

Curiosity, Pleasure And Play: *A Neurodevelopmental Perspective*

by Bruce D. Perry, M.D., Ph.D., Lea Hogan, M.Ed., Sarah J. Marlin, Baylor Medical Student

The human brain is an amazing organ. It mediates all of our thoughts, feelings and behaviors. It allows us to create, share and hope. It allows us to communicate and connect, to teach and to learn. The brain allows us our humanity.

In order to do all of these wonderful things, our brain must organize its 100 billion individual nerve cells (neurons) into efficient systems to sense, process, perceive, store and act on the continuous bath of sensations sights, sounds, tastes, smells and touch - in the environment. Furthermore, our brains do not just automatically pop into existence, capable of all these wonderful functions. The brain begins to develop in utero from just a few cells. Within a few short years it has grown to be 85% adult-size. The brain *grows* to become a dynamic ever-changing biological system which gives us the capacity to love, create, communicate or think. Our brain becomes a product of our genetic potential and our history of experience.

Experiences - repetitive, consistent, predictable and nurturing experiences - are required to express the underlying genetic potential of each child. It is becoming increasingly clear that it is the experiences of early childhood that play a key role in determining the foundational organization and capabilities of the brain (Schoore, 1997; Perry, 1994).

The experiences, environments and opportunities we provide our children help determine their strengths and vulnerabilities. If the child's world is chaotic, violent and emotionally or cognitively impoverished, his potential will remain unexpressed. If the child's world is safe, nurturing and rich in social, emotional and cognitive opportunities, he or she will flourish. Central to a child's healthy development is the opportunity to act on his natural curiosity - to explore, to play and, thereby, to learn.

Play, more than any other activity, fuels healthy development of children and the continued healthy development of adults. This is a bold statement. To judge this statement, we must consider what play is and how the human brain develops and changes.

What Is Play And Why Is It Important?

Play takes many forms, but the heart of all play is pleasure. If it isn't fun, it isn't play. We play from birth on - we play using our bodies (e.g., building with blocks) and our minds (e.g., fantasy play). We use words to play (e.g., jokes, wit, humor), and

we use props (e.g., blocks, toys, games). While the exact nature of play evolves, becoming more complex as we grow, play at all ages brings pleasure. And with pleasure comes the powerful drive to repeat the pleasurable activity. And with repetition, comes mastery. Mastery brings a sense of accomplishment and confidence. The more comfortable a child feels with the world, the more likely she will explore, discover, master and learn. This cycle starts with curiosity.

Curiosity, a neurobiological feature of many primates, drives exploratory play. Play can satisfy curiosity as the child explores her environment, thereby expanding her catalogue of experience. When the child explores, she discovers. A wonderful cycle of learning is driven by the pleasure in play. A child is curious; she explores and discovers. The discovery brings pleasure; the pleasure leads to repetition and practice. Practice brings mastery; mastery brings the pleasure and confidence to once again act on curiosity. All learning - emotional, social, motor and cognitive - is accelerated and facilitated by repetition fueled by the pleasure of play.

Simple principles of neurodevelopment match the observations related to play that have been made by academics, clinicians and parents over the years. Neurodevelopment, while very complex, has a number of core concepts and principles that can illustrate the central, crucial role of play in healthy development.

Neurodevelopment Principle One: Sequential Development. The brain, at birth, is undeveloped. During its development it organizes and grows in a sequential fashion, starting from the lowest, most regulatory regions of the brain and proceeding up through the more complex parts of the brain responsible for more complex functions. Healthy development of one region/capability is dependent upon the healthy development of lower brain regions that take place earlier in the process (see Figure 1). Play during development, therefore, parallels this sequential neurodevelopmental process. In early childhood, when the brain is developing motor-vestibular capabilities, for example, there is much more large motor play than in adolescence. Play opportunities for the child must be provided in an appropriate sequence and matched to the child's level of neurodevelopment. In turn, this matching process is dependent upon adequate assessment of the child's development in the key areas of physical/motor, behavioral, emotional, social and cognitive domains.

