Observations of Change Project:
Changes in Physiology and Functioning While Working on Differentiation of Self, Therapy Guided by Bowen Theory, A Natural Systems Theory of the Family

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Introduction

Murray Bowen (1913-1990) developed a natural systems theory of human behavior based upon observational research with families with a schizophrenic family member, retaining what he considered scientific in the work of Freud and integrating observations with evolution and the natural sciences. (Kerr, 1998) He began to document ways in which the family is an emotional system that governs the biology and behavior of individuals. Perhaps best known as one of the founders of the family therapy field, Bowen considered his greater contribution to be the development of a theory consistent with what David Sloan Wilson has written about science.

Scientific theory is much like this. We use a theory and available factual information to make the best possible first guess. Then we continue to use the theory along with accumulating information to refine our search until we find what we are looking for. … No theory leads directly to the facts. There is always a repeating process of hypothesis formation and testing." (Wilson, 65)

Bowen Theory

Two Fundamental Forces
Emotional Systems
Chronic Anxiety

Nine Concepts
Scale of Differentiation
Emotional Triangles
Multigenerational Transmission
Nuclear Family Emotional Process
Family Projection Process
Emotional Cutoff
Sibling Position
Societal Emotional Process

Bowen theory incorporates two fundamental forces (emotional systems and anxiety) and eight basic concepts (differentiation of self and the scale of differentiation; emotional triangles, nuclear family emotional process and multigenerational family emotional process; family projection process, sibling position, emotional cutoff and societal process) to employ in understanding the variation in human functioning as part of evolution. The electronic and written works involved in the development and applications of this theory are archived at the National Library of Medicine History of Science division as a natural systems theory available to guide further research and applications. (Bowen, 1978; 1980; http://murraybowenarchives.org)

Research Project Purpose & Hypotheses

Bowen family systems theory serves as an alternative conceptual framework to individual or group theories in psychiatry and psychology, social work and family therapy. Therapy is guided by theory.

"(Therapy) is designed to help one or more family members to become aware of the part self plays in the automatic emotional responsiveness, to control the part self plays, and to avoid participation in the triangle moves. When one person in the triangle can control self while remaining in emotional contact with the other two, the tension between the other two subsides. …Therapy also involves a slow process of differentiation between emotional and intellectual functioning and slowly increasing intellectual control over automatic emotional processes." (Bowen, 307)

This project investigates changes that can be observed in physiology and in functioning for an individual and his or her family that accompany working on differentiation of self in the family, the basis for applications of Bowen family systems theory in psychotherapy.

The hypothesis is that steps involved in working on differentiation of self will be associated with increased ability to observe and manage anxiety; decreased anxiety; increased ability to be more thoughtful and function with capability and maturity; greater self-regulation with decreased automatic patterns of reactivity; and decreased symptoms in self and close family members.

Steps toward differentiation of self that are part of family systems psychotherapy include: increased contact with more members of the family; the development of person to person, individual relationships with more family members; practice in observing and managing one's own automatic and

anxious reactivity in emotional triangles (distance, pursuit of closeness, conflict, functioning for others instead of for self) and increasing ability to define one's own beliefs and principles and act upon them.

Research Design

Volunteers from the Bowen Center Postgraduate Program are professionals from various fields who learn and apply Bowen theory in their own family and life as the basis for applications in their work. Eight people, all women ages 39 to 60,

1) Obtained measures of physiological reactivity (EMG, DST, EDR and Cortisol) & EEG & Salivary Cortisol: 4 X a year
2) Maintained daily observations of metabolic activity (Blood sugar, peak flow oxygen, heart rate) & medical blood work
3) Recorded nodal events in the family, symptoms that occurred in self & family, contact with family, & steps related to differentiation of self and
4) Completed the Skowron Differentiation of Self Inventory.

Each participant also participated in coaching with BCSF faculty to work on differentiation of self in her own family, a process that is equivalent to psychotherapy based in Bowen theory.

Results: Case Study #1

The eight participants in the first year of the study, from September 2013 to June 2014, varied in the amount of data collected. Case Study #1, who gathered a great deal of consistent information, illustrates changes in physiological reactivity and cortisol levels that indicate decreasing anxiety accompanying contact with a greater number of family members and steps toward differentiation of self. She also reported improved functioning in her son, the most symptomatic family member, and improvement in relationships where emotional cutoff occurred. Her differentiation of self (DOS) scores increased over the first year of the study.

