From Attention to Comprehension: How Children Watch and Learn From Television

Aletha C. Huston
David S. Bickham
June H. Lee
John C. Wright*

University of Texas, Austin

In this chapter, we present an overview of some of the research on children's attention and comprehension of television, relying particularly on our own work conducted over the last 25 years at the Center for Research on the Influences of Television on Children (CRITIC). There have been two overriding objectives guiding our research. First, we have tried to understand the ecology of developing children's media use—that is, to investigate developmental patterns and changes in media use and to understand the influences of the family and contexts on children's use of television and other electronic media. Second, we have examined the content and forms of television as influences on children's cognitive processing of televised information. In this work, we have attempted to
understand how TV's form and content guide children's attention to television, how children come to understand the medium, and how characteristics of the medium affect what children learn from it. To achieve these objectives, we have conducted naturalistic, longitudinal studies of children's television use as well as laboratory investigations of children's attention and comprehension of selected bits of television. The ultimate goals of this work are to gain a better understanding of cognitive and social development and the more practical objective of determining how television can be used to enhance that development.

We begin the chapter with basic information about the development of viewing patterns, examining some of the influences of family and other ecological contexts on viewing. We then turn to theory and research designed to help us understand how and why some of these developmental changes come about, considering the relations of television form and content to attention and comprehension. In the last section, we present investigations of what children learn from educational television content in their everyday lives.

DEVELOPMENTAL CHANGES IN TELEVISION VIEWING

As children develop, both the amount and content of their television diets change. Children's cognitive abilities, structural factors in their lives, and personal preferences combine to determine duration of viewing and program choices. Individual characteristics (e.g., gender) affect television use, as does the larger sociocultural context. Children from different socioeconomic backgrounds and different ethnic groups use television differently throughout their childhood.

Total Amount of Television Viewing

The amount of time children spend with television has been a primary concern for years among parents, caregivers, pediatricians, and others concerned with the healthy development of young people. Numerous reports have documented the prominence of television in children's lives. For many children, television consumes more time than any other activity except sleep (Comstock & Paik, 1991). Even with the proliferation of new electronic media, television is a strongly preferred leisure activity for many children, and understanding patterns of its use is essential to understanding development.

Television viewing starts in infancy, when familial viewing patterns and controls determine exposure. In recent years, the viewing habits of children under 2 years old have been the center of national attention. At
least one TV program has been designed with this age group as its target audience (Télétubbies), and the American Association of Pediatricians recently recommended that parents completely prohibit television viewing for children this young. This and other concerns about infant viewing, however, are based more on conjecture than research. Considering the paucity of reliable information about very young children’s television use, the fact that children as young as 12 months can learn from television (Meltzoff, 1988), and the tendency for viewing habits to be set early in life and remain stable (Huston, Wright, Rice, Kerkman, & St. Peters, 1990; Tangney & Feshbach, 1988; Wright & Huston, 1995), research describing how very young children use television can provide valuable insight into the inception of its use.

Data from the Panel Study of Income Dynamics Child Development Supplement (PSID-CDS) lend themselves well to investigating television viewing among young children. During 1997, parents in this nationally representative study completed two time-use diaries for their children ages 0 to 12 years in which they accounted for all of the child’s activities over 1 weekday and 1 weekend day (see Hofferth & Sandberg, 2001, for a description of CDS methods). Whenever the child watched television or played video or computer games, parents reported the titles of the program or game being used. Our analyses of these data revealed that children aged 2 and younger watched on average 10 hours and 45 minutes of television a week, significantly less than did older children (Wright, Huston, Vandewater, et al., 2001).

In the Early Window Study, we also described the media habits of very young children. For this project we followed a sample of approximately 240 children from low-income families over the course of 3 years, one group from age 2 through 5 and another from age 4 through 7, collecting repeated time-use diaries about their television viewing. Viewing was classified as a primary activity if it was named first as a description of the child’s activity, but TV could also be a secondary activity, performed concurrently with playing, eating, or other activities. Very young children (2-3-year-olds) had high levels of secondary viewing of general-audience programs (an average of 80 minutes per day), suggesting that they were exposed to a great deal of television that adults and older children were watching (Huston, Wright, Marquis, & Green, 1999). Similarly, very young children in the PSID study had more secondary viewing than did older children (Wright, Huston, Vandewater, et al., 2001).

Cross-sectional studies show that viewing generally increases during the preschool years and peaks in early adolescence. Although earlier studies found a slight decline around age 6 when children enter school
(Comstock, Chaffee, Katzman, McCoombs, & Roberts, 1978; Comstock & Paik, 1991; Comstock & Scharrer, 2001), two more recent studies with large representative samples show fairly steady amounts of viewing from the preschool years into the early elementary years. It is possible that school entry represents less change in time away from home than in earlier years because most preschool children spend time in child care or early education programs. Both studies showed increases between about ages 8 and 13, and declines during later adolescence (Roberts, Foehr, Rideout, & Brodie, 1999; Wright, Huston, Vandewater, et al., 2001).

