

**Physiological Reactivity in the Family:
Triangles, Anxiety & Differentiation of Self
Victoria Harrison, LMFT, LCSW**



“...human behavior is part of all nature, so that it is as knowable and predictable and reproducible as other phenomena in nature. I believe that research should be directed at making theoretical contact with other fields, rather than applying the scientific method to subjective human data.”

Murray Bowen, 340



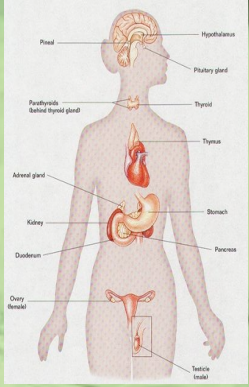
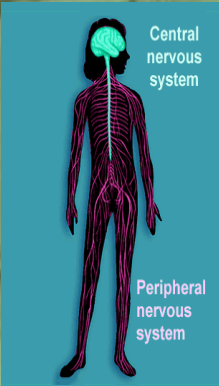
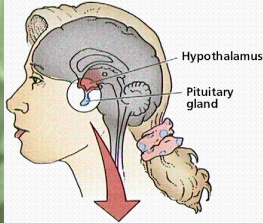
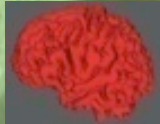
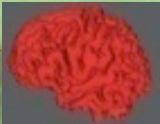
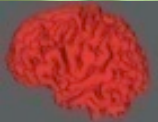
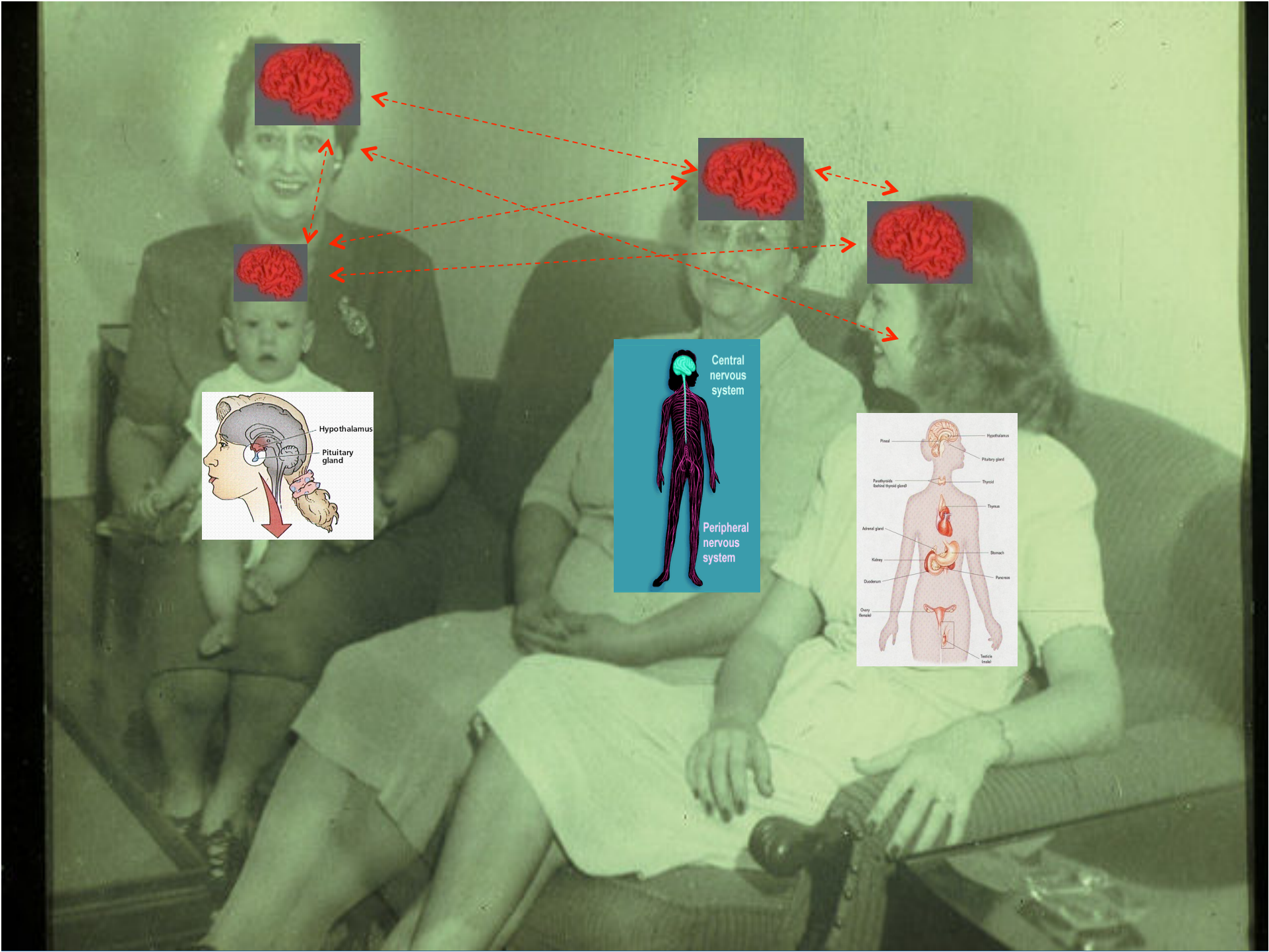
“Man is viewed as an evolutionary assemblage of cells who has arrived at his present state through hundreds of millions of years of evolutionary adaptation and maladaptation and who is evolving toward other changes. In this sense, man is related to all living matter. Man differs from other animals in the size of his brain and the ability to think and reason.”

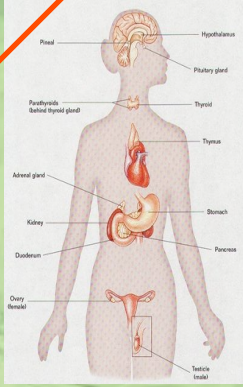
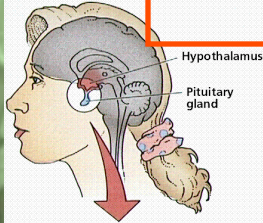
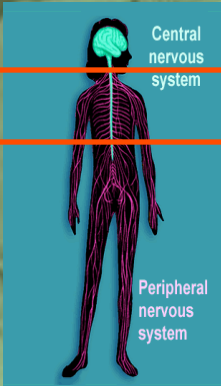
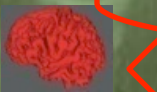
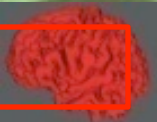
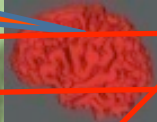
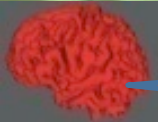
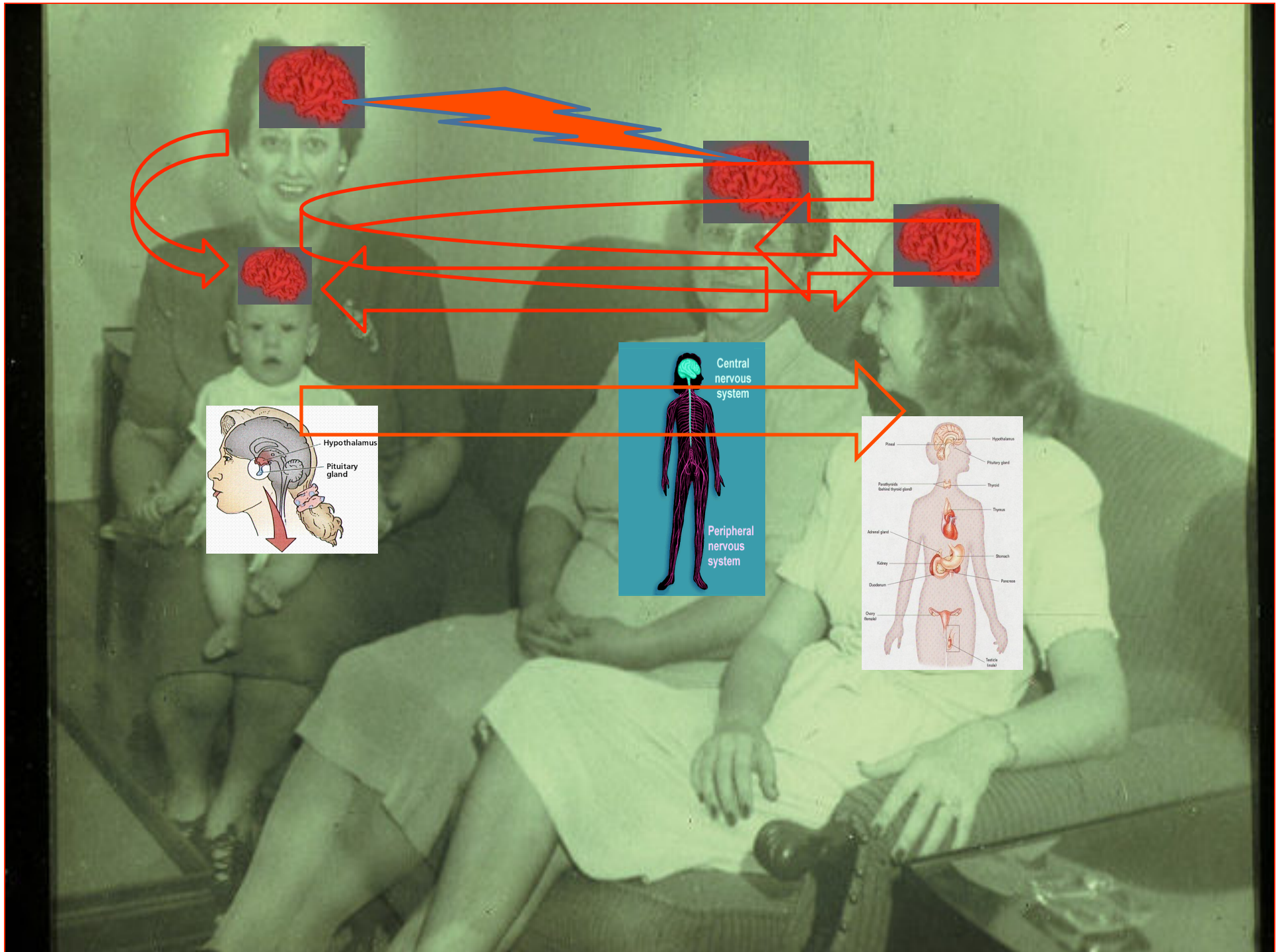
Murray Bowen, Family Therapy in Clinical Practice, page 135

