
Effects of Planned Television Programming

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Do children learn from educational programming? If so, what is learned, how is it learned, what television techniques are most successful in teaching, and what situational influences in the viewing environment affect learning? These questions provide the focus for the present chapter, which is organized into four sections. In the first two, the effects of planned programming on cognitive skills and prosocial behavior are examined. In the third section, the processes by which children learn from television are explored. The fourth section presents information about what features of television programs and the child's environment enhance or detract from the effectiveness of educational programming.

Cognitive Skills

Early Research

Attempts to use television in a teaching capacity began soon after commercial television was introduced in the late 1940s and early 1950s. The special attractiveness of the medium and its ability to reach large

numbers of Americans raised hopes of massive educational impact despite the fact that similar hopes for educational radio had gone largely unfulfilled (see Schramm, 1962). Educators during this time compared the effectiveness of televised and face-to-face instruction, both in public schools (Craig, 1956; Lathrop, Norford, & Greenhill, 1953; Michael & Maccoby, 1953) and in adult education (Deutschmann, Barrow, & McMillan, 1961; Rock, Duva, & Murray, 1953).

Fairly comprehensive reviews of the studies during these years were provided by Schramm (1962) and Kumata (1960). They reached several conclusions regarding the effectiveness of instructional television: (a) Only in a few well-defined areas did televised instruction produce learning superior to traditional techniques; (b) when effects were apparent, it was generally the brighter students who were helped by television instruction; (c) while some studies demonstrated short-term positive effects of televised instruction, there was no consensus on its effectiveness for long-term retention; (d) the "motivation" of the student was of prime importance in the learning process; and (e) improvement was most likely for topics which benefited from use of concrete examples (e.g., science, math). In short, televised instruction was useful for certain kinds of teaching, but, on the whole, it was no more or less effective than face-to-face instruction.

Early efforts at televised instruction were distinguished from more recent attempts in several respects. Most were aimed at adults and high school students rather than at the children on whom we now focus. Early televised instruction usually consisted of a classroom lecturer filmed by a television camera. When some of television's potential advantages—such as presentations of microscopic phenomena, graphic and dynamic spatial displays, or modeled examples and demonstrations—were later explored, students responded positively and learned, as compared with classroom controls exposed to live lectures (Kumata, 1960). Finally, with a few exceptions, televised instruction was evaluated in the classroom. It was not intended to compete with commercial television in the home, and it wasn't evaluated there.

Schramm (1962) listed the main objections at that time to the use of television as a teaching medium: It could not stop to answer questions; it did not readily permit class discussion; it could not effectively quiz the students; it was not able to adjust to individual differences in learning capacities; and it tended to encourage a passive form of learning versus an active seeking and manipulation of one's environment. Many of these limitations remain at the end of the 1970s. It appeared that these problems were inherent in the medium and that instructional television was an experiment that had largely failed to fulfill the hopes held for it.

A New Approach to Educational Television

During the 1950s and 1960s, there were a few programs on public and commercial television designed to educate or benefit young children, but they drew small audiences and provided little competition for entertainment programming on commercial television. In 1967 a group of academics, researchers, and television producers joined together to create, develop, and produce a series that would entertain as well as educate children. The goals, techniques, and promises of *Sesame Street* went far beyond what had previously been attempted (see Lesser, 1974, for an account of the development of *Sesame Street*). The series had a major impact on the television industry by attracting a mass audience in numbers well above the early predictions of the creators. Partly as a result of its success, a number of similarly styled educational programs appeared on both public and commercial television in the next several years (e.g., *The Electric Company*, *Villa Alegre*, *Big Blue Marble*, *Schoolhouse Rock*). Existing series, such as *Captain Kangaroo*, also incorporated more educational material and a more heterogeneous format. Instructional programming, too, discarded its reliance on the classroom lecture and began to combine education with entertainment.

Several of these series have been subjected to summative evaluations. Our discussion of cognitive effects will focus on the evaluations of *Sesame Street* and *The Electric Company*, prototypes for many others. These evaluations included large numbers of children, diverse geographical areas, varied viewing contexts (school and home), and carefully designed measurement procedures. Exploring their findings in some detail provides information about what and how television can teach effectively.

Research on *Sesame Street*

Much of the formative research for *Sesame Street* was concerned with identifying those program attributes that attract and hold children's attention. Children were observed while viewing the show, and the program segments that got high visual attention were then compared to those that got low attention to determine how they differed. Some of the attributes that were associated with high or low attention are summarized in Table 4.1. Armed with this information, producers presumably included in their next efforts more of those attributes which evoked high attention and fewer of those which evoked low attention. The appeal of the programming increased, and with it, the opportunity to learn.

