Children and Television: The Visual Superiority Effect Reconsidered

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Through a review of the literature, it was demonstrated that the visual superiority effect is confounded with comprehensibility of auditory-verbal information, and that comprehensibility, rather than modality of presentation, is the critical element in children's television processing. Four issues were examined: (a) evidence for a visual superiority effect, (b) comprehensibility of program content as a determinant of visual attention, (c) centrality of information presented in the auditory and visual modalities, and (d) the need for age-appropriate linguistic forms in the language of television. Such a discussion has implications for how best to present educational information to young children through television. Suggestions for future research are offered.

Some investigators argue that television is primarily visual. They contend that there is a "visual superiority effect" in which the visual modality of television is more salient and memorable for young children than is the auditory component. The auditory modality is considered to be of secondary importance, serving primarily to supplement the processing of the visual images presented. Other researchers, however, have begun to acknowledge that the auditory modality contributes more than merely a supplement to children's visual processing of television. They argue that the auditory modality plays an integral role in the young child's viewing experience, not only by signaling when it is important to look, but by conveying important information through language.

One problem with the auditory component of television is that the typical language of television is abstract, requiring symbolic knowledge to pro-
cess the semantic information. The information received through the visual modality is more concrete and similar to everyday perceptual experience than most of the information received through the auditory modality. Young children, such as preschoolers, whose linguistic abilities are less developed than those of older children and adults, probably find the visual images more comprehensible than the auditory features because of their relative simplicity, thus leading to a prediction of greater reliance on the visual modality to process program content.

It is possible, however, that visual superiority has been confounded with the incomprehensibility of the auditory-verbal component of television. Some investigators (e.g., Gibbons, Anderson, Smith, Field, & Fischer, 1986) note that research which supports a visual superiority effect has not considered the relative complexity and comprehensibility of each modality, particularly with regard to the language of television. In other words, modality comparisons have been made without consideration for whether or not the language of television was as comprehensible — or could be made as comprehensible — as the visual component. Given the use of linguistic forms appropriate to young children’s language abilities, the dialogue and narration of television could be made as comprehensible and attention-worthy as visually presented information.

The purpose of this article is twofold. Through a review of the literature, it will be demonstrated that, first, the auditory modality plays as important a role as the visual modality in making program information comprehensible. It will be argued that the language of television is an essential element in this process and that the auditory-verbal component can convey important, central information which is comprehensible to young children. Second, and more importantly, it will be demonstrated that comprehensibility of information presented, rather than modality of presentation, is the critical element in young children’s processing of television. Regardless of the modality in which information is presented, young children will attend to that which is comprehensible and meaningful to them in order to process program content.

The literature will be organized around four themes. First, evidence for a visual superiority effect will be examined. The data suggest that while a visual superiority effect exists in some contexts, the visual and auditory modalities act in concert to enhance program comprehensibility for young children. Second, evidence will be discussed which supports the proposition that comprehensibility of information, rather than modality of presentation, serves as the primary determinant of attention. The function of the auditory component in enhancing comprehensibility is demonstrated. Third, centrality of information presented in each modality will be reviewed. Fourth, and finally, the usefulness of employing linguistic forms appropriate to young children’s linguistic abilities will be demonstrated.
The importance of such a discussion lies in how best to present information to young children through television. A fuller understanding of the function of the auditory modality, and its relation to the visual modality in enhancing comprehensibility of program information, might allow us to convey educational and prosocial messages more effectively to young children.