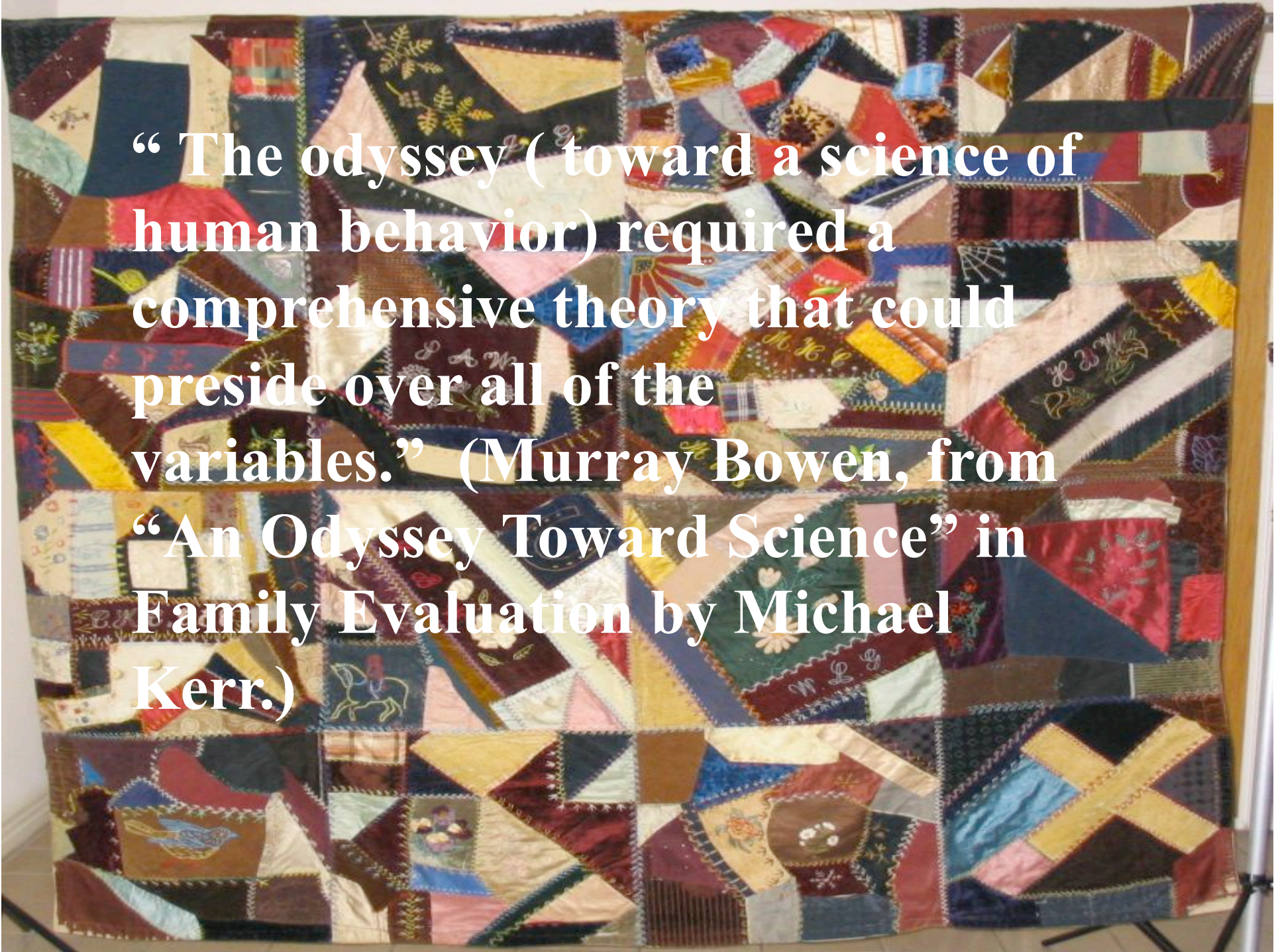


It takes a special effort.

**Learning & Using Bowen theory as the framework for:
Observations in one's own family
Extensive reading in evolution & natural sciences
Clinical Practice and Research using biofeedback &
neurofeedback**







“ The odyssey (toward a science of human behavior) required a comprehensive theory that could preside over all of the variables.” (Murray Bowen, from “An Odyssey Toward Science” in Family Evaluation by Michael Kerr.)

In what ways are

Togetherness
Individuality

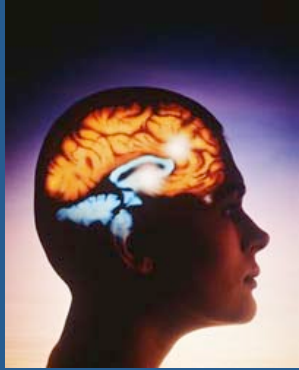
&

Differentiation of Self

&

Anxiety

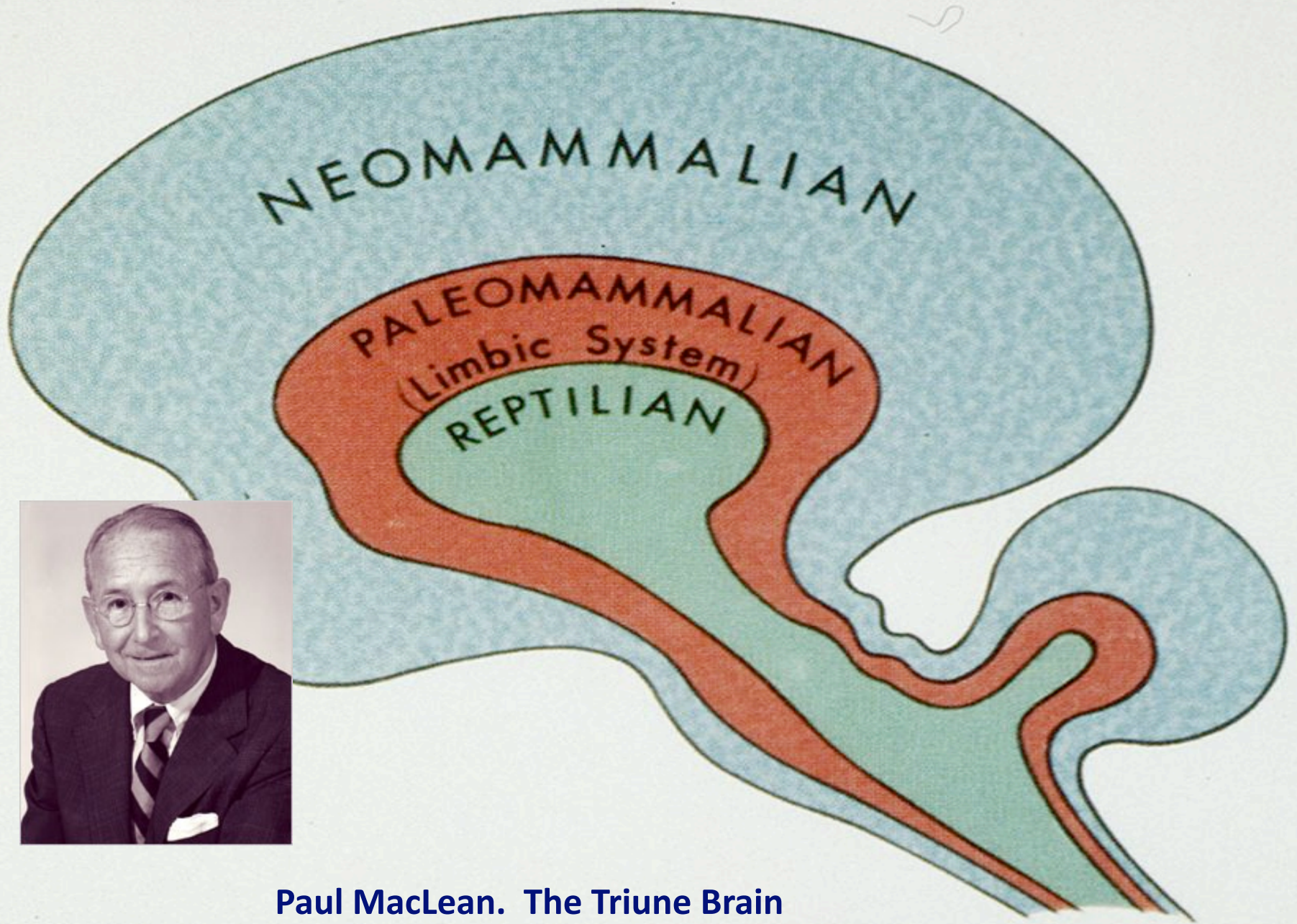
built into our brains & our biology?