During the first 2 years *Sesame Street* was broadcast, summative

Table 4.1
 Program Attributes That Are Positively and Negatively Correlated with Children's Visual Attention to Sesame Street and The Electric Company^a

Positive correlates (attributes associated with high visual attention)

Functional action (central to theme or plot)
 Cognitive content with a sparse plot
 Simple, clear language in short speeches
 Rhythm and rhyme
 Lively music
 Children's voices and peculiar voices
 Changes in sound and sound effects
 Clear plot with semipredictable outcome
 Songs and speech that are slow in pace and can be easily understood
 Animation
 Inviting viewer participation
 Childhood conflict situation with build-up of tension
 Showing objects being constructed

Negative correlates (attributes associated with low visual attention)

Long or complex speeches
 Content which can be understood from audio portion alone
 Song and dance numbers
 Men's voices
 Live animals

^a Based on Anderson and Levin (1976); Bernstein (1978); Lorch and Anderson (1978); Rust (1971); and Wright, Calvert, Huston-Stein, and Watkins (1980).

evaluations of the extent to which children learned from it were carried out by Educational Testing Service (ETS), an independent research organization. These evaluations were on a much larger scale than previous research and set a precedent for later summative evaluations (e.g., *The Electric Company*, *Freestyle*). The measures were selected to determine whether or not children had learned the content the series was designed to teach (e.g., letters, numbers, relational terms) rather than to test changes in IQ or more general cognitive functioning. By this procedure, it could be readily discerned whether or not the series was fulfilling its goals. This strategy of teaching and then assessing specific skills is much like measuring academic achievement in traditional education. While measures were also obtained for a wider variety of variables, such as attitudes toward school and vocabulary, these effects were not part of the principal focus of the evaluation.

The basic research strategy was to design a field experiment by creating randomly assigned "experimental" (viewing) and "control" (non-viewing) groups. The experimental treatment, called "encouragement to view," involved contacting mothers to tell them about the series, sending them printed materials, and checking with them periodically to find out

whether or not their children were watching. Control groups were not given specific information about the series. During the first year, the unexpected success of the series created havoc with the experimental design because many of the control group children watched it. Therefore, comparisons were made between children who watched frequently and those who did not, regardless of their experimental condition. In the second year, cities were chosen where the series was available only on cable or UHF. Reception capacity was supplied to the experimental group but not to the control group. These tactics were successful in creating differences in the amount viewed.

Overall, *Sesame Street* accomplished its goals. Detailed reports of the evaluative findings can be found in Ball and Bogatz (1970, 1972) and Bogatz and Ball (1971). In comparing children who were and were not exposed to *Sesame Street*, either in classroom or home settings, it was found that those children who watched the series achieved significantly higher performance gains on the ETS assessment tests. Pretest and gain scores for children who watched different amounts of the series are illustrated in Figure 4.1. Children were assigned to quartiles that were determined by how frequently they watched the series. Children in the lowest viewing quartile (Q1), who rarely or never watched, gained less than did children in the highest viewing quartile (Q4), who watched on the average more than five times a week. In Year 2, children who were encouraged to view gained more than did children who were not encouraged.

The series was effective for most of the subgroups tested. Younger children learned (i.e., gained) more than older children, perhaps because they had fewer skills to begin with. Disadvantaged children who watched frequently gained as much as did advantaged frequent viewers and gained more than did advantaged infrequent viewers. The patterns for each group are shown in Figure 4.1. The finding that advantaged children who watched infrequently gained more than disadvantaged infrequent viewers suggests that advantaged children more often have other sources for learning the skills taught. We will return to this issue. Other comparisons indicated equivalent learning by boys and girls, Spanish- and English-speaking children, and rural and urban children (Ball & Bogatz, 1970).

The majority of significant gains occurred for skills taught directly in the series but there was some evidence of generalization to other skills. For example, after the second year, frequent viewers had significantly higher scores on a test of verbal IQ than did infrequent viewers (Bogatz & Ball, 1971). Frequent viewers also showed some evidence of more positive attitudes about school and were rated higher in performance by their first-grade teachers.