Longitudinal designs allow for an examination of the stability of individual viewing habits over time. In our Topeka Study, conducted in the early 1980s, we followed cohorts of young children over a 2-year period (Huston et al., 1990). From ages 3 to 5, total viewing increased slightly from 19.2 hours a week to 20.8. Between ages 5 and 7, viewing declined from 19.2 hours a week to 15.5, perhaps illustrating the effects of school entry. Individual differences in both amounts and types of programs viewed were stable over 2 years, and preschool viewing was modestly associated with total viewing 10 years later (Anderson, Huston, Schmitt, Linebarger, & Wright, 2001). Children apparently acquire television habits very early in life and maintain them at least through their early school years.

Explaining Developmental Differences in Viewing

Cognitive developmental change constitutes one basis for increases and decreases in viewing with age. As children grow, they become increasingly capable of decoding the audio and visual messages of television, making time with the medium both more pleasurable and more informative. This cognitive change is also indicated by the fact that the percentage of time children pay attention to the screen while in the room with a television increases with age until about age 10 (Anderson, Lorch, Field, Collins, & Nathan, 1986). The peak in viewing at early adolescence or late elementary school age may also be a result of developing cognitive processes. It is at or around the age of 10 that the format and pace of television most completely match the abilities and sophistication of the child viewer (Anderson & Smith, 1984). When the child is slightly older than this, he or she is a "master television viewer" and sees the medium as a primary source of knowledge and relaxation. In subsequent years other sources of information and entertainment (e.g., music and magazines) may be perceived as more engaging and may partially replace television.
Television Content

With age, children also make shifts in the types of content viewed, often choosing more cognitively challenging programming. In the Topeka Study, we coded television programs for redundancy of scenes and characters and for the amount of temporal integration required by the content, both measures of cognitive demand. Between ages 3 and 7, children moved from less demanding to more demanding programs, according to these indicators (Huston et al., 1990).

The amount of time children spend watching child-informative television drops dramatically as they progress from preschool into kindergarten and beyond (Huston et al., 1999; Huston et al., 1990; Wright, Huston, Vandewater, et al., 2001). What is a popular choice among 3- to 5-year-olds for 4 hours a week is significantly less preferred among 9- to 12-year-olds, who watch educational television only about 1.5 hours a week (Wright, Huston, Vandewater, et al., 2001). This is probably attributable to the fact that most educational programs target preschool children as their primary audience (Huston et al., 1990). Viewing cartoons also declines with age, albeit a little later than the decline in viewing educational programs.

Television violence is often linked to features of the medium that attract children's attention. In cartoons designed for children, both humor and violence are seamlessly merged with quick pace and animation to ensure the most attention and attraction to the images. As children age, they move away from cartoons, but continue to be attracted to comedy (e.g., situation comedies) and to violence (e.g., action-adventure; Wright, Huston, Vandewater, et al., 2001). Despite these shifts in genre, there are stable individual differences. Young children who watch age-appropriate humorous programs such as cartoons or educational shows watch situation comedies at a later age. Children who watch a lot of cartoons in the early years watch more action-adventure in later years (Huston et al., 1990). This stability may indicate lasting preferences and individual differences in the perceived function of television as a source of humor and entertainment.

The violent content of many children's favorites has been a concern since the medium's inception. The established relations between media violence and aggression, criminal activity, and other antisocial behaviors justify extensive research attention to this issue (see Bushman & Huesmann, 2001 for a review). In fact, a recent meta-analysis found that the link between violent television viewing and aggressive behavior is
almost as strong as the relation between smoking and lung cancer (Bushman & Anderson, 2001). Therefore, understanding developmental patterns of viewing violence is especially important to understanding who is at risk for these consequences.

CHILDREN’S CHARACTERISTICS AS INFLUENCES ON VIEWING

Children’s abilities and interests are likely to affect their choice of television as an activity and their choice of content to view. Boys and girls have different interests and preferences, but there is surprisingly little evidence of large gender differences in overall TV use. Among preadolescents, some studies find slightly more viewing by boys than by girls, but others do not. In one study (Roberts et al., 1999) boys watched 20 minutes more a day than did girls (a statistically reliable difference), whereas in two others (Huston, et al., 1999; Wright, Huston, Vandewater, et al., 2001) there were no overall gender differences.

