

## **How Do Children Learn to Learn from Television?: A Critical Review**

Early in the 1960's, television programmers realized that young children were a viable target market for the production and distribution of media and this has given rise to many educational programs such as *Blue's Clues*, *Sesame Street*, and *PBS Kids* (Warren, 2003). In fact, studies have shown that television can and does teach children skills and behaviors (Bandura, 1965; Bandura, et al 1963, as cited in Barr & Hayne, 1999; Huston & Wright, 1999). For example, Bandura (1965) had a group of 3-5 year old children watch a video of an adult acting aggressively with a Bobo doll and another group who did not see this demonstration. When placed in the room with a Bobo doll, he found that the group of children who had seen the aggressive behaviors performed by an adult on video showed higher rates of aggressive behaviors toward the doll than those children who did not witness the video. Bandura interpreted these findings to mean that children can learn negative behaviors from watching television. However, children can also acquire positive skills from television viewing. Comstock (1991) focused on students with limited English skills and found that the amount of television that these children watched was positively correlated with school achievement. Such findings demonstrate that children can learn concepts presented to them on television, but obscure the fact that it is not until about the age of 2 that children can comprehend television and its content (for a review, see Huston & Wright, 1999).

Research on television viewing has shown that consistent viewing appears around the age of 2 (Anderson et al, 1979) and children at this age also begin to look more at programming aimed at kids rather than that aimed at adults (Schmitt et al, 1999).

Observations such as these have led researchers to question 1) when and how children

begin to comprehend what is shown on television and 2) when and how children learn to apply concepts seen on television to everyday life. One of the first studies to examine the age at which children begin to comprehend television was conducted by Meltzoff in 1988. He had 14 and 24 month old infants view a video monitor where an experimenter performed a one-step action with a novel toy and compared them to a control group of 14 and 24 month old infants who did not see the experimenter perform that action. Infants who were exposed to the video were more likely to perform those actions than were infants who were not exposed; thus, he concluded that infants as young as 14 months can comprehend and apply material that they see on a television screen. While this study clearly implies that infants can imitate simple behaviors that they see on video, it does not indicate whether infants as young as 14 months can take information from television and perform more complex actions.

Recent research on young children's comprehension of television has focused on search designs, where children have the opportunity to use information presented on a television monitor to solve real-life problems (See Box 1). The results from these studies consistently indicate that children are able to retrieve hidden toys more often after seeing an experimenter hide an object through a window versus watching an experimenter hide the toy on closed-circuit television; that 2 ½ year olds commit fewer search errors than 2 year olds after watching an experimenter on videotape; and that it is not until the age of 3 that children's retrieval performance with video is equivalent to watching it live (Barr & Hayne, 1999; Schmitt, 1997; Schmitt & Anderson, 2002; Troseth & DeLoache, 1998). Thus, something occurs between the ages of 2 and 3 that enable children to understand that information they see on television can be applied to real live events.

Many theories have been offered as to why and how this occurs, but it is beyond the scope of this paper to review them all. In the first section, five main theories for how children's comprehension of television develops will be reviewed and evidence will be provided for each (see Box 2 for an overview of the three main theories). In the second section, it will be argued that the theories to date are missing a crucial factor and cannot fully explain children's development of comprehension of television; namely, that the context in which children usually watch television must be taken into account and as a result, the role that parents or caretakers play in the development of their children's television comprehension must be examined.

### **Theories of the Development of Television Comprehension**

One of the earliest theories of the development of television comprehension in children was suggested by Fitch, Huston, and Wright (1993). They hypothesized that the factuality, and therefore the applicability, of a television program is determined mostly as a consequence of genre (e.g., news is factual, drama is not), which relies on the formal production features of a program. In other words, formal production features (such as cuts, fades, laugh tracks, and music) are recognized by children as young as preschool age and they, like the super-ordinate scripts underlying the content of the program, are used as markers for what kind of television they are viewing (Huston & Wright, 1999, review). If the formal production features indicate that a program is factual, then the information in that program will be processed more extensively and deeply, thus leading to greater comprehension.

