

# Social Science Computer Review

<http://ssc.sagepub.com/>

---

## **Video Viewing and Cognitive Development in Preadolescents**

Santha Kumari and Simerpreet Ahuja

*Social Science Computer Review* 2010 28: 170 originally published online 17 April 2009

DOI: 10.1177/0894439309334815

The online version of this article can be found at:

<http://ssc.sagepub.com/content/28/2/170>

---

Published by:



<http://www.sagepublications.com>

**Additional services and information for *Social Science Computer Review* can be found at:**

**Email Alerts:** <http://ssc.sagepub.com/cgi/alerts>

**Subscriptions:** <http://ssc.sagepub.com/subscriptions>

**Reprints:** <http://www.sagepub.com/journalsReprints.nav>

**Permissions:** <http://www.sagepub.com/journalsPermissions.nav>

**Citations:** <http://ssc.sagepub.com/content/28/2/170.refs.html>

>> [Version of Record](#) - May 10, 2010

[Proof](#) - Apr 17, 2009

[What is This?](#)

# Video Viewing and Cognitive Development in Preadolescents

Santha Kumari  
Simerpreet Ahuja  
Thapar University

Preadolescent heavy television, video game, and computer viewers were compared to light viewers on their performance on tests of creative imagination, visual memory, and attention span. Results indicate that heavy viewers performed poorly compared to light viewers on all cognitive dimensions studied. Findings are explained in terms of the displacement hypothesis and formal features of video, which may hamper optimal brain development.

**Keywords:** *video viewing; attention span; creative imagination; visual memory; preadolescents*

In recent years, there has been an upsurge of attention regarding the cognitive, social, emotional, and physiological dangers of video viewing from early childhood to adolescence. Several studies have been conducted related to the content of television messages and its impact on the cognitive development of children. The impact of media usage and its influence on cognitive functions are carried out on small children, adolescents, and adults (Ray & Malhi, 2003; Subrahmanyam, Kraut, Greenfield, & Gross, 2001), and there is a severe paucity of such studies on preadolescents that is considered to be the most critical period in the development of an individual. Researchers believe that preadolescence is a sensitive period during which media has a maximal effect (Van Evra, 1990).

Advances in the science of cognition have enabled investigators to construe perception as a top-down process where the deep-lying layers of the primal brain parts converge to produce the appreciation of the stimulus impinging on the sense organs. The sensory data in any case are far richer than the representations made out of them. In this sense, a strong, intense stimulation can not only numb the senses but may also throttle the emerging unconscious themes and schemata, which are primary inputs to the conscious realization of the articulated thoughts. There is strong evidence to suggest that creative imagination and memory are highly nourished under the subliminal stimulation levels (Ornstein, 1972). Additional support comes from the work on hypnagogic imagery states (Brown, 1985). An excessive exposure to visual stimulation using television, computer graphics, and video games can be hypothesized to have negative impact on very elementary and complex cognitive functioning at every stage in the ontogenetic development. In this context, it can be surmised that excessively bright, fast-moving and flickering visual displays can have both

---

**Authors' Note:** Please address correspondence to Santha Kumari, School of Management & Social Sciences, Thapar University, Patiala 147004, India; e-mail: [santhakk@yahoo.co.in](mailto:santhakk@yahoo.co.in). A part of the research reported herein is funded by the Department of Science and Technology, Government of India, Project No SP/SO/B48/2001 to the first author.

inhibitory and suppressive effects. It may inhibit the cognitive mechanism underlying the evolution of vivid and rich imagery and similar processes linked to creative imagination. The present study is an endeavor to examine the influence of extended video viewing on attention span, creative imagination, and visual memory on preadolescents. It was hypothesized that prolonged video viewing may be detrimental for the development of attention span, creative imagination, and visual memory.

## Method

### Participants

Preadolescent children of the age range 9 to 12 years (boys = 900; girls = 700) studying in various public schools of Punjab participated in the study. A video-viewing questionnaire was used to categorize participants into light and heavy video viewers. Those who viewed less than 12 hours per week were categorized as light viewers and more than 20 hours were categorized as heavy viewers. The participants of the medium category, those who viewed video between 12 and 20 hours ( $N = 1200$ ), were excluded from the study. The heavy and light viewers were further tested on creative imagination, visual memory, and attention span. Socioeconomic status, education level, and congenital abnormalities were controlled. The consent of parents was sought for testing children on all measures. All participants were given educational materials for motivating them. Tests of creative imagination, visual memory, and attention span were administered individually to heavy viewers ( $N = 200$ ) and light viewers ( $N = 200$ ).