With success came criticism. In particular, one group of researchers

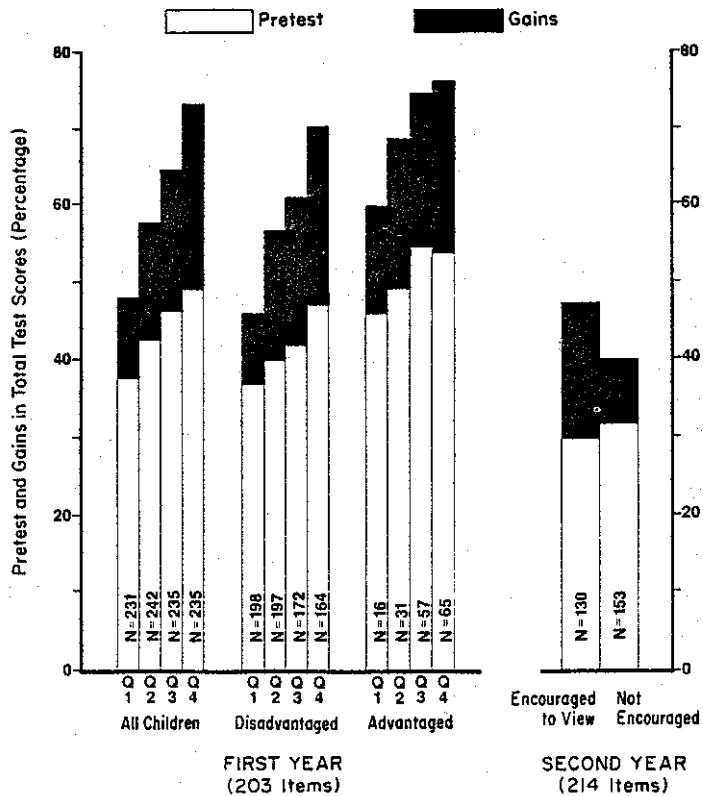


Figure 4.1. Pretest and gain scores on ETS test totals for advantaged and disadvantaged children by quartiles of Sesame Street home viewing (year 1) and by condition (year 2) in percentages. (Adapted from Ball & Bogatz [1970] and Bogatz & Ball [1971].) Q1 = rarely or never; Q2 = 2-3 times per week; Q3 = 4-5 times per week; Q4 = more than 5 times per week.

(Cook, Appleton, Conner, Shaffer, Tabkin, & Weber, 1975) reanalyzed the ETS evaluation data and arrived at much more modest conclusions about the effects of Sesame Street. They argued that because the experimental treatment, "encouragement to view," provided magazines and printed materials and drew mothers into involvement with the series, effects could not be attributed solely to viewing the series. In fact, the results did show greater gains for children whose mothers were "encouraged" than for the control group in which mothers were not encouraged, even when frequency of viewing was similar. Cook and his colleagues argued that the only true indicator of the effect of the series alone was the comparison of frequent and infrequent viewers in the control group. This comparison showed some significant differences, but, perhaps because of small numbers, they were not as general as those for the encouraged group. The issue remains open. The evaluations indicated that, with or without parental involvement, the series could affect some important areas of

children's learning and that interest and involvement by an adult could further increase that learning.

A second major criticism was that *Sesame Street* might be increasing rather than decreasing the gap between advantaged and disadvantaged children. Although disadvantaged children who watched the series gained just as much as advantaged children, Cook *et al.* (1975) argued that fewer disadvantaged children *did* watch it often. The net result was that a larger proportion of advantaged children were gaining from the series. This criticism is difficult to evaluate because their audience figures were based primarily on the first two seasons, before the series became well known among disadvantaged groups. More recent audience data assembled by the producer indicate that large numbers of disadvantaged children watch it (Palmer, personal communication). Moreover, "gap filling" was not one of the goals of the series. Instead, it was designed to be an effective teacher of disadvantaged children who, as the evaluation demonstrated, have fewer alternative sources for learning the skills taught. Perhaps critics should work on finding ways to increase viewership by disadvantaged children rather than condemn a program because it teaches too well.

Educators have also criticized the fast-paced format as a possible contributor to hyperactivity, impulsivity, and behavioral problems in the slower-paced environment of public school (Bronfenbrenner, 1976; Singer & Singer, 1979; Sprigle, 1972). However, experimental and field studies have not indicated that such problems result from viewing (Anderson, Levin, & Lorch, 1977; Ball & Bogatz, 1970).

