

A Work in Progress**THE TEEN BRAIN***By Debra Bradley Ruder*

Your teenage daughter gets top marks in school, captains the debate team, and volunteers at a shelter for homeless people. **But while** driving the family car, she text-messages her best friend and rear-ends another vehicle.

Includes an anecdote to lead to main idea

Stage 1:

Writer introduces the issue or topic: the paradoxical period of teen brain development

How can teens be so clever, accomplished, and responsible—and reckless at the same time? Easily, **according to two physicians at Children’s Hospital Boston and Harvard Medical School** (HMS) who have been exploring the unique structure and chemistry of the **adolescent** brain. “The teenage brain is not just an adult brain with fewer miles on it,” **says Frances E. Jensen**, a professor of neurology. “It’s a **paradoxical** time of development. These are people with very sharp brains, **but** they’re not quite sure what to do with them.”

Poses a question that the text will address in more detail

Stage 2:

Writer develops the ideas related to the teen brain and this paradoxical time of development: cites research, notable studies, and expert opinions to develop these ideas

Research during the past 10 years, powered by technology such as functional magnetic resonance imaging, has revealed that young brains have both **fast-growing synapses and sections that remain unconnected**. **This leaves** teens easily **influenced by** their environment and more **prone to** impulsive behavior, **even without** the impact of souped-up **hormones** and any **genetic** or family **predispositions**.

Cites research to explain the workings of the teen brain and the impact on teen behavior. Begins to address the question posed earlier

Most teenagers don’t understand their **mental hardwiring**, **so** Jensen, whose laboratory research **focuses on** newborn-brain injury, and David K. Urion, an associate professor of **neurology** who treats children with cognitive impairments **like** autism and attention deficit disorder, are giving lectures at secondary schools and other likely places. They **hope to inform** students, parents, educators, and even fellow scientists about these new data, which have wide-ranging **implications** for how we teach, punish, and medically treat this age group. **As Jensen told** some 50 workshop attendees at Boston’s Museum of Science in April, “This is the first generation of teenagers that has access to this information, and they need to understand some of their **vulnerabilities**.”

Provides background information on two neurologists and what they are doing to help teens during this time of brain development

Human and animal studies, **Jensen and Urion note**, **have shown that** the brain grows and changes continually in young people—and that it is only about 80 percent developed in adolescents. **The largest part, the cortex, is divided into lobes that mature from back to front**. The last section to connect is the frontal **lobe**, responsible for **cognitive processes** **such as** reasoning, planning, and judgment. **Normally this mental merger is not completed until somewhere between ages 25 and 30—much later than these two neurologists were taught in medical school**.

Discusses the results from recent studies that have been conducted on human and animal brains and the impact on cognitive processes

There are **also** gender differences in brain development. **As Urion and Jensen explain**, the part of our brain that *processes* information expands during childhood and then begins to thin, peaking in girls at roughly 12 to 14 years old and in boys about two years later. This **suggests that** girls and boys may be ready to absorb challenging material at different stages, and that schools may be missing opportunities to reach them.

Notes research on gender differences in brain development and possible implications.

**Meanwhile**, the neural networks that help brain cells (neurons) communicate through chemical signals are enlarging in teen brains. Learning takes place at the synapses between neurons, as cells excite or inhibit one another and develop more robust synapses with repeated stimulation. This cellular excitement, or “long-term potentiation,” **enables** children and teenagers to learn languages or musical instruments more easily than adults.

Describes workings of teen brain and benefits for teens

**On the flip side**, this plasticity **also** makes adolescent brains more vulnerable to **external stressors**, as **Jensen and Urion point out**.

Describes the workings of the teen brain and cites experiments and studies that illustrate some of the negative effects for teens (i.e., vulnerable to external stressors such as alcohol and drugs)

Teen brains, **for example**, are **more susceptible than** their adult counterparts to alcohol-induced toxicity. **Jensen highlights** an experiment in which rat brain cells were exposed to alcohol, which blocks certain synaptic activity. When the alcohol was washed out, the adult cells recovered while the adolescent cells remained “disabled.” And **because** studies show that marijuana (cannabinoid) use blocks cell signaling in the brain, **according to Jensen**, “We make the point that what you did on the weekend is still with you during that test on Thursday. You’ve been trying to study with a self-induced learning disability.”

**Similarly**, **even though** there is evidence that sleep is important for learning and memory, teenagers are notoriously sleep-deprived. **Studying right before bedtime** can help cement the information under review, **Jensen notes**. So can aerobic exercise, **says Urion**, bemoaning the current lack of physical-education opportunities for many American youths.

Cites additional external stressors that may negatively effect teens (i.e., lack of sleep, sensory overload)

Teens are **also** bombarded by information in this electronic age, and multitasking is **as routine as** chatting with friends on line. **But** Jensen highlights a recent study showing how **sensory overload** **can hinder** undergraduates’ ability to recall words. “It’s truly a brave new world. Our brains, evolutionarily, **have never been subjected to** the amount of cognitive input that’s coming at us,” she says. “You can’t close down the world. All you can do is educate kids to help them manage this.” **For his part**, **Urion believes** programs **aimed at** preventing risky adolescent behaviors would be **more effective if** they offered practical strategies for making in-the-moment decisions, **rather than** merely lecturing teens about the behaviors themselves. (“I have yet to meet a pregnant teenager who didn’t know biologically how this transpired,” he says.)

Based on expert opinions (i.e., the two neurologists), offers a possible solution to help teens make better decisions and cope with the possible negative effects of teen brain development

**By raising awareness of** this paradoxical period in brain development, **the neurologists hope to help** young people **cope with** their challenges, **as well as recognize** their considerable strengths.

Emphasizes the neurologists’ solution to support teens during this paradoxical time of brain development

Stage 3:  
Writer provides a concluding statement.

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## Key

*Yellow – Examples of Cohesive Devices (link ideas)*

*Blue – Examples of Attributive Tags*

*Red – Examples of Precise Verbs and Verb Phrases*

*Purple – Examples of Domain Specific Vocabulary*

*Green – Examples of Complex Sentences*

*Orange Line- Separates Introduction, Development of Ideas, and Conclusion Stages*

*Text Boxes on the Left Explain Typical Text Structure for Informative/Explanatory Text*

*Text Boxes on the Right Explain What the Author is Doing, that is, the Author's Writing Moves*

### Examples of Language Functions Used in this Particular Text:

- Describing people and phenomena
- Expressing cause and effect relationships
- Comparing and contrasting ideas and information
- Exemplifying information and ideas
- Justifying ideas/opinions
- Offering solutions