### Measures

*Video-viewing questionnaire.* A video-viewing questionnaire was used to categorize the participants into light video viewers and heavy video viewers. It consisted of 21 items to elicit the number of hours children watched television/DVD and used a computer per week at home and school. It also contained items to gauge the socioeconomic status of the parents in terms of the annual income and any kind of congenital disorders such as mental retardation, epilepsy, and so on. The questionnaire was sent to parents to indicate the video viewing habits of their ward on weekdays and weekends separately. Two extreme categories, light and heavy viewing, were chosen on the basis of mean (16.2) and standard deviation ( $SD = 7.92$ ) values of 1,600 children who were surveyed to study their video viewing habits. Half  $SD$  above and half  $SD$  below the mean were categorized as heavy viewers and light viewers, respectively.

*Digit span task.* Attention span was tested using a digit span task. Participants were shown visual stimuli using a tachistoscope containing digits varying from 3 to 12 digits. The digits were chosen using random numbers. One second per digit was given while presenting the cards. Four trials were given for each stimulus, and the participants reproduced the

numbers verbally. The highest value reproduced in each trial was noted and the mean computed. The mean for all the trials correctly reproduced comprised the digit span score.

*Benton Visual Retention Test (BVRT).* Form C of the BVRT (Benton, 1992) was used for testing the visual memory. It consists of 10 cards having geometrical designs. Each card was shown for 10 seconds, and after 15 seconds delay the participants were asked to reproduce the design on a sheet of paper. The number correct score procedure was used for scoring. The examinee's reproduction of each design was judged on all or none basis. If the reproduction contained no errors, it was scored as correct and awarded a score of 1 and if it contained any error then a score of 0 was given. The range of possible scores for this form of the test (10 designs) is 0 to 10 points.

*Holtzman Inkblot Technique.* Form A of the Holtzman Inkblot Technique (Holtzman, 1961) was used to test the creative imagination of children. This form consists of 47 blots, of which two are trial blots. During the pilot study, it was observed that children experienced fatigue when all stimulus cards were used. Therefore, half of the cards were chosen in the order of 1, 3, 5, . . . 45 (all odd-numbered inkblots). Scoring was done based on the Holtzman Inkblot manual. Movement responses were scored based on the standard procedure of the Holtzman Inkblot Technique. The total scores for 23 cards comprised the creative imaginative scores. The range of scores for this test is 0 to 4 points.

## Results

The mean and *SD* of the attention span scores of heavy and light viewers for both boys and girls were computed. Heavy viewers performed poorly compared to light viewers. The mean scores for heavy viewers are 6.92 (*SD* = 1.38) and 5.76 (*SD* = 1.22) for boys and girls, respectively. In the case of light viewers, the mean is 8.73 (*SD* = 1.24) for boys and 8.41 (*SD* = 1.53) for girls. A 2×2 analysis of variance (ANOVA) yielded a significant main effect of video viewing ( $F(1, 396) = 271.55, p < .0001$ ), sex ( $F(1, 396) = 29.83, p < .0001$ ), and the interaction effect ( $F(1, 396) = 9.38, p < .002$ ).

For creative imagination, the mean scores of heavy viewers are 14.85 (*SD* = 4.98) for boys and 15.61 (*SD* = 5.75) for girls. In the case of the light viewers, the mean is 36.06 (*SD* = 7.41) and 36.58 (*SD* = 7.80) for boys and girls, respectively. Heavy viewers performed poorly compared to light viewers on creative imagination. The analysis of the data using a 2×2 ANOVA showed the main effect of video viewing as significant ( $F(1,396) = 1032.40, p < .0001$ ). However, the main effect of sex and interaction effect were not significant.

On visual memory, heavy viewers performed poorly compared to light viewers. The mean scores for heavy viewers are 3.98 (*SD* = 1.62) and 4.93 (*SD* = 1.62) for boys and girls, respectively. For the light viewers, however, the mean is 7.62 (*SD* = 1.32) for boys and 7.66 (*SD* = 1.46) for girls. A 2×2 ANOVA was carried out to study the main effects and interaction effects. The main effect of sex ( $F(1, 396) = 10.70, p < .001$ ), video viewing ( $F(1, 396) = 443.16, p < .0001$ ), and the interaction effect ( $F(1, 396) = 9.04, p < .003$ ) were found to be significant.

## Discussion

The findings of the present study are consistent with the hypotheses posited. Heavy viewers performed poorly compared to light viewers on all the cognitive dimensions studied. The prolonged video viewing has been found to be related to reduced attention span, poor imagination scores, and low visual memory.

