



# Hardwired to Learn

Part I: Creating Classrooms in  
Cocert With Our Genes,  
Experience and Mindsets  
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Knowledge is power.

Sir Francis Bacon

The greatest obstacle to  
discovery is not ignorance - it  
is the illusion of knowledge.

Daniel J. Boorstein

Caution should be taken in jumping to readily onto the bandwagon of whatever happens to be the prevailing enthusiasm of the moment.

**Sir Michael Rutter**

# Instinctual Optimism

Instinctual optimism can be understood as a vital component guiding human development, self-discipline, a sense of ownership and responsibility for one's behavior.

**Instinctual optimism serves as  
the fuel for a resilient mindset.**

*Resilience* is a  
pattern of positive  
adaptation in the  
context of past or  
present adversity.

**Good Coping =  
Resilience**

Did you ever wonder . . . ?

Neurological development is  
not a simple process of  
gradual growth from simple to  
complex.

# Our Brain

- During fetal development the foundations of the brain are laid as billions of neurons form appropriate connections and patterns. No aspect of this complicated structure has been left to chance.
- The basic wiring plan is encoded in the genes.

# Our Brain

- It has been shown from previous studies that in developing embryos of animals, nerve cells are created in or travel to designated regions of the brain, and once in place send out axons along preprogrammed paths to make contact with specific targets.

# Our Brain

- The brain's billions of neurons connect with one another in complex networks.
- All physical and mental functioning depends on the establishment and maintenance of neuronal networks.

# Our Brain

- Is malleable and responsive to life experience.
- Consists of a Central Nervous System that is constantly changing and adjusting throughout life.
- Responds to stimulating environments by expanding cortical areas, branching neurons and in the case of trauma, increased neuronal survival.

# Our Brain

- During encephalization, human brain mass increases beyond that of other species relative to body mass. This process is especially pronounced in the neocortex, a section of the brain involved with language and consciousness.

# Our Brain

- The neocortex accounts for about 76% of the mass of the human brain; with a neocortex much larger than other animals, humans enjoy unique mental capacities despite having a [neuroarchitecture](#) similar to that of more primitive [species](#).

# Our Brain

- The human brain is the source of the conscious, cognitive mind. The mind is the set of cognitive processes related to perception, interpretation, imagination, memories, and crucially language (e.g. Broca's and Wernicke's areas) of which a person may or may not be aware.

# Our Brain

- Beyond cognitive functions, our brain regulates autonomic processes related to essential body functions such as respiration and heartbeat. The brain also controls all movement from lifting a pencil to swinging a golf club.

# Our Brain

- Extended neocortical capacity allows humans some control over [emotional behavior](#), but neural pathways between emotive centers of the brain stem and [cerebral motor control areas](#) are shorter than those connecting complex cognitive areas in the neocortex with incoming sensory [information](#) from the brain stem.

# Our Brain

- Powerful emotional pathways can modulate spontaneous emotive expression regardless of attempts at cerebral self-control. Emotive stability in humans is associated with [planning](#), [experience](#), and an environment that is both stable and stimulating.

# Our Brain

- The human brain appears to have no localized center of conscious control.
- We seem to derive consciousness from interaction among numerous systems within the brain.

# Our Brain

- Executive functions rely on cerebral activities, especially those of the frontal lobes, but redundant and complementary processes within the brain result in a diffuse assignment of executive control that can be difficult to attribute to any single locale.

# Our Brain

- A person's habits and skills -- such as nail-biting or playing a musical instrument -- become embedded within the brain in frequently activated neuron networks.
- When a person stops performing an activity, the neural networks for the activity fall into disuse and eventually may disappear.

# Brain Development Occurs From Conception Through Childhood

- Additive processes involve proliferation of neurons, development of synaptic connections and myelination.
- Subtractive processes involve programmed cell death prenatally and synaptic pruning postnatally.
- Development is more than overproduction followed by cutting back, substantial functional reorganization takes place.

# Adults vs. Children

- Increased metabolic activity peaking at 150% by two years of age
- Focal or localized brain functions in adults are carried out by diffuse regions in children
- Adults utilize inhibitory processes, children do not as routinely
- Less automatization of brain mediated functions in children

Compared with the brain of the child, representation of function in the adult brain is likely to be more focal, to make greater use of inhibitory processes, and to implicate non-cortical regions associated with the automatization of skills

How do genes contribute to learning and development?

We fail to appreciate that children are genetically endowed with certain patterns of behavior and thought.

# What Are These Traits?

**The drive to help.**

**The drive to mastery.**

**Intrinsic motivation.**

**Altruism.**

**Problem solving.**

**Social connection.**

**The drive to acquire knowledge.**

What is and is not  
intelligence?

How is intelligence different  
from knowledge?

How is intelligence different  
from achievement?

What role do caregivers and teachers serve in the developmental process?

Caregivers are the architects of the way in which experience influences genetically preprogrammed but experience dependent brain development.

Daniel Siegel  
*The Developing Mind*

Or to put it in simple terms:

Caregivers create  
an environment in  
which instinctual  
optimism, resilience  
and self-discipline  
can flourish.

Intrinsic motivation driven by instinctual optimism explains the drive of young children.

Learning is greatest when prompted by intrinsic motivation rather than external controls.

Intrinsic not external  
motivation is at the center of  
creativity, responsibility,  
healthy behavior and lasting  
change.

Motivation isn't something that gets done to children but rather something that children must do for themselves.

A child's curiosity is an  
astonishing source of  
energy.

Edward L. Deci

As parents and educators, the question we must ask ourselves is how we can create environments within which children will motivate themselves to think, acquire knowledge and achieve.

Adopt a learning to  
ride a bicycle  
mindset!

Students will work in order to earn extrinsic rewards, avoid punishments, win competitions or to nurture their intrinsic motivation.

By middle elementary or primary school age many children become passive learners. They appear to have lost that interest and excitement driven by their instinctual optimism that is so obvious in preschool children.

Educational settings must strive to create learning experiences that drive intrinsic motivation and self-discipline to replace the status quo in which children are manipulated and controlled by extrinsic forces.

The problem with rewards, avoidance of punishments and competitions is that once you start down this road you cannot easily go back.

Students oriented towards rewards work only in the presence of the reward, seek the shortest way to the goal and ultimately lose the opportunity to experience the joy of learning.

Children with much of the former don't work without the external rules and consequences in place. They have trouble coping with failure.

Those with the latter enjoy the process of learning, even in the face of mistakes or struggles.

Children follow through better with assigned tasks when they are provided with a rationale to complete the task, their feelings are acknowledged and when pressure is at a minimum.

Children's innate characteristics not only affect their behavior and development but also have an impact on their environment which then changes their parents and teachers and further impacts their development.

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