

EMOTIONAL CUTOFF AND THE BRAIN

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Emotional Cutoff and the Brain

Priscilla J. Friesen

INTRODUCTION

The concept "emotional cutoff" in Bowen family systems theory describes the mechanism for managing anxiety related to the connection with one's original family. Emotional cutoff is manifested in physical distance, internal distance, or a combination of both in order to create a life of one's own. Bowen observed these patterns in the behavior and psychology of individuals (Bowen and Friesen, 1988). The interplay between emotional cutoff and physiological functioning can be considered the underpinnings of behavior and psychology from the point of view of Bowen family systems theory.

This chapter addresses the concept of emotional cutoff at the level of physiology of the brain. One measure of the brain's functioning is through the mechanism of neurofeedback. Neurofeedback measures and relays specific patterns of electrical activity in the brain to the individual via a system of electrodes connected to a computer. Neurofeedback is also known as electroencephalograph (EEG) biofeedback as developed by Sterman and Friar (1972), Lubar (1991), Green, Green, and Walters (1970), and Peniston and Kulkosky (1989).

For the clinician using neurofeedback in the context of Bowen family systems theory, variation in these electrical patterns between people and within one person over time raise some interesting questions: How can these variations be understood? What are these patterns of the brain responding to? Can the patterns of the "individual" brain reflect the patterns of relationships? How do the processes Bowen described in the family relate to the individual brain? How do brain patterns within the individual relate to emotional cutoff between the generations?

The purpose of this chapter is to address these and other questions that are a natural consequence of using this technology in a clinical setting. This chapter posits a fundamental assumption that the structures and functions of the human brain are a culmination of the coevolution of social units/systems and the brain itself. In other words, the electrical patterns seen in an individual brain on neurofeedback probably reflect an evolutionary interplay with the relationship environment (i.e., family) that has been essential for its survival in the human. In order to explore this thesis, the evolutionary development of the brain in the context of the family will be described.

In addition, information about electrical patterns in the brain is described. Some observations, questions, and preliminary conclusions about ways in which emotional cutoff is manifested in neurofeedback are presented and then illustrated in a clinical case.

THE HUMAN BRAIN

Evolution

In his book, *Evolving Brains* (1999), Allman describes the evolution of the human brain. His thesis is that the complexity of the human brain evolved in conjunction with the development of the extended family as the social group. The complexity of the human brain can be seen as a by-product of a three-generation social unit.

Allman cites a difference in the size of the brains of those primates that have a multigenerational social unit and those that have a dyadic social unit. Humans, bonobos, and chimpanzees raised in three-generation social groups have a larger cortex than species that are raised in a dyadic social group such as gibbon, orangutan, and siamang. In looking at the variables of the generational character of the reproductive unit and brain size, there is no overlap between the groups (Allman, 2000, personal communication).

A three-generation reproductive unit means that there is knowledge of and association with at least three generations. In the dyadic reproductive unit, the group of association is the same generation of peers raising their young. In the human, reproductive units may have varied association with three generations, but three generations are typically known. The range of the human reproductive unit's association patterns includes three or more generations relating closely with one another to three generations that are known but have little or no contact. It is the author's suggestion that this variation in association patterns among generations within the human species is linked to the concept of emotional cutoff as a mechanism regulating the attachment among the three generations.

The size of the cortex corresponds to the number of neural connections present. The connections create an expanded adaptive capacity needed in a multigenerational context. The ability of the brain to have an increased variety of choices for survival-related decisions can be linked with the presence of a social unit that is both multigenerational and more dependent for a longer period of time. A human infant requires eighteen to twenty-one years of potential development and dependence upon the social group for its survival and maturity (Hannaford, 1995). This prolonged period of development allows for remarkable levels of diversity in adaptation. The next section explores this thesis, namely, that the brain can be thought of as a "relationship organ."

Brain Development

Physical and emotional development in individuals within each generation provides a window to observing how each generation varies and what the mechanisms are for transmission of patterns from generation to generation. It might be possible to look step by step at the development of the brain and the coinciding processes present in the family. This may allow for an understanding of the mechanisms present that produce variations in the individual brain and how those variations are passed from one generation to the next.

Development takes place within an environmental context. Our genes, cells, senses, and muscles require the environment to develop. What is the "environment"? At the earliest point, it is the uterine environment of the mother. The physical and emotional condition of the mother is the environment of the developing fetus. The fetus experiences the mother primarily through her changing hormonal state. This hormonal state is regulated by her experience of her life moment to moment - how glad is she to be pregnant; how does the pregnancy affect her marriage? If she is not married, how does she experience her situation? Does she have a mother and extended family? What is her relationship with them?

Science is discovering more about the effects drugs, malnutrition, and trauma have on stages of uterine development, thus having a long-term impact on the life course of a developing individual (Hofer, 1981). These are the more gross observations. In addition and perhaps more fundamentally, I suggest a

more subtle level of impact. The development of the sensory experience of the fetus and infant is primarily influenced by the mother's experience of her own world. The mother's own anxiety level, and her relationship position and functioning mold the basic sensory development of the child. The mother's experience of her own mother and father's marriage is reflected in her emotional experience and therefore is communicated in her hormonal reactions. As she experiences the ebb and flow of increased or decreased arousal levels in response to her life, that too is communicated to the fetus. These reactions have an impact on the mother's own relationship with the child's father, and the fetus responds to that interaction long before it is aware of the parents' interaction per se. This is how fundamental the relationship nuances are and how they are built into our brains.

The way we experience the world is highly variable. The way we develop our senses, how they are organized and related to each other, and the way we interpret the information are all variations that are relationship dependent. The environment in which these variations occur is the relationship system.

Bowen Theory and Brain Development

From a Bowen theory point of view, there are three factors affecting a child's brain development:

1. The level of differentiation of the family unit in which the child is developing
2. The level of anxiety present during different developmental stages
3. The position of the developing individual in the anxiety regulation of the family or the extent to which the child is absorbing anxiety-related to the family's methods of anxiety regulation

Level of Differentiation

The level of differentiation of the family is a composite of the functioning of its members. The more emotionally dependent family members are on one another, the more reactive they are to one another. These family members are physiologically organized to be highly reactive and responsive to one another. They heavily rely on mechanisms such as social or emotional distance, conflict, adaptation of a spouse, and projection of anxiety to manage this anxiety. Thus, these families have the most relationship problems and emotional, social, and physical problems expressed by individual members. From a sensory integration point of view, the perception of the environment by the individuals in this kind of family is constrained and limited as the individuals organize automatically for survival.

