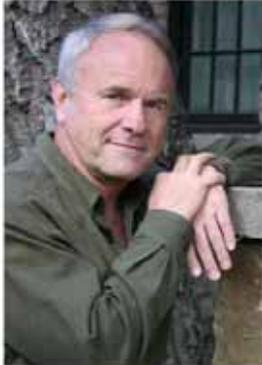


Sensory Deprivation and the Developing Brain

by

Michael Mendizza



Brain growth and everything that implies is 'experience dependent.' The last decade of research reveals a reciprocal dynamic between the brain and the environment. Change the environment and you change the brain. A sweeping statement, I know, but true.

For millions of years the natural environment triggered most brain growth as increasingly complex creatures adapted to that environment. In the last 50,000 years human adaptation has changed the environment. Today the melting of polar ice and mass extinction of species all over the planet

demonstrate how changes in the human brain are affecting the environment. Environment and brain are not independent. They are two sides of a single coin.

This reciprocal dynamic develops as millions of sensors deep inside and covering the surface of the body contact the environment and abstract meaning form the sensory information gathered moment by moment. The structure of each major system of the brain is designed genetically. How each develops however, is shaped by adapting to sensory, emotional and later abstract symbolic 'experiences'.

It is easy to appreciate how fresh, whole, organic foods nourish the cells of our body as sun, rich soil and rain nourish a plant. The same is true of all the senses, touch, movement, sight, hearing, taste, olfactory. The nature, quality, presence or absence of each sensation represent nutrients for the developing brain.

Our body was planted and evolved in a rich multi-sensory natural environment and expects to be fed rich multi-sensory experiences. Sensory deprivation, that is limiting, diminishing or removing all together the quality and/or quantity of one or more sensory experience very early in life, as the brain is establishing its foundation for life, may alter basic patterns that brain will use for a lifetime.

Dating back to the 1960s this reciprocal relationship between the brain and environment was studied in the laboratory by observing the impact of sensory deprivation on the developing brain. Harry Harlow's famous mother-infant separation studies ushered in a cascade of research exploring how sensory experiences promote or retard brain growth and development.

Intimate body contact, breast feeding, being held, movement and affectionate play provide naturally a constant source of multi-sensory experiences that feed development. From this point of view not breastfeeding, no skin to skin contact, not being held, not moving and playing affectionately are forms of sensory deprivation, which are as damaging as a steady diet of junk food would be or no sunlight to a very new and rapidly developing human being.

In many ways our modern life style and world are deficient in both touch and movement, both critical for healthy and whole development. One example, and there are many, the World Health Organizations recommends breastfeeding for two and a half yeas or longer, something virtually nonexistent in industrialized societies.

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Yes, some women breast feed but very few for twelve months or longer. What most fail to realize is that pleasure shared through intimate safe somatic stimulation is as or more important than vitamins and minerals, especially when considering early brain development.

Of course good nutrition is essential but so are intimate body contact, sight, smell, taste, touch, movement and affectionate play. These are the sensory nutrients that develop the regulatory capacities of the limbic (emotional-social-sexual) brain. An absence of these sensory-nutrients early in life retard the whole and integrated development of what has come to be called 'emotional intelligence' lifelong.

Emotional intelligence is the natural expression of a neuro-integrative brain, one that embraces and weaves together life's experiences and it is the limbic (emotional-social-sexual) brain that does the weaving. Depriving the brain of the sensory-nutrients it needs, again very early in life, has been shown to cause permanent alterations in brain development and function. If the sensitive window for optimum development of certain structures is passed, yes the damage is permanent.

No one knows this better than James W. Prescott, PhD, a pioneering researcher who followed with brain and behavior studies Harry Harlow's mother-infant separation (sensory deprived) research. One of the most startling findings was that movement played a central role in the development of emotional-social-sexual intelligence. At ten months of age the mother-deprived infants who were raised with a moving surrogate (a cloth covered plastic bottle) expressed few of the pathologies that plagued mother-deprived infants raised with the same surrogates that were immobile. During the most sensitive period of brain growth and development conception to approximately eighteen months of age, movement is as critical as good nutrition.

Attention deficits, impulse dys-control, sudden bursts of anger and violence all point to an emotional-social-sexual brain that has not developed the capacity to integrate and regulate sensory information. This is usually traced to the failure of the early environment to provide the rich multi-sensory experiences that brain needs to develop its integrative capacity. Pleasure, which means safe-bonded-intimate-play is the key to this development. Pleasure is the essential and overarching field, context or catalyst that develops the biological foundation for emotional-social-sexual intelligence.