(Continued on page 10)

Sequential Neurodevelopment and Play

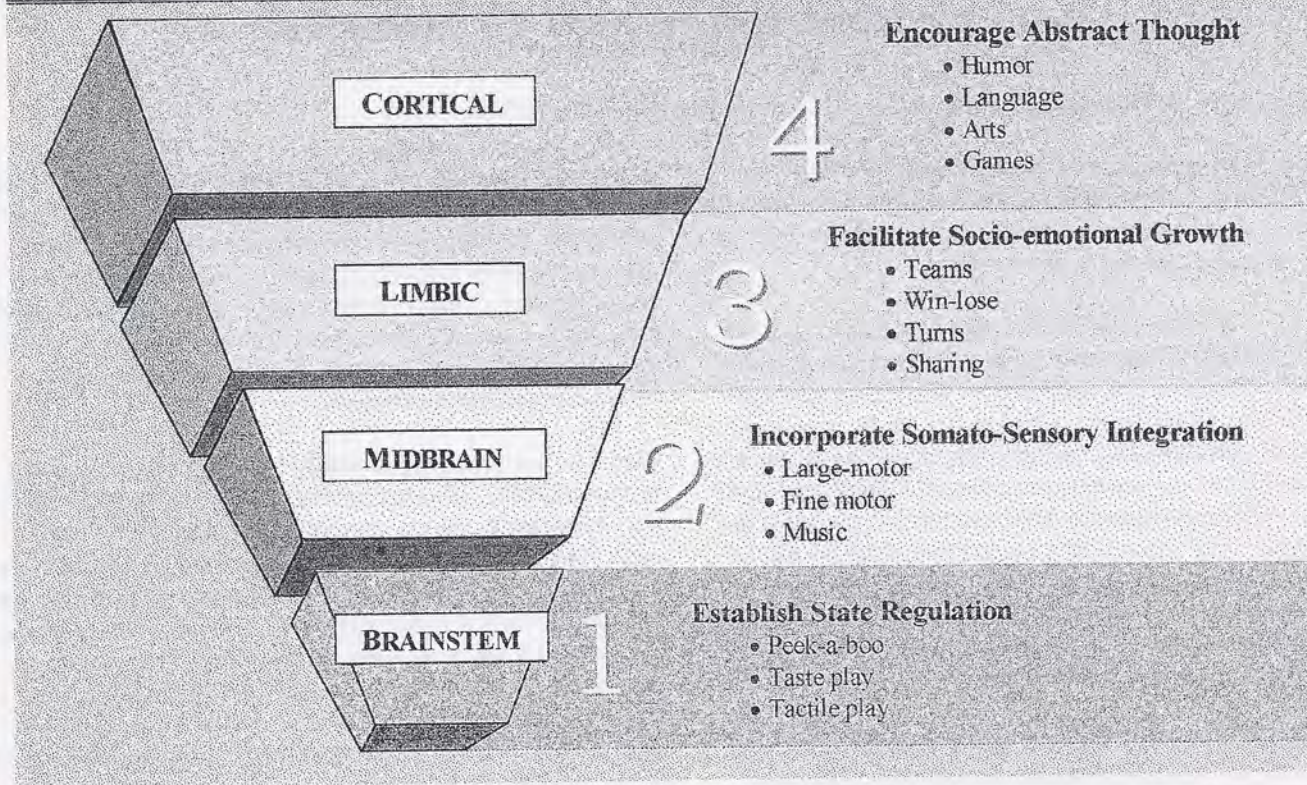


Figure 1: The Hierarchical Structure of the Human Brain: The human brain is organized and develops in a hierarchical fashion. The lowest and most simple areas develop first, followed in sequence by more complex areas that mediate more complex functions. Play activities of children mirror this process and facilitate healthy development of the brain. Babies play at the nipple, toddlers practice motor skills, and fantasy play encourages socio-emotional and cognitive development. As children grow, the complexity of play grows. Solitary, parallel, dyadic and then group play develops in sequence with the developing social capabilities of the child. At each stage of development, it is play and the repetitive elements of play that help organize neural systems which will ultimately mediate more complex motor, social, emotional and cognitive skills.

