Developmental Programming of Ethical Consciousness: Impact on Bioscience Ethics Education and Learning

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Personal ethics are strongly influenced by emotions, particularly secondary emotions, because these emotions expand ethical reasoning and development as the child matures. A well-developed consciousness profoundly influences a person’s actions and conduct when solving problems of what is thought, or taught to be, right or wrong. Compelling neurological evidence supports the claim that children begin to develop enduring ethical standards at an early age and that these standards are largely based on the experiences of early childhood. Essentially, the innate sense of ethics requires nurturing during infancy before it can be cognitively understood and practiced in maturity. In biological terms, the development of neural networks that regulate emotional growth, and subsequently, the capacity for ethical discrimination, depends on the infant's early social environment. Thus, the toddler’s early epigenetic experiences enhance, or impede, its innate still dormant genetic potential. Importantly, personal character development and ethical discrimination begins long before the child’s formal educational years. As a consequence, early learning has to discover ways of conserving adaptive thinking which can be applied to the choices that may confront future generations. Early ethics education, including accurate access to scientific, medical, and technological knowledge, is thus critical. Future generations will increasingly require education from a global perspective when making major ethical decisions in areas, such as nuclear technology, disposal of wastes, preservation of biodiversity, global warming, and unregulated human population growth. As long as our culture continues to reflect advances in science and technology, there is an obligation to make science education overlap with crucial periods in the advancement of ethical consciousness. Significantly, when considering the human capacity for excess at times of conflict, it is incumbent on the scientific community to integrate research-based knowledge with wide-ranging learning and problem-solving skills. Bioscience ethics, the established interface bridging applied science and applied bioethics, can assist in this process of integration. To become fully responsible adults, we must share our extraordinary cognitive talents and respect life on earth in all its rich diversity. In biological terms, human uniqueness resides primarily in our brains with its products being co-operation in family and ancestral units, long education, sophisticated language and culture, and importantly, ethical consciousness—all attributes held in trust by knowledge and wisdom for future generations.

Keywords: human brain programming, evolution and ethics, neuroethics, primary and secondary emotions, bioscience ethics, bioscience ethics education, early childhood education

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1. Introduction: The Heritability of Ethics

Development in the child is a complex process and it lies at the very heart of every human being and his or her learning process, beginning at birth and even before, in utero.

The implication of this on society, and the way children are taught, is enormous and necessarily means that the importance of the first few years of life is increasingly being stressed by educators. Scientists now know that experiences after birth rather than innate elements are actually responsible for wiring the brain together.1

During infancy and early childhood, children develop their ability to regulate their own emotions and behavior. This development of self-regulatory mechanisms has been considered to be the crucial link between genetic predisposition, early experience, and later adult functioning in society. In evolutionary terms, the success of the human species is attributed to the ability to live socially in groups, thus, humans have a longer period of childhood compared to other species and it is suggested that this difference prepares the child for the increasingly complex and changing socio-cultural environments encountered in adulthood (Berger et al. 2007). Despite this insight, the standard teaching of human growth and development has generally been addressed to the changes in the physical body and pays comparatively less attention to the processes of ethical consciousness and self-determination. Sadly, the coincidental development of healthy ethical principles, as facilitated by the relationships children have with the people around them, is often neglected (Kochanska, Gross, and Nichols 2002). Unquestionably, infancy and early childhood are periods in human lives when the brain is most susceptible to both negative and positive experiences which, in turn, create fresh neural tracks that guide a person’s destination throughout life (Fig. 1).

Fig. 1. The Neurobiological Tracks of Social Engagement Are Shaped Early in Life By Emotional Experiences That Set the Imprint for Ethical Development and Moral Judgment (Photo, I. Pollard).
2. Human Brain Programming and the Evolution of Ethics

Neuroethics—at the intersection of bioethics and neuroscience—is a recent rationalization of centuries-old philosophical deliberations of the ethical issues associated with mind, behavior, and society. In practice, modern neuroethics deals with the pros and cons of research conducted on the brain, as well as the social, legal and ethical implication of treating or manipulating the mind (Pollard 2007). Since our brain interprets what it receives and incorporates it into judgment, volition, and consciousness of self and others, it is much more than an instrument responding to the environment. Significantly, from abstract qualities evolved the human ability to choose between alternative behaviors which accelerated the development of a fitness-enhancing collective awareness, or ethics.