**Television and the Visual Superiority Effect**

A number of studies have found that when young children process televised information, they rely more heavily on the visual than on the auditory component, a phenomenon described as the "visual superiority effect." Donald Hayes and his colleagues, for example, found that preschool-age children failed to detect an auditory mismatch with a visual presentation, suggesting that the children processed the auditory information at a superficial level (Hayes & Birnbaum, 1980). When the auditory and visual tracks were congruent, a visual superiority effect was found in that recognition was better for items assessing information presented only in the visual modality versus only in the auditory modality (Hayes & Birnbaum, 1980; Hayes, Chemelski, & Birnbaum, 1981). Moreover, the magnitude of the visual superiority effect increased when the children were instructed to remember the program content (Hayes et al., 1981). When asked to recall the content of a story presented either in a television format (both auditory and visual) or a radio format (auditory only) preschool children made significantly more misinclusion errors (including events and characters not a part of, or not logically inferred from, the story) and distortion errors (story events and characters incorrectly described) in the radio condition than in the television condition, with the distortion errors occurring exclusively in the radio condition (Hayes, Kelly, & Mandel, 1986). The only instance in which the visual superiority effect disappeared was for recognition of information presented in both modalities (Hayes & Birnbaum, 1980) which might have been due to some mediating property of the visual modality. Indeed, presenting visual information with accompanying auditory information has been found to help mediate the processing of verbal content. One study found that elementary school children's story comprehension was better when it was presented in either a television format or storybook with pictures than when presented in a radio format, even though the test items were based primarily on auditorily presented material (Pezdek, Lehrer, & Simon, 1984). Similarly, visual mediators have been found to facilitate preschool children's sequential processing of televised events to a greater degree than auditory mediators (Hayes & Kelly, 1984). Finally, in a related study using high school students, individuals higher in visual/spatial processing ability better comprehended television news segments relative to
students higher in verbal processing ability, again suggesting that the visual modality mediated verbal information (Pezdek, Simon, Stoeckert, & Kiely, 1987).

One reason for the visual superiority effect of television can be drawn from the experimental literature. Posner, Nissen, and Klein (1976) suggest that visual stimuli are not as automatically alerting as stimuli presented in other modalities. Colavita (1974), for example, found that adults' recognition reaction times to an auditory tone were quicker than to a light (visual cue) when the two stimuli were presented separately, indicating an inferior alerting capability of the visual modality. When the two modalities were presented together, subjects responded more often to the light than to the tone. Guttentag (1985) found similar results with children as young as four years of age. Therefore, to process visually presented information, one must actively attend to the visual event, resulting in the reduction of attention to other modalities.

Such a phenomenon may occur when children view mismatched audio and visual stimuli on television. For example, one study found that kindergarten children's auditory comprehension in an audiovisual mismatch condition was significantly less accurate than auditory comprehension in an audiovisual match or auditory-only condition, suggesting that the children reduced auditory attention in order to process more closely the visual modality (Pezdek & Stevens, 1984).

However, while visual superiority is found with mixed modality presentations, it would be inappropriate to suggest that visually presented material is usually sufficient in and of itself for good comprehension of program content. Pezdek and Stevens (1984) found that kindergarten children's memory for both auditorily and visually presented information was significantly reduced in a mismatch condition relative to a match treatment, albeit with auditory comprehension suffering more. Furthermore, Rolandelli, Wright, and Huston (1985) found that 5- and 7-year-old children's visual attention and comprehension were significantly enhanced when the youngsters were presented narrated versions of television programs relative to nonnarrated versions of the same programs, even though the programs were originally produced to be fully comprehensible without narration or dialogue. The narration appeared to make the programs more comprehensible or interesting and thus more attention-worthy. It appears, therefore, that while the visual modality has been found to facilitate auditory processing, the auditory component can facilitate visual processing as well.

Moreover, it might be more parsimonious to state that congruent audiovisual presentations are more effective in conveying information than single-modality presentations, regardless of whether the single-modality stimulus is auditory or visual. Congruent audiovisual presentations can maximize the opportunity for children to obtain program information from
two modalities rather than one, making the program more comprehensible.

Indeed, there is evidence to suggest that comprehensibility of the information conveyed, rather than the modality in which it is presented, is the critical element in children’s processing. Regardless of modality of presentation, children will attend to that which is comprehensible in order to process program content. The evidence also indicates that the auditory component alerts the viewer to what is comprehensible or interesting in the visual modality.

Comprehensibility of Program Content

According to several investigators (e.g., Anderson, Lorch, Field, & Sanders, 1981; Huston & Wright, 1983; Lorch, Anderson, & Levin, 1979) comprehensibility is a major determinant of visual attention. The auditory component signals what is comprehensible and worthy of visual processing. Children monitor the soundtrack at a nonsemantic level and listen for particular auditory formal features which, they have learned, signal comprehensible, informative, interesting content. When interest is triggered, children will visually attend to the screen, and maintain both visual and auditory attention in order to assess the meaning of the content for as long as the material is comprehensible.