Physiological Reactivity and Cortisol

The graphs in illustration 1 trace the Highest and Lowest and Average levels of DST, EDR, and EMG that were obtained six times, every three months, between September, 2013 and December, 2014. The criteria for evaluating measures of physiological reactions are these:

- Fingertip temperature or digital skin temperature (DST) reflects the constriction of blood vessels in fingertips produced when increased SNS and adrenalin stimulate hollow vessels throughout the body. DST of 93° to 95° F is characteristic of active but at ease, without SNS activity. DST below 93° F indicates vasoconstriction produced by increased SNS activity. DST above 95° F shows activation of the "old vagal reaction," a shutdown or collapsed state following sustained and ineffective SNS and somatic reactions.
- Palm sweat levels, or electrodermal response (EDR), are another indicator of adrenalin level stirred by SNS. A flat EDR at 1-2 μ℧ signals exhaustion. EDR of 2-4 μ℧ indicates active but at ease levels of adrenalin. EDR of 4 – 20 μ℧ shows increased SNS activity.
- Skeletal muscle activity (EMG) of 2 – 4 μV indicates relaxation. EMG between 4 – 8 μV is characteristic of active but at ease. Between 8 and 50 μV indicates tension.

These criteria for evaluating physiological reactivity measures were established through numerous studies compiled in *Standards and Guidelines for Biofeedback Applications in Psychophysiological Self-regulation* (Amar, 1993). Specific physical reactions have been associated with increased anxiety or stress, while others are associated with relaxation and with being active but at ease (Rosenbaum, 1989). Porges' polyvagal theory of nervous system functioning provides additional perspective for interpreting physiological measures associated with chronic anxiety and an old vagal state of collapse. (Porges, 2009).

Constriction of small blood vessels in the fingertips (DST) signals reactions to an immediate threat with a shift in blood flow and oxygen away from the body's perimeter and toward the muscles or brain, where it can fuel flight, flight or problem-solving activity. Increased adrenalin, evident in palm sweat response (EDR) is another signal of increased SNS activity. Elevated skeletal muscle activity (EMG) signals mobilizing or bracing the body as a reaction to threat. Indicators of chronic, ongoing, or cumulative anxiety reactions also are evident in fingertip temperature. Fingertip temperature (DST) above 95 F indicates vagal activity that occurs in the presence of sustained SNS activity without effective

action or problem-solving. This reaction is characteristic of what Porges has described as immobilization or shut down reaction, reflecting the unmyelinated vagal visceral pathway connecting the brain to the heart and abdomen (Porges 2009). Adrenalin, with sustained activation over time, becomes flat and exhausted. Skeletal muscle activity may be high, inhibited, or exhausted.