Human brain programming is multiphasic and is the process by which a stimulus or exposure during a critical developmental period has a long-lasting or permanent influence on brain function (Sandman et al. 2011). In the early years of life, the brain increases in size due to cell division, migration, specialization, pruning, and remodeling (Nepomnaschy and Finn 2009). Synaptic connections gained, reinforced, or lost during these critical developmental periods become the basics for learning and memory. In humans, brain development is exceptional in that there are many critical developmental periods during which potentially adverse brain-targeting influences may challenge the orderly progression of the early growth and organizational phases triggering primary and/or secondary effects resulting in functional-emotional impairments, behavioral aberrations, and learning difficulties (Pollard 2009c).

Emotions are an exceptional component in brain development because of their task in monitoring social relations and mental/physical wellbeing. The capability to express varying emotions appears progressively in the course of infant development, reflecting mainly genetic effects in the early stages, and psychosocial conditioning and environmental factors in later ones (Pollard 2009b). Importantly, the brain’s psychological advancement and consequent behavioral repertoire—which gradually characterizes the adult personality—depend largely on the prenatal neurophysiological development and postnatal maturational accomplishments during infancy.

2.1. Ethics: Our Biological Heritage

The evolution of our brain can be divided into three distinct ancestral stages (the Triune brain—a term popularized by Paul MacLean in 1990), in which each evolutionary stage solved different physical, emotional, and behavioural survival functions. The triune brain is composed of the primitive (or reptilian) brain, the early mammalian (or limbic) brain and the new mammalian brain (or neocortex).

The primitive reptilian brain (also called the basal ganglia) is largely controlled by the unconscious autonomic nervous system, and embodies a significant core of automatic survival functions, including sentiments of which we are not necessarily aware. Some basic herd functions relating to instinctive behavior patterns of self-preservation include the desire for pleasure, choosing a mate, breeding, fighting, fleeing, territorialism, social hierarchy (“pecking order”), selection of leaders, status maintenance, resistance to change, awe for authority, ritualism, prejudice, and deception. Evolutionary analyses view these basic instinctive behaviors as adaptive for species survival, because they help to reduce vicious competitive interactions between members of a species irrespective of moral considerations (Kemper 1987; Hayakawa, Altheide, and Varki 2005). We carry our primitive reptilian brain around us largely unchanged.
The early mammalian or limbic brain evolved about 150 million years ago during the transition from reptiles to mammals and embodied the first layer of the cortex responsible for our social and family behaviors as mammals. It underlies the subjective experience of emotional feelings that guide functions involving defense, food, and sex, as well as activities related to the expression of the semi-conscious emotions and feelings linked to attachment and care of offspring. Accordingly, the limbic brain’s primal activities (such as the “fight or flight” fear response) relate to the production of powerful emotions that enhance the objectives derived from the primitive portions of the brain. Limbic-generated emotions and their corresponding reactions are, typically, independent of thought reactions as relayed by the senses. This may explain why certain judgments, or any strongly felt passion, may be so overwhelming that they remain in the face of logic and contradiction.

The latest evolutionary development is the new mammalian brain or neocortex, which evolved over the last 60 million years, and it is most notable in primates, particularly ourselves. Our extensive neocortical development encompasses conscious mental activity, and this made reasoning, abstract intelligence, mathematical thinking, and decoding of sensory information possible, as well as many other new talents, such as music, language, meditation, dreaming, expanded memory, spirituality, ethical reflection, and the development of moral rules (Pollard 2009b).