Research on The Electric Company

Soon after *Sesame Street* came *The Electric Company*, a series aimed at teaching reading skills to children in early primary grades who were poor readers. The goals were limited more to academic skills than were those for *Sesame Street*. Three basic reading strategies were emphasized: (a) *blending*, discriminating, and combining phonemes; (b) *chunking*, or recognizing and processing certain letter groups as single units; and (c) *scanning for patterns*, or searching text for units that may affect pronunciation. *The Electric Company* viewers were taught to discriminate vowels from consonants, to scan for typical word structures, to learn strategies of reading for meaning, and to use the context of a sentence to determine the meaning of an ambiguous word.

The summative evaluation of *The Electric Company* (Ball & Bogatz, 1973) was designed to assess whether or not child viewers of the series achieved the curriculum goals. The evaluation research design, sampling procedure, and measurement techniques were parallel to those in the *Sesame Street* evaluation. Again, the specific skills taught in the series were measured with a specially constructed ETS test—The Electric Bat-

tery. A standardized reading test was also used to measure generalization. Children participated in a series of experiments either at home or in school. Each assessment section was designed to evaluate and compare the performance of the experimental groups, who viewed or were encouraged to view *The Electric Company* segments, and that of control children, who either did not view (school) or were not encouraged to view (home).

The effects of schoolroom viewing were positive. At all ages, the viewing classes had significantly higher overall performance than did the nonviewers. These effects were most pronounced on *The Electric Battery*; they were less consistent on the standardized reading test. Like *Sesame Street*, the benefits were especially strong for those skills taught specifically by the series. For first grade children, improved performance, both over their own pretest and compared to control children, was observed on the scales which measured blending, chunking, scanning for patterns, and reading for meaning. For third and fourth grade participants, significant performance improvements occurred in the area of blending and also for some chunking tasks. No effects on the individual scales were observed for the second grade children, although, again, when all scales were totaled, experimental children outpaced controls. At-home viewing produced no significant effects. The evaluators attributed this outcome to the fact that the experimental children who were encouraged to watch at home did not view significantly more than did the controls. In addition, school viewing was accompanied by related curriculum materials and rehearsal by teachers; children who watched at home did not have additional learning aids.

Summary

Evaluations of *Sesame Street* and *The Electric Company* demonstrated that children could learn intellectual skills from television productions that were designed to be both entertaining and instructional. Television was an effective teacher for disadvantaged children and for children as young as 3. Home viewing was effective for teaching preacademic skills to young children, but it was not effective for teaching reading to elementary school-age children. Some skills, such as letter and number recognition, were learned more effectively than others. In all cases, learning from the televised series was enhanced when supplementary learning materials and/or an interested adult were available.

Prosocial Behavior

In the decade of the 1970s there was a notable increase in the production of series designed to teach prosocial behavior and attitudes. Series such as *Inside/Out* and *Ripples* were produced for in-school broadcasting,

the Emergency School Aid Act (ESAA) funded such multicultural series as *Vegetable Soup* and *Villa Alegre* for both home and school viewing, commercial networks produced such series as *Fat Albert* and *the Cosby Kids*, and the Public Broadcasting Service (PBS) carried *Misterogers Neighborhood*, ESAA series, *Sesame Street*, and others. This is not to imply that production of programming designed to affect cognitive skills or to teach traditional academic subjects ceased in the 1970s, but rather to indicate the broadening of the educational goals which television was willing to tackle.

A pioneer in such programming was *Misterogers Neighborhood*, a PBS production that originated in the 1960s. In that program, a friendly adult introduces the viewer to such emotional issues of childhood as birth of a sibling, feelings of anger, and loneliness. Cooperation, caring, helping, empathy, kindness, task persistence, self-acceptance, and other prosocial attitudes and behaviors are demonstrated in live vignettes and in a fantasy "Neighborhood of Make Believe" by puppets and actors. The program is slowpaced, deliberate, and reflective. Mr. Rogers talks directly to the viewer, uses the singular "You are my friend" rather than the plural, refers to the program as a visit with the child, and employs other techniques designed to give viewers a feeling of individual communication with him.

In general, prosocial programming has not been evaluated as extensively as *Sesame Street* and *The Electric Company*. The ESAA series are, because of the legislation under which they were funded, most likely to have undergone some summative evaluation. Even these, however, are likely to be more limited in the size and representativeness of the sample studied and in the length of the viewing period over which effects are assessed. Nonetheless, we do have some information about the effects of such programming. This information is organized here into work on learning and behavioral effects with preschool and then elementary school children and work on attitudinal effects for children of all ages.