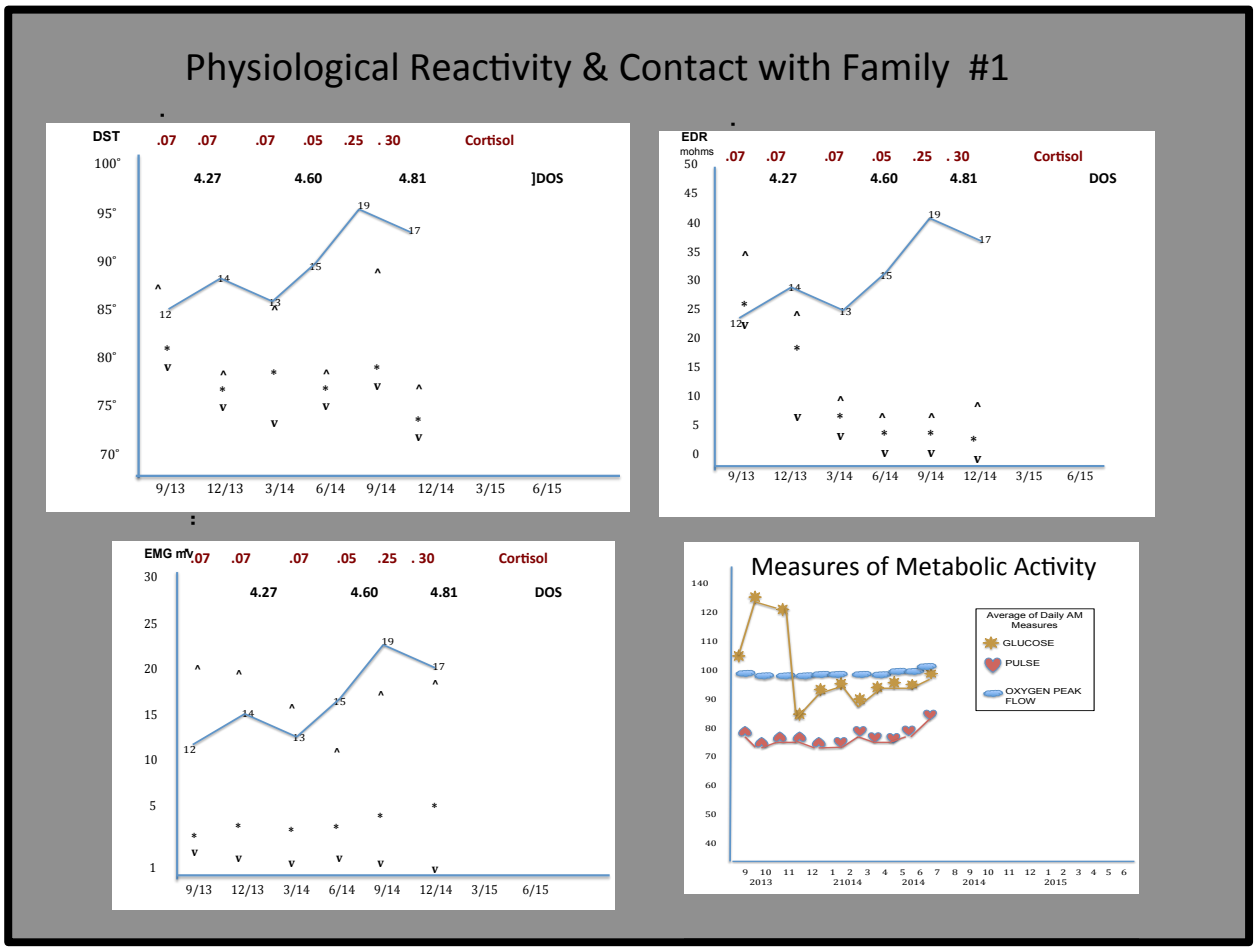


Illustration 1. Physiological Reactivity, Cortisol, Family Contact & Differentiation of Self (DOS) score

The earliest significant decrease in anxious physiology is evident in the December 2013 decrease in EDR reflecting Ms. A's reduced level of adrenalin. Decreased levels of adrenalin reflected in EDR continue throughout the year. Greater variation in Digital Skin Temperature (DST) evident of SNS activity and in skeletal muscle activity (EMG) indicating somatic levels of activity occurs over the year. Cortisol levels for the first year are in the low range of normal indicating a fatigue or low energy characteristic of chronic tension evident in DST and EDR. By September 2014 however, Ms. A's cortisol measures indicate increasing energy.

Criteria for Cortisol Level
7:30 – 11AM: .04-.56
2PM – 6PM: .04-.15

The changes in cortisol levels accompany contact with an increased number of family members, the decline in EDR, and several steps toward differentiation of self that will be described below.

Measures of metabolic activity indicate an overall decline in blood sugar levels between September and December 2013. Increases do continue to occur but from a lower baseline level. Pulse rate follows a similar pattern. Daily measures of glucose and pulse rate permit observations of reactivity that accompanies specific steps toward differentiation of self in the family that will be discussed below.

The changes in minute to minute measures of physiological reactivity on the F1000 biofeedback/neurofeedback unit illustrate another significant change in anxiety. The protocol for measuring EDR, DST, EMG and the amplitude of EEG at 14 Hz is for each subject to talk for 20 minutes about the history and functioning of the family and to describe whatever steps toward differentiation of self they took in the previous months. Then each person is asked to sit quietly for 10 minutes. It is typical for anxious reactivity to occur while talking about family and the efforts involved in relating to family. Those who experience chronic levels of anxiety do not begin to recover from anxious reactions while sitting quietly. People with less chronic anxiety begin to recover physiologically while sitting quietly. (Harrison, 2005)