More recently—paralleling our brain’s biological evolution, a corresponding psychological theory has been formulated. “Triune Ethics Theory” suggests that three types of ethical orientations emerged during human evolution. These are the ethics of security, which focuses on self-preservation; the ethics of engagement, which focuses on emotional affiliations with others; and the ethics of the imagination. The “ethics of the imagination” coordinates the older parts of the brain (primitive and early mammalian) using reasoning to adapt to social relationships by flexibly addressing future eventualities (reviewed in Narvaez 2010). Since each brain level pertains to specific types of actions, the overall mix becomes significant, as it directly influences character development and expression. Crucially, our early childhood experiences determine how we favor these potential courses of action in later life and are, therefore, indispensable in facilitating the evolution of an adaptive personal ethics. In order for a strong emotional circuitry to form that promotes a mature personal ethics to be realized, optimal childhood environments providing safety and affirmative social interactions are crucial.

Clearly, emotions are an important part of our inner selves and cover many domains. Emotions are subjective, internal experiences that arise from a group of biological reactions in response to situations that give rise to various functional, cognitive, physiological, and behavioral responses. From an early age, humans are aware of their surroundings and how they perceive things should be. While each individual possesses a unique personality, early emotional experiences combined with a particular genetic predisposition form a mood balance that influences the way an individual interacts with and perceives the world (Pollard 2003).

2.2. Early Attachment and the Evolution of the Primary and Secondary Emotions

Modern neurocognitive and neuroimaging research has generated increase in our understanding of the neural mechanisms underlying cognition, behavior, and moods (Lemerise and Arsenio 2000). Mood is the consistent extension of emotion in time, while emotion is typically transient and responsive to the thoughts, activities, and social situations of the day. Emotion corresponds to an ancient signaling system that evolved millions of years ago in all mammalian species living in social groups.

Human emotions can be classified into two basic sub-types—primary and secondary. The basic primary emotions are innate in nature and begin expression early in the life of the neonate. These emotions are love, joy,
surprise, sadness, anger, fear, and disgust. Human primary emotions are remarkable in that they respond to environmental cues that variously register security, protection, threat or danger and impel us to react (TenHouten 2006). The secondary emotions (also referred to as the self-conscious emotions) stem from the primary emotions. Secondary emotions, which include embarrassment, shame, guilt, jealousy, resentment, and pride are learned through socialization, and significantly, rely on the intelligent judgment against experience and an acquired set of ethical standards. For example, guilt or embarrassment is learned through the primary emotion of fear. When a child commits a mistake, he/she fears punishment, and over time, the child learns that when a similar “blunder” is committed, and fears punishment, then guilt is the emotion that should be invoked.

Other secondary emotions are happiness, affection, lust, longing, cheerfulness, zest, pleasure, amazement, astonishment, and panic. With the emergence of these secondary emotions, ethical reasoning and behaviour starts to develop and expand. For example, feelings of shame and embarrassment demonstrate that the child is very aware of other people’s perception of it, and as a consequence, will be more involved in the establishment of rules in social groups and gatherings (Ferguson, Stegge, and Damhuis, 1991; Ho Fu and Ng 2004). Feelings of pleasure support happiness and demonstrate that the child is content in the company of significant others. When children feel remorse, repulsion, sadness, empathy, or anger, they are aware of issues concerning injustice and immorality. We should not forget that the self-conscious emotions rely on the ethical consciousness of an individual, and importantly, are not innate in nature; that is, a child is not born with a particular set of ethics or values, rather the innate predisposition for ethical judgment requires nurturing during infancy before it can be cognitively understood and practiced in maturity. The relationships children have with other children during the early stages of life are also important in establishing the ethical values associated with sharing, cooperation, and the idea of intentions. Children as young as four years old are able to distinguish between negligence and intentional wrongdoing when given a number of ethical situations to interpret (Ruffy 1981).