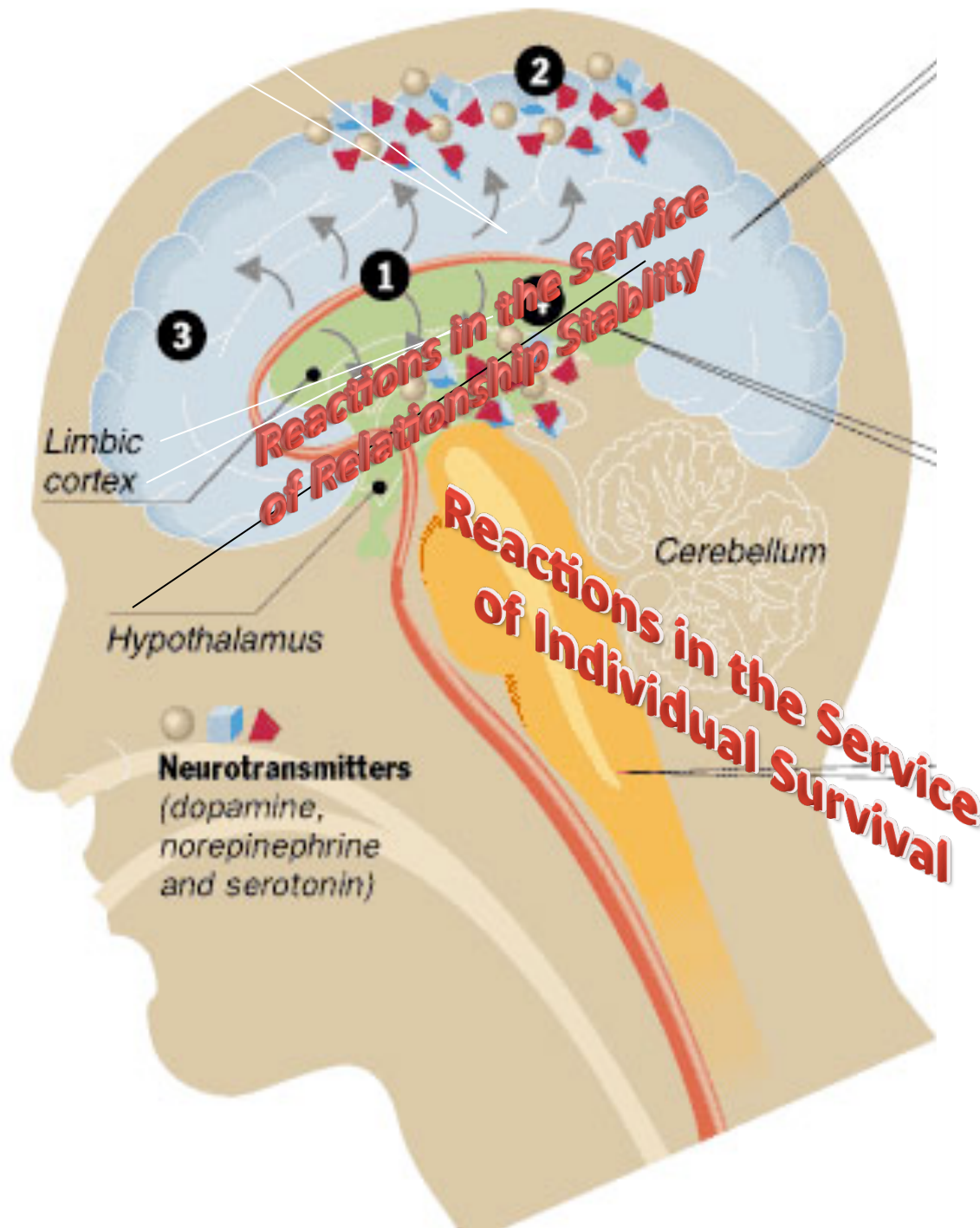
Neuroscience

Is the intersection of various fields without an overarching theoretical framework nor research that correlates across diverse measures.

- Neuroanatomy
- Neurochemistry & pharmacology
- Electrical Measures EEG
- Oxygen/blood flow measures
- Neuronal measures: molecular
- Biofeedback & Neurofeedback



Paul MacLean. The Triune Brain



J.P. Henry
*Stress, Health & the
Social Environment*

➤ Experiences life as a separate self

➤ On the clock

➤ Weighs self interest

➤ Can put words to experience & perception

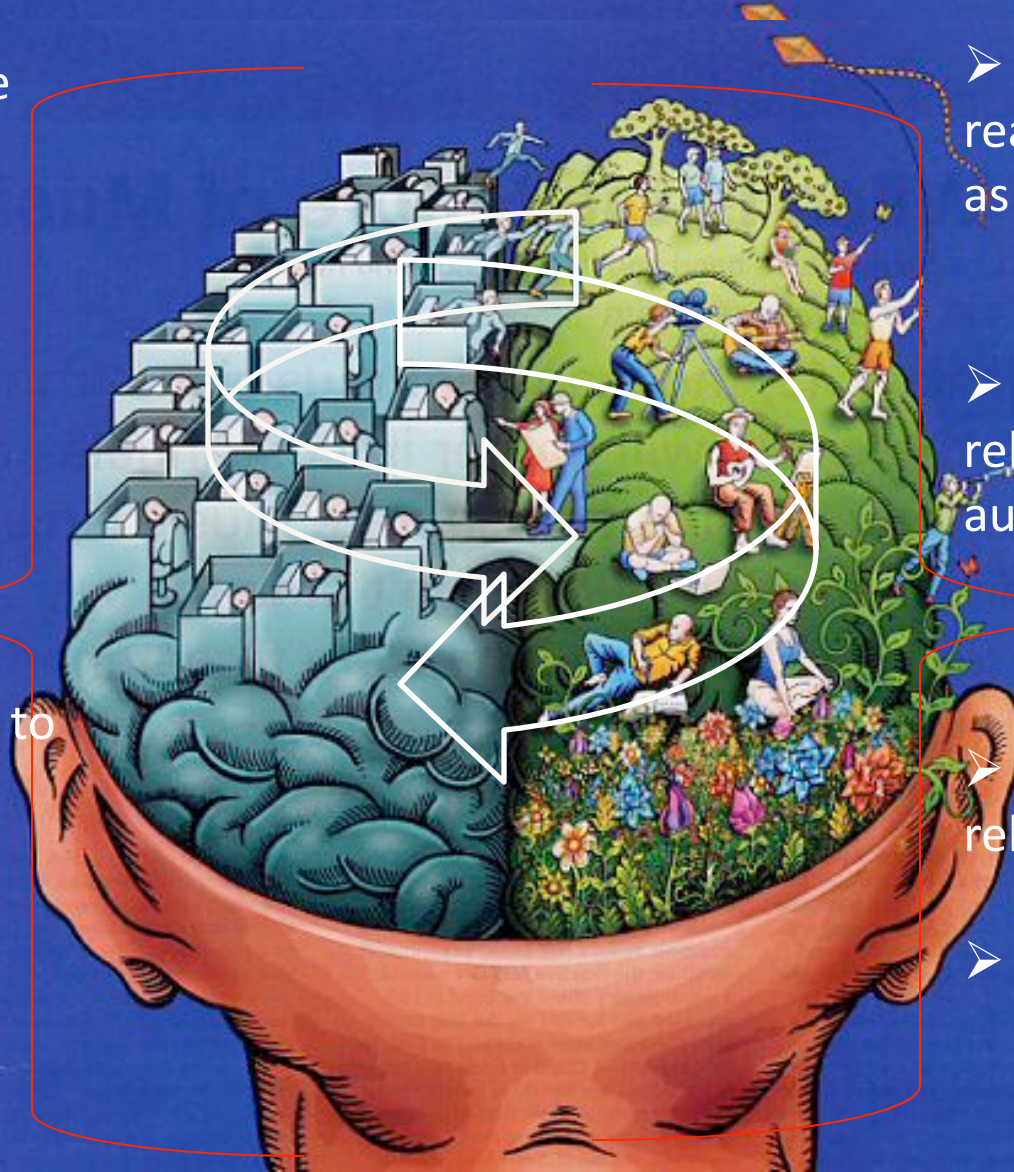
➤ Math & Calculation

➤ Experiences the reactivity of others as one's own

➤ Navigates in the relationship system automatically

➤ Senses the relationship realities

➤ The Eternal Now





- “ ...the right hemisphere was more active when he recognized others but his left hemisphere was most active when he saw himself.” page 96
- “One reason the sense of self can be so fragile may be that the human mind is continually trying to get inside the minds of other people.” 95
- “The medial prefrontal cortex ...is continuously stitching together a sense of who we are.” 96

“The Neurobiology of the Self”

Carl Zimmer

Scientific American, November 2005

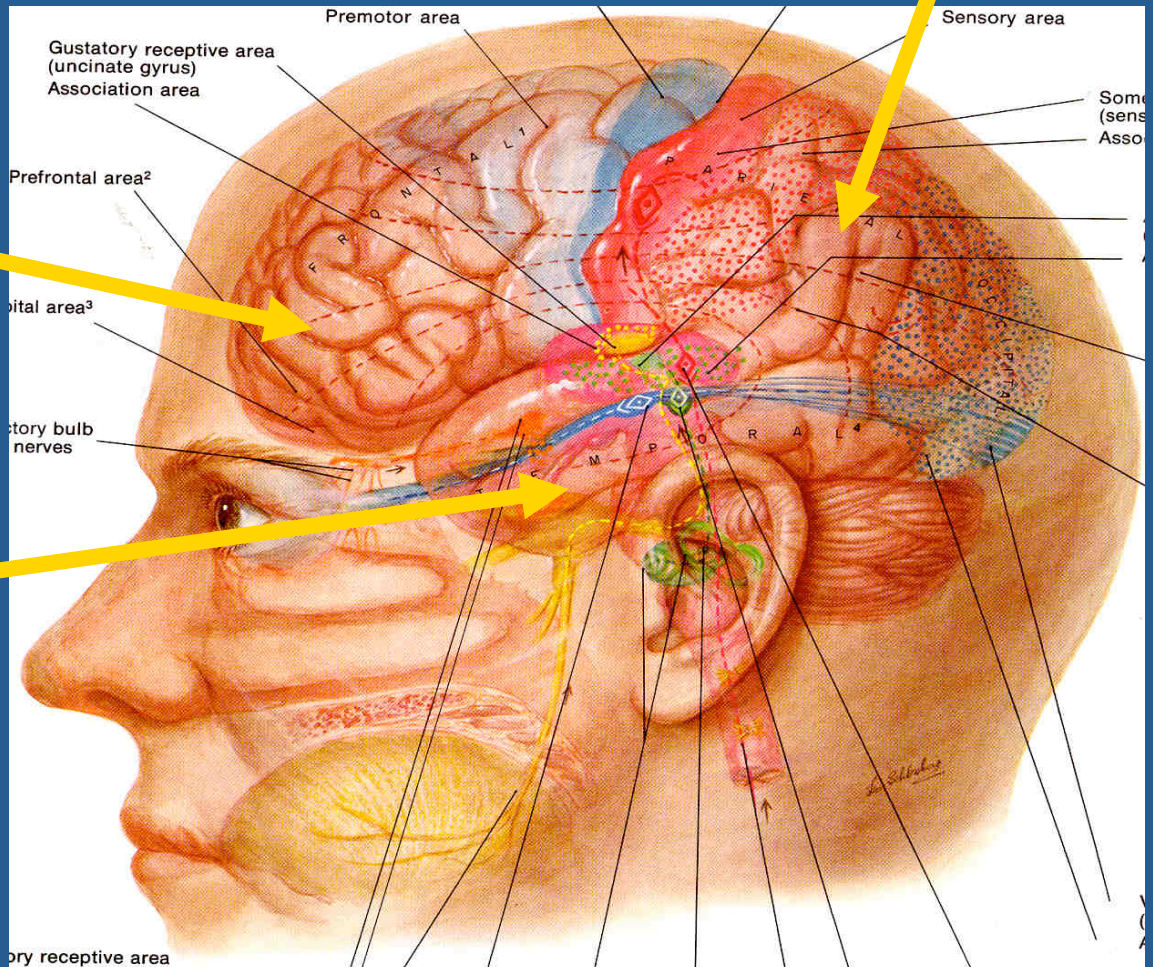
“The medial prefrontal cortex becomes more active at rest than during many other kinds of thinking.”