The Feature Signal Hypothesis was based on previous research that had shown that television viewing depends on the attributes of the program, as well as on the

cognitive structures and experience that a child brings to the situation (Huston & Wright, 1983; Wright & Huston, 1983, as cited in Huston & Wright, 1999). For example, in one study, experimenters had children watch educational videos with identical content, but with different formal production features (Campbell, Wright, & Huston, 1987). One educational video was animated, used kids voices, and sound effects; whereas the other used live photography and adult voices. The experimenters found that children paid more attention to the child-oriented version than to the adult-oriented version, which implies the children deemed that particular version as more “attention worthy” because the formal production features indicated the show was for them.

While young children do make periodic, informed decisions about the “attention-worthiness” of a program based on content, they cannot accurately discriminate factuality until they are older (Huston & Wright, 1999). Thus, the ability to quickly and accurately judge a program increases with age and experience. In fact, Condry and Freund (1989) found a steady improvement in children’s ability to identify programs as real or “make-believe” when they compared 2<sup>nd</sup>, 4<sup>th</sup>, and 6<sup>th</sup> graders’ ability to correctly identify 5 second samples of programs (as cited in Huston & Wright, 1999)..

Based on these and similar findings, it appears that the characteristics of television, coupled with children’s cognitive abilities and experience, does influence their comprehension of television. However, even though young children can identify program characteristics, they cannot do so consistently until they are older. Further, the majority of studies conducted on children’s comprehension of television using formal production features were conducted on children who were older than the preschool years. Therefore, the Feature Signal Hypothesis does not adequately explain how children come

to understand that certain programs *are* factual and how children's cognitive structures develop to produce this outcome.

Another theory of the development of children's comprehension of television focuses on the development of symbolism in young children. According to the Dual Representation theory, it is difficult for young children to focus on the symbolic role of an object if their attention is captured by the object itself (DeLoache, 1991; DeLoache 2004; Troseth, 2003; Troseth & DeLoache, 1998). Children are unable to see the symbolic representation of an object because they are focused on the particular characteristics of that object. For example, DeLoache (1991) asked children to search for a toy hidden in a room after being exposed to either a model of the room with a miniature version of the toy hidden or a picture of the room and the location of the hidden toy. They found that three year old children were as successful in finding the toy after viewing the model as when viewing the picture, but 2 ½ year old children only performed well after viewing the picture. Further, 2 year olds did not perform well in either task. Based on these findings, DeLoache argued that 2 ½ year olds performed better in the picture task because they were unable to manipulate the picture, but because the model could be picked up and manipulated, it became an object in and of itself. As a result, 2 ½ year olds become focused on the model as a model and were not able to understand that it was a symbol for something else. In addition, she argued that the 2 year olds had not yet fully developed their concept of symbols, which rendered them unable realize that pictures could be symbolic of live objects and it was not until the age of 3 that children could consistently view pictures and models as symbols. Thus, there is a progression of

symbol development from the age of two to the age of three, which enables children to see that information from media sources can be used in real life events.

Troseth and DeLoache (1998) extended this research into the realm of television media. They used the same search task as above, but instead had one group of 2 year olds and one group of 2 ½ year olds view an experimenter hide a toy on closed circuit television. Two and a half year olds correctly retrieved the hidden toy on the first attempt 80% of the time, whereas two year olds correctly retrieved the hidden toy on the first attempt only 44% of the time. They then had another group of 2 year olds watch an experimenter hide the toy through a window (e.g., “live”) and found that the children could correctly retrieve the toy on the first attempt 100% of the time. Troseth and DeLoache concluded that the 2 year olds performed so poorly in the video condition because they were unable to understand that television can symbolically represent reality not only because they see the television as an object in and of itself, leading them to have a weak understanding that the video display represents an actual room, but mainly because young children believe that nothing on television is real. According to Troseth and DeLoache, children dismiss evidence from television as not real because they watch a lot of television that does not correspond to reality. To test this claim, they convinced a group of 2 year olds that they were looking through a window at an experimenter hiding a toy, when in fact they were looking at a video monitor with the edges of the screen hidden by the window frame. In this task, 2 year olds were able to retrieve the toy correctly on the first try 63% of the time. The researchers argued that this was evidence for their claim because more children were able to locate the toy on the first attempt, which implies they believed the information they were seeing was real and applicable.