The development of the emotions of pride, shame, and guilt are thought to arise within the first two years of life and are important in the development of the concepts of what is “right” and “wrong”, and later, higher ethical standards (Allessandri and Lewis 1996). With the emergence of self-conscious emotions, a strong connection between a toddler’s emotional life and a developing sense of self is established; for instance, joy/pride following success, sadness/guilt/shame following disapproval. If a child is to thrive, its basic needs must be respected. If, for instance, the child receives gentle but unambiguous discipline mixed with gaiety, love and respect, it will, in turn, learn to respect others and their feelings. If the child has to work hard to be loved, as is the case of conditional love, then the infant is left confused, repressed, and emotionally isolated, risking its behavior becoming manipulative or deceptive. If a child is dominated, then the child may become aggressive in its fight to protect its interests, risking becoming a dominating person in turn. Importantly, total consistency with the parent’s own behavior and what they communicate as acceptable behavior for the child is essential for the healthy development of the sense of what is socially acceptable and what is not.

By the time, a child reaches the age of seven or eight, the brain has developed sufficiently for the child to understand complex moral issues and apply this understanding to its behavior and the choices it makes. In the last analysis, the healthy integration between the physical and the mental forms a continuum coordinated by the neuroendocrine and immunological systems (Pollard 2009d).

The human brain is resilient to psychological trauma with the exception of two critically sensitive periods—at the second half of the first year of life, and the period between 25 and 36 months. Severe stress, especially during critical periods of development, may adversely influence the developing brain of an infant, causing
hyperactive stress responses linked to unsocial behaviors (Lupien et al. 2009). Childhood neglect in the first year of life risks damaging brain chemistry by altering the normal activity of hormones and neurotransmitters that drive understanding—essential for forming secure and healthy social bonds. Normally, by the age of one, the infant understands distress and comforts those under stress with hugs and kisses (DeScioli and Kurzban 2009). By the age of three, children start to develop moral judgments and are able to distinguish between both intentional and unintentional violence (DeScioli and Kurzban 2009).

2.3. The Neurobiology of Trust and Empathy

Early attachment is achieved through physical contact between a child and its caregiver(s) following a stressful event. This is mediated by the release of the neurotransmitter oxytocin to lower the infant’s heartbeat and promote attachment (Zak 2008). In this way, early childhood bonding is an example of an adaptive response to stress and is linked to the promotion of trust that increases flexible resilience. There are several brain structures that release and respond to oxytocin and control emotions by modulating dopamine release—the neurotransmitter that makes one feel good—thus rewarding and reinforcing specific behaviors. As children grow older, they are less dependent on their parents and guardians and rely more on the experiences that they may encounter in the wider community to guide them to decide and exercise their own personal standards. Under normal circumstances, children become more independent and are able to distinguish thoughts from personal feelings and make use of the more mature emotion of empathy. The capacity of empathy also provides the gift of intuitive behavior which is set in motion very early in life. For example, by the mother anticipating the child’s needs, the child, in turn, learns to anticipate the needs of others. Anticipation becomes linked to survival, whereas failure to anticipate creates anxiety.

Recent advances in non-invasive neuroimaging techniques and genetics have enable scientists to elucidate more clearly the neurobiological basis of oxytocin’s influence on human social behaviors. These investigations have revealed a role for oxytocin in a variety of human social cognitive processes, including social memory and recognition, emotion perception, empathy, trust, cooperation, fear and aggression, and social stress (reviewed in Zink and Meyer-Lindenberg 2012). Inadvertently, the availability of new research tools have provided the essential context needed to make biological sense of the high-throughput data and so propel the neurosciences to the forefront of mainstream biology. For instance, epidemiological studies have demonstrated that severely neglected children do not respond with increased oxytocin secretion on physical contact (Moll et al. 2005). Other surveys found that children who were exposed to corporal punishment at a young age had difficulty expressing empathy as adults and also had impaired moral development compared with those exposed to little or no physical punishment as children (Lopez, Bonenberger, and Schneider 2001). As identified earlier, ethical reasoning through an imaginative ethic occurs in the prefrontal cortex of the brain and physiological or psychological damage to this area adversely affects the recognition and review of socially-acceptable behavior. Indeed, functional magnetic resonance imaging (FMRI) has been successfully used to assess neurological damage in children who have been neglected or abused during the first three years of life. Importantly, it was confirmed that those children with impaired orbitofrontal cortex function were able to express primary emotions like anger or violence, but could not express secondary emotions like empathy or pride (Moll et al. 2002; Koenigs et al. 2007).