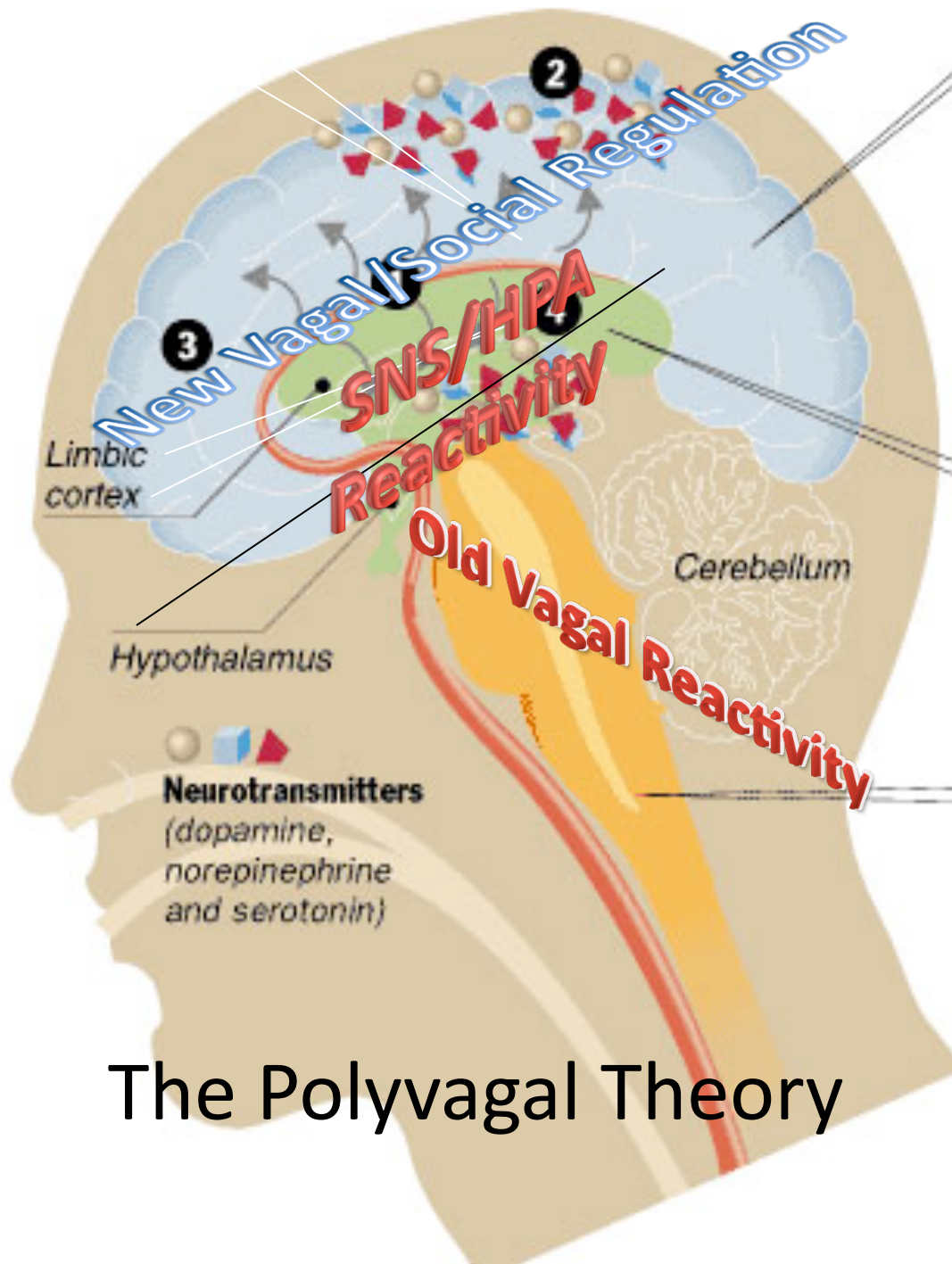
Dr. Debra A. Gusnard
Washington University

Medial Prefrontal Cortex

Anterior Insula

Precuneus





Steve Porges, PhD
 Director of Brain-Body
 Center, U of Illinois in
 Chicago
www.StephenPorges.Info

The Polyvagal Theory

Theory of Dissolution

“The higher nervous system arrangements inhibit (or control) the lower, and thus, when the higher are suddenly rendered functionless, the lower rise in activity.”



–John Hughlings Jackson (1835-1911)
Father of English Neurology
Quoted by Stephen Porges 11/01

New Vagal

Attunement to facial
expression & eye contact
linking to gut & heart via
vagal tract

SNS/HPA Reactivity

Fight/Flight/Befriend
Alarm/Fear
Adrenalin,
Catecholamines &
Cortisol

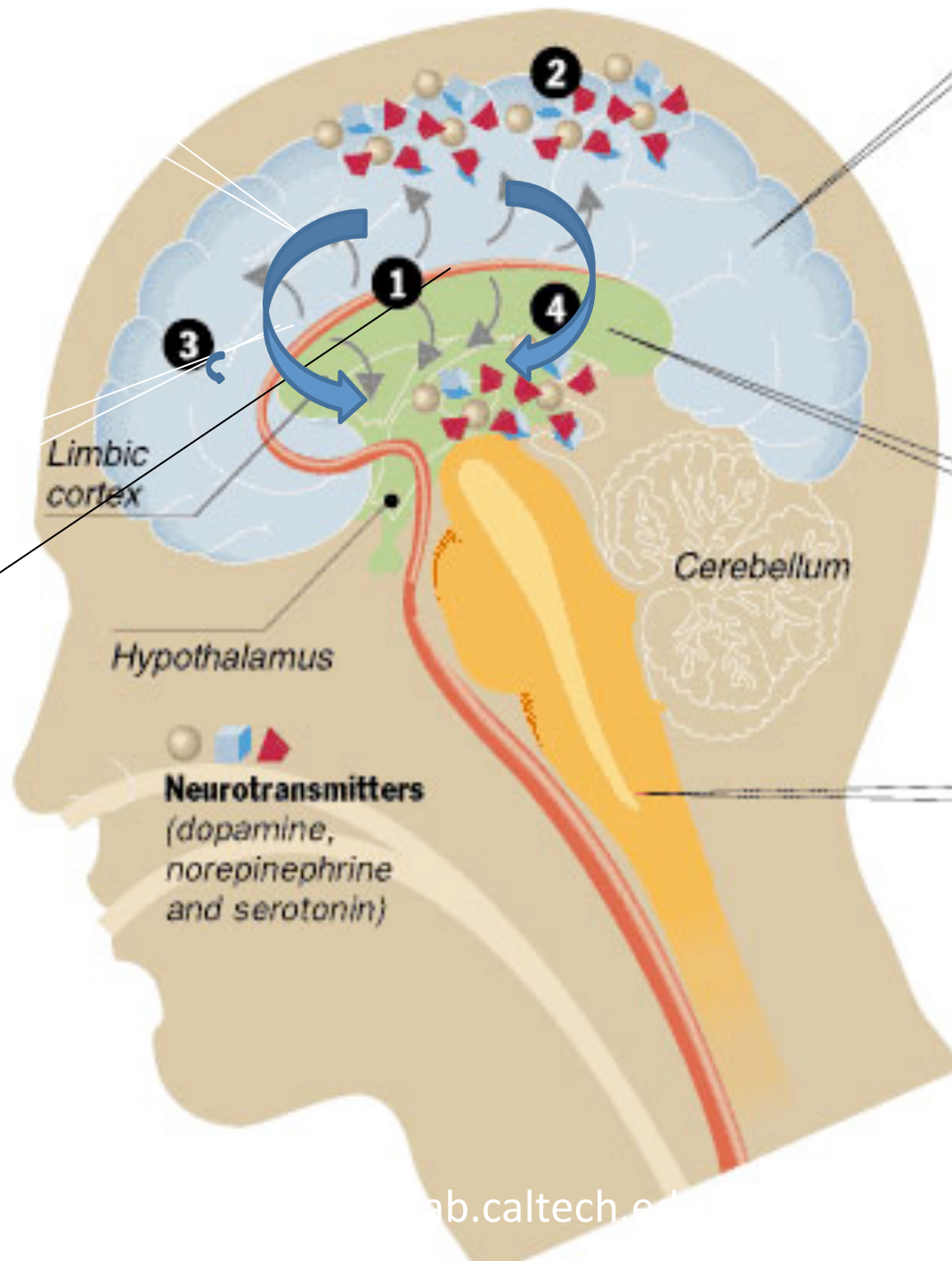
Old Vagal Reactivity

Freeze, Shut Down,
Play dead, Disassociation,
Sleep

Prefrontal Cortex:
Intellect, language,
math, prayer, music,
reflection, ability to
study something,
learn new behaviors

Anterior Cingulate
Gyrus: Awareness
of Self/Feelings arise

Von Economo
neurons
(spindle cells)



Cerebral Cortex:
senses: smell,
hearing, sight, taste,
touch.