There are gender differences, however, in preferred content, particularly as children reach late childhood and early adolescence. In the PSID study, among 9- to 12-year-olds, girls watched more comedy and relationship dramas, and boys watched more sports programs. The decline in viewing cartoons occurs at an earlier age for girls than for boys (Wright, Huston, Vandewater, et al., 2001). All of these differences are consistent with the idea that viewing specific genres of television is one of many gendered activities that dominate the time of early adolescents. Programs that include older characters and social relationships are attractive to girls in this age group because maturity and social interactions are themes that traverse all areas of their lives. Similarly, cartoons and sports contain subject matter relevant to boys entering adolescence.

ECOLOGICAL INFLUENCES ON VIEWING

Television viewing occurs in an ecological context of the family, which is in turn affected by the social and cultural institutions surrounding that family (Kotler, Wright, & Huston, 2001; Wright, St. Peters, & Huston, 1990). Parents’ and siblings’ viewing choices affect the kinds of programs that children watch. For children under age 7, most viewing of general audience programs occurs with an adult, usually a parent. In our analyses of co-viewing patterns, it appeared that parents’ preferences affected the
programs that they viewed with their children more than children's preferences did (St. Peters, Finch, Huston, Wright, & Eakins, 1991). Similarly, children with younger siblings were more likely to watch educational TV than were children with older siblings, probably because of sibling preferences (Caplovitz, 2002; Piñon, Huston, & Wright, 1989).

School and child care are institutional influences, affecting children's time at home and exposure to television. Children who attend school or center-based child care are less likely than those who are at home to have opportunities to watch television on weekdays (Huston et al., 1999; Piñon et al., 1989). In the analysis of the PSID data, weekday viewing peaked among 3- to 5-year-olds and was lower for school-age children. Weekend viewing was highest among 6- to 8-year-olds and 9- to 12-year-olds, suggesting that school-age children may compensate with increased viewing on the weekends (Wright, Huston, Vandewater, et al., 2001).

The drop in viewing during adolescence may also be a result of increased involvement in school, out-of-school activities, and time with peers away from home (Comstock & Paik, 1991). The medium is not only less appealing cognitively than it was when they were younger, but also more interesting activities are more available and socially essential.

Both socioeconomic status and ethnic group are markers of sociocultural influences on media use. Children from families with relatively high levels of parent education and income watch less television overall, but not necessarily less educational television, than do children whose parents have less education and income (Huston & Wright, 1997; Truglio, Murphy, Oppenheimer, Huston, & Wright, 1996). In general, African American children watch more than White children, and there are smaller differences associated with parent education and income among African American than among White children (Bickham et al., 2002). Hispanic American children's viewing falls somewhere between the other two groups (Bickham et al., 2002; Roberts et al., 1999; Tangney & Feshbach, 1988). Developmental changes in viewing appear to vary slightly across ethnic groups. In our analyses of the PSID data, there were no age differences in total television viewing for African American children, but, for both White and Hispanic American children, older children watched more than did younger children (Bickham et al., 2002). In another large sample, older Black children watched about 2 hours of television more a day than their younger counterparts, whereas older White children watched only 1 hour more than younger White children (Roberts et al., 1999).
SUMMARY OF VIEWING PATTERNS

Overall, television is a popular activity for children at all points along the developmental path. They watch television when they can find the time and begin to lose interest in it as social activities and other life events begin to take precedence in their lives. Children are, however, never nonviewers. Even very young children and older adolescents watch enough to experience both its positive and negative effects.

THE MECHANISMS OF DEVELOPMENTAL CHANGES IN TELEVISION VIEWING

Children's naturally occurring use of the medium as a whole and the types of programming it delivers correspond broadly to the cognitive changes and to structural features of their lives. Children appear to be attracted to the medium when they understand and are excited by its form. They seek out content that they find entertaining and relevant to their current situation. A more precise understanding of the processes guiding children's uses of TV can be gained by moving from the natural environment to the laboratory, examining the ways in which children process the information they encounter on TV.

Children Use Television Actively

The early models of television effects, which implied a passive child being manipulated by the media environment, long ago gave way to models of a child who uses, processes, and makes decisions about the media information that is available. Children make decisions about when and how they watch television. At a more microscopic level, they make moment-to-moment decisions about when to attend, when to look away, and when to monitor sound for an interesting moment. They integrate and interpret content according to the intellectual skills and schemata that they possess.

Exploration–Search

Television as a medium presents information in particular forms and formats. In fact, much of the criticism of the medium is based on its forms. Critics have argued that it is inherently superficial or overwhelming to children because information is presented at a rapid pace that cannot be
THEORY OF VIEWING PATTERNS

Watching television is a popular activity for children at all points along the developmental stages of their lives. Children are, however, never passive viewers; young children and older adolescents watch television not only for entertainment but also for educational purposes. The medium lead to visual information processing that interferes with language development (Healy, 1990) or imagination (Singer & Singer, 1981).