The evidence is undeniable that adults who were mistreated and/or abused as children, or were raised under extreme hardship, risk growing up with a set of ill-advised ethical values and may thus engage in
inappropriate behavior. By experiencing higher levels of stress compared with non-maltreated children, abused and neglected younger children tend to develop post-traumatic stress disorders (PTSD) early in their lives. As a result, these children often have a smaller corpus callosum compared with average children. The corpus callosum is responsible for the integration of the right and left hemispheres of the brain (Becker-Weidman and Hughes 2008). Poorly, integrated cerebral hemispheres and under-development of the orbitofrontal cortex cause severe social and emotional symptoms. Major symptoms, consist of difficulty in controlling emotions, reduced ability to accurately recognize emotions, inability to express own emotions and a lack of conscience (Koenigs and Tranel 2007; Reynolds and Ou 2010).

The tragic cascade of severe neglect during early childhood and its consequences seen in later life was clearly illustrated by the Romanian orphans living in institutional settings. In 1966, the Romanian communist dictator Nicolai Ceausescu banned birth control and abortion in order to increase the country’s population and workforce. His social experiment worked in terms of population growth, but with population growth increased rates of child abandonment. When he was overthrown in 1989, an estimated 170,000 unwanted children were left in orphanages across the country in appalling conditions. Orphans living in inhumane conditions provided neurologists and psychologists access to an “experiment” where the effects of severe neglect and deprivation on child development could be examined.

The Romanian orphans had, on average, lower brain activity with significantly lower intelligence quotients (IQs) compared with the children living in the broader community (Kaler and Freeman 1994). As described above, the brain is most plastic in early childhood, and given optimal experiences, it develops healthy, flexible, and diverse capabilities. In abusive and neglectful environments, the process of normal neurodevelopment is disrupted, as these children’s brains are “frozen” in a state of fear-related activation. Fortunately, not all of the findings in these studies were negative. Although the effects of early deprivation in children are not completely reversible, they can be minimized in some circumstances. However, it behoves us to remember that these Romanian orphans were all born with the genetic potential to excel in most aspects of human life, but it was environmental deprivation during critical periods in infancy and early childhood that hindered their ability to reach their full genetic potential.

3. Education: Whose Responsibility?

While direct measurement of happiness presents challenges, tools have been developed by researchers. Positive psychology researchers use theoretical models that include describing happiness as consisting of positive emotions and positive activities, or that describe three kinds of happiness: pleasure (positive sensory experience), engagement (involvement with one’s family, work, romance and hobbies), and meaning (using personal strengths to serve some larger end).²

It is agreed that to bring a child into the world that one is not ready for and would, or might resent, presents a huge social problem. Parents who physically and emotionally batter, isolate or dominate their children are in need of help. But what about the generations of children living in countries experiencing war, political upheaval and economic hardship? How does the violence of one generation affect the ethical development of the children in the next and subsequent generations?

It is well established that compassionate nurturing reflects compassionate and tolerant behavior in children and, similarly, stronger levels of behavioral self-regulation are observed in preschoolers with a healthy social upbringing (Eisler and Levine 2002; Kochanska et al. 2008). In comparison, neglected children show higher levels of violence, perhaps reverting to more primitive and self-preserving behaviors. In order to promote the
development of an adaptive community that is positive, optimistic, and welcoming of life, it is crucial that early infant and childhood experiences integrate caring relationships in high abundance. Early caregivers play a most significant role in a child’s neurological development. Furthermore, recent evidence has shown that the social environment may alter neurogenesis in the adult brain and such adjustments vary depending on the type of social stimulus (Lieberwirth and Wang 2012). Neurogenesis, or progenitor cell division leading to functionally integrated neurons, was traditionally believed to occur only in the developing brain, but more recent studies are highlighting the significance of the newly generated adult neurons in variously modulating neurobehavioral tasks. Hence, there is an urgent need to consider new ways that society can facilitate educational experiences, activating subconscious neurological maturational processes driving the establishment of mature secondary emotions, such as empathy, reasoning, and peace-promoting ethical values.