Prescott's' research demonstrates time and time again that the absence (sensory deprivation) of pleasure is more damaging that short bursts of physical pain. This is the tip of a culture changing iceberg that very few have the courage to address.

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While working on a soon to be released lifetime archive project dealing with sensory deprivation and the developing brain I asked pioneering researcher, James W. Prescott, PhD if he believed that most westernized-industrial cultures suffer from early sensory deprivation? "Isn't that what the social statistics indicate," was his reply.

Caesarian section, separation at birth, the near absence of breast feeding especially after the first twelve months are all forms of sensory and social deprivation compared with our natural evolutionary history.

We live in a 'keep your hands to yourself – don't touch world.' Many children have more eye contact with television characters than their own parents. Insurance risks eliminated swings from many preschools and so called playgrounds. Recesses are shrinking. So too are art classes and woodshop. Interaction with a 3D natural world has been replaced by 2D screens. Considering sensory development which is richer, two dimensions or three? Jim has a point.

Normal is relative. In the short term normal means typical, common, average. In terms of human development normal means typical or average over perhaps a million years. From this larger perspective today's environment far from normal, far from healthy. Look at childhood and adult obesity.

Why is this important? Because DNA and everything it produces uses the long view of normal as a baseline. In many ways DNA represents a form of memory reaching back millions of years as it adapts to the present moment.

Joseph Chilton Pearce describes how nature has an agenda for the unfoldment of increasingly complex capacities. Starting with the first cell division the blossoming of a new human follows a blueprint, a timed sequence established over millennia. The field of Embryology has charted this unfolding blueprint day by day in utero as Piaget and others have done during childhood.

The full spectrum of innate and latent capacities unfolds according to this blueprint. The entire process of growing a new human being implies a reciprocal dynamic with the environment. At each age and stage of development there is an assumed expectation that the environment will provide the precise catalysis necessary to develop the current stage and trigger yet another giant step forward in complexity.

To arrive at full functionality however, each capacity, with its implied structure, must be nurtured. This leads to another of Pearce's central themes, what he calls the 'model imperative,' echoed by Bruce Lipton's view of biology. It is the model-environment that triggers our development and destiny.

Development is experience dependent and this dependency refers to the environment. Failing to meet one or more needs at any age or stage might be compared to a seed being planted in sand, not being watered or placed in poor sunlight. When nature's unfolding agenda calls for a stem or leaf, that plant will do its best to grow what is needed and will do so with the resources it has developed.

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A plant left in the dark will produce a leaf that is underdeveloped small, weak compared to a fully nurtured plant. The same is true of child's developing brain and body.

Soil, sun, wind and rain are the plant's environment. Children are planted in adults and the adult culture. When a plant wilts we water the soil and by doing so provide the best environment for that plant to grow. When a child's development stumbles perhaps we might consider the same prescription, nurture the soil these children are planted in – focus our attention and resources on parents and the people who care for children. Childhood abuse and neglect are caused by poor soil conditions not the seedling.

I prefer the term sensory deprivation to neglect or abuse. Abuse and neglect produce images of a wounded psyche, transient feelings that are easily dismissed. Sensory deprivation is more concrete – starvation, malnutrition, torture. Are parents and the adult culture meeting nature's long term expectations at each age and stage of a child's development or not? That is the basic question. To answer this question we must turn to the senses and this takes us back to the research of James W. Prescott, PhD.

Dating back to the 1960's Jim, more than any one I know has studied how sensory deprivation impacts the developing brain very early in life. It was Harry Harlow who separated infant monkeys from their mothers at birth. He raised them in colony rooms where they could see, smell and hear other monkeys, but not touch or be touched by them. Touch and movement were the two critical forms of stimulation being denied these infants at the most critical period of brain growth and development.

Soon it became apparent that Harlow's mother-deprived infants were profoundly abnormal. Development was slowed. Social, emotional and sexual development was retarded. The monkeys were depressed, inattentive rocked in stereotypical patters, engaged in self-mutilation. There was no play. When touched at ten months of age they acted as though touch was unpleasant, their bodies stiffened, bearing their teeth. As juveniles touch produced outbursts of violent aggression. Mating and child rearing were impossible. The absence of normal touch and in particular movement produced permanent alterations in the brain of these mother deprived monkeys. Jim describes how this takes place.