Individuals in families at higher levels of differentiation function more independently of each other. During anxious periods, they are able to optimize the benefits of cooperation that a family unit affords and manage the anxiety with more resilience. Individuals and families at higher levels of differentiation rely less on anxiety-regulating mechanisms, such as physical or emotional distance, to manage themselves in their families. The sensory perception of the environment is more considered and less survival oriented.

For a child developing in these varying ranges of functioning, the basic brain structures and functions are developing in concert with similar levels of brain organization as his or her parents. That is, the way the parents experience the world and respond is the primary influence upon the child's own development. These patterns of experience and response can be observed in the organization of the brain. These patterns are an aspect of levels of differentiation.

Emotional cutoff corresponds to level of differentiation. Emotional cutoff occurs more at lower levels of differentiation, providing a current solution but exaggerating the problem in the next generation. People with higher levels of differentiation have more viable connections with the generations present, providing more flexibility in managing the challenges life presents. The more relationships present, the more flexibility in functioning for the individual. People with lower levels of differentiation have less multi-generational connection, producing more dependence on the present generation. That is, the more rigid the patterns of intergenerational relationships, the fewer relationship options are available and a decrease occurs in the individual's functioning.

Level of Anxiety Present During Individual's Development

The level of acute anxiety present in every family varies over its life course. How individuals and families experience anxiety varies with different levels of differentiation. The higher the level of differentiation, the more a member of a family has the ability to perceive or experience the environment with more options and less reactivity, and can manage anxiety while developing fewer symptoms.

At lower levels of differentiation, life is experienced as a threat more of the time. Life presents challenges. A child born when there is a high level of family life challenge will be impacted differently than a child born during a less challenging period of time. The earlier in the child's development the family challenge occurs, the greater is the lifelong impact.

For example, a child is developing during the second trimester of pregnancy when her maternal grandmother suddenly dies. The child, a girl, is born three months later, on what would have been her grandmother's birthday. This child, as an eight-year-old, displays a high level of social anxiety as well as learning difficulties related to the intense fusion with her mother. The child was in the womb and born in the midst of a challenging period in the life of the family.

The grandmother had experienced forced immigration due to war during her young adulthood, leaving her with minimal contact with her original family in her adult life. She raised her own children without grandparents and with minimal extended family. To the extent the grandmother was cut off from previous generations, she invested her life energy more intently into her children.

The pregnant mother in this case is vulnerable to a disruption in the relationship with her own mother. The grandmother's death during the pregnancy affects the mother's own emotional well-being. The emotional state, primarily transmitted through the hormonal state of the mother, is the environment for the final stages of sensory organization and integration during the third trimester. The birth of the child on the birthday of her deceased grandmother seals the association between the disruption of the relationship with the grandmother in her death and the newborn. The young mother describes the time between the death of her mother and the early years of her daughter's life as a blank. A disorganized, distracted mother provides a disorganized environment for a developing child.

The mother and her offspring inherit a degree of intensity between them. The intensity between the pregnant mother and her own mother is a product of the grandmother's investment in her children as she dealt with her own disconnection. The intensity is also related to the disruption in the mother-grandmother relationship with the grandmother's death as the next generation is born. This intensity is transmitted into the next generation with a resulting heightened arousal level in the child that can be observed with persistent cold hands and high levels of distraction in her EEG patterns on the biofeedback machine.

This family is highly educated and otherwise high functioning. The child's level of social anxiety and academic problems are unusual for the family. Had the grandmother died when the granddaughter was thirteen years old, the death would have had a different impact on the daughter. It may have then had more of an impact on a different aspect of the granddaughter's development, such as her experience of maturing and becoming more independent, rather than her basic sensory organization, which affected her ability to learn and her state of well-being in relationships.

Position of the Child in the Anxiety Regulation of the Family

The position that the developing child plays in the anxiety management of the family is related to the impact of life challenge upon the development of the brain. In the family just described, the family worried about the well-being of the child born at this important time. The anxiety related to the sudden loss of the grandmother was exaggerated when the birth occurred on the birth date of the grandmother three months after her death. The child was a girl, the same sex as her grandmother, and in the tradition of the family the child was named for the grandmother. All this contributed to an increased focus on the child. Perhaps the anxiety would have been a bit less had the child been a boy. Had the anxiety been "managed" in the marriage with increased marital conflict leading to a divorce, the child's functioning would have been

differently impacted. Had the death of the grandmother occurred as the granddaughter was entering adolescence, it might have activated something different in the mother. The mother had had a difficult time with her own mother at that time in her life and so the death then might have funneled anxiety into the relationship between the mother and granddaughter. This pattern often results in acting-out behavior on the part of an adolescent daughter.

These three factors - level of differentiation of the family, level of anxiety present during different developmental stages, and the position of the developing individual in the anxiety regulation of the family - provide a framework for seeing the remarkable capacity our species has for adaptation. The way a family adapts to challenges during the development of its members sets the stage for adaptability into the next generation. It sets in motion both the potential for adaptation and constraint in the next generation.

EMOTIONAL CUTOFF AND BRAIN DEVELOPMENT

The human species has one of the longest periods of offspring dependency on the parent; the time the human offspring responds to the family unit in its potential development is twenty-one years (Hannaford, 1995). With a genetic underpinning also influenced by the environment, the structure and functioning of each individual brain, mind, and body occurs as the individual brain develops in the interaction with its family and social environment. I suggest that the developing individual brain adapts to the influences of the multigenerational family and is the basis for individual differences in functioning.

The concept of emotional cutoff will be discussed within the context of these assumptions about the brain. How is sensitivity to the previous generation passed to the next? It is hypothesized that emotional withdrawal from one generation in order to create the next generation is not only a behavioral phenomenon. In order to move into his or her own life and reproduce, an individual may respond with distance from his or her parents. This response or emotional cutoff has a physiological as well as emotional and behavioral substrate. It is the physiological reactivity present in the individuals constituting the new parental unit that sets the stage for the reactivity in the next generation. A mother's way of dealing with the acute and chronic anxiety in her own family lives in her physiology. Beginning in utero, the reactivity of the mother and her relationship to her family is communicated primarily at the hormonal level, influencing the development of the senses and their organization and the basic patterns of reactivity, all of which influence the ability of the infant to survive.