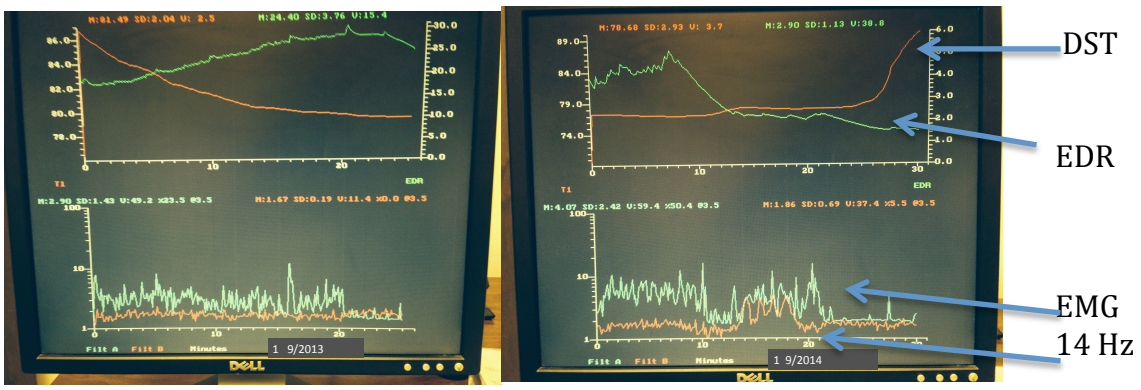


Illustration 2. F1000 measures of EDR, DST, EMG and EEG in 9/2013 and 9/2014

Ms. A's reactivity in September 2014 demonstrates an increased ability to recover in all three physiological reactions measured: a decrease in EDR from 5.80 to 1.80; an increase in DST from 77.20˚ to 89˚; and a decrease in EMG from 20mv to 2.20 mv while sitting quietly. The amplitude of her brain activity at 14 Hz increases from 1.67mv to 1.86mv, an increase in neural activity associated with self-awareness and self-regulation of anxiety.

These overall measures and observations are associated with specific steps toward differentiation of self. Ms. A summarized a timeline of her efforts to observe the patterns of reacting in three family triangles and to manage herself differently in each.

Steps Toward Differentiation of Self in Family Triangles

Ms. A, the daughter of divorced parents, grew up taking responsibility for her parents and their troubled relationship. Her father developed psychiatric symptoms and her mother appeared helpless. Ms. A carried that anxious sense of responsibility for others into her marriage. She felt particularly responsible for her son who reacted to his mother's anxious focus with distance. He lived with his father and had begun to have problems at school.

When Ms. A began the research project she was in the middle of her mother's problems with her own brother over the family estate. Mother complained to Ms. A. Her uncle complained to Ms. A. Brother and sister refused to talk to each other. In September 2013, Ms. A began to increase individual contact with both her uncle and her mother. She worked on ways not to take responsibility for either of them with the other. Eventually her mother and uncle negotiated distribution of the estate with each other. Ms. A recorded those conversations on a monthly timeline and noted that during one particularly difficult conversation in February, 2014 her blood sugar increased to 107. The following blood sugar measures stabilized at lower levels as Ms. A continued her efforts in the triangle with her mother and uncle.

In December 2013, Ms. A's son was arrested with a group of friends for possession of marijuana. This accelerated her efforts to a) make personal contact with her former husband and his family and b) to define her best thinking and a position on who was responsible for which consequences in this situation. Her goals were to be realistic, to work on seeing and managing her anxiety, and to deal with her former

husband as directly as possible. She left responsibility to her son for dealing with his part of court proceedings and community service.

It was important that she also maintained the parallel process of contact with her father and mother and extended family and of working on her functioning in relation to her husband and his family. Over time and several thoughtful conversations about the future, her son's grades improved. He began to talk to both parents about his plans after high school. The relationship between mother and son became less tense, more open and personal by December 2014.

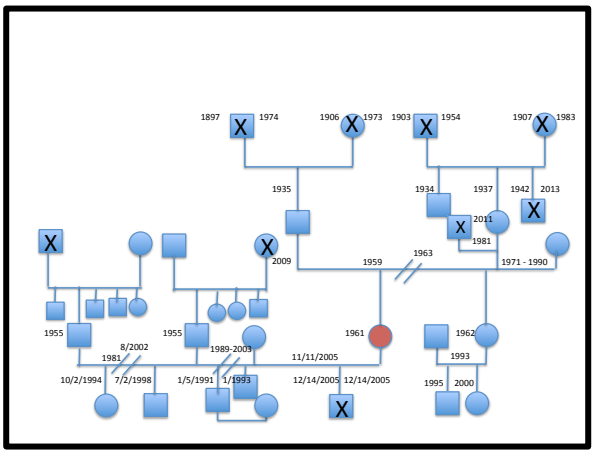
The third triangle involved her husband and adult sons from his previous marriage. This effort involved managing her anxious focus on contact with the sons and defining a realistic perspective on her relationship as a second wife, not a step-mother. Several family gatherings and the wedding of one son were challenging opportunities. Ms. A noted increased anxiety, and elevated glucose levels, during the wedding in July 2014. Anxiety levels decline and stabilize as Ms. A begins to recognize that the lack of contact is not personal but has more to do with the tension between their divorced parents. There is an increase of contact between the sons and their father though Ms. A experiences more anxious focus on her husband.