Much of our early research was devoted to gaining a better understanding of children's responses to and knowledge of the forms and formats of television (see Huston & Wright, 1989). The initial work was guided by Wright and Vlietstra's (1975) exploration-search model of information getting. In that model, microgenetic developmental changes in information getting are proposed as a sequence moving from exploration to search. When an individual confronts a new stimulus environment, exploration dominates. Exploration is characterized by somewhat disconnected, brief attention to various parts of the environment. The most perceptually salient aspects are likely to be noticed first and to get attention. As the stimulus becomes more familiar, attentional processes become more systematic, goal directed, and intentional as the person searches for particular aspects of the stimulus based on her individual goals and existing knowledge or schemata. This microgenetic process can occur for people of all ages when they encounter new situations. For example, an adult arriving in Paris for the first time might be in the exploration mode, wandering the streets, noticing many features of the environment and moving from one to the next with little in the way of preexisting guidelines. A person who is familiar with Paris, on the other hand, might be in search mode, making directly for a particular museum or landmark chosen in advance.

Many microgenetic exploration-search sequences accumulate to a macrogenetic pattern because, as children get older, they are less likely to encounter completely new stimulus environments and are more likely to be in environments that are at least partially familiar. They also gain skill in regulating, planning, and guiding their own activities. Hence, overall, children move from attention patterns that are predominantly exploration in infancy and the early preschool years to attention patterns that are predominantly search by middle childhood.

Wright and Huston (1983) applied this theory to children's processing of televised information. We assumed that such processing was a function not only of the content presented by the medium but also of the particular forms, or formal features, that characterize the presentation. Formal features are characteristics of the televised presentation that are relatively independent of content (e.g., animation). Many of the formal features used in children's programming are perceptually salient (e.g., high action, visual special effects, and auditory effects); others are less striking.
perceptually but relay program-specific information (e.g., moderate action and dialog).

We predicted initially that younger children would attend more to salient formal features and older children would attend more to informative features, but for the most part, these predictions were not supported (Huston & Wright, 1989). Children did attend to salient features, but there was little change with age. Anderson and Lorch’s (1983) studies of children’s attention to television demonstrated that children attended to content that was comprehensible, even when it was presented without perceptually salient formal features. They proposed that children learn that certain formal features are regularly associated with child-oriented content (e.g., child and female voices), and attend because they expect the content to be comprehensible. That is, formal features serve as signals for content.

Stimulus Sampling Model

Wright (see Huston & Wright, 1983) expanded this idea by proposing that viewers confronted with a television program sample bits of the program with quick looks (or by listening) and make fairly rapid judgments about whether or not the content is likely to be comprehensible, interesting, entertaining, or relevant. Wright argued that it was logically impossible for comprehensibility to affect later attention to the content already comprehended. Instead, the content and form at one point in time lead children to have expectations about what is likely to come next, and those expectations influence subsequent attention. Formal features often guide these judgments because one can recognize them almost instantly. For example, one can detect animation immediately, whereas it would take longer to determine whether or not the content presented dealt with a topic of interest. If the stimulus sample suggests the content is worth viewing, attention continues. If not, attention quickly moves to something else and can be rerecruited by auditory cues or by loss of interest in the alternative activity.

Developmental changes in this process come about through familiarization. What is comprehensible and interesting changes not only with cognitive development, but also with repeated exposure. Attention and interest are likely to be greatest when content is neither too easy nor too hard; that is, it is moderately familiar and understandable. If content is too easy or familiar, it will be boring; if it is too difficult, it will hold little interest. Over time, with increasing cognitive sophistication and knowledge,
likely that younger children would attend more to
and older children would attend more to informa-
tion most part, these predictions were not supported
(1989). Children did attend to salient features, but
with age. Anderson and Lorch's (1983) studies of
텔레비전 demonstrated that children attended to
rehensible, even when it was presented without
ormal features. They proposed that children learn
atures are regularly associated with child-oriented
al female voices), and attend because they expect
rehensible. That is, formal features serve as signals

Model
Wright, (1983) expanded this idea by proposing
with a television program sample bits of the pro-
or by listening) and make fairly rapid judgments
the content is likely to be comprehensible, interest-
relevant. Wright argued that it was logically
sibility to affect later attention to the content.
Instead, the content and form at one point in
e have expectations about what is likely to come
ions influence subsequent attention. Formal fea-
judgments because one can recognize them almost
one can detect animation immediately, whereas it
determine whether or not the content presented
rest. If the stimulus sample suggests the content
on continues. If not, attention quickly moves to
be reacquired by auditory cues or by loss of inter-

es in this process come about through familiariza-
hsible and interesting changes not only with cog-
also with repeated exposure. Attention and
greatest when content is neither too easy nor too
ately familiar and understandable. If content is too
boring; if it is too difficult, it will hold little inter-
creasing cognitive sophistication and knowledge,

FIG. 2.1. The traveling lens model. From "The Forms of Television: Effects
on Children's Attention, Comprehension, and Social Behavior," by M. L. Rice,
Printing Office. Reprinted with permission.

the optimal point of moderate familiarity or comprehensibility changes.
What was very difficult before becomes moderately difficult and therefore
interesting; what was moderate before becomes easy and less interesting.
This process is illustrated in Fig. 2.1 (Wright & Huston, 1983).