Children living in war zones, or similar chaotic circumstances, “adjust” their ethical judgments to their surrounding conditions. For example, a study found emotional differences in the ethical judgment of Jewish Israeli and Palestinian children when they were given problems to solve based on real life scenarios. It was found that Palestinian children offered more violent solutions than Jewish Israeli children (Elbedour, Baker, and Charlesworth, 1997; Baker and Shalhoub-Kevorkian 1999). Further, Colombian children exposed to violence and subjected to geographical displacement were more likely to engage in unethical behavior when provoked (Ardila-Rey, Killen, and Brenick 2009). Distressingly, early childhood exposure to war and violence irreversibly compromises the ethical development of these children in many ways. This was graphically demonstrated in the aftermath of the Second World War where children who had been traumatized by their experiences in Nazi concentration camps could not learn nor understand the significance of ethics; that is, they had no capacity for empathy, nor feelings for others. At the time, the majority of these children were between the ages of 4 and 12. Another insight comes from psychological assessments of infamous terrorists and dictators, many of whom have had dysfunctional childhoods which made them hate before they learned what they hated. When children face life threatening situations, their mind and body respond by engaging in the struggle for survival. The energy needed to fight for survival is derived by channeling energy from other important activities, such as generating adaptive emotions and ways of thinking (Parson 2000). Hence, such deprived kids are lacking in ethical standards, and concepts, such as right and wrong, have little meaning. The horror of Hitler’s racial eugenics program clearly reminds us of the human capacity for excess.

In the above context, we cannot forget war’s continuing social impact where children are conscripted as child soldiers and forced to commit atrocities in exchange for basic requirements, such as food, shelter, and tenuous protection. Most frightening is how children as young as eight years of age are being manipulated by adults and forcibly recruited, coerced, and induced to become combatants. By this means, war-zone children are not only victims of violence but also active participants. Human Rights Watch documented that there are an estimated 300,000 children at any given time participating in armed hostilities while “serving” in rebel groups and government forces around the world. These child soldiers perform a range of tasks, such as participating in armed conflict, laying mines and explosives, scouting, spying, acting as decoys, serving as porters, and cooks as well as sexual slaves (Pollard 2009a).

4. Evaluating the Impact of Education

We should not underestimate the power of social learning where the children of one generation learn ways to think and behave from influential members of their community acting as role models, and in turn, transmit
this learning across the next and subsequent generations. In the final analysis, how we provide essential
education and health care, eradicate poverty, stem population growth, and restore war-ravished landscapes will
determine future living conditions. Current circumstances provoking strong physiological and psychological
stimuli will induce reactions, but as reviewed earlier, the character of these reactions follows the basic imprints
consigned during critical periods of cerebral development. Possessing this knowledge provides us with
power—to choose the preferred option; either the primitive instinctive (reptilian) option or the more cognitively
considered option is offered as possible choices. Given our technological power, we would be wise to adapt
eemotionally in order to balance our unprecedented opportunities to annihilate ourselves and our fellow
passengers on earth. When we are profiting from the gifts provided by our advanced intellectual intelligence
(roughly measured by IQ), it is only fair that this gift be counterbalanced by an improved instinctive awareness
or emotional intelligence (EQ). Thinking along these lines, it seems below human dignity to irresponsibly
devalue scientific advances by applying science’s technology to aid the forces of conflict and destruction. An
in-tune EQ describes the ethical aptitude and skill to perceive and assess the emotions of self, others, and
groups. In neurological terms, a well-directed EQ signals that the brain’s homeostatic system has adopted an
advanced steady state—one more responsive to the physical and social environments, and therefore, more
adaptive in terms of ethical control over changing circumstances.

