Strangers in our Homes: TV and our Children's Minds (i)

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The US American pediatrician and Waldorf teacher Susan R.Johnson explains the fatal consequences of watching television and playing computer games on child-development. Drawing from brain research, she shows that children need natural, multi-sensory stimuli for their healthy development. Her own experience at a high school health centre in San Francisco demonstrates how the digital overstimulation of sight and hearing can lead to attention- and learning deficits. This is her conclusion: Do not allow the strangers from television- adverts and programs into your home!

The effect of television on children

As a mother and a pediatrician who completed both a three-year residency in Pediatrics and a three-year subspecialty fellowship in Behavioral and Developmental Pediatrics, I started to wonder: "What are we doing to our children's growth and learning potential by allowing them to watch television and videos as well as spend endless hours playing computer games?"

I practiced seven years as the Physician Consultant at the School Health Center in San Francisco, performing comprehensive assessments on children, ages 4–12, who were having learning and behavioral difficulties in school. I saw hundreds of children who were having difficulties paying attention, focusing on their work, and performing fine and gross motor tasks. Many of these children had a poor self-image and problems relating to adults and peers.

As a pediatrician, I had always discouraged television viewing because of the often violent nature of its content (especially cartoons) and because of all the commercials aimed at children. However, it wasn't until the birth of my own child, six years ago, that I came face to face with the real impact of television. (ii)

At age 3 years, our son went on a plane trip to visit his cousins near Boston, and on the plane was shown the movie Mission Impossible. The movie was right above our son's head, making it difficult to block out. Earphones had not been purchased, so the impact was only visual, but what an impact it had on our son. He had nightmares and fears about fires, explosions, and bloody hands for the next six months, and his play was profoundly changed. One of my colleagues told me I just had an overly sensitive child, and because I had not taken him to see a movie or let him watch much TV, he was not "used to it" and that was why he was so disturbed by the pictures he saw. All I could think was—thank heaven he was not "used to it."

TV rots the senses in the head! It killst he imagination dead! It clogs and clutters up the mind! It makes a child so dull and blind. He can no longer understand a fantasy, A fairyland!

His brain becomes as soft as cheese! His powers of thinking rust and freeze!

An excerpt from Charlie and the Chocolate Factory by Roald Dahl, 1964

Later that year, I assessed six different children from ages 8–11 years at the School Health Center who all had similar difficulties with reading. They couldn't make a mental picture of letters or words. If I showed them a series of letters and asked them to identify one particular letter, they could do it. If I gave them no visual input and just asked them to write a particular letter by memory, they couldn't do it. All of these children watched a lot of television and videos and played computer games. I wondered what happens to a developing child placed in front of a TV set if they are presented with visual and auditory stimuli at the same time. What is left for the mind to do? At least with reading a story or having a story read to them, the mind can create its own imaginative pictures.

A question arose and I immediately called up my colleague and asked: "Could television itself be causing attention problems and learning difficulties in children?"

My colleague laughed and said just about everyone watches TV—even my child does—and she doesn't have Attention Deficit Disorder or a learning disability. I thought to myself: "Are we spending enough time with our children and looking deeply enough into their development and souls to notice the often subtle changes that occur from spending hours in front of the TV set?" Maybe some children are more vulnerable to the effects of television because of a genetic predisposition or poor nutrition or a more chaotic home environment. I wondered about the loss of potential in all our children, because they are exposed to so much television and so many videos and computers games. What are the capacities we are losing or not even developing because of this TV habit? I then started to read, attend lectures, and ask a lot more questions.

Television

Television has been in existence for the past 80 years, though the broadcasting of entertainment shows didn't begin until the 1940s. In 1950, 10 percent of American households owned a TV set. By 1954, this percentage had increased to 50 percent, and by 1960, 80 percent of American households owned a television. Since 1970, more than 98 percent of American households own a TV, and currently 66 percent of households own three or more TVs. In an average American home, television is on almost 7 hours per day. Children of all ages, from preschool through adolescence, watch an average of 4 hours of TV per day (excluding time spent watching videos or playing computer games). A child spends more time watching TV than any other activity except sleeping, and by age 18 a child has spent more time in front of a TV than at school.

There have been numerous articles looking at the content of television and how commercials influence children's (and adults') desires for certain foods or material goods (e.g., toys), and how violence seen on television (even in cartoons) leads to more aggressive behavior in children (Fischer et al. 1991, Singer 1989, Zuckerman 1985).