(Continued from page 9)

Neurodevelopment Principle Two: Use-dependent Development. The normal organization of any brain area or capability is 'use-dependent.' Neurodevelopment is dependent upon the presence, pattern, frequency and timing experiences during development. The more patterned activity (e.g., music, reading, conversation), the more the brain regions responsible for these tasks will organize and be functionally 'healthy'. The implications of this are profound. Patterned repetitive activity results in patterned neural activity that changes the brain. These experiences help build in the neural capacity to better perform those functions (i.e., hearing language helps develop speech and language capabilities; practicing piano develops fine motor and rhythm-reading capabilities and reading increases capacity for verbal comprehension and abstract reasoning). Children exposed to consistent, predictable, nurturing and enriched

experiences will develop neurobiological capabilities that will increase the child's chance for health, happiness, productivity and creativity. Conversely this means that the child with neglect, chaotic, and terrorizing environments will have significant problems in all domains of functioning (see Perry 1995; 1997).

Play has a crucial role in providing the repetitive experiences that can improve and express the potentials in all areas of the human brain. Depending upon the nature of the play, growth and change in all parts of the brain can be facilitated. The more opportunities for enriched and complex play, the more repetition will take place. As we think about the importance of play we can never underestimate the need for consistent, predictable, patterned and frequent opportunities for play in a child's life. This means that the major providers of the experiences in the child's life - caregivers, teachers, and parents - must appreciate the role of play and pleasure in overall learning.

Conceptual Principle Three: Windows of Opportunity.

Much of this sequential and use dependent development of the brain takes place in early childhood. This means that of all the experiences throughout the life of an individual, the organizing experiences of early childhood have the most powerful and enduring effects on brain organization and functioning! Society does not capitalize on this window of opportunity in early childhood. Indeed, we typically wait until a child is so impaired and dysfunctional, acting out and failing in school, before we initiate services. Those few resources that are dedicated to early childhood tend to be inefficient and unfocused.

With play, we have an inexpensive and efficient means to help children develop. Proactive is better than reactive. Simple music and movement activities provided early in life for high-risk children, for example, appear to have powerful and positive impact on young children. We must teach young mothers and caregivers how important it is to play with their young children. The best toy for a young child is the invested, caring adult - someone to pay attention, to engage and to play with the child using words, song, touch and smile.

Play And Exploration

Play and exploration are crucial activities for young children. They help the child's brain develop in optimal ways. Child sensitive spaces, semi-structured activities and opportunities for exploration are safe, nurturing and enriched in developmentally appropriate stimulation and should be the core elements of all child-focused programs. Play and exploration grow the brain - healthy play and exploration grow healthy brains.

How Does Play Help Your Child Grow?

Through play, a child's sense of who she is can become more defined and integrated. As she learns about herself and the world, she acquires a wide range of important developmental, social, and cognitive skills, as well as positive inner traits, that help form the basis for happiness, productivity and a healthy future. Play-related skill building tracks with neurodevelopment. As described in Figure 1, the brain organizes from the bottom to the top.

Gross motor skills, such as walking, kicking, or skipping, can be enhanced when a toddler pushes a toy grocery cart or an older child jumps rope. When a young child kicks a ball across the room, she is practicing coordination by balancing on one foot to kick with the other. She is additionally developing larger muscle control, tone and flexibility, qualities that may help her score the winning goal when she is old enough to play soccer.

Children can develop advanced fine motor and manipulation skills while playing as they use their fingers to build and color a

sign for a backyard tree house. When throwing and catching a ball, they are practicing hand-eye coordination and their ability to grasp. As they scribble with a pencil on paper, they are developing the muscle control and coordination needed to one day write a letter to a friend.

Children have opportunities to enhance their language skills through play by talking and singing with other children. A child's interactions with and repetition of his playmates help him master the semantics of language as he participates in spontaneous rhyming and word play. While having fun, he increases his play-related speech, his sentence length, and his vocabulary.

The child's cognitive, or mental, abilities can also be enhanced by play. A child's play often involves physical and mental trial and error, problem-solving tasks, and an ability to discriminate between relevant and irrelevant information. Play requires the child to make choices and direct activities and often involves strategizing, or planning, to reach a goal. Through pleasurable play, children often become motivated and perseverant, qualities that frequently may later translate into the classroom.