Limbic System: SNS/
PNS/HPA Reactivity
to Relationships,
fight, flee, freeze,
befriend, sexual,
stress reactions,

Brain Stem: Survival,
energy metabolism,
wake-sleep,
digestion, heart rate,
vagal activity



“The Mirror Neuron System” Giacomo Rizzolatti & others

Annual Review of Neuroscience

Vol. 27, July 2004, 169-192

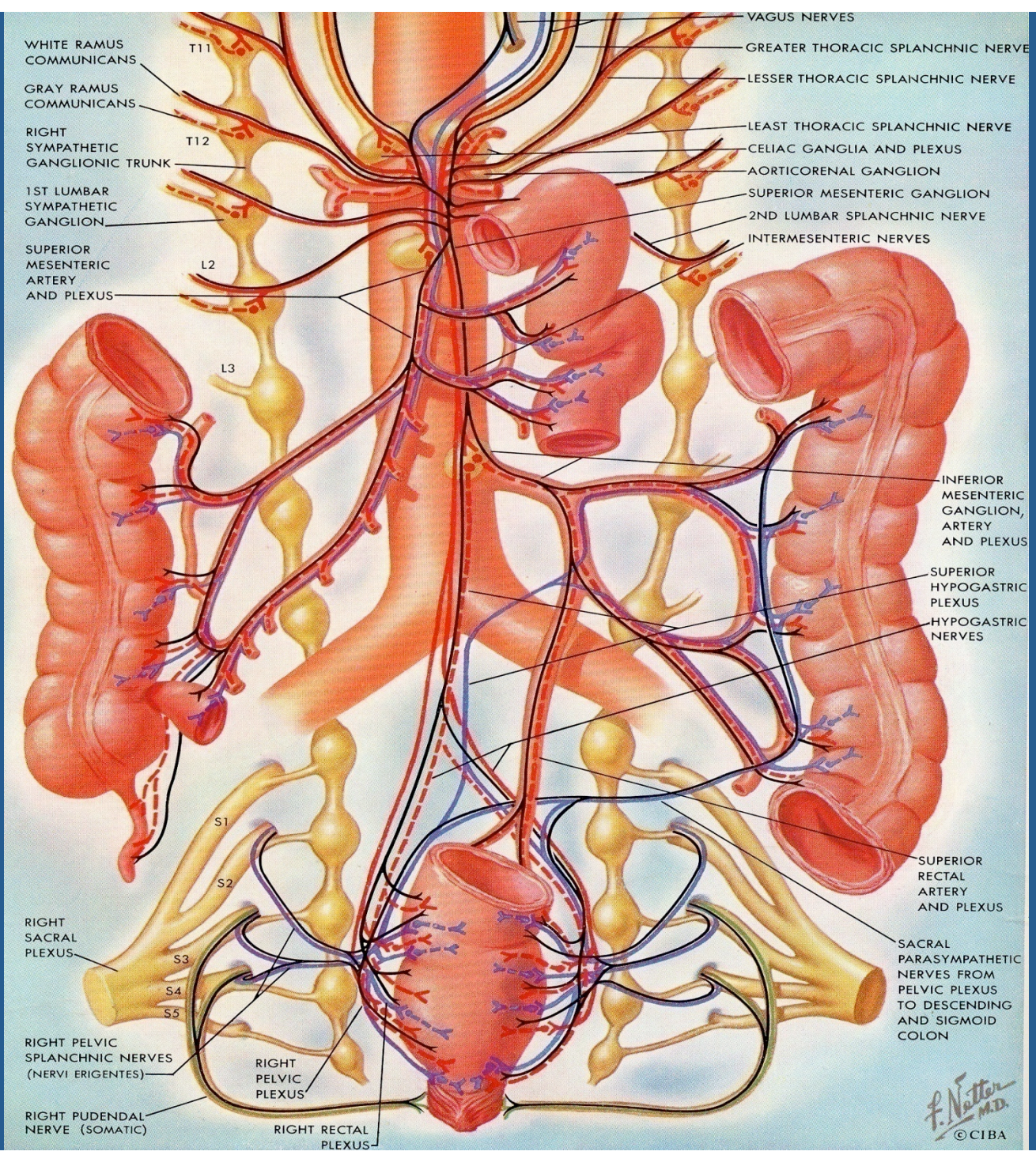


The Nervous Systems

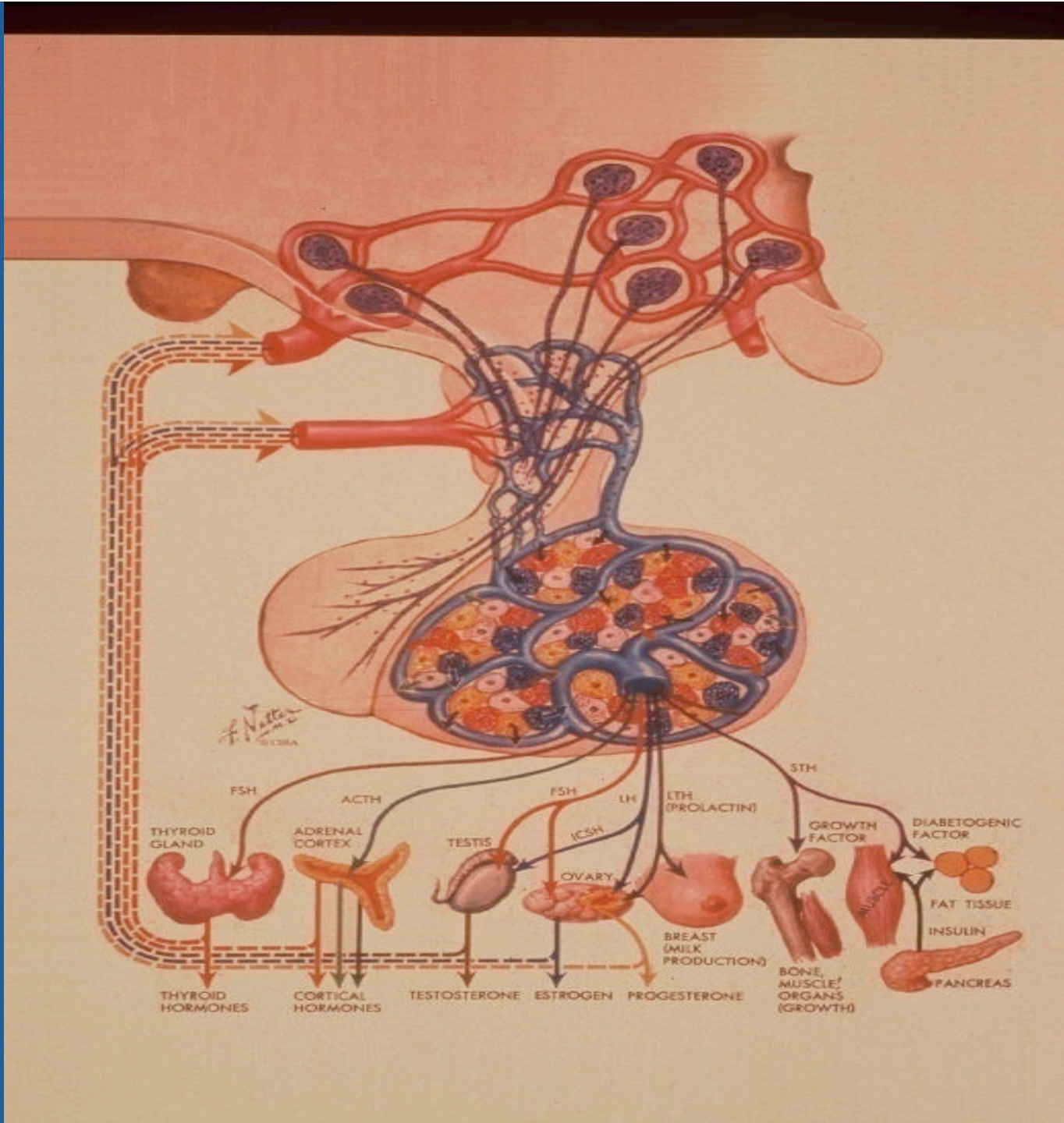


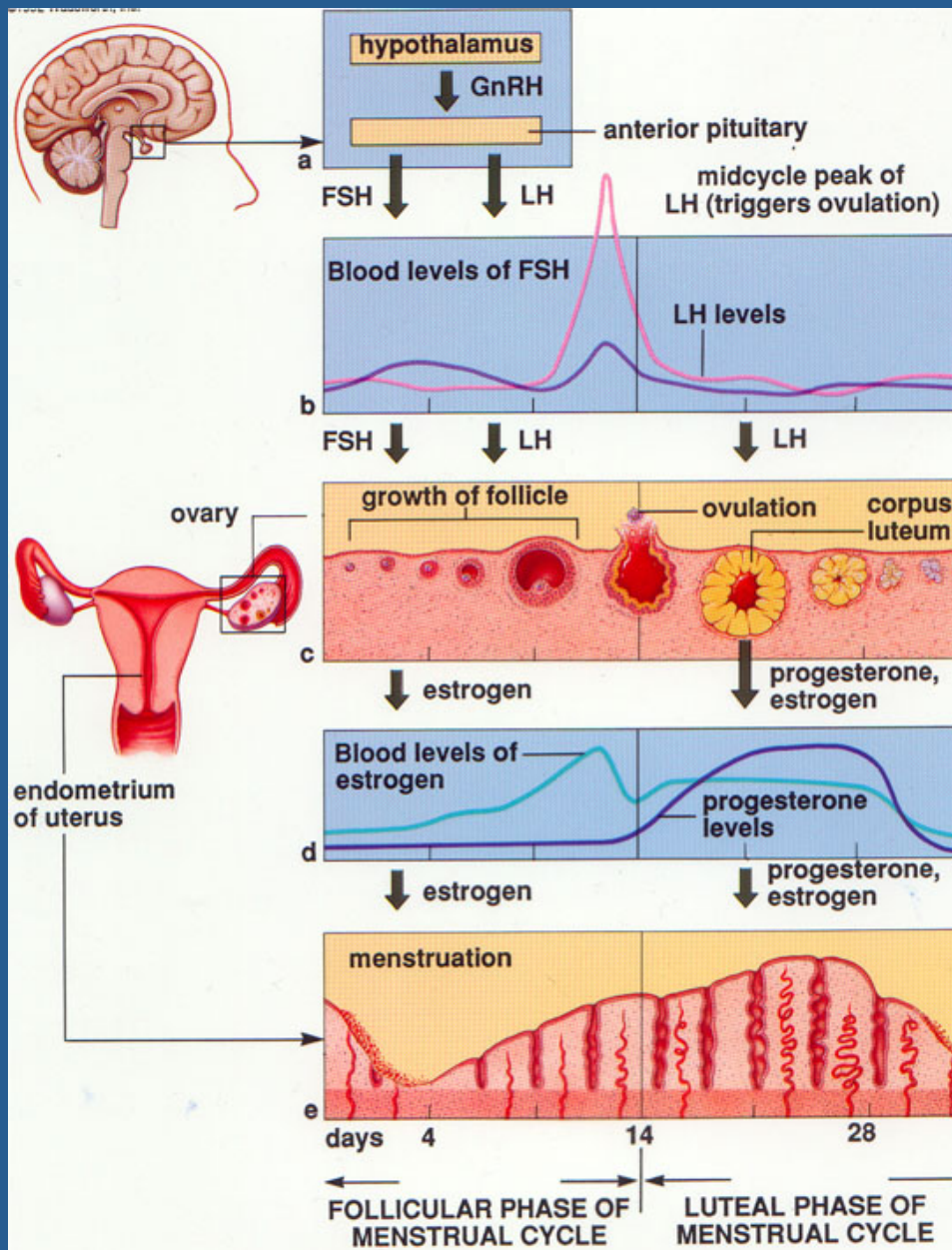
Central
nervous
system

Peripheral
nervous
system

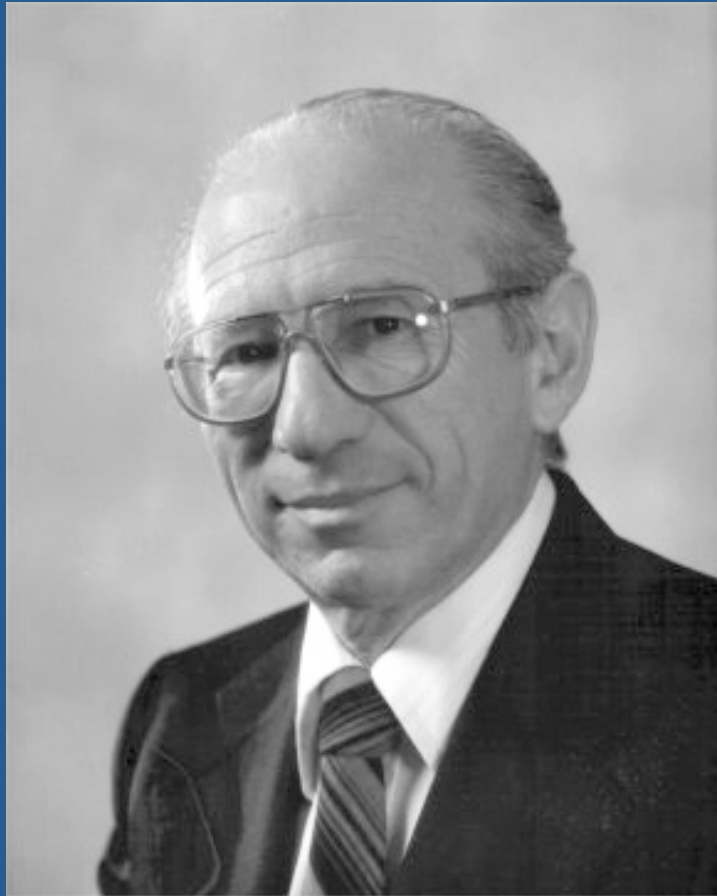


F. Netter M.D.
 © CIBA





Changing hormone levels during the menstrual cycle.



Emil Steinberger, PhD
1928 - 2008

Founding Chairman and Professor of Department of Reproductive Medicine and Biology at University of Texas Medical School at Texas Medical Center in 1971 and in 1983 established and directed Texas Institute of Reproductive Medicine and Endocrinology.

Hosted my sabbatical in 1985, was teacher and mentor, and with his wife Dr. Anna Steinberger, collaborated on the study of ovulation and reactivity.

In what ways do

Relationships between kin & kind

Regulate

Our brains, biology & behavior?



Dr. David Crews
Professor of Comparative Zoology and
Psychology [www.utexas.edu/
research/crewslab](http://www.utexas.edu/research/crewslab)

“The relationship process is basic to adaptation of life, and reactivity to relationships is built into the biology and behavior of all species.

...Relationships and reactivity to these relationships is absolutely fundamental to biological systems.”

David Crews, “Biology and Relationships: Adaptation in Nature” in Family Systems, Vol. 4, No. 2, 1998.



Pioneer research on Menstrual Synchrony between Women in the 1970's.

“Diversity in the Social Regulation of Fertility” in *Psychobiology of Reproductive Behavior*, ed. D. Crews.



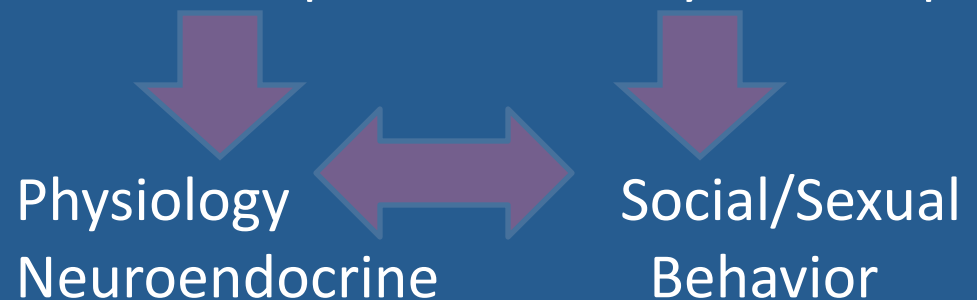
Martha McClintock, PhD
Professor Department of
Psychology
University of Chicago



Social Regulation of Reproduction in Primates and Humans

For
CSNSF Facts of Life Conference : 2004

Relationships in the Family or Group



Reproduction

Toni Ziegler, PhD

Senior Scientist,

National Primate Research Center

University of Wisconsin- Madison

<http://ink.primate.wisc.edu/~ziegler/>

