

The Effects of Electronic Media On A Developing Brain

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Apportioning Time And Energy During Maturation

We have about 150,000 hours of living to expend between the ages of one and 18.

We sleep about 50,000 hours of this time, and we dream about two hours of the eight we sleep each night. Sleeping and dreaming appear to be positively related to the development and maintenance of the long term memories that emerge out of daytime activities, because they allow our brain to eliminate the interference of external sensory/motor activity while it physically adds to, edits, and erases the neural network synaptic connections that create long-term memories.

We spend about 65,000 of our 100,000 waking hours involved in solitary activities, and in direct informal relationships with family and friends, and these activities play a major role in the development and maintenance of important personal memories.

We spend about 35,000 of our waking hours with our larger culture in formal and informal metaphoric/symbolic activities -- about 12,000 hours in school, and about twice that much with various forms of mass media (e.g., TV, computers, films, music, sports, non-school print media, churches, museums). Mass media and school thus play major roles in the development and maintenance of important culture memories .

So on an average developmental day between the ages of 1-18, a young person sleeps 8 hours, spends 10 waking hours with self, family, and friends, 4 with mass media -- and only 2 hours in school. Our society has incredible expectations for those two hours!

Young people tend now to spend much time/energy on such electronic media as video games, TV, and computers -- at the expense of non-electronic media and socialization (although new forms of socialization are evolving around TV-watching and video-game-playing).

The attentional demands of electronic media range from rapt (video games) to passive (much TV), but this is the first generation to directly interact with and alter the content on the screen and the conversation on the radio. Screenagers emotionally understand electronic media in ways that adults don't -- as a viral replicating cultural reality, instead of as a mere communicator of events. For example, portable cameras have helped to shift

TV's content from dramatic depiction's to live theater, extended (and often endlessly repeated and discussed) live coverage of such breaking events as wars, accidents, trials, sports, and talk-show arguments. What occurs anywhere is immediately available everywhere. Our world has truly become a gossipy global village, where everyone knows everyone else's business.

Emotion drives attention, which drives learning, memory, and behavior, so mass media often insert strong primal emotional elements into their programming to increase attention. Since violence and sexuality in media trigger primal emotions, most young people confront thousands of violent acts and heavy doses of sexuality during their childhood media interactions. This comes at the expense, alas, of other more positive and normative experiences with human behaviors and interactions. Mass media tend to show us how to be sexy not sexual, and powerful not peaceful.

Commercial sponsorship in mass media has led to a distorted presentation of important cultural and consumer-related issues. For example, TV commercials tend to be very short, superficial, and factually biased. Further, computer programs and TV editing techniques tend to compress, extend, and distort normal time/space relationships, a critically important element in the creation and use of effective long- term memories.

Our Brain and Electronic Media: Biological Systems, Cultural Issues

Brain Development

- Our awesomely complex, yet elegantly simple brain is the best organized three pounds of matter in the known universe. Decidedly human but individually unique, it is a wary, curious, and exploratory organ that actively experiences and interprets its environment, applying a variety of cognitive models and systems that it develops (within established limits) to the reality it perceives. The brain, as a basic animal organ, developed in three successive layers over evolutionary time to meet survival, emotional, and finally rational challenges. Our rational cortical forebrain is unique among animal brains in its size and capabilities, but our sub cortical survival and emotional systems play much more powerful roles in shaping our thoughts and behavior than previously believed.
- Our brain is composed of tens of billions of highly interconnected neurons that interact electrochemically with surrounding and distant neurons through a complex system of tubular (dendrite/axon) extensions that receive and send messages. Cortical neurons are organized into a vast number of dedicated semiautonomous columnar modules (or networks)/ most of which are modifiable by the experiences that wire up our brain to its environment. Each module processes a very specific function (a tone, vertical lines), and groups of modules consolidate their functions to process more complex cognitive functions. And so, for example, sounds become phonemes become words become sentences become stories.

- Genetics plays a much larger role in brain development and capability than previously believed. Because biological evolution proceeds much slower than cultural evolution, we're born with a generic human brain that's genetically more tuned to the pastoral ecological environment that humans lived in thousands of years ago than to our current fast-paced urban electronic environment. Our curiosity and inherently strong problem-solving capabilities allowed us to develop such tools as autos/books/computers/drugs that compensate for our body/brain limitations -- and very powerful portable electronic computerized instruments are now rapidly transforming our culture. We can thus view drugs and technology as a fourth technological brain -- located outside of our skull, but powerfully interactive with the three integrated biological brains within our skull.
- Motivation experience and training can enhance generic capabilities (e.g., infants can easily master any human language, but they aren't born proficient in any of them), so brain development is a dynamic mix of nature and nurture. Thus, it's important to choose one's parents carefully -- because of the genes they pass on, and because of the cultural environment they create -- the appropriate mix of biology, technology, and society.
- Our brain is designed to adapt its cortical networks to the environment in which it lives (e.g., to master the local language). A socially interactive environment that stimulates curiosity and exploration enhances the development of an effective brain. Thus, excessive childhood involvement with electronic media that limit social interaction could hinder the development of a brain's social systems. Conversely, denying a child easy and extensive exploration of electronic technology helps to create an electronically hampered adult in an increasingly electronic culture. Surfing on TV, video, the Internet, and anything else that's electronic is the screenagers version of how to drive a car by first successfully mastering a tricycle/wagon/bicycle.