Emotional cutoff describes a pattern of reactivity that requires distancing oneself emotionally and/or physically in order to act on one's behalf into the future. Emotional cutoff may refer to actually putting physical distance between self and one's family. There may be an optimal distance. For example, six hours distance may seem optimal as long as it is on the same continent or each sibling unit has his or her own city. What is considered a comfortable distance from family varies. Another individual might consider it incomprehensible to live anywhere other than the town where his or her parents are buried.

Individuals may disregard or be unaware of the impact their families have on them. They may say they do not like their family and see no reason for continuing contact with them: they have "moved on." Emotional cutoff may also be more internal. Individuals may live in the same town or house and be emotionally disconnected from one another. In this case, individuals may lose energy or shut down in the presence of family, or focus on the baseball team, or complain about others. All of these stances serve to separate individuals from one another. This process of moving away from relationships reduces complexity and diversity in the short run. It produces more rigidity or a predictably patterned response that can be observed not only in behavior but also in the psychology and physiology of the individual.

At higher levels of differentiation, the process of moving away from the family of origin into one's own life is natural and smooth. Families with more anxiety require some emotional cutoff to make the transition to the next generation. The term emotional cutoff refers to a mechanism that happens in all families to some degree as generations develop and configure new family units. This chapter addresses how the intensity of this process is passed from generation to generation.

A clinical case that illustrates the ideas of emotional cutoff and the individual's behavioral, emotional, psychological, and physiological functioning, as well as the family relationships, is presented. It describes how functioning, particularly when significant emotional cutoff is present, can be observed in the family and in an individual's brain and physiology with biofeedback. Bowen hypothesized that if a person can move into meaningful contact with previous generations, there is a decrease in anxiety in the present generation and an increase in functioning. The author believes that a change in the relationships is correlated with a change in the brain. Bridging cutoff changes the adaptability of the brain and physiology of the bridging individual.

To understand this in relationship to the concept of emotional cutoff, a brain that develops with more contact between more generations may develop more intrinsic ability to discriminate the input from the senses with a wider range of possible associations and behaviors. A brain that develops within a more limited relationship system has more reliance on fewer individuals. The individuals they are dependent upon have fewer resources themselves and are more vulnerable to a heightened experience of threat. The sustained increased experience of threat can be transmitted to the developing individual in the next generation. The more the experience of heightened threat, the more the individual will react to the threat for survival. The short-term solution is protective, but as a long-term solution withdrawal builds less resilience and fewer alternatives into the brain, physiology, and behavior of the next generation.

The ability of an individual to evaluate new situations and make decisions is essential for optimal adaptation. In the human species, it appears that the brain develops within a social structure that requires at least three generations for optimal adaptation.

Bridging cutoff also changes relationships. Theoretically, bridging cutoff not only changes the individual initiating the behavior but affects all in the emotional unit. The clinical case illustrates this.

The human brain is a product of the evolution of the human family. It has developed within the set of relationships necessary for survival. These interdependent relationship patterns have led to the development of our complex and adaptive brains. As the next section elaborates, perhaps a broad and connected extended family matrix provides the most functional potential for raising the next generation.

EMOTIONAL CUTOFF AND BRAIN FUNCTIONING

Allman discusses the importance of the anterior cingulate gyrus (Allman et al. 2001). This structure of the brain is considered a part of the cortex; it is located deep within the cortex, close to the subcortical portion of the brain. Allman describes the anterior cingulate gyms as the focal structure for evaluating new situations and making decisions. This structure is important because of its linkage between the subcortical areas of the brain and the cortex. The subcortex is the deeper, survival-oriented portion of the brain. This linkage is made early in human development, with neuronal migration between subcortical and anterior cingulate gyrus beginning within days of birth (Allman, Hakeem, and Watson, 2001).

The first fruits of the ability to decipher basic sensory information and to build in the ability to respond to it with cortex potential has profound resonance with Bowen's concept of differentiation (Bowen, 1978). It can be inferred from this knowledge of early brain development that the difference in social structures or the number of individuals present in the social system of an infant is the basis for the connection between the lower parts of the brain (survival or automatic functions) and the cortex. That is, the early neuronal pathways developing the basis for the functioning of the anterior cingulate gyrus are established in the early family relationships. This variation in the functioning of the anterior cingulate gyms is associated with the three-generation family.

Allman (2000, personal communication) also suggests that multigenerational interdependence might be a better criterion for social complexity than simply the actual numbers of individuals present in a social group. For example, individuals in a social group based upon three generations of family may have more neuronal pathways between the subcortical regions of their brains and the anterior cingulate gyrus in the cortex. This means that an individual's ability to evaluate and consider possible reactions to a situation is based upon the multigenerational complexity of his or her relationships and is reflected in brain

functioning. In addition, this may be more relevant to complexity and variation in the brain than the presence of a large, unrelated social group.

Bowen described an individual's ability to distinguish the automatic "feeling" reactions from the "thinking" ability as fundamental to differentiation. This psychological description may be consistent with the function of the anterior cingulate gyrus. It may relate not only to brain functioning but also to the complexity of the multigenerational family in which the individual brain develops. This may be one function of the brain relating to the level of differentiation.

To extend this idea further to the concept of emotional cutoff, this author suggests that there is a relationship between the complexity of the extended family into which one is conceived, born, and nurtured and the structures and function of the brain. The more limited the relationship connection with multiple generations of a family, the more constrained the adaptation of an individual brain.

Bowen's concept of emotional cutoff describes the nature of relationships from one generation to the next. This concept also describes the trend toward decreased social complexity as anxiety increases. The outcome of decreased complexity is a constraint in the flexibility of functioning in subsequent generations. Knowledge of the brain may illuminate how solving relationship issues by increased emotional distance between the generations is a physical response on the part of the organism itself - one that seems to produce an internal constraining experience as well as a behavioral one.

The evolutionary nature of the brain also provides a context for understanding a broader range of human social potential. What is optimally possible for the human? Does this evolutionary basis provide the ability to form even larger, more complex adaptive social groups, such as businesses, churches, and organizations, to cooperate for the greater good of individuals, even beyond nuclear and extended families?