Human biology is organized to allocate energy for

❖ Individual Metabolism

Growth, Healing, Digestion, Etc.

❖ Relationships

Family of Origin

Spouse(s)

Reproduction & Offspring

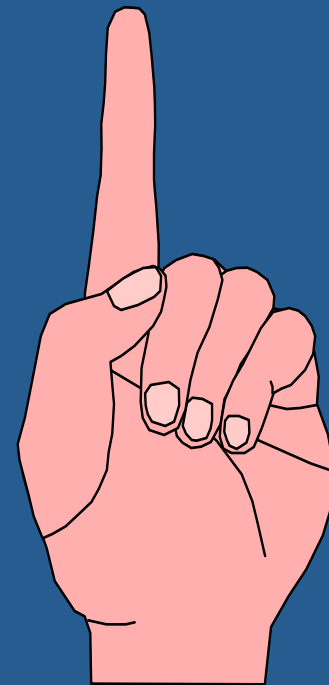
❖ Brain Development

Adapted from study of Bioenergetics which focuses on the individual & energy sources & consumption

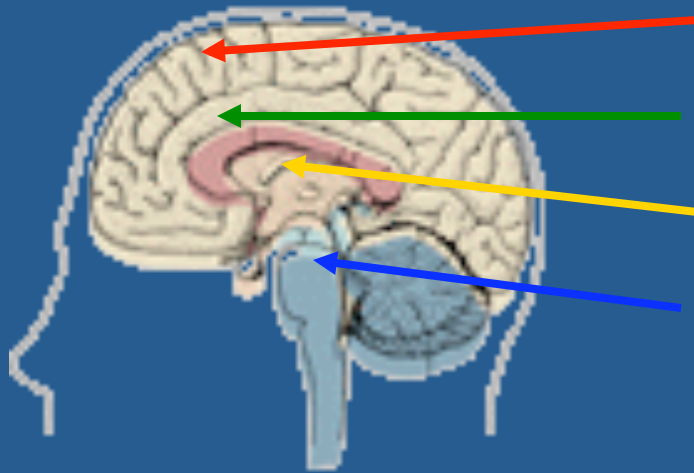


Five Fingers of Fitness

- Survival of individual
- Stability of family
- Mate or marriage
- Reproduction/rearing children who rear child
- Exercising the brain



Measures of Reactivity and Anxiety



EEG: Electrical Activity

Prefrontal Cortical Activity: 16 Hz +

Intellect/Emotion Connect: 14 Hz

Emotional Reactivity Limbic: 6 – 12 Hz

Emotional Reactivity Brain Stem: 2-6 Hz

Vagal Component of ANS

Biofeedback:

4-8 mV Active but At Ease
^8 mV Tense v2 mV Relaxed

93-95 degrees F Active but At Ease
v90 degrees SNS arousal
^95 degrees Inflammatory Process

2 – 4 mohs Active but At Ease
v2 mohs & flat Exhaustion
^4 mohs Tense

EMG: Skeletal Muscle Activity

DST: Vasoconstriction due to ^ SNS activity that cools fingertip temperature to V 90 F (^ catecholamine) or ^95 due to inflammatory process & vagal overactivity

EDR: ^ skin sweat response measured in mohms of electrical activity at palm (adrenal activity)

EEG Measure & Levels of Differentiation of Self

- Dominant 2 – 8hz EEG indicates
 - Greater effort required to manage self in relationships
 - Greater reactivity to relationships
 - Greater degrees of emotional fusion
- Associated with a variety of physiological reactions and symptoms.

EEG Measures & Levels of Differentiation of Self

- Lower 14hz EEG indicates
 - Lack of access to intellect & prefrontal cortex for self-awareness & self-regulation
 - Decreased “top down” influence over emotional reactivity
 - Increased fusion of emotional reactivity & intellectual activity

Research Project

The Study of Physiological Reactivity in the
Family at Higher and Lower Levels of
Differentiation of Self

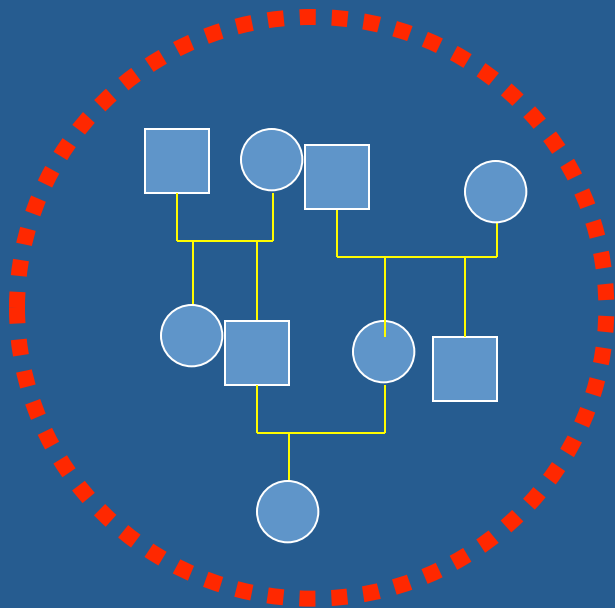


“Biochemistry of people in an intense relationship will have complementary & reciprocal relationships with each other. Chemistry will come to be reciprocal or complementary in relation to each other.”