Conclusion and Discussion

It is important to note that anxious physiological reactivity moderates in a variable fashion. No one measure alone captures the decrease in anxiety nor the anxiety that rises with nodal events, such as her son's arrest, and with the effort involved in differentiation of self. This is an important observation. The assumption that all anxiety is the same, i.e. symptomatic, leads to recommendations that people avoid anxious situations and family members. Therapy based in Bowen theory postulates that anxiety is predictable in the process of differentiation of self and will decrease with practice and experience at being more responsible for self in relationships with family.

It is also interesting to observe that symptoms decline even in the presence of anxiety. What are the differences between anxiety associated with symptoms and that which is not? Can this be related to neural or physiological patterns? What makes the difference when anxiety is related to symptoms within self or to symptoms in another family member, one's spouse or children? The next year of research will include a standardized check list of symptoms and for whom they occur to augments the diary format used for first 2 years. One goal is to better understand these differences.

Even a single case raises questions for further study. What is the impact of contact with a greater number of family members? Does the nature of contact make a difference? Are some contacts more important than others? The contact with more family members is part of an overall strategy toward differentiation of self in the family triangles. More careful categorization (personal, Facebook, telephone, text) may help distinguish the function of increased contact and how it is part of the differentiation process.



Differentiation of Self Inventory scores raise interesting questions about what changes are being measured in this instrument. More careful analysis of the 4 categories of questions may highlight specific areas of change and allow them to be examined in relation to physiological measures and the steps toward differentiation of self accomplished. Continued study will involve more regular, standard DOSI administration.

Initial comparisons between participants indicate that everyone does not experience the same consistent association between declining anxiety, increasing contact, increasing DOS scores and decreased symptoms in the family. Bowen theory describes the basis for variation in functioning along a

continuum of levels of differentiation of self, degrees of chronic anxiety, and cutoff between generations, as well as aspects of one's position in the family. The family diagram outlines facts about the structure and functioning of three generations that indicate the adversity or stress, stability or instability, and patterns of reactivity in the family. Will differences in these factors in the family system contribute toward variation in changes that occur? The documentation of nodal events during the project provides information about differences in the nature and timing of stressful experiences. Will the nature and timing of nodal events account for differences in symptoms and anxiety reactions between the participants?

Physiological measures indicate that a percentage of participants exhibit a pattern characteristic of chronic levels of anxiety. Others do not. Will that make a difference in the changes observed and symptoms experienced during the study?

Therapy practice from any approach is characterized by variation in process and in outcome. The observations of change and careful documentation of family and individual functioning is one way to examine factors that Bowen theory proposes to govern individual variation in symptoms and in health. Family systems psychotherapy is guided by Bowen theory and includes the many steps involved in working on differentiation of self. This study will provide a perspective on differential progress, on shifting symptoms, and on what changes can be sustained over time, both for the individual and for their family members.

The implications of Bowen theory and this study for understanding adaptation and evolution in the human will be discussed more fully in the future. The family as an emotional system that has evolved a counterbalance of togetherness and individuality, along the phylogenetic lineage of uninterrupted reproduction, is one fundamental assumption. (Harrison, 2015) Emotional fusion between family members and degrees of separateness as an individual govern variation in reactivity and self-regulation. The multigenerational family is a system that governs the biology and behavior of individuals in ways that are consistent with species-specific patterns in other forms of life. Greater capacity for differentiation of self, for self-regulation in the face of powerful reactivity in relationships, arises with a brain that is capable of observing itself with some objectivity. Therapy is guided by steps associated with increasing differentiation of self. This study aims to demonstrate the difference that therapy makes in the functioning of the family and to consider the implications for increased adaptation for future generations.

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