If we have pleasurable sensory stimulation then that's the brain engrams, the templates that will be stored and they will be images of pleasure. If they are painful they are going to be images of pain. And pain evokes violent responses. But there is something else that invokes violent responses, and that is the absence of pleasure, and that is really different than the sensory event of pain, and most people don't yet appreciate that distinction. And in fact, more damage occurs with the sensory deprivation of pleasure than the actual experiencing of physical, painful trauma, which, in fact, can be handled quite well in individuals who have been brought up with a great deal of physical- affectional bonding and pleasure, which carries with it emotional trust and security and so forth.

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So we really have to look at the trauma of sensory deprivation of physical pleasure and that translates into the separation experiences, the isolation experiences of the infant from the mother, that's the beginning.

Interview with James W. Prescott, PhD

More damage occurs with the sensory deprivation of pleasure than the actual experiencing of physical, painful trauma. This one sentence holds the key to early childhood social-emotional-sexual development and everything that is built on this early foundation.

Joseph Chilton Pearce, James w. Prescott and I authored an essay – *Pleasure Bonds*. In it we describe the essential role of pleasure in forming and securing lasting binds as children and in adults.

Pain warns us of danger—avoiding what is harmful. Pleasure attracts us to what is nurturing—seeking what is good. The developing brain must experience pleasure and happiness if the integration of sensations involved in learning and social adaptation is to take place. A child denied pleasure and happiness develops a brain that is neuro-dissociative, one that fragments rather than integrates experience.

This integrative nature of pleasure and the dissociative effect of pain were demonstrated years ago when newborn monkeys were separated from their mothers and raised in isolation. The pain and pleasure systems of these mother deprived monkeys were impaired causing maturing juveniles and adults to compensate for their early sensory loss with super-sensory stimulation, i.e., chronic touch, stereotypical rocking, hyperactivity, attention deficits, touch aversion (hyper-reactivity) and self-mutilation (impaired pain perception), all behaviors with strong parallels in many of today's children and adults.

(See the complete essay at www.tffuture.org)

Which is richer in terms of sensory experience: Being held close to mother's breast or sucking artificial formula from a plastic bottle? Being strapped in a plastic stroller or carried on dad's shoulders? Digging a hole to China in the back yard or watching the Disney Channel? Legos or building a clubhouse for scrap wood? Catching frogs in the ditch down the street or The World of War Craft? Neighborhood pick-up games or adult organized Little League? Day by day, sensation by sensation the full spectrum experiences offered by a natural three-dimensional world have been replaced by sensory deprived counterfeits.

Nate Jones, a formula one racing specialist, began to notice that boys coming to work in his shop during the early 1980s were physically and imaginatively awkward compared to every generation that came before. He could not figure out why and then it dawned on him, catalytic converters hit the car industry the same year Nintendo hit teenage boys.

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Suddenly cars became too complex to work on at home so kids stopped working in three-dimensions and invested their developmental time to two-dimensional screens. Which is more complex – two dimensions or three?

Nate's hypothesis was supported by Frank Wilson's, a Stanford Neurologist new book, 'The Hand: How Its Use Shapes the Brain, Language, and Human Culture.' More brain power is devoted to the thumb and hand than the entire body beneath the neck. And how is this brain power developed? By playing with three dimensional objects throughout childhood.

Frank explains that every physical movement creates an inner image of the body's position in three-dimensional space, a form of kinesthetic imagination or embodied cognition we call proprioception. Upon this embodied imaginative foundation we later add symbolic and metaphoric forms of imagination. Now imagine, if you can, a child with a rich three-dimensional sensory foundation and a child that skipped or was deprived of this three-dimensional foundation and leaped ahead to two-dimensional symbolic abstractions. Which of these two children would you expect to expand their capacity for critical and creative thinking and problem solving? Easy - the child who experienced and developed their brain relating to the natural three-dimensional world.

The important link between sensory stimulation, which nearly always involves the hand, brain development and creative thinking, was further supported when the head of Pasadena's prestigious Jet Population Laboratory read an essay written by Nate. He too had seen the same physical and imaginative awkwardness, not in young car mechanics but in the pick of our nation's top universities. The social, emotional and imaginative capacities of our brightest graduates did not match that of earlier generations. These young men had skipped playing in the mud, digging to China and catching frogs. Instead they rushed into two-dimensional flat screen abstractions, and by so doing deprived their early brains of critical three-dimensional stimulation, the essential foundation for full spectrum embodied cognitive AND symbolic imagination.

We come full circle. More damage can occur with the sensory deprivation of pleasure than the actual experiencing of physical, painful trauma. Crawl before you walk. Play in the mud, build sand castles and tree houses before you build rockets to Mars. The early sensory world lays the templates for our entire social, emotional and sexual life. And upon this foundation or lack of it, our thoughts, beliefs, our politics and values rest.

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