Research on Behavioral Effects on Preschool Children

Most research on *Misterogers Neighborhood* was designed to test hypotheses about the ways in which children might learn prosocial behavior from television rather than to evaluate the effects of the series. One of the first studies (Friedrich & Stein, 1973; Stein & Friedrich, 1972) was a 9-week field experiment to compare the effects of daily viewing for 4 weeks of *Misterogers Neighborhood*, aggressive cartoons, or neutral programs on the natural behavior of nursery school children in the classroom. Children who saw prosocial television increased in task persistence as compared with the other two groups. Improved prosocial interpersonal behavior (cooperation, nurturance, and the like) also occurred for viewers

from lower social status families. In other studies, similar increases in prosocial behavior have been found using both laboratory and naturalistic observations. In many instances, however, the changes were limited to certain categories of behavior, to subgroups within the sample studied, or to groups who received additional rehearsal or help in understanding the television program (Coates, Pusser, & Goodman, 1976; Friedrich & Stein, 1975; Friedrich-Cofer, Huston-Stein, Kipnis, Susman, & Clewett, 1979; Shirley, 1974; Singer & Singer, 1976; Singer, Singer, Tower, & Biggs, 1977; Stein & Friedrich, 1975a, 1975b).

Although teaching social skills was a secondary goal of *Sesame Street*, some segments emphasized cooperation and taking another person's point of view. Evaluations of these materials indicated that children do learn concepts like cooperation and often imitate the televised behavior if they are put in a situation like the one on television, but no generalized effects on their social behavior have been found (Leifer, 1975; Paulson, 1974).

Research on Learning and Behavioral Effects on Elementary School Children

Commercially made programs with prosocial content and instructional programming for schools are often aimed at elementary school children rather than at preschoolers. One such series, *Fat Albert and the Cosby Kids*, contains episodes dealing with topics such as the arrival of a new baby, divorce, safety, being proud of a father's job even when it is menial, and liking activities that are stereotyped for the other sex. Evaluations by the CBS research department (CBS Broadcast Group, 1974; CBS Economics and Research, 1977) show that elementary school children understand the messages in most of the programs quite well, even when they watch at home under natural conditions. In a more recent study (Watkins, Calvert, Huston-Stein, & Wright, in press), 8- to 10-year-olds recalled most of the content, but 5- to 6-year-olds did not recall it well unless they had some additional help understanding the program messages.

In addition to understanding prosocial messages, children also show increased prosocial behavior in laboratory tasks after seeing commercially-made prosocial programs. For example, W. A. Collins and Getz (1976) found that children from fourth to tenth grade were more helpful to a peer after seeing an action-adventure program containing constructive, cooperative problem solving than after seeing a neutral program or an aggressive program. Similar positive effects occurred when children saw a version of *Lassie* with a prominent theme of helpfulness (Sprafkin, Liebert, & Poulos, 1975). One caution about such findings, however, is that the positive effects of prosocial behavior can be eclipsed and distorted if the same characters are also aggressive. Liss and Reinhardt

(1979) found that young children who saw a version of *Superfriends* in which there were both a prosocial theme and violent treatment of the villain were not only less helpful than those who saw a "pure" prosocial version, but they were also more aggressive than a group who saw straight violence. Apparently the prosocial nature of some of the characters who were also aggressive served to justify their aggressive behavior and make it worthy of emulation.

While the preceding studies all show some prosocial effects in rather carefully controlled testing situations, there is some question about how much these behavioral changes generalize to everyday life. One field-correlational study of prosocial television viewing and natural behavior provided little evidence for widespread effects (Sprafkin & Rubinstein, 1979). Another correlational study in which home viewing was related to self-reported prosocial behavior indicated positive, but very weak relationships between viewing and behavior (Atkin & Greenberg, 1977; Reeves, 1977).

Research on Attitudinal Effects

Television can also influence children's attitudes toward minorities, foreigners, and people who are in other ways "different" from themselves. In two laboratory studies, preschool children expressed more positive attitudes toward children of other ethnic groups or toward general individual differences among children after seeing segments of *Sesame Street* or *Misterogers Neighborhood* that were devoted to those themes (Collins, H. L., 1976; Gorn, Goldberg, & Kanungo, 1976). Early research demonstrated that British children became less ethnocentric after seeing a series of programs on the BBC that presented people from other nations in a positive context (Himmelweit, Oppenheim, & Vince, 1958). In the 1970s the ITT-sponsored *Big Blue Marble* series presented exciting, colorful vignettes about children and adolescents all over the world. A summative evaluation of the reactions of children in fourth through sixth grades indicated that the children liked the program and that their attitudes toward children from other parts of the world became more positive after viewing it. They also became less ethnocentric in the sense that they less often considered U.S. children to be superior to other children and more often thought children in other countries were healthy and happy. A short exposure led to considerable changes in children's preceptions of their world (Roberts et al., 1975).