Lorch et al. (1979) found, for example, that visual attention was greater for 5- and 6-year-old children who viewed a program without toy distractors than for those children who viewed with the distractors. Greater levels of visual attention, however, did not facilitate comprehension of central information any more than lower levels of visual attention displayed by children in a toys-present viewing condition. Nonetheless, visual attention was positively related to comprehension to the extent that those segments of the program most poorly understood received relatively low visual attention while those portions which were better understood received relatively high visual attention. Pezdek and Hartman (1983) found that in a video-only television presentation with no auditory accompaniment, the presence of toys significantly reduced 5-year-old children’s comprehension and visual attention, presumably because auditory stimuli were not present to draw their attention away from the toys. When competing stimuli are present children monitor the soundtrack for comprehensible, attention-worthy content, and only then direct their visual attention to the program.

Similarly, studies conducted in both Japan and the United States reveal that the use of incomprehensible speech (e.g., backward speech, foreign language) reduces preschool children’s visual attention to a program relative to when the auditory-verbal component is comprehensible (Akiyama &
Kodaira, 1987; Anderson et al., 1981). When speech was comprehensible, visual attention was enhanced particularly during portions of the program which required close attention to the auditory-verbal track in order to understand the program plot (Akiyama & Kodaira, 1987).

Children can understand auditory-verbal content even with little visual attention. Pezdek and Hartman (1983) found that when children were given a congruent audiovisual presentation where central information was conveyed only auditorily through dialogue, the presence of toys reduced visual attention but not comprehension. Contrary to what proponents of a visual superiority effect indicate, the children were able to comprehend program material through the auditory modality without visual mediators.

Thus, comprehensibility rather than modality of presentation appears to be a critical factor in children's processing of televised information. Children can and do use either auditory or visual information to understand program content. The auditory component serves two functions: it signals attention-worthy, comprehensible content for visual attention, and it conveys information linguistically which can usually be understood independent of the visual modality.

**Centrality of Auditorily and Visually Presented Information**

While young children are able to process auditory-verbal information on television, when it is presented in a comprehensible way, some investigators are concerned with whether the information processed is central to the program. If not, the auditory modality in general may be an inappropriate means for presenting important material.

Some researchers have found that the recall of central information by children is comparable for the visual and auditory modalities (Beagles-Roos & Gat, 1983; Lorch, Bellack, & Augsbach, 1987; Meringoff, 1980). Other investigators have found that central information is better recalled by children, particularly preschool youngsters, when presented through the visual modality than through the auditory modality; incidental information is better recalled either through the auditory modality than the visual modality or at least equally well through both the auditory and visual modalities (Hayes et al., 1986; Watkins, Calvert, Huston-Stein, & Wright, 1980).

Hayes and his colleagues question the results of studies reporting comparable comprehension results across modalities (e.g., Beagles-Roos & Gat, 1983; Meringoff, 1980) and argue that the verbal information children recalled was incidental rather than central to the program plot (Hayes et al., 1986). Hayes et al. contend that program content needs to be assessed in order to determine the degree of importance of information presented at various points in the story. Only then can investigators accurately draw conclusions about recall of incidental and central content presented in the visual and auditory modalities.
Two recent studies which have formally assessed central and incidental content have yielded mixed results. Hayes et al. (1986) found that while preschool children, presented with a radio version of a story, naturally relied more on dialogue and sound effects in recalling story events, the increased use of auditory and verbal features was generally not related to the recall of central information. On the other hand, Lorch et al. (1987) using a televised presentation, reported that preschool children’s recall of central content was comparable for material presented only in the auditory modality, only in the visual modality, or in both modalities. It is, however, possible that the visual component of the televised presentation mediated processing of central auditory information, even though the visual information itself was not of central importance.

It is unclear from the evidence discussed here if central information is better understood through the visual modality or understood equally well through either the auditory and visual modalities. The issue, however, is an important one. If Hayes and his colleagues are correct, greater effort should be made to present central information through the visual modality so as to maximize young children’s processing of televised material. Nevertheless, the reported visual superiority effect for processing of central information could be attributed to another factor, namely, the nature of the language used in television. Language does contain central information. As noted earlier, however, the language of television often is linguistically too complex for young children. Modality might, therefore, be confounded with complexity or comprehensibility. If provided with linguistically appropriate forms, young children may be able to comprehend central information through the narration or dialogue of television.