Concerns have been raised about who is teaching our children and the developmental appropriateness of what is presented on TV to toddlers, children, and even adolescents. Miles Everett, PhD, in his book, How Television Poisons Children's Minds, points out that we don't allow our child to talk to strangers, yet through television we allow strangers into the minds and souls of our children every day. These "strangers" (advertising agencies), whose motivations are often monetary, are creating the standards for what is "good" or developmentally appropriate for the developing brains of our children.

More importantly, several investigators (iii) have drawn attention to the fact that the actual act of viewing television is even more insidious and potentially damaging to the brain of the developing child than the actual content of what's on TV. So what are we doing to our children's potential by allowing them to watch television?

How does a child's brain develop and how does a child learn?

Joseph Chilton Pearce in his book, Evolution's End, sees a child's potential as a seed that needs to be nurtured and nourished in order to grow properly. If the environment doesn't provide the necessary nurturing (and protections from overstimulation), then certain potentials and abilities cannot be realized.

The infant is born with 10 billion nerve cells or neurons and spends the first three years of life adding billions of glial cells to support and nourish these neurons (Everett 1992). These neurons are then capable of forming thousands of interconnections with each other via spider-like projections called dendrites and longer projections called axons that extend to other regions of the brain.

It is important to realize that a six-year-old's brain is 2/3 the size of an adult's though it has 5-7 times more connections between neurons than does the brain of an 18-month-old or an adult (Pearce 1992). The brain of a six- to seven-year-old child appears to have a tremendous capacity for making thousands and thousands of dendrite connections among neurons. This potential for development ends around age 10–11 when the child loses 80 percent of his neural mass (Pearce 1992, Buzzell 1998). It appears that what we don't develop or use, we lose as a capacity. An enzyme is released within the brain and literally dissolves all poorly myelinated pathways (Pearce 1992, Buzzell 1998).

In the developing child, there is a progression of brain development from the most primitive core (action) brain, to the limbic (feeling) brain, and finally to the most advanced neocortex, or thought brain. There are critical periods for brain development when the stimulus must be present for the capacity to evolve (for example, language). There is also plasticity in brain development so that even adults can make new dendritic connections, but they have to work harder to establish pathways which were more easily made in childhood.

The core (action) brain is dedicated to our physical survival and manages reflexes, controls our motor movements, monitors body functions, and processes information from our senses. Along with the limbic (feeling) brain, it is involved in the "flight or fight" response that our body has to a dangerous or threatening situation. Humans react physically and emotionally before the thought brain has had time to process the information (Buzzell 1998). Our limbic (feeling) brain wraps around our core (action) brain and processes emotional information (e.g., our likes/dislikes, love/hate polarities). Our feeling brain gives meaning and value to our memories and what we learn. It influences behavior based on emotional feelings and has an intimate relationship to our immune system and capacity to heal. It is involved in the forming of our intimate relationships and emotional bonds (e.g., between mother and child) and is connected with our dreaming, subtle intuitive experiences, and the daydreams and fantasies that originate from the thought brain (Healy 1990).

This feeling brain connects the more highly evolved thought brain to the more primitive action brain. Our lower action brain can be made to follow the will of our thought brain or our higher thought brain can be "locked into" the service of the lower action-feeling brain during an emergency that is real or imagined (Pearce 1992). The action and feeling brains can't distinguish real from imaginary sensory input. It is a survival advantage to react first and think later.

Finally our thought brain, the neocortex, represents our highest and newest form of intellect. It receives extensive input from the core (action) brain and limbic (feeling) brain and has the potential of separating itself and being the most objective part of the brain. It connects us to our higher self. However, the neocortex needs more time to process the images from the action and feeling brains. It is also the part of the brain that has the most potential for the future, and it is the place where our perceptions (experiences), recollections, feelings, and thinking skills all combine to shape our ideas and actions (Everett 1997). The thinking brain is "five times larger than the other brains combined and provides intellect, creative thinking, computing and, if developed, sympathy, empathy, compassion and love" (Pearce 1992).

There is a sequential development (a progressive myelination of nerve pathways) of the child's brain from the most primitive (action) brain to the limbic (feeling) brain and finally to the most highly evolved thought brain, or neocortex. Myelination involves covering the nerve axons and dendrites with a protective fatty-protein sheath. The more a pathway is used, the more myelin is added. The thicker the myelin sheath, the faster the nerve impulse or signal travels along the pathway. For these reasons, it is imperative that the growing child receives developmentally appropriate input from his/her environment in order to nourish each part of the brain's development and promote the myelination of new nerve pathways. For example, young children who are in the process of forming their motor-sensory pathways and sense organs (the action brain) need repetitive and rhythmical experiences in movement.