Based on the growing use of television and video cameras in children's lives, Troseth (2003) investigated the impact prior experience to videos had on the development of children's symbolism and consequently, the development of children's comprehension of television. In this experiment, Troseth compared a group of 2 year old children who had previous experience with live video to a group of 2 year olds who did not have previous experience with live video and compared them on search tasks involving pictures or video as sources of information. She found that the group with prior live video experience performed better than the group who did not; further, this finding applied to when pictures were used as a source of information, as well as when videos were used as a source of information. Troseth maintained that both positive transfer from the experience with live video for the experimental group and negative transfer from regular television for the control group contributed to the results. For instance, children who watched themselves on live video in their homes were exposed to contingency cues between their own movements and those they saw on the television screen, something which may have translated to the lab videos and indicated that they were in a similar situation. This realization likely led to changes in what Gentner and Lowenstein (2002) have termed structural alignment and mapping. According to Gentner and Lowenstein, finding matches between objects and relationships in one's conceptual representation of two situations leads one to recognize that the two situations are analogous, which in turn leads to changes in structural alignment. Thus, children with prior experience to video were not only able to see the similarities between home videos and lab videos, but were also able to see that pictures could be used as sources of information as well.

Children who did not receive prior experience with live video only had their experience with regular television as a base for comparison. As noted earlier, because children watch a lot of television that does not correspond to reality, they conclude that what they see on television is not real. In this manner, regular television has a negative transfer effect on children because they assume that the information they see on the lab video is false just like the information they see on the television at home (Troseth, 2003). On average, young children only have their experience with regular television to use as a basis of comparison and it is not until children acquire more experience with correspondences between television and reality that they are able to use television as a source of information. Thus, Troseth argues, children begin to learn to apply information they see on television once they acquire more experience with videos, which aids them in their symbolic development.

While researchers such as Troseth and DeLoache have chosen to interpret their findings on the basis of the Dual Representation theory, other researchers have taken a difference stance, and in some cases, have even argued against their theory. Specifically, Schmitt and Anderson (2002) re-ran the experiments conducted by Troseth and DeLoache (1998) and interpreted the findings in a completely different way. Although Schmitt and Anderson obtained similar results overall, they found that 2 year olds in the video condition were above chance in locating the toy on the first trial, but declined in performance on subsequent trials (2002). Based on this, they argued that 2 year olds must think that some things on television are real; otherwise they would not perform at levels above chance. This claim is supported by previous research that indicated that 2 year olds believe television characters can enter their world (Jaglom & Gardner, 1981),



which implies that children do believe that there is some truth to what they see on television. Thus, they maintained, it is not what the children believe about the information on the television set; rather it is the quality of the perceptual cues that the children see on television that impedes their comprehension (Schmitt & Anderson, 2002).

They pointed out that the images children view on the television screen are limited and degraded representations of three dimensional space, which produce poorly resolved cues that would normally allow depth perception. For young children, this degradation in motion parallax, texture, and shadow gradients puts a burden on their cognitive capacity, which makes it difficult for them to use the information being shown on the television screen (Schmitt & Anderson, 2002). Also, they maintained that children who are 2 years old and younger perceive the objects and events that occur on the television screen as taking place in the television cabinet. In other words, children's spatial representation of the hidden room is very different from the actual room, and because of this discrepancy, children must "scale up" their mental representation to meet the size of the actual room (2002). Such "scaling up" places an additional burden on young children's cognitive capacity, which then interferes with their ability to correctly retrieve the toy in the hidden room. However, once the prefrontal areas of the brain that are responsible for better coordination of spatial representations develop, children are able to take the information they see on television and apply it to real life situations (2002). Contrary to what Troseth and DeLoache (1998) suggested, it is maturational factors in the development of children's cognitive capacity that enable them to comprehend the information they see on television and not the false belief that nothing seen on television is real.