Bowen theory describes the emotional processes that occur in human social groups and the ways in which these processes can build in flexibility over the generations. His theory looks at the family over many generations and describes the patterns that are transmitted. One aspect of those patterns is the way in which each generation organizes itself in relationship to the previous generation. Bowen describes the variation in the human family that evolves over at least three generations to create the diversity that optimizes the family's ability to survive.

Biofeedback, Neurofeedback, and the Family

For more than twenty years, the author has observed many individuals' physiological responses via biofeedback technology. Using this technology, individuals simultaneously receive information through sight and sound about their brain waves, blood pressure, heart rate, vascular blood flow (hand temperature), muscle tension, respiration, and sweat response. This information is used to assist individuals to change their body's automatic responses through use of the mind, developing self-regulation. The clinician can also use the information to observe how it corresponds to emotional reactions as the individual is speaking about his or her life. Over time, one can see changes in the physiology related to relationship changes. Monitoring a person during consultation sessions supplies both an immediate feedback during conversation as well as information at the end of a session. One can also compare sessions over time.

Each individual has a physiological profile, or a consistent way that his or her body responds. Within this response pattern, an individual varies in the intensity and severity of the response. For example, the amplitude, the dominant frequency of a brain wave, as well as its synchrony with other waves constitute a given pattern. Another response pattern is the intensity of a muscle response and the ability to recover after a challenge. These physiological patterns correspond to level of differentiation, level of anxiety, and patterns of anxiety management in relationships.

Biofeedback and brain wave biofeedback (also known as neurofeedback) shows the physiological reactivity present in individuals. Biofeedback usually describes the process of self-regulation through the learned control of the autonomic nervous system, including muscle tension, hand temperature, sweat response, and heart rate. Electroencephalograph (EEG) biofeedback and neurofeedback refers to the process of learning control of the central nervous system or brain waves. For the purposes of this chapter, references to neurofeedback or biofeedback include both the central nervous system and the autonomic nervous

system. Although immediate feedback may be focused on the central nervous system during training, the autonomic nervous system responses also are collected. All the physiological data is considered at the end of the session. In addition to training with the central nervous system, ongoing information from the autonomic nervous system displays the nuances of reactivity during talking, thinking, and training. From a training point of view, neurofeedback is quicker, but information from the physiology is invaluable in understanding the connections between one's relationships and reactivity at the level of physiology.

The underpinning of the response patterns is genetic. It is genetic that one individual reacts predominantly with a cardiovascular response and another tends to have a gastrointestinal response. However, the intensity, frequency, and duration of the individual's patterns of physiological response is developed in the context of the family and varies with the individual's differentiation. The ability to regulate oneself is at the core of differentiation. Biofeedback used with Bowen theory associates the individual's reactivity with relationships. Biofeedback is used to increase the ability to regulate oneself by seeing one's automatic patterns of response and associating them with one's position in the relationship processes. Developing more ability to regulate self through biofeedback can be a part of the process of differentiation of self.

Neurofeedback and the Central Nervous System

Neurofeedback or brain wave training involves the central nervous system (CNS). Neurofeedback measures brain waves with EEG (Figure 3.1). The electrical patterns measured on the surface of the head with neurofeedback technology are by-products of the chemical actions taking place within the brain. The measurement of the electrical patterns from the head is a gross measurement of the summary of electrical activity happening within the brain at a moment in time. The electrical patterns are a range of electrical

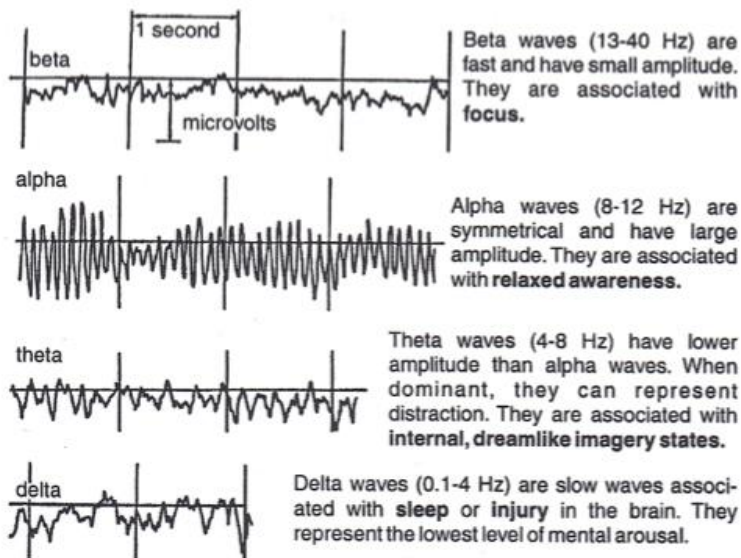


Figure 3.1. Brain wave patterns.

frequencies, measured in Hertz (Hz), that can be correlated with both subjective states and with the functioning of the organism. Twenty-three years of observing these electrical patterns during training, talking, and thinking has given this author an ability to correlate brain activity with family functioning.

There are many variables to consider as one interprets the brain wave patterns. Different brain wave frequencies are generated in different parts of the brain (Sterman, 1996). The importance of the origin of the brain wave is related to how to "read" the brain wave patterns that one sees. For example, theta brain wave frequency (4-8 Hz) is produced in the thalamic region of the brain, also known as the limbic region.

This is the area of the brain that expands its development early in life and regulates the autonomic nervous system. This brain wave is essential for integration of new information into an individual's personal history. This brain wave carries the "emotional" character of one's life.

Beta waves (13-40 Hz), produced in the cortex, are correlated with focus and attention. If theta is overriding the faster brain wave patterns such as beta that are essential for attention in the moment, a person will be distracted, preoccupied, and unable to focus.

Different brain waves are optimally found in particular parts of the brain. If they are found in a part not usually associated with them, it may be an indication of symptoms. For example, alpha (8-12 Hz) is typically seen in the back of the brain with heightened amplitudes as eyes are closed. It is a state of relaxed awareness. Alpha in the left frontal lobe may be an indication of depression.

An optimally functioning brain has the ability to focus. This means that an individual can organize his or her intention to attend to a task. In the brain this can be seen as the inhibition of lower frequencies (theta) and the consistent presence of higher frequencies (beta). A person can have difficulty focusing or attending to the present when it is difficult to inhibit the activity of the deeper parts of the brain - the parts of the brain required for survival and automatic functioning. This is very basic in the ability to regulate oneself. This can be seen in the EEG patterns as dominant low-frequency brain patterns with little ability to produce high-frequency patterns. Or a brain may "try" very hard to get itself organized and produce repetitive thought patterns. This can be an EEG pattern of dominant high "beta" (30+ Hz), corresponding to effortful anxiety or persistent worry.