Children also need experiences that stimulate and integrate their senses of sight, hearing, taste, smell, and touch. Since young children are literally sponges, their senses need to be protected from overstimulation. Children absorb all they see, hear, smell, taste and touch from their environment since they haven't developed the brain capacity to discriminate or filter out unpleasant or noxious sense experiences. The sense of touch is especially crucial since our culture and its hospital birth practices (including the high rate of C-sections) and, until recently, its discouragement of breast-feeding, deprive infants of critical multi-sensory experiences.

The stimulation and development of our sense organs is the precursor to the development of part of our lower brain, called the Reticular Activating System (RAS). The RAS is the gateway through which our sense impressions coordinate with each other and then travel to the higher thought brain. The RAS is the area of the brain that allows us to attend and focus our attention. Impairments in motor-sensory pathways lead to impairments in children's attention span and ability to concentrate (Buzzell 1998). Overstimulation and under-stimulation of our senses and poorly developed fine and gross motor movements may lead to impairments in attention.

By age 4, both the core (action) and limbic (feeling) brains are 80 percent myelinated. After age 6–7, the brain's attention is shifted to the neocortex (thought brain) with myelination beginning first on the right side or hemisphere and later joined by the left hemisphere.

The right hemisphere is the more intuitive side of the brain, and it particularly responds to visual images. It grasps wholes, shapes and patterns and focuses on the big picture rather than the details. It directs drawing and painting and monitors melodies and harmonies of music. It is especially responsive to novelty and color and is the dominant hemisphere when watching TV (Healy, 1990, Everett 1997).

The left hemisphere dominates when a child reads, writes and speaks. It specializes in analytical and sequential thinking and step-by-step logical reasoning. It analyzes the sound and meaning of language (e.g., phonic skills of matching sound to letters of the alphabet). It manages fine muscle skills and is concerned with order, routine and details. The ability to comprehend science, religion, math (especially geometry) and philosophy relies on abstract thinking characteristic of the left hemisphere.

Even though we emphasize which functions of learning are performed by which hemisphere, there is a crucial connection between the two hemispheres called the corpus callosum. It consists of a large bundle of nerve pathways that form a bridge between the left and right hemispheres. It is one of the brain's latest-maturing parts. The left and right sides of the body learn to coordinate with each other by this pathway. Gross motor activities like jumping rope, climbing, running, and circle games and fine motor activities like form drawing, knitting, pottery, origami, woodworking, embroidery, and bread-making are crucial to myelinating this pathway and lead to more flexible manipulation of ideas and a creative imagination. This pathway provides the interplay between analytic and intuitive thinking, and several neuropsychologists believe that poor development of this pathway affects the right and left hemispheres' effective communication with each other and may be a cause of attention and learning difficulties (Healy 1990).

We myelinate our pathways by using them. Movements of our bodies combine with experiences of our senses to build strong neural pathways and connections. For example, when a toddler listens to the sound of a ball bouncing on the floor, tastes and smells the ball or pushes, rolls and throws the ball, neurons are making dendritic connections with each other. When a toddler examines balls of varying sizes, shapes, weights and textures, a field of thousands (and possibly millions) of interconnecting neurons can be created around the word "ball" (Pearce 1992). Repetition, movement, and multisensory stimulation are the foundations of language development and higher level thinking. The toddler's repetitive experiences with an object like a ball create images or pictures in his/her brain. "The images of the core limbic brain form much of the elemental 'food' for the remarkable and progressive abstracting abilities of the associative high cortex [neocortex]" (Buzzell 1998).

What is so harmful to the mind about watching television?

Watching television has been characterized as multileveled sensory deprivation that may be stunting the growth of our children's brains. Brain size has been shown to decrease 20–30 percent if a child is not touched, played with or talked to (Healy 1990). In addition, when young animals were placed in an enclosed area where they could only watch other animals play, their brain growth decreased in proportion to the time spent inactively watching (Healy 1990). Television really only presents information to two senses: hearing and sight. In addition, the poor quality of reproduced sound presented to our hearing and the flashing, colored, fluorescent, overstimulating images presented to our eyes cause problems in the development and proper function of these two critical sense organs (Poplawski 1998).

