April). Demographic influences on long-term effects of television: A theoretical approach. In S. M. Fisch (Chair), *Theoretical approaches to the long-term effects of television viewing*. Symposium conducted at the meeting of the Society for Research in Child Development, Minneapolis, MN.

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