One of the most viable explanations for the detrimental effect of extended video viewing is in terms of the displacement hypothesis. According to this, children spend a considerable proportion of their free time watching media, displacing the time for other beneficial activities. It can be assumed that television viewing occurs at the expense of other activities such as reading or listening to the radio, which are thought to stimulate creativity (Huston, Wright, Marquis, & Green, 1999; Valkenburg, 2000). The significance of imaginative play in developing creative imagination in children has been greatly emphasized in many studies by Singer and Singer (1976, 1983) and Singer et al. (1990). Children's imaginative play is highly affected by television and computer games (Singer & Singer, 1976; Singer, Singer, & Zuckerman, 1990). Play involves a variety of behaviors that serve an important purpose in the child's social, emotional, and intellectual development. Cognitive competence is hardly demanded by a presentation of sequences that predisposes the learner to be a passive spectator of images played in front of him or her and hampers a child's capacity to attend and imagine. Valkenburg and Van der Voort (1994) report that children's play has become less dramatic and less imaginative in its verbal expression and in the way they play and the things they make. A field study conducted by Singer and Singer (1983) showed that greatest imaginative play occurred when children were in the presence of an adult, rather than with a television or alone.

Children's television programs demand constant attention shifts by their viewers but do not require them to pay prolonged attention to real-life events. In a longitudinal study, Christakis, Zimmerman, DiGiuseppe, and McCarty (2004) found that television exposure between the ages of 1 and 3 years leads to attention problems in the later years.

Television, video games, and computers are more attractive and require less cognitively complex physical or social effort than reading and other physical activities (Huston et al., 1999).

Another explanation is that excessively bright, fast-moving, and flickering visual displays can have inhibitory and suppressive effects. Children's video viewing is governed by the novelty of the visual stimulus, rapid formal features such as movements, visual complexity, acts, pans, zooms, which produce an orienting reflex (Huston & Wright, 1989). The media intervene in the process of memory by often constructing a view of the world as a perceptual and pervasive presence through the real-time lens of visual stimuli.

The highly intense glare and revealing light of television plays havoc with the inquisitive mind because little is left to the imagination of the viewer and learner (Valkenburg & Van der Voort, 1994). Imagination is a form of human thought characterized by the ability of the individual to reproduce images or concepts originally derived from basic senses. It can be regarded as a critical feature of human cognition and information processing. The secret of a good memory is the secret of forming diverse and multiple associations. Imagination is an inner eye that preserves the possibilities in contrast to the external organic eye, which preserves what is given out there.

Imagination arises in the context of lack of resolution in cognition where themes and images are yet to attain a definiteness and resolved exteriorization in the extrapersonal space. The lack of resolution gives rise to abundant free play of umpteen possibilities as much wider freedom to vary. However, when children watch television, there is little demand placed on the minds of the young viewer to explicate from the given facts, to infer, and even solve problems. Prolonged watching of television leads to mental laziness, and in turn, the child is not ready to invest the mental effort required to master reading or to be creative, leading to low academic achievement and creativity (Valkenburg & Van der Voort, 1994).

There is a growing body of empirical evidence indicating that watching television causes physiological changes irrespective of the type of program children watched (Sigman, 2007). Environmental experiences play a major role in shaping the developing brain due to the plasticity of its neuronal connectivity. Prolonged exposure to any stimulus in the child's environment affects the mental and emotional growth of the child and deprives the brain of other experiences. It has been shown that this shaping process affects our brain structure and function and influences both cellular development and neurotransmitter regulation (Healy, 2004; Sigman, 2007).

Television is considered to be the flavor enhancer of the audiovisual world providing unnatural levels of sensory stimulation, thereby having a tendency to overpay the child for paying attention to it. This may physically corrupt the reward system of the brain in releasing the neurotransmitter dopamine, which is associated with reward. Novel and stimulating television messages may cause the brain to release excessive dopamine, thereby corrupting the reward system, and children fail to pay attention to real-life events as they are less stimulating. Studies have shown that the underfunctioning of dopamine may fail to reward the brain's attentional systems (Sagvolden, Johansen, Aase, & Russel, 2005).

Kawashima and his colleagues reported high-level activity in brain areas associated with vision and movement when children played computer games, whereas high level of activity was observed in the right and frontal lobes while performing an arithmetic task (Kawashima et al., 2001). The frontal lobe is associated with learning, memory, emotion, and impulse control, and its optimal development is essential for problem solving, personality manifestations, social interactions, and judgment. Kawashima claims that prolonged video viewing can stunt teens' brains.

Another important outcome of the present study is the sex differences. The plausible explanation for this may be the difference in the nature of content they watched and the media portrayals and parental monitoring. In the present study, these factors were not taken into account. It has been observed that in Indian culture parents exhibit overpermissive attitudes toward boys causing them to indulge in undesirable behaviors. Some studies report that men outnumber women in prime-time programming (Davis, 1990; Signorielli & Bacue, 1999), and girls view family drama and nonaggressive programs, which portray traditional roles. Female characters are more likely than male characters to be portrayed in traditional stereotypes, such as being emotional, romantic, affective, and domestic (Thompson & Zerbinos, 1995). Girls view media under parental control, which help them in distinguishing between reality and fantasy (Fabes, Martin, & Hanish, 2003). It is also reported that boys are more likely than girls to use media as a tool to increase their energy level and seek stimulation and girls use it for socialization.