To begin with, a child's visual acuity and full binocular (three-dimensional) vision are not fully developed until 4 years of age, and the picture produced on the television screen* is an unfocused (made up of dots of light), two-dimensional image that restricts our field of vision to the TV screen itself. Images on TV are produced by a cathode ray gun that shoots electrons at phosphors (fluorescent substances) on the TV screen. The phosphors glow and this artificially produced pulsed light projects directly into our eyes and beyond, affecting the secretions of our neuroendocrine system (Mander 1978). The actual image produced by dots of light is fuzzy and unfocused, so that our eyes, and the eyes of our children, have to strain to make the image clear. Television, like any electrical appliance and like power lines, produces invisible waves of electromagnetism. Last June, a panel convened by the National Institute of Environmental Health Sciences decided there was enough evidence to consider these invisible waves (called electromagnetic fields or EMFs) as possible human carcinogens. In the article it was recommended that children sit at least 4 feet from TV and 18 inches from the computer screen (Gross 1999).

Our visual system, "the ability to search out, scan, focus, and identify whatever comes in the visual field" (Buzzell 1998), is impaired by watching TV. These visual skills are also the ones that need to be developed for effective reading. Children watching TV do not dilate their pupils, show little to no movement of their eyes (i.e., stare at the screen), and lack the normal saccadic movements of the eyes (a jumping from one line of print to the next) that is critical for reading. The lack of eye movement when watching television is a problem because reading requires the eyes to continually move from left to right across the page. The weakening of eye muscles from lack of use can't help but negatively impact the ability and effort required to read.

In addition, our ability to focus and pay attention relies on this visual system. Pupil dilation, tracking and following are all part of the reticular activating system. The RAS is the gateway to the right and left hemispheres. It determines what we pay attention to and is related to the child's ability to concentrate and focus. The RAS is not operating well when a child watches television. A poorly integrated lower brain can't properly access the higher brain.

In addition, the rapid-fire change of television images, which occurs every 5 to 6 seconds in many programs and 2 to 3 seconds in commercials (even less on MTV), does not give the higher thought brain a chance to even process the image. It reportedly takes the neocortex anywhere from 5 to 10 seconds to engage after a stimulus (Scheidler 1994). The neocortex is our higher brain, but also needs a greater processing time to become involved.

All the color combinations produced on the television screen result from the activation of only three types of phosphors: red, blue and green. The wavelengths of visible light produced by the activation of these phosphors represent an extremely limited spectrum compared to the wavelengths of light we receive when viewing objects outdoors in the full spectrum of reflected rays from the sun. Another problem with color television is that the color from it is almost exclusively processed by the right hemisphere so that left hemisphere functioning is diminished and the corpus callosum (the pathway of communication between the brain's hemispheres) is poorly utilized (i.e., poorly myelinated).

Reading a book, walking in nature, or having a conversation with another human being, when one takes the time to ponder and think, are far more educational than watching TV. The television - and computer games - are replacing these invaluable experiences of human conversations, storytelling, reading books, playing "pretend" (using internal images created by the child rather than the fixed external images copied from television), and exploring nature. Viewing television represents an endless, purposeless, physically unfulfilling activity for a child. Unlike eating until one is full or sleeping until one is no longer tired, watching television has no built-in endpoint. It makes a child want more and more without ever being satisfied (Buzzell 1998).

Susan R. Johnson MD, FAAP, completed a three-year fellowship in Behavioral and Developmental Pediatrics at the University of California, San Francisco and a graduate of the San Francisco Waldorf Teacher Training Program affiliated with Rudolf Steiner College. She has a private practice in Behavioral and Developmental Pediatrics at Raphael House in Colfax, CA.

For more articles see also Susan Johnson's website You and Your Child's Health.

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Endnotes

i Research released since this article was written indicates that all electronic visual displays -computer monitors, cell phones, laptops, tablets, e-readers, and all other mobile computing applications - can be included in this analysis.

ii It wasn't just the content, for I had carefully screened the programs my child watched. It was the change in my child's behavior (his mood, his motor movements, his play) before, during and after watching TV that truly frightened me.

Before watching TV, he would be outside in nature, content to look at bugs, make things with sticks and rocks, and play in the water and sand. He seemed at peace with himself, his body, and his environment. When watching TV, he was so unresponsive to me and to what was happening around him that he seemed glued to the television set. When I turned off the TV he became anxious, nervous, and irritable and usually cried (or screamed) for the TV to be turned back on. His play was erratic, his movements impulsive and uncoordinated. His play lacked his own imaginative input. Instead of creating his own play themes, he was simply reenacting what he had just seen on TV in a very repetitive, uncreative, and stilted way.

iii Healy 1990, Pearce 1992, Buzzell 1998, Winn 1985