FORMAL FEATURES GUIDE COGNITIVE
PROCESSING OF TELEVISION

Getting the Content Message
The stimulus sampling hypothesis implied that formal features that signal
interesting or comprehensible content, independent of the actual con-
ent, would guide children's attention. To test that prediction, Campbell,
Wright, and Huston (1987) designed a set of televised segments presenting
nutritional information in two formats: (a) a "child" format that was animated, had sprightly music, and was narrated by a cartoon-character voice using second-person pronouns ("You are stronger when you eat X"); and (b) an "adult" format that used live photography, sedate music, and was narrated by an adult male using third-person pronouns ("People are stronger when they eat X"). Messages at three levels of difficulty were constructed in each format, but within each difficulty level, content was virtually identical. Hence, format and difficulty were independent of one another.

The feature signal hypothesis led to the prediction that children would attend more to the child format than to the adult format, and the data strongly supported that prediction. Children also recalled more information from the child format segments than they did from adult format segments with identical content. It appears that the child formal features attracted children to the content (or adult forms repelled them) and that they learned more from it as a result (Campbell et al., 1987).

Formal features that elicit attention can also serve as guides helping children to distinguish important from unimportant content. In one investigation, targeted items of content in Fat Albert and the Cosby Kids were classified as central or incidental to the plot. Some of these were marked by visual special effects or sound effects; others were not. Overall, children understood and recalled the content that was central to the story better when it was marked with salient formal features than when it was not. This finding was more true for younger (5–6-year-olds) than for older (8–9-year-olds) children (Calvert, Huston, Watkins, & Wright, 1982).

Interpreting Content Connotations

Formal features signal much more than the level and interest of the content. Producers use filmic and video conventions as implicit cues to appeal to particular audiences or to convey particular connotations. For example, advertisements for sex-typed toys are made with different forms. Commercials for boys' toys are made with rapid action, quick cuts and scene changes, and loud sound effects; commercials for girls' toys are made with dreamy or tinkling music, scene changes marked by dissolves, and quiet sound (Welch, Huston-Stein, Wright, & Plehal, 1979). Children recognize these sex-typed cues, judging televised segments as sex-typed even when the content of the segment is neutral (Huston, Greer, Wright, Welch, & Ross, 1984).
Judging Reality

Formal features guide children’s judgments about fiction and reality—whether what they are seeing is real or not. In recent years, reality programs, infomercials, and other new genres have blurred the line between fiction and reality partly by using formal features. The features that were once reliable markers of reality may now confuse adults as well as children. For example, staged reconstructions of crimes are shown with handheld cameras, running commentary, and other features that characterize live broadcasts of real events.

Perceptions of reality occur on two dimensions: factuality (“Did it happen in the unheared real world?”) and social realism (“How like real life is it, even if it is fictional?”; Wright, Huston, Reitz, & Piemay, 1994). Judgments about factuality—which the content shown exists in the real world outside television or whether it is constructed and scripted for TV—occur in a fairly regular developmental sequence. For example, 7-year-olds understand better than 5-year-olds that fictional characters do not retain their TV roles in their off-TV lives. The older children also understand that fictional shows are scripted, rehearsed, made up, and synthetic. In the preschool years, children argue that animated content is not real, but that other content is. By about age 8 or 9, children are about as accurate as adults in judging whether a television program is presenting fiction or fact. Individual differences between children appear to be a function of overall levels of cognitive development, as indexed by measures of general intellectual ability, rather than experience with television itself (Wright et al., 1994).

Children make factuality judgments primarily on the basis of genre (e.g., news is factual; drama is not), which in turn depends primarily on formal production features (e.g., talking heads and onscreen graphics indicate news or documentaries; Fitch, Huston, & Wright, 1993). Children ages 9 through 12 who were interviewed just after the Challenger shuttle disaster initially knew the televised events were factual and not just space fiction partly by noting the formal features characteristic of live news and not simply by judging the plausibility of the content (Wright, Kunkel, Piron, & Huston, 1989). When children perceive that a program is factual, they process the information presented more extensively and deeply, but they also learn social information from fiction. Third- and fourth-grade children who perceived the content of a TV story as factual recalled more complex, inferential content, and more psychological and emotional states of characters than did those who perceived the story as fictional (Wright, Huston, Alvarez, et al., 1995).
When children have real-world information about an occupation, they can make distinctions between reality and the images seen on fictional TV. In one study, different groups of children were asked what real police officers do, what real nurses do, what TV police officers do, and what TV nurses do; their answers were different in predictable ways. For example, they said that TV police officers catch criminals and engage in car chases and real-world police have to work hard (Wright, Huston, Truglio, et al., 1995).