The optimal brain function is a flexible one, demonstrating the ability to produce a wide range of brain states as well as to produce a focusing state in the midst of high anxiety. It is possible to see via the neurofeedback the subtle ways in which thinking patterns are dominated by the emotional state. Often this subtlety is out of our awareness. Noticing the cluttered kitchen counters when anxious, but finding that the same cluttered counters are out of awareness when less anxious is an example of the subtlety of anxiety-driven experience.

When physical, emotional, and social symptoms are present, the brain wave patterns are less flexible. The lower-frequency waves (theta) are dominant more of the time. Or the high frequency (beta) patterns may be unrelenting.

In the author's experience, there are two general patterns of brain waves that seem to coincide with social systems that are emotionally cutoff. Both patterns coincide with high levels of emotional sensitivity and reactivity to relationships. Both patterns are present in individuals developing within a more isolated relationship system. Both patterns are less flexible than in individuals who are not cut off.

The first is a highly reactive behavior pattern that corresponds with high amplitude brain wave patterns. This means the amplitude or strength of the wave is greater than typical for the brain wave, indicating excessive activity. The detail of this pattern is described in the following clinical example.

The second is a constricted, inwardly oriented behavior pattern associated with low amplitude in the brain wave patterns. It is as if the individual is constraining his energy to adapt. Both are products of similarly anxious and cutoff families. Both have high levels of physiological reactivity - cold hands and high muscle tension. This pattern may also produce a "shutdown" sweat response, a sweat response that is below normal (10 μ mhos).

The author associates high levels of chronic physiological reactivity with high levels of relationship sensitivity, more emotional cutoff, and lower levels of differentiation. More emotional cutoff is associated with more reliance on existing relationships, an increased relationship sensitivity producing heightened physiological response patterns, and less ability to regulate self.

Autonomic Nervous System and Self-Regulation

Although there is a genetic underpinning to physiological, psychological, emotional, and behavioral patterns, the details of functioning are fleshed out in interaction with the relationship environment generation to generation. The autonomic nervous system is a by-product of the central nervous system. The body's response system to threat is called the autonomic nervous system (ANS). It is the

physiological regulation system that develops in response to what we have learned and is essential for survival. The autonomic nervous system provides the organism's ability to respond when it experiences a threat and to recover after the threat subsides.

The autonomic nervous system develops early in life. Schore (1994) describes the period of its development as occurring between the ages of ten and eighteen months. He describes this process as the development of the self, or the ability of the individual to learn to regulate the reaction to threat. Physiological self-regulation provides the underpinning for the development of emotional and psychological functioning. The ability for an individual to regulate physically is then an important marker of "self" for the individual. Self-regulation is an aspect of differentiation of self.

The autonomic nervous system is a counterbalancing system. An organism evaluates a threat, responds, and then returns to baseline. The sympathetic nervous system or the excitatory response develops between ten and twelve months. The parasympathetic system, or the inhibitory response, develops between sixteen and eighteen months. These response patterns develop in reciprocity with the parents. The parents' ability to be steady, consistent, and defined in relationship to a child promotes the ability of the child to develop this ability for himself or herself. A parent who is reactive and has little ability to self-regulate has an impact upon the child's ability to develop self-regulation (Gottman, 1997).

Variations on the theme of self-regulation emerge (Siegel, 1999). Patterns of response in the child vary with parental pattern. For example, a child who experiences a parent as emotional, inconsistent, and volatile during the development of self-regulation may develop a highly responsive, vigilant stance with an overexcited response pattern, becoming anxious and unable to calm down. Or a child with preoccupied parents may be wary of the environment, hesitant, and overinhibited in his or her actions. These behavioral patterns also have physiological manifestations.

Gellhorn (1969), a physiologist, describes this balancing of the excitatory and inhibitory responses as a "tuning" process. There are those individuals with response patterns that are dominantly excitatory, those whose are primarily inhibitory, and those who seem to employ both mechanisms. In these cases, there is a pronounced physiological double bind. It is like pressing the gas and the brake pedal at the same time. Both responses are activated in tandem, sustaining a chronic reactivity that may produce physical symptoms such as asthma or gastrointestinal symptoms.

Emotional cutoff exaggerates the perception of threat and decreases the ability to regulate self at the level of physiology. The greater the emotional cutoff between generations, the more intensely individuals within the family require one another. This "requirement" can be played out in a variety of relationship patterns, including what may appear as minimal responsiveness.

It is important to observe how a person recovers after being in a stressful situation or thinking about a difficult situation. How does an individual's body calm down after a challenge? Does it recover completely, and how long does it take? Often there is a sustained response that does not change. This reflects the chronic level of reaction. Some examples are a person who has cold hands all the time, an individual who sustains a high level of muscle tension, or a person who consistently worries. The more flexibility there is in a bodily or mental response, the more "flexible" a person is in recovering from a challenge. Symptoms are present when there is little flexibility and an individual is unable to recover from an aroused state. This highly sustained physiological arousal corresponds to an individual who experiences self in a chronic state of "threat."

A sense of threat as described earlier varies from individual to individual. What a person experiences as a threat and how intense that experience is depend upon the patterns and levels of anxiety in his or her nuclear and extended family during development. The earliest developmental context for threat is in the sensory development in utero and continues in response to his or her position in the family. This early experience varies from individual to individual and then manifests differently in patterns of the body, mind, and action of the individual. The physiology, psychology, and behavior develop within the family that an individual depends on for survival. These patterned responses guide the individual through a lifetime of adapting as he or she has learned.

CLINICAL EXAMPLE

A clinical example will illustrate the levels of physiological, emotional, perceptual, cognitive, and relationship reactivity that are present in individuals. The variation in an individual's reactivity corresponds to the variation in relationship sensitivity. The more emotionally cutoff, the more reactive an individual is to his or her present relationships. This reactivity can be observed in the physiological patterns (brain waves, muscle tension, hand temperature, and sweat response) as well as emotional, behavioral, and relationship patterns.