To conclude, it can be construed that prolonged video viewing can have crippling effects on the evolving minds and its capacity for creative imagination and lucid exploration of the mind's realm.

The present findings have significant educational and clinical implications. Educators and policy makers can emphasize the detrimental effects of heavy video viewing on young children and recommend activities in schools and the home based on children's developmentally changing needs. The curriculum can be integrated into the rhythms of human growth and development. Parents can be educated about the harmful effect of prolonged video viewing in children so as to control problems related to attention and other learning difficulties.

## References

- Benton, S. A. (1992). *Manual Benton visual retention test*. San Antonio, TX: The Psychological Corporation.
- Brown, J. W. (1985). Imagery and the micro structure of perception. *Journal of Neurolinguistics, 1*, 89-141.
- Christakis, D. M., Zimmerman, F. J., DiGiuseppe, D. L., & McCarty, C. A. (2004). Early television exposure and subsequent attentional problems in children. *Pediatrics, 113*, 708-713.
- Davis, D. M. (1990). Portrayals of women in prime-time network television: Some demographic characteristics. *Sex Roles, 23*, 325-332.
- Fabes, R. A., Martin, C. L., & Hanish, L. D. (2003). Young children's play qualities in same- other- and mixed-sex peer groups. *Child Development, 74*, 921-932.
- Healy, J. M. (2004). *Your child's growing mind: Brain development and learning from birth to adolescence* (3rd ed.). New York: Broadway.
- Holtzman, W. H. (1961). *Guide to administration and scoring*. New York: The Psychological Corporation.
- Huston, A. C., & Wright, J. C. (1989). The form of television and the child viewer. In G. Comstock (Ed.), *Public communication and behavior* (Vol. 2, pp. 103-158). San Diego, CA: Academic Press.
- Huston, A. C., Wright, J. C., Marquis, J., & Green, S. B. (1999). How young children spend their time: Television and other activities. *Developmental Psychology, 35*, 912-925.
- Kawashima, R., et al. (2001). Reported in World Neurology. *World Neurology, 16*, 3.
- Ornstein, R. (1972). *The psychology of consciousness*. New York: Penguin Books.
- Ray, M., & Malhi, P. (2003). *Television viewing habits of adolescents in a developing country: An exploratory study*. A paper presented at Euro pediatrics, Prague, Czech Republic.
- Sagvolden, T., Johansen, E. B., Aase, H., & Russel, V. A. (2005). A dynamic developmental theory of attention deficit/hyperactivity disorder (ADHD) predominantly hyperactive/impulsive and combined subtypes. *Behavioral and Brain Sciences, 28*, 397-419.
- Sigman, A. (2007). Visual voodoo: The biological impact of watching TV. *Biologist, 54*, 12-17.
- Signorielli, N., & Bacue, A. (1999). Recognition and respect: A content analysis of prime-time television characters across three decades. *Sex Roles, 40*, 527-544.
- Singer, D. G., Singer, J. L., & Zuckerman, D. M. (1990). *The parent's guide: Use of TV to your child's advantage*. Reston, VA: Acropolis Books.
- Singer, J. L., & Singer, D. G. (1976). Fostering creativity in children can TV stimulate imaginative play? *Journal of Communication, 26*, 74-80.
- Singer, S. L., & Singer, D. G. (1983). Psychologists look at television: Cognitive, developmental, personality and social policy implications. *American Psychologist, 38*, 826-834.
- Subrahmanyam, K., Greenfield, P., Kraut, R. & Gross, E. (2001). The impact of computer use on children's and adolescent's development. *Journal of Applied Developmental Psychology, 22*, 7-30.
- Thompson, T. L., & Zerbino, E. (1995). Gender roles in animated cartoons: Has the picture changed in 20 years? *Sex Roles, 32*, 651-673.
- Valkenburg, P. M. (2000). Television and child's developing imagination. In D. G. Singer, and J. L. Singer (Eds.), *Handbook of children and the media* (pp. 121-132). Thousand Oaks, CA: Sage Publications.

Valkenburg, P. M., & Van der Voort, T. (1994). Influence of TV on day dreaming and imagination: A review of research. *Psychological Bulletin*, *116*, 316-339.

Van Evra, J. (1990). *Television and child development*. Hillsdale, N.J.: Lawrence Erlbaum.

**Santha Kumari** is an associate professor of psychology in the School of Management & Social Sciences at Thapar University, Patiala, India. She may be contacted at [santhakk@yahoo.co.in](mailto:santhakk@yahoo.co.in).

**Simerpreet Ahuja** is a research scholar of psychology in the School of Management & Social Sciences at Thapar University, Patiala, India. She may be contacted at [ahujasimer@gmail.com](mailto:ahujasimer@gmail.com).