When occupations are unfamiliar, however, children use both factual and fictional TV as a source of information. In one experiment, we showed children documentaries or fictional stories about unfamiliar occupations. When asked what people in that occupation do, they responded with the actions they had seen. Those who had seen documentaries were a little more likely to think the content was accurate, but those who saw fictional content often thought it presented a realistic view of the occupation (Huston, Wright, Fitch, Wroblewski, & Picmyat, 1997).

The second dimension of perceived reality—social realism—has to do with the child’s perception that the television portrayals of unfamiliar people and places are plausible and true to life. Judgments about the social realism of television do not decline with age. Children judge social realism primarily on the basis of content cues, often comparing the actions they see on television to their knowledge about the real world, but formal features (e.g., a laugh track) can also contribute to these perceptions. The more television one has habitually watched, the more socially realistic one believes TV in general to be, and the more one finds information in entertainment programming to be applicable to, and useful in, the real world (see Huston & Wright, 1997). Analogous results have been obtained regarding perceptions of the reality of televised violence (Huesmann, Lagerspetz, & Eron, 1984). Children who judged television as both factual and socially realistic were the ones whose beliefs about real-world occupational roles were most like television portrayals of those occupations (Wright, Huston, Truglio, et al., 1995).

**SUMMARY**

The work summarized here represents only a small part of existing knowledge about how children use television to acquire information and knowledge. The medium of television offers a range of forms and formats in which to present content. Children use these forms and formats as guides to attention, aids to comprehension, and guides to the type of
2. HOW CHILDREN WATCH AND LEARN FROM TELEVISION

content being presented. Even in the very early years, children make moment-to-moment decisions about attending or not attending on the basis of their judgments about the likely comprehensibility and interest of the content. With development, they learn to use the conventions of the medium as one basis for those judgments. They are not passive recipients or victims of irresistible perceptual onslaughts, but active users of the medium. And, most important for the real world of children’s experiences, children can learn and retain a range of information from television. When this information is age-appropriate, relevant, educational content, children are likely to learn its messages. We turn now to the exploration of the effects of viewing this type of program.

Developmental Changes in Learning Educational Content From Television

There is strong, consistent evidence that age-appropriate educational television has positive and enduring effects on children’s development. This body of research has largely centered on preschool children, for whom the most prominent and successful example of educational programming is Sesame Street. Its influence has been a frequent subject for inquiry over the last three decades.

Evidence of the Positive Educational Effects of Sesame Street. Sesame Street was the first children’s program to address an educational curriculum with detailed, specified goals. It pioneered the use of formative research to inform production and evaluated the program’s effectiveness with extensive summative research (Palmer & Fisch, 2001). Numerous assessments of Sesame Street, using methods ranging from experimental studies (Ball & Bogatz, 1970; Bogatz & Ball, 1971) to national surveys (Zill, 2001) to longitudinal studies, have confirmed its positive impact among young audiences (see Fisch & Truglio, 2001).

We conducted a 2-year longitudinal study, the Topeka Study, with 271 children ages 3 and 5 to explore the implication of television viewing for early learning skills. We found that watching Sesame Street contributed to preschoolers’ vocabulary development, independent of parent education, gender, the presence of older siblings, parental encouragement of Sesame Street viewing, and parental attitudes toward television viewing (Rice, Huston, Truglio, & Wright, 1990). This benefit, however, was limited to the younger cohort. Three-year-olds who were frequent viewers of Sesame Street showed more improvement in vocabulary scores by age 5 than did...
infrequent viewers. *Sesame Street* viewing at age 5 was not related to vocabulary development by age 7. In fact, analyses showed children in the older cohort who had higher vocabulary scores were marginally less likely to watch *Sesame Street* at age 7, suggesting that these children may have advanced beyond the level of the program.

The Early Window, a second comprehensive longitudinal study of the relations between television viewing and academic skills, conducted with children from low-income families, demonstrated similar results (Wright, Huston, Murphy, et al., 2001). This study was a 3-year longitudinal assessment of the relations between viewing different categories of television content and academic competencies in two cohorts of children (followed from ages 2–5 and 4–7). The sample was ethnically diverse and consisted of children from low- to moderate-income families. The children's viewing information was collected in repeated 24-hour time-use diaries. All programs were coded according to their content and intended audience, yielding the following categories: (a) child-audience, informative or educational; (b) child-audience, noninformative cartoons; (c) child-audience, other programs; and (d) general-audience programs. We controlled for the quality of the home environment and the primary language spoken at home (English or Spanish).