A similar theory to the one outlined above proposes that it is the child's ability to process disparate information in the program itself that contributes to children's comprehension of television. Fisch (2000) reasoned that not only must children process both the narrative and educational content of a program, but that such processing is influenced by a variety of factors. For instance, processing of narrative content is influenced by the child's prior knowledge of the story and characters, by the story schema, and by the capacity of their short term memory; likewise, processing of educational content is influenced by prior knowledge of content, interest, clarity of presentation, and advanced organizers (2000). On top of all these factors, the allocation of working memory is governed by three principles which gives narrative processing dominance over educational processing, constrains the limits of working memory (e.g., the higher the demand for narrative processing, the less resources there are for educational processing), and allows working memory resources to be allocated voluntarily (2000). Accordingly, as children age they have more factors conducive to processing relevant information and more cognitive resources, which allows them to take information that is presented to them on television and apply it to real life. Again, it is the maturation of the cognitive structures that give children the ability to comprehend television and not a false belief about television that children hold.

### **The Ignored Factor**

Despite the abundance of research in support of the above theories, each are flawed with respect to the emphasis that is placed on factors that are intrinsic to the child. Such an emphasis on internal factors ignores the context in which television viewing normally takes place, which is in the presence of a parent or caretaker. It would be

foolish to ignore the interactions that likely take place between a parent and their child during television viewing; in fact, research has shown that human behavior cannot be understood independent of the social and cultural context in which interactions take place (Miller, 2002). While theories that focus on factors within the child may hold merit, they do not fully capture the entire story of the child, nor do they address questions regarding children's viewing context (see Box 3). It is important to note that, not only do children come to see television as a source of relevant information due to internal factors; they come to do so as a result of their interaction with others as well.

A growing body of research indicates that instructive mediation is an effective tool in helping children to understand what they are viewing on television (Warren, 2003). The term instructive medication refers to the occasion when parents watch television with their children and then discuss what they have just seen with them, a strategy that has been associated with increased gains in knowledge and higher performance on various tasks (Ball & Bogatz, 1970; Raessi & Wright, 1983, as cited in Troseth & DeLoache, 1998). One study conducted by Singer and Singer (1994) compared a group of young children who watched *Barney* with associated activities to a group of young children who watched *Barney* without any associated activities. The authors found that children who participated in the associated activities performed better on tasks relevant to the information they viewed on *Barney* than those children who viewed *Barney* alone. This finding indicates that interactions with another specifically helped in children's comprehension of television, which highlights the impact that instructive mediation can have on the development of children's ability to apply information they view on television. Thus, parents who interact with their children

during and after television viewing likely influence their child's perception of the information they have just seen.

Support for this claim also comes from qualitative data on the interactions between parents and children. For example, studies have found that mothers spend considerable time helping their children distinguish reality from fantasy (Messaris, 1987, as cited in Warren, 2003) and that younger children ask questions about television itself as well as about specific shows (Anderson, et al, 1984, as cited in Warren, 2003). In other words, discussions between parents and children center on television's veracity as well as its applicability to reality. Such interactions with parents likely provide "scaffolding" on which children can construct their knowledge and uses of television and learn that information on television can be directly relevant and real.

However, not all instruction that children receive from parents is verbal. Children can also learn concepts from television by practicing behaviors with their parents. For example, it is likely that children and parents practice prosocial behaviors that children view on television as a means to solidify what the child has just learned. In addition, such modeling of behavior would enable children to see the similarities between their actions and those on the television screen, which would further enable them to apply the information they view on television to reality. Moreover, this is one of the reasons espoused by Troseth (2003) to account for the difference between the children with prior video performance and without prior video experience. This shows that context can be easily adapted with the child-centered theories mentioned above.

Although research on instructive mediation has indicated that it is used less frequently than other forms of mediation (e.g. restrictive mediation, or controlling what

programs a child watches), it has been shown to be a key strategy in developing young children's viewing skills (Ball & Bogatz, 1970; Raessi & Wright, 1983; Singer & Singer, 1994; Warren 2003). Thus, it is not just intra-individual factors that develop and emerge within the child as they age, but inter-individual factors as well that facilitate the development of the cognitive structures needed in order for the child to comprehend and apply what they are viewing on television. An overarching theory that takes into account both the context and the child is needed in order to fully understand what allows a child to learn that they can use information from television. Once this theory is developed, then programmers and parents will know what techniques or strategies will be useful in helping children hone their cognitive skills. In this manner, television may cease to be viewed as a negative factor in children's development and be seen as a useful tool to help children learn.