While enjoying their play, children can acquire a wide range of interpersonal/social skills, ranging from communication to cooperation. When children argue about who stepped "out of bounds" and agree upon a "do over," they are learning how to negotiate, compromise and work together. They are learning about teamwork when they huddle together and decide how they will position themselves for the next shot. The child gains an understanding about those around him and may become more empathetic and less egocentric. When playing with peers, children are developing a learning system of social rules, including ways to control themselves and tolerate their frustrations in a social setting.

Play Develops Skills
• Creativity
• Teamwork/cooperation
• Communication/negotiation/compromise
• Developmental skills
• Goal setting
• Following rules/directions
• Self-reliance
• Empathy
• Social interaction
• Problem solving
• Self-expression
• Self-confidence

(Continued from page 11)

Creating A Healthy Environment To Optimize Play And Learning

A child will play when she feels safe. And to a child, feeling safe has little to do with outlet plugs and childproof cabinets. A child's sense of safety stems from a calm and *predictable* world – one in which she knows what will happen next. This means her life is fairly consistent from one day to the next – and the adults in her world are predictable, consistent and, ideally, attentive, attuned and attached. She knows her caregiver is there for her to feed her, protect her and comfort her. You can make a child's world more predictable by keeping her on a daily schedule. For example, she wakes, eats meals and bathes roughly at the same time every day. Significant changes to her daily routine (for example, frequent home moves) are kept to a minimum. Predictability will help eliminate the element of surprise. In an unpredictable world with no routine, children may be anxious. Anxiety kills curiosity. A child that feels safe and is in familiar space will be curious and will seek novelty. A child that is anxious or in an unfamiliar setting will be unwilling to try new things.

“With play, we have an inexpensive and efficient means to help children develop.”

A child's environment should also be rich in sights, sounds, smells, tastes and touch. Environments rich in sensory experiences stimulate the child's brain and give him/her new information about the world. For a child, a sensory-rich experience could be as simple as the smell of blueberry muffins baking in the kitchen or the touch of a velvet pillow to the face. It is important for caregivers to recognize the importance of sensory experiences to a child. Caregivers should also recognize that too much stimulation could overwhelm a child. For example, one toy with bells and whistles might be interesting to a child, but many noise-making toys might over stimulate him/her. Caregivers should note that television is not considered a sensory-enriched experience for a child.

In today's world we often underestimate the importance of play. We over schedule our children with educational or structured activities that often inhibit spontaneous, curiosity-driven exploration. In the end, if we want to help our children meet their potential, we must allow children to have free time, spontaneous play and safe and enriched play and learning environments.

For more information on this and related topics:

Visit these web sites;

<http://www.ChildTrauma.org>

<http://Scholastic.combruceperry>

References

Perry, B.D. (1997) Incubated in Terror: Neurodevelopmental Factors in the 'Cycle of Violence' In: Children in a Violent Society (J Osofsky, Ed) The Guilford Press, New York, pp. 124-150.

Perry, B.D., Pollard, R., Blakely, T., Baker, W., Vigilante, D. Childhood trauma, the neurobiology of adaptation and 'use-dependent' development of the brain: how "state: become "traits". Infant Mental Health Journal 16 (4): 271-291, 1995.

Shore, R. (1997) Rethinking the Brain: New Insights into Early Development Summary from Conference: Brain Development in Young Children: New Frontiers for Research, Policy and Practice. Families and Work Institute, New York.

About the Authors

Bruce D. Perry, M.D., Ph.D. is the Thomas S. Trammell Research Professor of Child Psychiatry in the Department of Psychiatry and Behavioral Sciences at the Baylor College of Medicine in Houston, Texas. Within the Baylor College of Medicine clinical system, he serves as Chief of Psychiatry at Texas Children's Hospital.

Lea Hogan, M.Ed. is a clinician at the Child Trauma Academy where she is the project director of the Early Childhood and Neurodevelopment Curriculum Project. Ms. Hogan has extensive clinical experience working with maltreated children and has been active in the Child Trauma Music and Movement projects.

Sarah J. Marlin graduated magna cum laude from Columbia University, New York, NY with a Bachelor of Arts in Biology. Currently she is a medical student at Baylor College of Medicine, Houston, TX.

Editor's Note: Dr. Perry will be the keynote speaker at the HAAEYC Fall 2001 Conference.