Mr. and Mrs. Bailey originally initiated consultation six years ago during the ending of their marriage. During the phone call before meeting, Mrs. Bailey reported that she feared for her and her husband's safety. They had been married for sixteen years. They had no children and worked together during their married life to establish a church. The intensity in this marriage corresponded to the level of isolation of the couple and emotional cutoff. Mr. Bailey had left India twenty-five years before to pursue education in the United States. He had no contact with his family or country of origin after leaving India. He built a successful life as a prominent spiritual leader. He had been married before and had a child from that marriage.

Mrs. Bailey was seventeen years younger and initially her husband's student. She was also committed to the development of the church and spiritual community. Until two years before consultation began, Mrs. Bailey had limited social contact beyond her husband and her immediate family. Mrs. Bailey's immediate family was present at the wedding, as was Mr. Bailey's child. However, the marriage between Mr. and Mrs. Bailey was a secret within the community, as was the existence of his first wife and child.

A number of factors affected the stability of the marriage. Secrecy permeated the relationship from the beginning. Although a constant challenge, the secrecy became intolerable to Mrs. Bailey later in the marriage when it supported Mr. Bailey's extramarital affairs. This became more evident and pronounced following the death of Mrs. Bailey's mother. Mrs. Bailey's mother died five years before consultation began. An inclination by Mr. Bailey toward affairs seemed to be in place from the beginning of the marriage, although nothing manifested until the death of Mrs. Bailey's mother. Mrs. Bailey spent a great deal of energy guarding against such an occurrence, at great cost to herself.

Both Mr. and Mrs. Bailey's anxiety-driven behaviors increased greatly with the death of Mrs. Bailey's mother. Mr. Bailey had great respect and affection for his mother-in-law. She may have been a suitable replacement for his mother. With the death of Mrs. Bailey's mother, his anxiety was evident. He had less enthusiasm and energy for life during the next five years, further fostering an emerging affair. Mrs. Bailey focused more on her marriage with more concern about Mr. Bailey's affairs.

Over the next five years, the intensity in the marriage increased. Two years before consultation, Mrs. Bailey finally confirmed her fears of other women in her husband's life. She described this as a turning point, at which she began to pursue a professional direction. At the same time she started school full-time, Mr. Bailey's mother died. He had not seen her for twenty-five years. Mr. Bailey experienced increased intense focus on Mrs. Bailey as she began expanding her relationships. The marriage became volatile, with threatened violence. Mrs. Bailey described this time as "dangerous, extremely unstable, and fearful." It was at this point that the couple sought consultation.

Mrs. Bailey had moderate contact with her family of origin and minimal contact with extended family. Her main priority was her husband and the church community they had created together, with her playing a background role. She was inclined to go along with others but at a cost to herself. She had circulatory disorder (constricted blood flow into hands and feet), erratic emotional states, and chronic insomnia. She had anxious energy and accomplished more than most could.

In the consultation with the couple, both described how they used meditative prayer to manage their personal levels of reactivity. But as Mr. Bailey described, the anxiety was too high for prayer to manage. Within three months of couple consultation, Mrs. Bailey began more consistent contact with her family. Mr. Bailey responded to his family in India about the news of his mother's death, eventually visiting his country for the first time in twenty-five years. During this very volatile time, the couple separated safely, albeit with the potential of violence at times. Mr. Bailey dropped out of consultation and Mrs. Bailey continued.

Contact with extended family in this case helped to decrease the high level of anxiety enough for the couple to separate without incident. Mrs. Bailey's achievement of more emotional stability through increased family contact, increased neutrality, and a broadening professional community helped avoid an unstable and dangerous outcome during the separation. They remained in contact with each other as they negotiated the financial and emotional details of divorce. They continue in cordial contact to this day. Mr. Bailey now maintains consistent contact with his family in India.

Early in the individual consultation, Mrs. Bailey began to use neurofeedback to assist in managing her anxiety. The amplitudes of her brain wave patterns were high, particularly during conversation or thought. Initially she had difficulty becoming focused (inhibited theta and enhanced beta) on either side of her brain. Focusing means her ability to inhibit the emotionality enough to be present in the moment with thoughtful attention. Self-criticism or focus on others was a primary cognitive state during this period. Her hand temperature was consistently in the low 70s (°F), which indicates chronic physiological reactivity. Meditative prayer was an important natural adaptation for managing the high levels of emotionality present. Her years of meditative prayer could be seen with high levels of alpha waves on the right side of the brain.

In the early stages of consultation, Mrs. Bailey was unsure of herself in relationships. She selected a life out of college that focused her energy on prayer and spiritual practice. Her primary relationship was her teacher, who became her husband. Her move to pursue further education and a broader world of relationships became the arena for learning in the next part of her life (Figure 3.2).

Family History

Mrs. Bailey is the youngest of four with an older brother and two older sisters. Her parents divorced when she was in college. Mrs. Bailey described her mother as energetic, full of life, and dramatic, with little self-awareness, and her father as hardworking, reliable, and emotionally constrained. The father was thirteen years older than the mother. Mother was described as dissatisfied in the marriage and had affairs. Mrs. Bailey was born into the family when the marital relationship was beginning to establish this dissatisfied pattern. Mrs. Bailey initially viewed her father as inadequate with respect to the demands of her mother and her mother as a vibrant and dramatic handful.

Mrs. Bailey's mother's life had been turbulent, including a sexual assault as a child. It is reported that her family blamed and punished her for the event. After the divorce, Mrs. Bailey's mother did not remarry. She lived a dramatic life in the arts, traveling widely until she died fifteen years ago in South America.

Mrs. Bailey's father was a successful lawyer. Given the wide socioeconomic gulf that existed between her mother and paternal grandmother, Mrs. Bailey admired the respect and mutual acceptance they had for each other. Mrs. Bailey describes her father as successful in the world but clueless with his wife, and attentive as a father. After the divorce, he remarried a widow with adult children.