### Box 1: Hidden Toy Search Task

In this design, there are typically two experimenters: Experimenter 1 helps to familiarize the child to the task and remains with the child to explain the task, whereas Experimenter 2 hides the toy in the live condition and is videotaped hiding the toy in the video condition (Barr & Hayne, 1999; DeLoache, 1991; Troseth & DeLoache, 1998; Schmitt & Anderson, 2002). Experimenter 1 familiarizes the child to the room where toys will be hidden, as well as to the toys that will be hidden. Next, Experimenter 1 and the child go into the viewing room, where the child sits in front of the television (or window) (See Fig. 1). Experimenter 1 points out the correspondence between the video and the hidden room and ensures that the child understands. Experimenter 1 then informs the child that they are going to be playing a hiding game with a toy, but first will be watching a video (or looking through the window). During this, Experimenter 1 explains the actions of Experimenter 2 as they hide the toy in the hidden room. Finally, the child is brought into the room to find the hidden toy and is considered successful if they retrieve the toy on the first attempt.

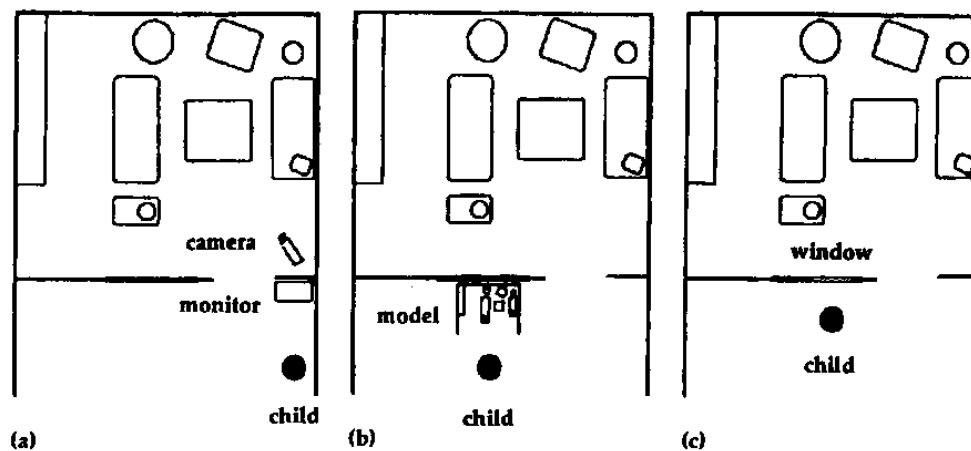


Figure 1 The physical arrangements for the video, model, and window tasks. Children were asked to retrieve a toy from the next room after watching the hiding event: (1) on the video monitor (Experiment 1), (2) in the scale model of the room (Experiment 1A), (3) through the window (Experiment 2).

\*Figure taken from Troseth & DeLoache, 1998

Box 2: Overview of the Three Main Competing Theories on How Children Learn to Apply Information Seen on Television

I. Feature Signal Hypothesis

- a. Espoused by Fitch, Huston, & Wright, 1993
- b. Factuality of a television program is seen as a consequence of the genre in which it belongs
- c. The genre is identified on the basis of formal production procedures (e.g., cuts, fades, laugh tracks, etc.)

II. Development of Symbolism

- a. Espoused by Troseth & DeLoache (1998)
- b. It is difficult for young children to focus on the symbolic role of an object, such as television, if their attention is captured by the object itself; a phenomenon they call Dual Representation
- c. In addition, children do not believe anything they see on television is real, a belief based on their experiences with regular television

III. Information Processing

- a. Schmitt (1997) and Schmitt and Anderson (2002) are representative examples
- b. The degraded 3-D quality of the television screen places a burden on the cognitive capacity of the child, which then interferes with their ability to use the information they can glean from the television
- c. Also, children must “scale up” mental representation from the television screen to meet the spatial requirements of the room, which places another burden on cognitive capacity

### Box 3: Questions To Be Addressed in Future Research

1. To what extent are children and parents interacting during television viewing in the home?
2. If parents were to increase their use of instructive mediation, would this speed up children's ability to comprehend television programs?
3. Has children's comprehension of television increased over the past 10 years with the increased use of home video cameras and interactive video games?
4. How do individual factors (e.g., cognitive capacity) interact with environmental factors (e.g. instructive mediation) to influence children's comprehension of television?
5. How can parents be encouraged to provide more instructive mediation?