Summary

We conclude from this literature that children can learn prosocial ideas from television, even at a young age, and that they sometimes put those themes into practice in their own behavior. It is unclear, however,

how much the behavioral changes generalize beyond the specific situations or contexts suggested by the television programs or beyond the environment where the children watch the programs. The most pronounced effects have been shown when children are placed in situations that are identical to or very similar to those seen on television (e.g., situations like those shown in the cooperation segments on *Sesame Street*) or in a laboratory environment where the television program may be unusually salient. When prosocial programs are shown in school, children sometimes generalize to behavior where neither the situation nor the child's response matches the televised content, but such effects are less consistent. We know little about the effects of viewing prosocial programs at home under natural conditions.

The Process of Learning from Television

The fact that children can learn cognitive skills and prosocial behavior and attitudes from television raises many questions about how that learning occurs. The skills acquired by *Sesame Street* viewers, for example, are not simple imitative repetitions of program content. Rather, they involve concepts and knowledge which must be generalized beyond specific instances. One of the strengths of the series is that each concept is illustrated repeatedly in a wide variety of ways. The most simplistic explanation for the process by which exposure leads to learning is based on an additive exposure model—children who watch more learn more. Children who see the same concept illustrated repeatedly in different ways may be increasingly likely to assimilate its important elements in a meaningful, durable, and generalizable way.

Active Processing of Televised Material

While some minimal level of exposure is obviously necessary for learning, any comprehensive explanation of the process of learning from television must go beyond an additive-exposure model. In a laboratory study, Lorch, Anderson, and Levin (1979) manipulated exposure to an episode of *Sesame Street* by providing toys in the viewing room for some of the subjects and no alternative activity for the remainder. Although children who viewed without toys watched almost twice as much as did those with toys, the amount learned from the program was virtually identical for the two groups. Thus, induced exposure to the program did not improve learning. Within the treatment groups, however, children who watched more learned more. The authors suggested that the comprehensibility of program material guided attention—that is, children were more attentive when they understood the content being presented. This interpretation and some of the results reported for prosocial programming sug-

gest that learning from television involves active selection and processing by the child, rather than passive reception, and that the match between the program material and the child's level of understanding is an important determinant of learning.

Television Form and Content

Another approach to understanding the process of learning from television has emphasized the fact that television presents information in forms and formats that are different from books, instructional materials in schools, or other sources from which children might learn. Children's learning from television may be a function of their ability to process both the form and the content that are presented. Understanding the forms of television should result from general cognitive development and from television viewing experience (Huston-Stein & Wright, 1977; Salomon, 1979; Wright, Watkins, & Huston-Stein, 1978). Salomon (1979) described some television features as filmic codes, or representatives of a complex symbol system, which require decoding before children are able to understand the messages intended. He suggested a series of learning steps that enable children to break the symbolic codes of television in order to extract its content. These theories propose that the forms of television can serve as syntactic organizers and symbols that help the knowledgeable viewer to process the content; they can also be confusing to a naive television viewer. Therefore, general familiarity with the medium should contribute to the child's ability to process televised content.

Children may also learn specific formats that are repeated in a particular series when they view it frequently. Palmer (1978) suggested that these repeated formats become the basis for "learning sets," or expectancies for particular skills or content. For example, when the song, "One of these things is not like the others," begins on *Sesame Street*, regular viewers know that a sorting (or oddity) problem is coming. They are set to think about classes of objects and to look for similarities and differences. Once these expectations have been learned through repeated exposure, the familiar viewer can learn more effectively from a given segment than can the naive viewer, who has to decode all the material presented at once.

Television Form and Mental Skills

In Salomon's view (1979) filmic codes serve not only as vehicles for transmitting content, but also as representations of mental skills or operations in their own right. For example, a zoom-in on one part of a complex array represents the mental operation of analyzing a stimulus into its parts. Showing an object from several different angles may be parallel to

the mental skill of perspective-taking. Several experimental studies with older children have demonstrated that they can learn parallel mental skills from these film techniques (Salomon, 1979).