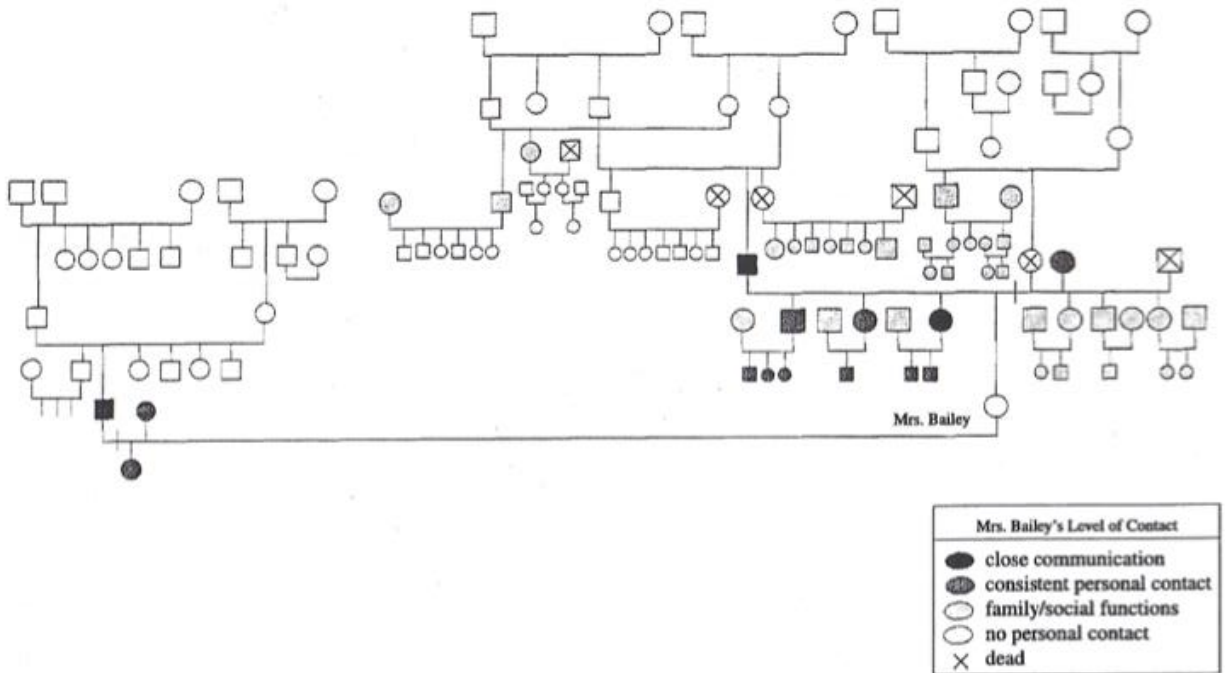


Figure 3.2. Original family diagram with first husband initial consultation six years ago.

Mrs. Bailey grew up in primary association with her maternal side. She knew her mother's only older brother and family well as a child. Superficial contact existed with the paternal side of the family. Grandparents were known but minimal personal relationship existed.

Consultation

During the eight years of consultation, Mrs. Bailey diligently used the neurofeedback and pursued knowledge of/and relationships with the broader family and other important family friends. Before Mrs. Bailey began consultation, she lived in an isolated world with her husband with some contact with her siblings and parents. The idea of more contact with the broader extended family made sense to her. She reestablished relationships with aunts, uncles, and cousins with whom she grew up but had contact only during family occasions, such as wedding and funerals, as an adult. She also pursued relationships with family members she did not know well, particularly on her paternal side. There were opportunities such as deaths, weddings, and birthday celebrations, at which she made a point of being present and an active participant. Developing these relationships allowed her to see her family and herself more neutrally (Figure 3.3).

After six years of consultation, she married her present husband. This marriage lives in the broader context of both families. She "uses" her relationships with her family and his family to counterbalance her tendency to focus on her spouse when anxious.

Mrs. Bailey used the neurofeedback consistently to improve her ability to think through emotional situations. She would think of difficult situations and work to maintain a neutrally focused brain state. This improved her ability to optimally think through an emotional dilemma.

Mrs. Bailey's improved ability to manage her emotional and physiological reactivity was particularly effective when she and her present husband discussed an issue while she was using neurofeedback. One time in particular, Mrs. Bailey experienced a "shutdown," as she describes it. In the exchange with her husband, Mrs. Bailey became overwhelmed, shut down, and could not speak. This

corresponded to high levels of theta (above 15 [microVolts]) and low beta (below 3 mV) on the neurofeedback, cold hand temperature, and high muscle tension. This was the first time that she was able to consciously experience the shutdown state and put it into language that allowed her to reengage in the relationship with her husband. This was an important turning point for Mrs. Bailey. With the assistance of the neurofeedback, she described in a neutral fashion, an ability to experience the state that had previously overtaken her. This reactive state had previously compelled her to shut down. This was a familiar state that she formerly lived in for long periods of time.

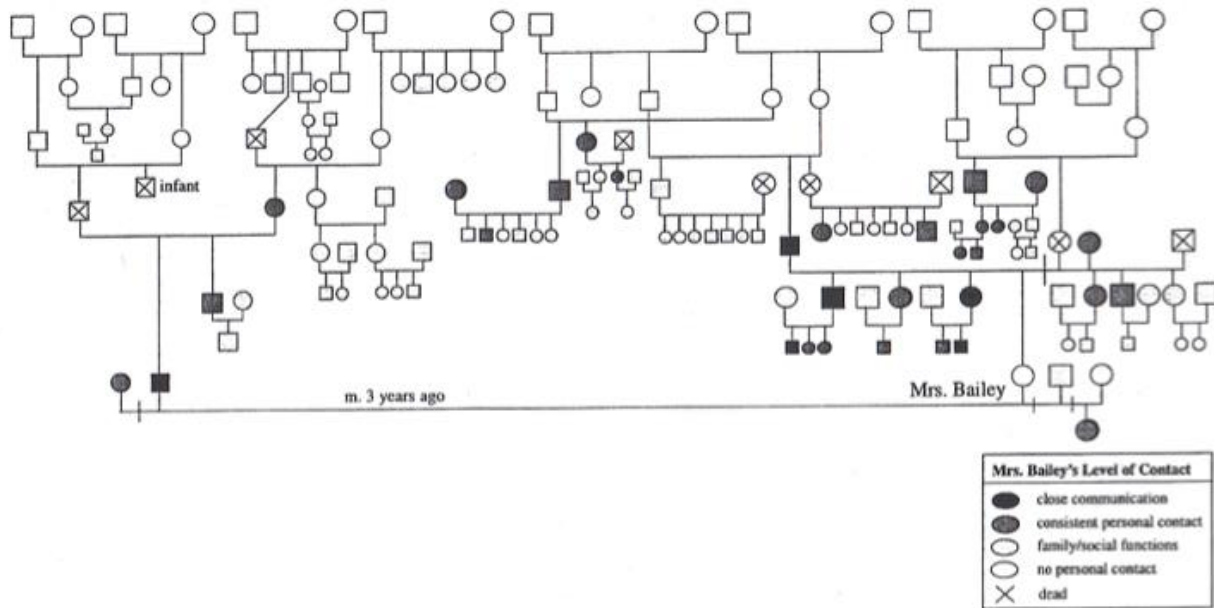


Figure 2.3 Family diagram with second husband at present.