### References

- Anderson, D. R., Alwitt, L. F., Lorch, E. P., & Levin, S. R. (1979). Watching children watch television. In G. A. Hale & M. Lewis (Eds.), *Attention and cognitive development*. New York: Plenum Press.
- Ball, S. & Bogatz, G. A. (1970). *The first year of Sesame Street: An evaluation*. Princeton, NJ: Educational Testing Service.
- Barr, R., & Hayne, H. (1999). Developmental changes in imitation from television during infancy. *Child Development*, 70, 1067-1081.
- Campbell, T. A., Wright, J. C., & Huston, A. C. (1987). Form cues and content difficulty as determinants of children's cognitive processing of televised educational messages. *Journal of Experimental Child Psychology*, 43, 311-327.
- Comstock, G. (1991). *Television and the American child*. Orlando, FL: Academic Press.
- DeLoache, J. S. (1991). Symbolic functioning in very young children: Understanding of pictures and models. *Child Development*, 61, 736-752.
- DeLoache, J. S. (2004). Becoming symbol-minded. *Trends in Cognitive Sciences*, 8, 66-70.
- Fisch, (2000). A capacity model of children's comprehension of educational content on television. *Media Psychology*, 2, 63-91.
- Fitch, M., Huston, A. C., & Wright, J. C. (1993). From television forms to genre schemata: Children's perception of television reality. In G. L. Berry & J. K. Asamen (Eds.), *Children and television: Images in a changing sociocultural world* (pp. 38-52). Newbury Park, CA: Sage.
- Gentner, D., & Lowenstein, J. (2002). Relational language and relational thought. In J. Byrnes & E. Ansel (Eds.), *Language, Literacy, and Cognitive Development* (pp. 87-120). Mahwah, NJ: Erlbaum.
- Gentner, D., & Medina, J. (1998). Similarity and the development of rules. *Cognition*, 65, 263-297.
- Huston, A. C., & Wright, J. C. (1999). Mass media and children's development. In Damon (Ed.) *The Handbook of Child Psychology* (5<sup>th</sup> ed.), 4, (pp. 999-1058). New York: Wiley.
- Jaglom, L., & Gardner, H. (1981). The preschool television viewer as anthropologist. In

- H. Kelly & H. Gardner (Eds.), *Viewing children through television: New directions for child development*, 13, 9-30.
- Meltzoff, A. (1988). Imitation of televised models by infants. *Child Development*, 59, 1221-1229.
- Miller, P.H. (2002). Vygotsky and the sociocultural approach. In P. H. Miller (Ed.), *Theories of developmental psychology* (pp. 367-419). New York: Worth Publishers.
- Schmitt, K. L. (1997). *Two- to three-year-olds understanding of the correspondence between television and reality*. Unpublished doctoral dissertation, University of Massachusetts, Amherst.
- Schmitt, K. L., & Anderson, D. R. (2002). Television and reality: Toddler's use of visual information from video to guide behavior. *Media Psychology*, 4, 51-76.
- Schmitt, K. L., Anderson, D. R., & Collins, P. A. (1999). Form and content: Looking at visual features of television. *Developmental Psychology*, 35, 1156-1167.
- Singer, J. L., & Singer, D. G. (1994). *Barney & Friends as education and entertainment: Phase 2. Can children learn through preschool exposure to Barney & Friends?* New Haven, CT: Yale University Family Television Research and Consultation Center.
- Troseth, G. L. (2003). TV guide: Two-year-old children learn to use video as a source of information. *Developmental Psychology*, 39, 140-150.
- Troseth, G. L., & DeLoache, J. S. (1998). The medium can obscure the message: Young children's understanding of video. *Child Development*, 69, 950-965.
- Warren, R. (2003). Parental mediation of preschool children's television viewing. *Journal of Broadcasting & Electronic Media*, 47, 394-417.