A longitudinal study of "television-naive" children in Israel who were exposed to *Sesame Street* provided further support for the idea that children can learn mental skills from the forms of the series as well as acquire the knowledge presented in the content. When the series was first shown in Israel, children had little experience with television of any kind, particularly programs using the elaborate production techniques employed on *Sesame Street*. Preschool children who saw the series gained knowledge of the content areas presented (e.g., letter matching, relational concepts, and classification). Second and third graders, however, improved not only in their knowledge of some content areas but also in the skills conveyed by the filmic codes (e.g., analyzing complex visual stimuli, perspective-taking). Salomon suggested that the preschool children processed whatever content could be understood without active decoding of the symbolic codes of the medium but that the older children acquired the ability to use those symbolic codes in their own thinking.

Children also used their understanding of media codes to extract the content knowledge from the programs. Before viewing *Sesame Street*, knowledge of those content elements taught by the program was unrelated to mastery of the mental skills needed to understand the media codes. At the end of the broadcasting period, this relationship remained unchanged for the younger children who viewed infrequently. However, for the older children who consistently viewed *Sesame Street*, the relationship between the two steadily increased. Once children became adept at understanding the meaning of the symbolic techniques used in educational television programming, they became increasingly adept at learning the content presented by the medium. When this ability was acquired by the older Israeli children, they became more capable of extracting the program content (Salomon, 1976, 1979).

If television viewing experience contributes to understanding media codes, one would expect American children to show such understanding at an earlier age than would the Israeli children who had had little television experience. The effects of *Sesame Street* on the two cultural groups cannot be directly compared, but one study of older children, fourth and sixth graders, did include a direct comparison (Salomon, 1979). Children's mastery of the mental skills conveyed by television form (e.g., perspective taking, visual analysis) was positively correlated with home television viewing only for Israeli fourth graders. Israeli children actually engaged in more "literate viewing" (i.e., they recalled more television content) than did Americans. This result may indicate that American children of both ages had already gained whatever benefit was possible from television exposure, as had the older Israeli children. Alternatively, this result

may reflect a fact about television viewing in the United States that complicates all findings that attempt to relate amount of home viewing to comprehension. The demographics suggest that children in families with higher income, employment, parent education, or intelligence watch less television than do other children (Comstock, Chaffee, Katzman, McCombs, & Roberts, 1978). Thus, those who watch the most television are less advantaged and, in general, less likely to excel on any comprehension test. In Salomon's U.S. sample, this fact may have prevented the expected positive effects of viewing on comprehension from appearing in the data.

In summary, learning from television occurs at several levels. At one level, children learn a variety of skills, behaviors, attitudes, and information—the program content—through active selection and processing of material that is comprehensible to them. At a second level, they learn formats that are specific to a particular program or setting which can serve as learning sets to facilitate understanding of content. At a third level, they learn those more general television forms that provide the syntax or symbolic codes of the medium, which in turn can be used to decode and understand a wide variety of content presentations. These symbolic codes also teach mental skills directly to the extent that they represent mental operations.

Enhancing Children's Learning from Television

Even though television can teach many things at different levels, broadcast television as it existed at the end of the 1970s has several inherent properties that limit its instructional power. It is a one-way medium that transmits information to a child who may sit "passively" receiving. Material is sequenced in a fixed pattern and rate over which the viewer has no control. There is no opportunity for the child to return and review earlier segments or to control the rate of presentation. There is no way to provide individual feedback or to tailor presentations to individual learning needs or histories. Information is presented in a temporal succession, so the child often must integrate temporally separated bits (Wright, Watkins, & Huston-Stein, 1978). Technological changes may remove many of these limitations, greatly increasing the teaching potential of television beyond what we have been able to report today. Within the limitations of the current state of the medium, however, there are a number of variables that may enhance or detract from the effectiveness of educational content. These variables fall into two broad categories: those that are part of the television production itself and those that are part of the child's own living and viewing environment.

Television Program Variables

A number of techniques have been developed by Children's Television Workshop and other production groups to make the viewing child active in the learning process. For example, songs have been presented once by a singer, then the music and visuals have been repeated without the voice so that the child would fill in the words (Palmer, 1978). In a series of experiments conducted by Dennis (1977), pauses were inserted in the middle of segments designed to teach classification and sorting. In one case, a narrator told the child to point to the right answer. This procedure increased preschoolers' active pointing and verbalizing and, in some cases, improved their learning from the segments.