Her brain patterns are more integrated with lower amplitude when she is calm. The theta and beta brain waves are closer together, producing a calmer, focused attention. When she is anxious, the previous patterns of high amplitude theta are present although not as sustained. In addition, her hand temperature is warmer and muscle tension is lower. Mrs. Bailey describes the process of neurofeedback and consultation as "loosening the knots or ruts of habit." She describes the process of consultation about herself in her family and relationships as amplified by the neurofeedback. The objectivity of the neurofeedback assisted her to see herself in her relationships more accurately and more quickly.

Over the past six years, Mrs. Bailey finished her education and successfully established herself in the field of medicine. She is teaching and is active in the broader professional community. After several years of exploring relationships, she developed a relationship with her present husband. She describes establishing relationships with her broader family and his family as having helped her loosen the focus on the current relationship, allowing it to be mutual and cooperative.

She is experiencing the fruits of her efforts. This past year included the death of two significant men in the older generation. Mrs. Bailey was an important part of these two family units during the period of dying. She was able to use her medical skill with the dying as well as with the surviving family members. She is an important part of each of these families. Rather than being experienced as the little sister, her opinions and thoughts are considered and acknowledged by her siblings and her father and stepmother. Her family is a resource to her and she to them. She is calmer, more thoughtful, and more present. She describes her life as having been transformed "like alchemy."

Change of this proportion takes time and determination. Moving into the past initially activates the anxiety that produced the cutoff. Learning to manage oneself despite the anxiety is essential to being able to change one's behavior and life patterns. Neurofeedback seems to provide a neutral reference point about anxiety and a vehicle to experience life differently. Bowen theory provides the grid to move in relationships differently.

The physiological changes correspond to the relationship changes. Changing the role one plays in the important relationships of one's history changes not only the relationships in the present but also one's physiology. These physiological changes may occur automatically as relationships change. There is also a learning process. Learning how to realistically see one's part in relationships brings a realization that the perceptions are constructed to promote the automatic reactions. When one can experience the part one plays in a situation, the relationship changes and the brain changes. Experiencing the part one plays is a complex brain integration. The automatic survival perception is to experience the impact others have on us and to focus on them. It is a different perspective to experience self through another's eyes.

EMOTIONAL CUTOFF IN CLINICAL WORK

In clinical work, the idea of emotional cutoff can be one of the most elusive concepts for individuals to grasp. Families living with high levels of cutoff often reject the idea that lack of contact is damaging or that knowledge of a broader extended family network is important for improving one's functioning. Individuals do not comprehend, or aggressively argue and disregard, that parts of the family are important: "I don't like them and they don't like me." "What do people I don't even know have to do with my life?" "I don't see how contact with them has anything to do with my marriage." Sometimes the response is more lethargic. Bridging cutoff may make sense, but it is difficult to find the energy to do anything. Some say they procrastinate, put off contacting individuals, and lose energy at even the thought. All of these responses reflect emotional cutoff and highlight the difficulty of pursuing the blind spots in perception.

There are reasons that emotional cutoff exists. It is important to respect its force. Moving back toward the known fears or the unknown produces anxiety. Neurofeedback provides a tool to engage the chronic anxiety of the individual. Knowledge of the past provides a framework for understanding one's reactions to the present. Bridging cutoff changes the basic patterns of perception built into the development of the brain and patterns of reactivity. Neurofeedback is a tool to assist in this process. It helps us to see how thought and responses out of our awareness are reactive responses developed to adapt to difficulties in our early relationships. The more the mechanism of emotional cutoff is present in the texture of the history of the family and in the individual, the less reality-based that individual's current perception will be. The individual will also perceive fewer choices. Neurofeedback can be a tool to increase "self" in relationships by experiencing the subtlety of anxiety-driven experience in a neutral environment, thus having more ability to respond with awareness, consideration, and choice.

Bridging the emotional cutoff present in a family is basic to differentiation of self. Bridging cutoff is not differentiation of self per se. It is, however, essential to building the functional basis upon which to be more of a self. Decreasing chronic anxiety allows one to be more of a self. Bridging emotional cutoff addresses the chronic anxiety present in a family. Although one may initially increase anxiety by moving toward an emotional cutoff, it increases the flexibility and promotes an increase in functioning and the potential to be more of a self.

SUMMARY

This chapter addresses the concept of emotional cutoff at the level of physiology and the brain. The functioning of an individual's brain is a product of the relationship system. The brain is a "relationship organ." The evolutionary nature of the brain is a culmination of the coevolution of social organizations and the brain itself. Adaptation occurs generation to generation. The variation in adaptation is transmitted

through the development of individuals within a family adapting to the changing conditions of life. Bowen theory suggests three variables important in this variation in development: composite level of differentiation of the family; the level of anxiety present during different developmental stages; and the position of the child in the anxiety mechanisms of the family. Emotional cutoff is more prevalent at lower levels of functioning. Emotional cutoff, while solving the short-term anxiety, increases the long-term problem by decreasing the flexibility of functioning in the next generation, as well as the current generation over time.

The author has studied emotional cutoff in her clinical work applying Bowen theory with neurofeedback, a clinical technology that provides information about the brain functioning by measuring the electrical patterns of the brain. Brain patterns and physiological measures correspond to variations in emotional cutoff in families. A clinical case presented a description of an individual's physiological, cognitive, emotional, and relationship functioning; her multigenerational family history; the nature of the emotional cutoff; the course of consultation with neurofeedback and Bowen theory; as well as changes in the individual's functioning, including the brain wave patterns.

Emotional cutoff, the mechanism for managing the intensity of the connection with one's original family by distancing to create a life of one's own, can be observed not only at the level of behavior and experience of individuals, as described by Bowen, but also at the level of the brain and physiology.

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