An array of dependent measures was examined: school readiness (e.g., knowledge of colors, shapes, spatial and size relations), reading skills, number skills, and vocabulary. Path analyses, conducted separately for each cohort, indicated that 2- to 3-year-olds who watched more child-audience informative programs scored higher on all four academic measures at age 3 than did those who watched less. Viewing such programs at later ages, however, did not contribute to performance on these measures beyond viewing in the initial period. That is, viewing child-audience informative programs at ages 4 to 5 did not predict test scores at age 5. For the older cohort, viewing at ages 4 to 5 and 6 to 7 were not related to academic skills at ages 5 and 7, respectively. By contrast, viewing child-audience cartoons and general-audience programs at an early age tended to predict low academic skills (Wright, Huston, Murphy, et al., 2001).

With reference to *Sesame Street* specifically, viewers at ages 2 to 3 had an advantage over nonviewers on academic measures at ages 3, 4, and 5, controlling for maternal education, family income-to-needs ratio, the quality of the home environment, the primary language spoken at home, and the child's initial language skills (Wright, Huston, Scan tin, Kotler, 2001). From ages 4 to 7, however, no benefits from viewing were apparent. These two studies were consistent in substantiating the value of
educational television for children from varied backgrounds, but there appears to be an early window of opportunity during which its effects are strongest.

**Effects of Preschool Educational Viewing.** Most educational programming has emerged from the PBS Ready to Learn initiative. More recently, commercial efforts have given rise to innovative educational programs. *Blue’s Clues*, a cable program designed to teach cognitive skills and prosocial behavior, has been enormously popular among preschoolers (Anderson et al., 2000). As with *Sesame Street*, *Blue’s Clues* has been successful in fulfilling its educational goals for its target age group. Three- to five-year-old viewers outperformed nonviewers on various measures of cognitive development, including riddles, Gestalt closure, and matrices (nonverbal skills and problem-solving ability). Viewing did not influence scores on expressive vocabulary or self-esteem measures. Viewers’ caregivers rated them as more flexible thinkers, better problem solvers, and more prosocial compared with ratings of nonviewers. The advantages enjoyed by viewers grew over the 2-year measurement period (Anderson et al., 2000). Whether these positive findings were consistent across ages was unclear, as the investigators did not differentiate between effects on younger and older preschoolers. However, the unique use of episode repetition and layering in *Blue’s Clues* (Crawley, Anderson, Wilder, Williams, & Santomero, 1999) may extend its effects to a wider age range.

Early television viewing appears to have long-term consequences for children’s achievement. In the Recontact Study (Anderson et al., 2001), we tracked 570 adolescents whose media use and family characteristics were studied in detail when they were 5 years old in one of two locations—Topeka, Kansas, or Springfield, Massachusetts. The frequencies of viewing three types of television—informative, violent, and all other programming—in the preschool years and in adolescence were calculated. Teens’ television viewing diets and the total time they had spent watching television as preschoolers were used to predict academic achievement, achievement motivation, leisure reading, extracurricular activities, aggression, health behavior, and self-image in adolescence. Child and family variables known to affect the relation between viewing and outcomes (gender, site, parent education, birth order, and gender-by-site interaction) were statistically controlled.

Analyses showed that viewing child informative programs as preschoolers predicted academic success in adolescents, but more strongly
for boys. Boys who had watched child informative programs frequently in preschool earned higher grades in English, math, and science in high school than did those who watched infrequently. Among girls, viewing and grades were positively, but not significantly, associated. For both sexes, adolescents who had viewed educational programming, particularly *Sesame Street*, as preschoolers reported spending more time reading books not required for school. This contradicts theorists who argue that such programming reduces interest in reading and books. Preschool-aged viewers of child informative programs also perceived themselves as more competent in math and science, and the boys among them placed more value on achievement, particularly in math and science, than did infrequent viewers. We proposed that boys may stand to gain more from the academic and prosocial content in educational shows because such content runs counter to other sex-typed socializing influences for boys.

The processes that translate educational viewing to academic success in adolescence clearly do not involve simple learning of content. Although preschoolers who watched educational programs may have maintained their interest in educational content and gone on to watch informative programs as adolescents, our analyses did not find evidence to support such a path (Anderson et al., 2001). Rather, it seems more likely that early educational viewing initiated a trajectory of learning. Viewers of educational programs master early learning skills, are interested and motivated learners, and, when they enter school, are perceived favorably by teachers. These predispositions set up children for early academic success, and they are magnified over time; as a result, the children become efficacious learners and high achievers as adolescents (Anderson et al., 2001). That is, as young viewers, children learn school readiness skills and positive attitudes toward learning, acquired in part through educational programming, and these carry forward into adolescence (Anderson et al., 2001).