**Linguistic Complexity of Television**

While few studies have examined the linguistic complexity of television programs, many researchers acknowledge that much of the auditory-verbal content of television is linguistically too abstract for young children, rendering it incomprehensible, a difficulty generally not found with older children and adults whose linguistic abilities are more sophisticated (e.g., Field & Anderson, 1985; Gibbons et al., 1986). The visual component of television might be more memorable and useful to young children because it is less abstract, requiring little symbolic knowledge and thus making it more comprehensible than the auditory-verbal modality. In other words, young children may have to look more than listen if they want to understand the content of television because the linguistic information is often incomprehensible.

Gibbons and her colleagues propose that the visual component of television probably presents more character action while the auditory modality presents mainly dialogue. Moreover, they note that dialogue is usually
abstract while actions are more concrete and thus may be more memorable than dialogue. Hence, the visual superiority effect may actually reflect an action superiority effect (Gibbons et al., 1986). Indeed, their results revealed that when actions were presented visually in an audiovisual condition with no narration or verbally in a narration-only treatment with no visual accompaniment, actions were remembered better than dialogue by 4- and 7-year-old children, regardless of whether actions were presented visually or verbally. A visual superiority effect was found only to the extent that the younger children remembered relatively more actions from the audiovisual condition than the older children.

Rice (1984) and Rice and Haight (1986) note that many programs popular among young children tend to be those in which the verbal component is appropriate to the children’s linguistic abilities. Two popular educational programs, *Mister Roger’s Neighborhood* and *Sesame Street*, for example, use restricted vocabulary, paraphrasing, repetition, slow rate of speech, simple sentences, long pauses, and an emphasis on the present, while avoiding nonliteral meanings and complex word forms (Rice & Haight, 1986). These linguistic forms, known as child-directed-speech, have been identified as being well-suited to children’s linguistic abilities and are used by adults when communicating with young children (Rice & Haight, 1986).

According to Gleason (1985), child-directed-speech “consists of shorter and grammatically simpler sentences containing fewer errors and more concrete words describing objects in the child’s immediate perceptual environment” (pp. 347–348). Gleason continues, that describing events and objects in the child’s immediate environment, “... provides the meanings of the words that are spoken. Because the topics tend to be concrete, the task of figuring out the referents of the words is kept within the scope of the child’s inferential ability” (p. 111).

Rice (1984) speculates that the popularity of children’s programs such as *Bugs Bunny*, usually attributed to such features as animation and humor, might also be a function of nonabstract, unchallenging verbal features. The narration in the stimuli used by Rolandelli et al. (1985), for example, which enhanced visual attention and comprehension, employed many of the linguistic forms described as understandable to young children, suggesting the usefulness of child-directed-speech in programming for children.

Indeed, when linguistic forms have been experimentally manipulated, the stimuli which elicited the most attention appeared to be those which were appropriate to young children’s language abilities. Anderson et al. (1981) found that when 3- to 5-year-old children were presented television programs with dialogue having (a) immediate referents (dialogue describing events occurring at the moment), (b) nonimmediate referents (dialogue describing events occurring at another time), or (c) no dialogue, children’s visual attention was higher when immediate dialogue was used than when nonimmediate and no-dialogue presentations were used. Anderson
et al. state that, "immediate TV dialogue is, in general, more concrete and thus more understandable to young children than nonimmediate dialogue . . . nonimmediate dialogue often employed more complex linguistic structures and used more abstract vocabulary than immediate dialogue" (p. 154). In fact, the no-dialogue presentation was better attended than the nonimmediate dialogue presentation.

Anderson et al. (1981) did not assess the children's comprehension so it is difficult to know if the linguistic forms that enhanced attention also facilitated children's understanding of central program content. However, to the extent that comprehension is positively correlated to visual attention (Lorch et al., 1979), it is plausible that the immediate referent form used in the dialogue did indeed facilitate children's comprehension.

Moreover, the findings of Anderson et al. (1981) are consistent with Gleason's (1985) observation that "...children are more likely to be responsive to simpler and shorter sentences that discuss their immediate perceptual environment, especially when those sentences are accompanied by considerable gestural and contextual support" (p. 348). It is possible that the child-directed-speech forms used in the stimuli, accompanied by relevant, comprehensible visual information to provide context, provided an effective means of enhancing the preschoolers' understanding of program content in a comprehensible form consistent with their own processing abilities.