Educational ideals can be summarized within basic human core values. Prominently, for example, a
familiarity with the current knowledge base of early childhood care and education, and the requirement to keep
current through continuing community education and in-service training. How peace-promoting initiatives are
applied depends on individual and societal circumstance; however, at the core stands the overriding
responsibility to support and guide children to express, challenge, and achieve their desired goals to the fullest
of their biological potential. Since we do not live in isolation but in a pluralistic globalized world, both adults
and children need ethical sensitivities that relate across diverse cultures, ethnicities, and secular and spiritual
commitments. Given that learning is deeply subsumed within the processes of emotion, early ethics education,
ilcluding accurate access to scientific, medical, and technological knowledge, becomes critical. Future
generations will increasingly require education from a global perspective when making critical ethical decisions
about the politics of, for example, disposal of wastes, preservation of biodiversity, global warming, and
unregulated population growth. Therefore, there is an obligation to make relevant science education overlap
with critical periods in the advancement of ethical consciousness. Bioscience ethics learning and education may
assist in this process. Bioscience ethics facilitates free and accurate information transfer from applied science to
applied bioethics which, in turn, provides unique educational opportunities for advancing biological
understanding within the scaffolding of ethics. The Bioscience-Bioethics Friendship Co-operative web
(http://www.bioscience-bioethics.org/) provides free admittance to educational material and access to other
useful links for those interested in bioscience and bioethics.

5. Summary and Conclusions

(1) Instinctual behaviors that are deeply rooted in the human brain are a product of evolution and serve to
benefit primarily ourselves. Personal ethics can best be described as the differentiation between right and wrong
which governs the behavior of individuals. It can be principles or rules which are used to judge actions of
individuals as being adaptive or destructive. Adaptive sets of ethical principles can be recognized in society,
religion, or philosophy, and are unique to each individual.
The primitive (reptilian) brain is a prime influencer of basic instinctive behaviors. Its function is to maximize basic survival behaviors, including territoriality, fear, and anger, all of which contribute to a security ethic and are hardwired into our subconscious. As a result, humans will default to these powerful behaviors if stressed or threatened; indeed such emotions can dictate the actions of the rest of the brain. This arrangement affects ethical judgment when instinctual needs overcome other ethical or moral circumstances. As children, close nurturing encourages the development of an ethically responsive brain, which is less likely to emotionally engage in the actions prescribed by the primitive brain.

In situations of early neglect or mistreatment, the stress caused to the infant releases stress hormones in several systems which, if prolonged, may cause developmental anomalies in the brain, primarily in the orbitofrontal cortex and corpus callosum—the centers of emotional integration and brain lateralization. These anomalies rob the child of the ability to feel regret about how its actions affect others and may lead to violence in situations of social unrest and armed conflict. When proper care is ensured, the child gains values, such as tolerance, empathy, and openness.

There are no immediate solutions that will help protect children from having difficult childhoods—we can only hope that with education, parents, and educators will become more attentive to the fundamental genetic-epigenetic influences reinforcing adaptive or non-adaptive maturational processes. Informational programs on their own are frequently ineffective, as they may change individual knowledge but not necessarily behavior. More encouraging outcomes could be found in programs that combine some kind of social competence training with a community wide involvement aimed not only at children but also at their connections, parents, and teachers.

In the final analysis, bioscience ethics can assist by providing transdisciplinary awarenesses. It is in this context that I invite the reader to access the web (http://www.bioscience-bioethics.org/) which provides free admittance to educational material in the area of stress physiology, reproduction, developmental toxicology and other useful links for those interested in bioscience ethics and bioethics. I hope that a better understanding of the neurobiological relationships between early development and ethical reasoning will provide a new basis for innovation in the design of learning environments.

Notes

2. Happiness from Wikipedia, the free encyclopedia.

Works Cited