**Older Children's Educational Viewing.** Compared with studies of preschoolers' educational viewing, assessments of educational programming aimed at older age groups have been scarce. Where research exists, it indicates that educational programs with well-designed curricula can offer benefits for older children's academic skills (Huston & Wright, 1997). For example, an evaluation of *Square One TV*—a mathematics show aimed at 8- to 12-year-olds—demonstrated that viewers scored higher in the number and variety of problem-solving heuristics used, as
watched child informative programs frequently in later grades in English, math, and science in high school who watched infrequently. Among girls, viewing was more frequent, but not significantly, associated. For both girls and boys, viewing educational programming, particularly in science, and the boys among them placed more particular interest in reading and books. Preschool-aged children perceived themselves as more interested in reading and books. This contradicts theorists who argue that such sex-typed socializing influences for boys.

Translating educational viewing to academic success does not involve simple learning of content. In fact, who watched educational programs may have had little impact in educational content and gone on to watch more educational programs as adolescents, our analyses did not find evidence to support these explanations. Rather, it seems more likely that early learning skills, are important, and that they may be important at any age. These predispositions set up children for early academic success; as a result, the children who persist and high achievers as adolescents (Anderson et al., 1999) or young viewers, children learn school readiness skills toward learning, acquired in part through watching, and these carry forward into adolescence.

**Educational Viewing.** Compared with studies of educational viewing, assessments of educational programming groups have been scarce. Where research exists, educational programming programs with well-designed curricula can be evaluated. The evaluation of *Square One TV*—a mathematics program designed for 2-year-olds—demonstrated that viewers scored higher on variety of problem-solving heuristics used, as well as the mathematical completeness and complexity of their solutions (Hall, Eady, & Fisch, 1990).

Overall, however, relatively little is known about older children's learning from educational television. Several factors could explain this gap in our knowledge. The role of television in children's learning changes according to the interplay between viewers' ages and program content and form (Rice et al., 1990). Children may simply lose interest in—or be less receptive to—educational programming during the school years, partly due to a lack of age-appropriate programs for older children, and partly due to the possibility that learning academic skills from television plays a less important role in children's lives once they enter school and receive formal instruction (Wright, Huston, Scanlin, et al., 2001).

With regard to program content and form, television is particularly well suited to convey certain kinds of content, such as letters, numbers, words and their meanings, shapes, colors, and so on—content that is most fitting for younger children. The combination of the medium's strengths (e.g., an emphasis on visual presentation, ability to focus attention through production techniques, repetition) and young children's preferences (e.g., repetition; their focus on concrete, visual aspects of content) may make it particularly effective for young children.

Compared with younger children, as noted earlier, older children favor programs with increasing complexity and continuous narratives, themes, or plots (Huston et al., 1990). Older children (10–11-year-olds) are also more interested in fictional and literary content and programs rich in verbal humor, satire, and male–female relationships (Mielke, 1983). Programs such as *Square One TV, Ghostwriter, and 3-2-1 Contact* have appealed to these preferences by incorporating dramatic storylines into certain program segments. For older children, however, television may be more useful for piquing their interest in subjects (e.g., science, geography, society, literature) than for teaching academic content directly (Wright, Huston, Scanlin, et al., 2001). This may explain the absence of effects among older children in studies using only academic skills (rather than, for instance, interest in specific subjects or achievement motivation) as dependent measures.

Currently, educational television remains in the domain of preschool audiences, among whom the strongest relations with learning seem to exist for the younger preschoolers. There is no reason to believe that its benefits are limited to young children, but its potential has yet to be fully realized for older children.
CONCLUSION

We understand a great deal more about how children use television, what engages their attention, and how and what they learn from television than we did 25 years ago. The old view of the zombie child mesmerized in front of the television set has been replaced with a model of a child who actively sifts, judges, and uses television content. Even as new electronic media proliferate, television remains a central part of children's lives, and they watch it almost from birth onward. Cognitive developmental changes lead to changes in viewing and in preference for different types of content. From quite an early age, children begin to learn the forms and formats of the medium; they use these as well as content to make judgments about what is attention-worthy, entertaining, and real or fictional. They spend a great deal of time with content that has no known value to their development, but when they watch programs designed to provide education and information, they can profit considerably. Young preschool children are particularly likely to learn preacademic skills from well-designed television, and early viewing has lasting associations with academic achievement.

REFERENCES


CONCLUSION

Deal more about how children use television, what and how and what they learn from television than the old view of the zombie child mesmerized in front of the television all day. Cognitive developmental changes lead to a different focus of attention, and they watch television differently. Younger children are more likely to passively watch television, while older children are more likely to actively interact with it.

REFERENCES


2. HOW CHILDREN WATCH AND LEARN FROM TELEVISION


Wright, J. C., & Huston, A. C. (1995, June). Effects of educational TV viewing on lower income preschoolers on academic skills, school readiness, and school adjustment one to three years later. Report to Children's Television Workshop, Center for Research on the Influences of Television on Children, University of Kansas, Lawrence, KS.