Murray Bowen from “Bowen Theory & Therapy: An Overview” Videotape 1
Bowen – Kerr Interview Series

“The human family is an emotional unit that regulates individual biology and behavior.”

Victoria Harrison, “A Better Chance”

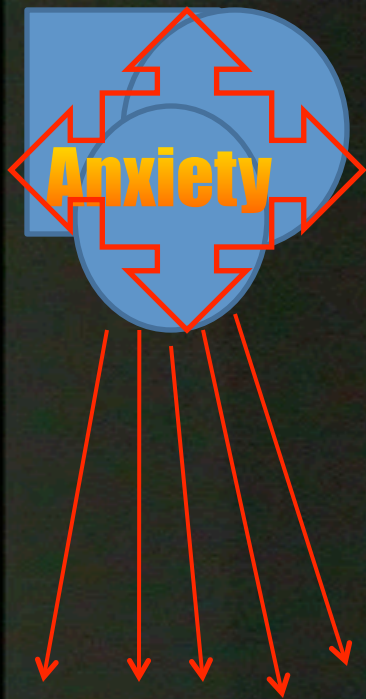


“An emotional system is composed of a series of interlocking triangles. ... A two person system is an unstable system that immediately forms a series of interlocking triangles. The triangle has definite relationship patterns that predictably repeat in periods of stress and calm.”

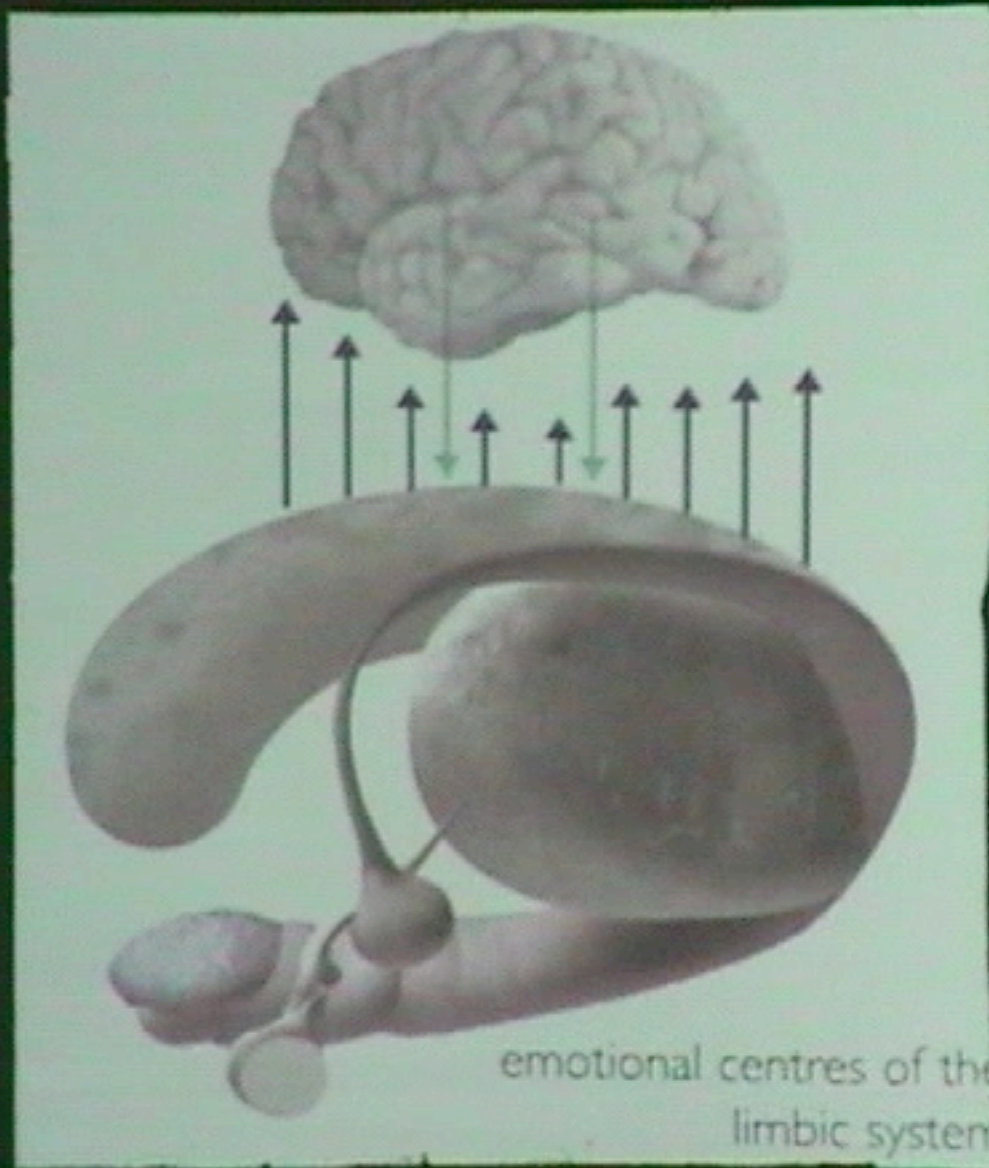
Murray Bowen, Page 199

“There are two important variables in triangles. One deals with the level of ‘differentiation of self.’ The other variable deals with the level of anxiety or emotional tension in the system. The higher the anxiety, the more intense the automatic triangling in the system. The lower the level of differentiation in the involved people, the more intense the triangling. The higher the level of differentiation, the more the people have control over the emotional process.”

Murray Bowen, Page 307



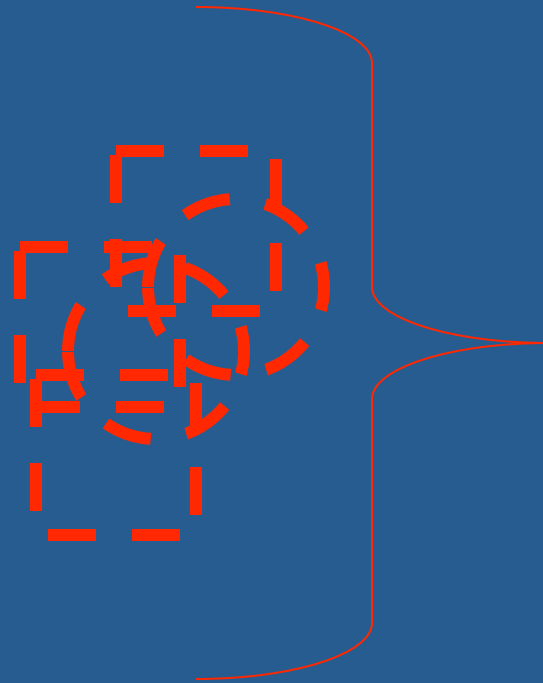
- 1 Distance**
- 2 Conflict**
- 3 Reciprocal
Functioning**
- 4 Symptoms in
Individual**
- 5 Projection
onto Child**



“There are varying degrees of fusion between emotional and intellectual systems in the human. The greater the fusion between emotion and intellect, the more the individual is fused into people around him. The greater the fusion, the more man is vulnerable to physical illness, emotional illness, and the less he is able to consciously control his own life.”

Murray Bowen 305

Hypothesis: At Lower Levels of DOS

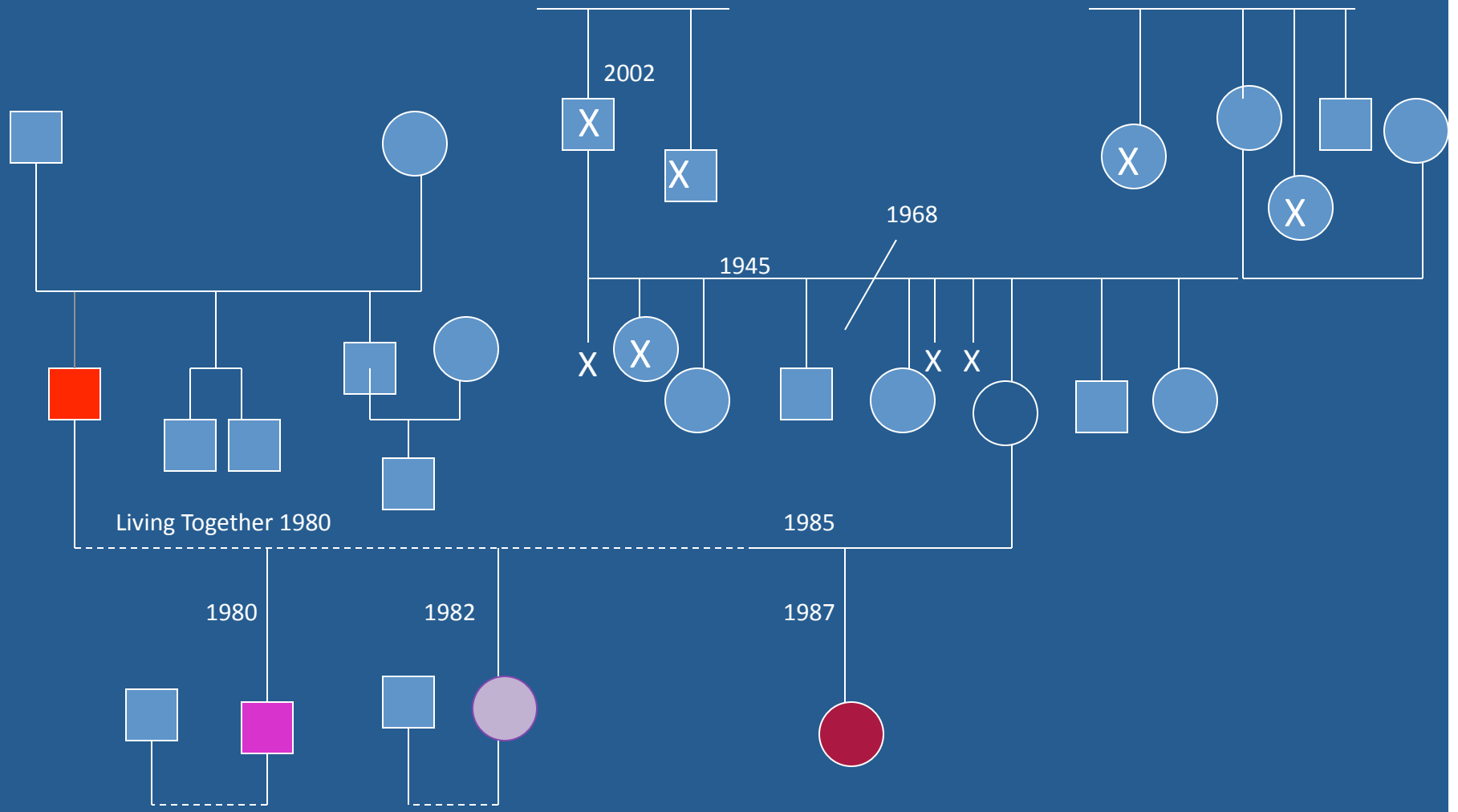


- Individuals operate more as extension of each other: react with; to; and for each other more of the time physiologically
- Higher level of anxiety reactions for everyone more chronic & ever-present
- Less regulation of self/ More reliance on others, on relationships
- Symptoms occur based upon patterns of reactivity operating in triangles