Memory Systems

- Our short-term (or working) memory is an attentional buffer that allows us to hold a few units of information for a short period of time while we determine their importance. Since the system has space/time limitations, it must rapidly combine (or chunk) key related bits of foreground information into single units by identifying similarities/differences/patterns that can simplify an otherwise confusing sensory field. The appeal of computerized video games may well lie in their lack of explicit instructions to the players, who suddenly find themselves in complex electronic environments that challenge them to quickly identify and act on rapidly changing elements that may or may not be important. Failure sends the player back to the beginning, and success brings a more complex, albeit, attractive challenge in the next electronic environment.

- Our short-term memory processes frame the segment of the environment that we perceive. We attend to the things that are inside the frame, and were merely aware of the context, the things that are outside of the frame. Mass media often eliminate a proper presentation of the context of an event, and so distort its meaning and importance. The result is that it presents a rare isolated event as being common, and people overreact. For example, a brutal park murder clears all the parks in the region. Children must develop a sense of context in the electronic media world they experience (and unfortunately, many adults who should assist them also equate rare with common. Even a President spoke normatively of welfare queens who lived in mansions and drive large cars).
- The efficiency of our dual long term memory system depends on our ability to string together and access long sequences of: (1) related motor actions into automatic skills (procedural memory), and (2) related objects/ events into stories (declarative memory). Thus, story-telling activities dominate our culture, through conversations/jokes/songs/novels/films/TV/ballets/sports/etc. Young people must master various storytelling forms and techniques, and electronic media can both help and hinder this process (through their range, editing techniques, and interactive potential).

Response Systems

- Our brain uses two systems to analyze and respond to environmental challenges, and electronic mass media often exploit these systems:
 1. A relatively slow, analytic, reflective system (thalamus-hippocampus-cortex circuitry) explore the more objective factual elements of a situation, compares them with related declarative memories, and then responds. It's best suited to non-threatening situations that don't require an instant response -- life's little challenges. It often functions through storytelling forms and sequences, and so is tied heavily to our language and classification capabilities. User-friendly computer programs and non-frantic TV programming tend to use this rational system.
 2. A fast conceptual, reflexive system (thalamus-amygdala-cerebellum circuitry) identifies the fearful and survival elements in a situation, and quickly activates automatic response patterns (procedural memory) if survival seems problematic.

The fast system developed through natural selection to respond to immanent predatory danger and fleeting feeding and mating opportunities. It thus focuses on any loud/ looming/ contrasting/ moving/ obnoxious/ attractive elements that might signal potential danger, food, and/or mates.

The system thus enhances survival, but its rapid superficial analysis often leads us to respond fearfully, impulsively, and inappropriately to situations

that didn't require an immediate response, (Regrets and apologies often follow). Stereotyping and prejudice are but two of the prices we humans pay for this powerful survival system. Worse, fear can strengthen the emotional and weaken the factual memories of an event. Consequently, we become fearful of something, but we're not sure why, so the experience has taught us little that's consciously useful.

- People often use mass media to exploit this system by stressing elements that trigger rapid irrational fear responses. Politicians demonize opponents; sales pitches demand an immediate response; zealots focus on fear of groups who differ from their definition of acceptable.

The fast pacing of TV and video game programming, and their focus on bizarre/violent/sexual elements also trigger this system. If the audience perceives these elements and the resulting visceral responses as the real-world norm, the electronic media must continually escalate the violent/sexual/bizarre behavior to trigger the fast system. Rational thought development would thus suffer. We can see this escalation in mass media.

- Conversely, if a person perceives these electronic-world elements as an aberration, and not normative of the real world, such electronic experiences could often actually help to develop rational thought and appropriate response. Those who will understand the normative center of a phenomenon must also know about its outer reaches -- and mass media provide a useful metaphoric format for observing the outer reaches of something without actually experiencing it (such as how to escape from a dangerous situation one might confront)

So perhaps it's not what electronic media bring to a Developing Mind that's most important, but rather what the Developing Mind brings to the electronic media. Children who mature in a secure home/school with parents/teachers who explore all of the dimensions of humanity in a non-hurried accepting atmosphere can probably handle most electronic media without damaging their dual memory and response systems. They'll tend to delay their responses, to look below the shiny surface of things. Further, they'll probably also prefer to spend much more of their time in direct interactions with real live people. They will thus develop the sense of balance that permits them to be a part of the real and electronic worlds -- but also to stand apart from them

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