Additional investigation of children's use of the language of television is warranted in order to assess the effectiveness of the auditory-verbal component in enhancing children's understanding of television programs. Specifically, in light of Hayes et al.'s (1986) concern about centrality, research that would examine the effectiveness of age-appropriate linguistic forms in children's understanding of central content is required. Merely enhancing comprehensibility of the language of television, while necessary, is not sufficient. The language must be capable of conveying central information if it is to have relevance beyond that of alerting the child to important visual information.

Furthermore, the role that the language of television may have on children's language development is an area where research is needed. Television exposes children to a rich variety of linguistic forms. Recent evidence suggests that television can facilitate vocabulary and language acquisition (Lemish & Rice, 1986; Rice, Huston, Truglio, & Wright, 1988; Rice & Woodsmall, 1988).

More consideration needs to be given to assessing the function of the auditory modality in determining how young children process televised information. This position has been well summarized by Rice (1984):

While the pictorial quality of television may render it easier to process than other media, this is not to say that the medium is only visual nor always easy
for young children to understand. On the contrary, ... children's television programs can be highly verbal as well as visual. Furthermore, the verbal messages range in complexity from those well suited to children's competencies to those that would pose a challenge. To the extent that higher order symbols, such as verbal language, carry the messages of television, children must call upon more than simple iconic levels of processing, contrary to what current critics claim. The medium may be a string of pictures, but the pictures are accompanied by words that take the viewer beyond the immediate visual information. A satisfactory model of children's mental activity while viewing must take this reality into account (pp. 460-461).

**Summary and Conclusions**

The literature reviewed here suggests that, while the visual modality is more salient than the auditory modality for young children when the visual component competes with an incongruent auditory track, the visual superiority effect is confounded with the complexity and comprehensibility of the auditory-verbal component of television. Comprehensibility of the content, rather than the modality in which the content is presented, appears to be a more critical factor in children's viewing behavior.

The auditory modality of television can enhance comprehensibility in two ways. Auditory formal features signal what is comprehensible and worthy of visual attention, and the auditory component can convey important information through language which itself can enhance program comprehensibility. The language of television can even allow the young child to follow the program plot with little visual attention, though maximum attention and understanding occur when both modalities are congruent and comprehensible.

It has been argued that even if children can process the auditory-verbal information of television, the visual modality is better than the auditory modality in conveying central information to young children. The issue is an important one and in need of further investigation. However, part of the difficulty lies in the fact that the typical language of television is linguistically difficult and incomprehensible for young children thereby increasing their reliance on the visual modality to obtain plot information. Few studies have examined the linguistic structure of television language and more investigation is required. It is suggested that given the use of child-directed-speech (e.g., concrete words, slow rate of speech, simple sentences, immediate referents, repetition), the language of television can be made comprehensible allowing even young children to obtain central information through the auditory modality.

Researchers and producers of educational television programs need to consider more fully the importance and potential of the auditory modality, especially language, in young children's processing of television. By capital-
izando on the effectiveness of the auditory component we may enhance the educational benefit of television. Moreover, it is clear from the literature reviewed here that the most effective use of the auditory and visual modalities is a collaborative one. There are undoubtedly many avenues through which this collaboration can be more systematically exploited to enhance children's comprehension of educational television programming. Exploring those avenues remains a challenge for researchers.

Notes

Campbell, Wright, and Huston (1987) suggest that perceived comprehensibility might be a greater determinant of attention than comprehensibility itself. Kindergarteners attended to, and comprehended more information from stimuli ranging in length from 30 to 90 seconds using formal features children associate with comprehensible content (e.g., animation, less abstract words, more active verb constructions, lively background music) than stimuli presenting the same information using more adult-related features (e.g., more abstract language, live photography, quiet background music). When content difficulty increased, comprehension decreased, although visual attention was comparable to that in programs with comprehensible content. The authors acknowledge that had longer stimuli been used, children's attention might have dropped as they eventually judged the program to be incomprehensible. Particular formal features can enhance attention because they suggest there ought to be comprehensible information presented. At some point, however, once attention is elicited, the content itself must be comprehensible and interesting if attention is to be maintained and the information adequately processed.

References