Production features can also be used to increase children's interest in prosocial programming and/or their understanding and likelihood of adopting prosocial behavior. Susman (1976) created versions of a game show in which sharing was verbally labeled by a major character and/or visual attention was focused on that behavior through zooming in when it occurred. Children who saw the versions with verbal labeling shared more than did those who saw unlabeled versions, and visual focusing added slightly to the effect. Such verbal labeling and explanation must be used carefully and sparingly if they are to be effective. In a later study by Watkins (1979), narrated explanations of program themes in a videotape of a *Fat Albert and the Cosby Kids* program produced little improvement in comprehension.

Visual and nonverbal auditory features can be used to improve learning. For example, after seeing an episode of *Fat Albert and the Cosby Kids*, children recalled correctly those central themes that had been presented with high levels of action by the characters and with perceptually salient visual and auditory features (special effects, loud music, and the like). When central content was presented primarily through verbal dialogue, children did not recall it as well (Calvert, Watkins, Huston-Stein, & Wright, 1979).

Environmental Variables

Viewing with an adult who explains, asks questions about, or demonstrates the central content helps children understand and incorporate prosocial themes. Watkins *et al.* (in press) found that the explanations that had been relatively ineffective when narrated during pauses on the *Fat Albert and the Cosby Kids* program were quite effective when provided by a co-viewing adult. Parent participation in children's viewing also increases learning of cognitive skills from television. In the summative evaluations of *Sesame Street*, children in the "encouragement to view" treatment gained a little more than did the controls even when the amount of viewing was comparable. The possibility that this may have occurred because mothers in the experimental treatment were more in-

volved in the child's viewing and learning from the series was tested experimentally in Israel. Children whose mothers had been encouraged to watch *Sesame Street* with them showed more-improved performance on measures that assess learning of specific series goals than did children whose mothers had not been so encouraged. The effect was particularly apparent for children from lower class homes (Salomon, 1977, 1979).

Although it is fairly clear that adult involvement in the child's viewing increases learning, it is not so clear why that happens. An adult who views with a child may aid learning through serving as a model of attention, interest, or liking; through focusing the child's attention; through verbal labels or clarifications; through eliciting the child's verbal statements about what has happened or will happen; or through indicating how program segments are examples of more general concepts. Available studies do not enable one to determine which of these processes is most important, but it is likely that the conceptual organization provided by verbal labels and explanation is one essential component. Our earlier discussion indicated that simply increasing attention would probably not improve learning greatly but that encouragement to review and anticipate may elicit deeper levels of processing than the child would spontaneously undertake.

Parents may also offer value judgments during viewing that affect the child's acceptance of prosocial educational content. Atkin and Greenberg (1977) found that children who reported that their parents often commented positively about prosocial actions in television programs were more likely to be responsive to those programs than were children whose parents were less involved.

Toys, books, puppets, play materials, and activities can all serve as means for children to rehearse and clarify prosocial television content. In one study of *Misterogers Neighborhood*, children who were told stories with relevant themes after viewing understood the content of the programs particularly well, but those who practiced role playing of program events were most likely to be helpful in a behavioral test (Friedrich & Stein, 1975). Similar patterns emerged from a field experiment in which groups of Head Start children saw a series of *Misterogers Neighborhood* programs in their classrooms. Increased prosocial behavior occurred only in those classrooms supplied with play activities and materials designed to stimulate verbal and behavioral rehearsal of the televised content (Friedrich-Cofer *et al.*, 1979).

Conclusion

Educational messages can be clarified and made memorable to children, not only by presenting them in a novel way on television but also by attending to the entire context of the viewing situation—be it the classroom, an experimental setting, or the home environment. The studies

we have just reviewed illustrate that the medium of television is only one facet of the educational experience. It should not be expected that children will learn much through simple observation of television without active involvement in the process. This involvement can be occasioned by the way in which the program itself is constructed (Wright, Watkins, & Huston-Stein, 1978) and by parents and teachers, who help to explain actions, intentions, and motives of characters, sequence and causality in the plot, and the like. By so doing they can involve the viewers in active processing of television information. As an analogy, few would believe that children might easily learn if schools consisted only of books with no instructors. Researchers and educators must be aware that the learning context, of which television is only a part, is a combination of all its components and that all are necessary for efficient learning. This does not argue against the effectiveness of television for presenting educational information in new and creative ways; it only underscores its value within the total learning experience.

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