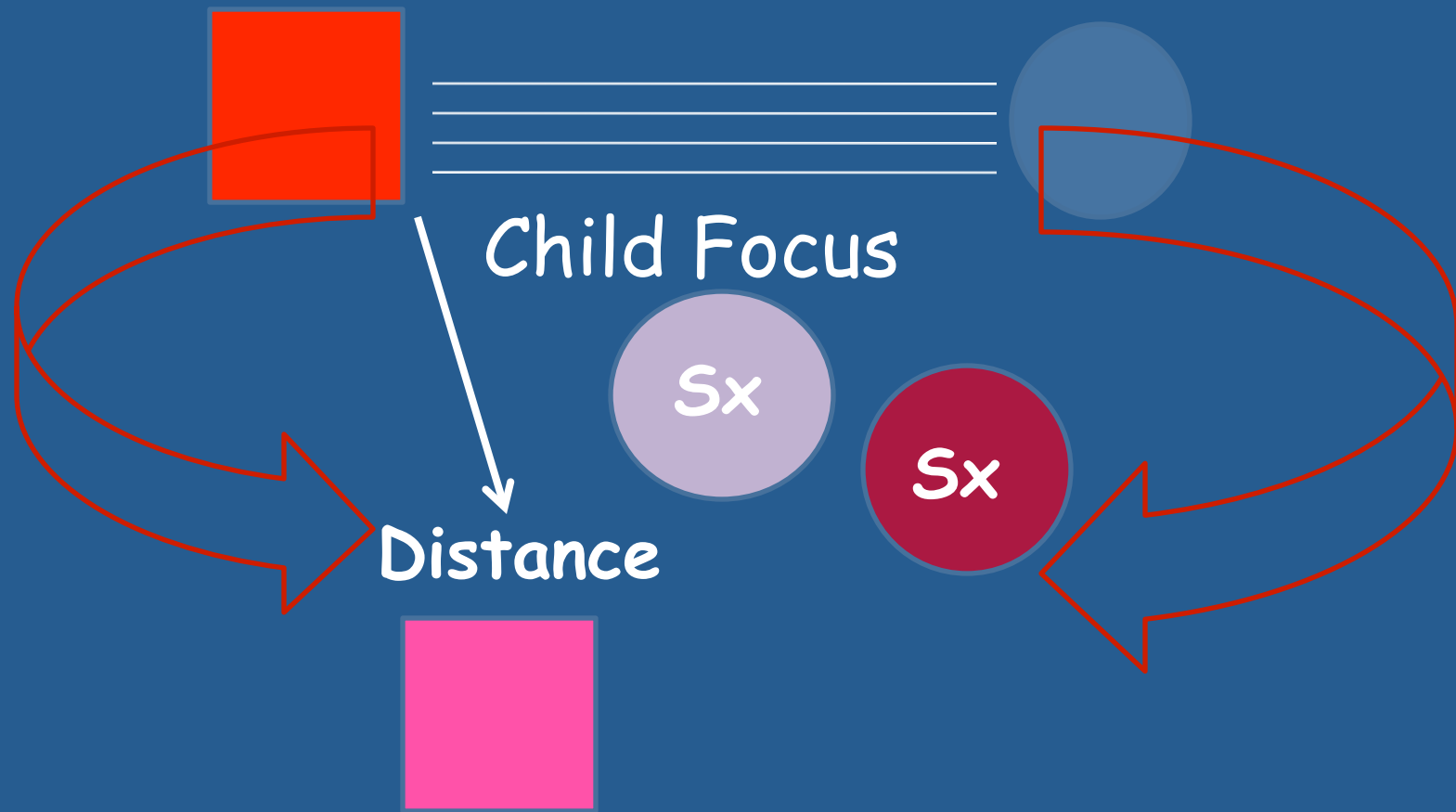
Hypothesis: At higher levels of DOS



- Greater separateness or independence is evident in physiological reactivity
- Less chronic & ever present anxiety reactions
- Individuals interrupt the transmission of anxiety in many ways.
- There is greater regulation of self.
- Fewer & less severe symptoms



Marital Distance





Research Protocol

Mother & Child Talk to Each Other about Self & the Other for 3 minutes

Pause for 1 minute

Father & Child Talk to Each Other about Self & the Other for 3 minutes

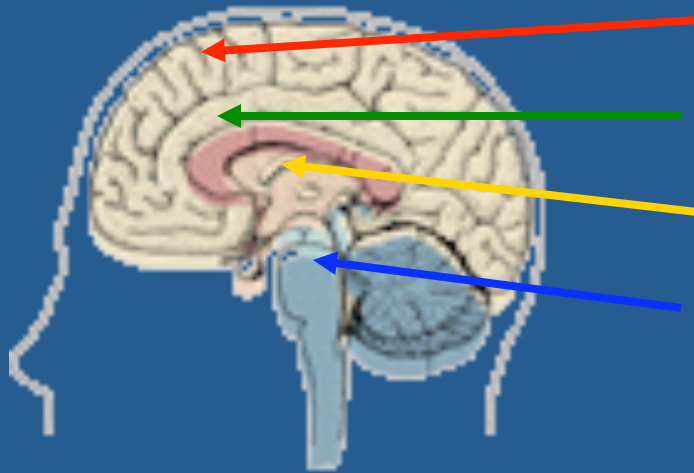
Pause for 1 minute

Mother & Father Talk to Each Other about Self & the Other for 3 minutes

Pause for 1 minute

During simultaneous measures of EMG, DST, EDR, and Brain Waves

Measures of Reactivity and Anxiety



EEG: Electrical Activity

Prefrontal Cortical Activity: 16 Hz +

Intellect/Emotion Connect: 14 Hz

Emotional Reactivity Limbic: 6 – 12 Hz

Emotional Reactivity Brain Stem: 2-6 Hz

Vagal Component of ANS

Biofeedback:

4-8 mV Active but At Ease
^8 mv Tense v2 mv Relaxed

93-95 degrees F Active but At Ease
v90 degrees SNS arousal
^95 degrees Inflammatory Process

2 – 4 mohs Active but At Ease
v2 mohs & flat Exhaustion
^4 mohs Tense

EMG: Skeletal Muscle Activity

DST: Vasoconstriction due to ^ SNS activity that
cools fingertip temperature to V 90 F
(^ catecholamine)

EDR: ^ skin sweat response measured in mohms of
electrical activity at palm
(adrenal activity)

Data Generated for Each Triangle

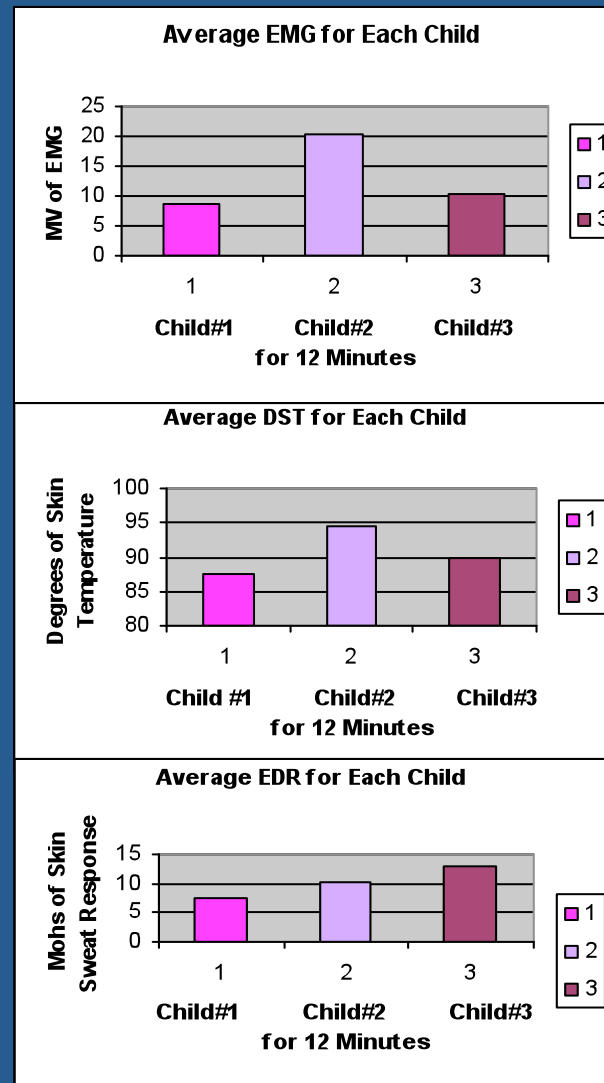
3 for each parent + 1 for each child = 9 sets of

- ✓ 12 Minutes of EEG from 2 Hz – 44Hz Spectrum display for each triangle
- ✓ 12 Minutes of 14 Hz EEG measured & stored in .002 increments of a minute = 542 measures/minute (graphed in a manual selection process)
- ✓ 12 minutes of EMG in mv measured & stored in .002 increments of a minute = 542 measures/minute (graphed in a manual selection process)
- ✓ 12 minutes of DST in degrees f in .002/minute increments = about 110 measures/minute
- ✓ 12 minutes of EDR in mohs in .002/minute increments = about 110 measures/minute
- ✓ Audiotape recording of 3 minute interaction segments

Organization of Data By Individual and By Triangle

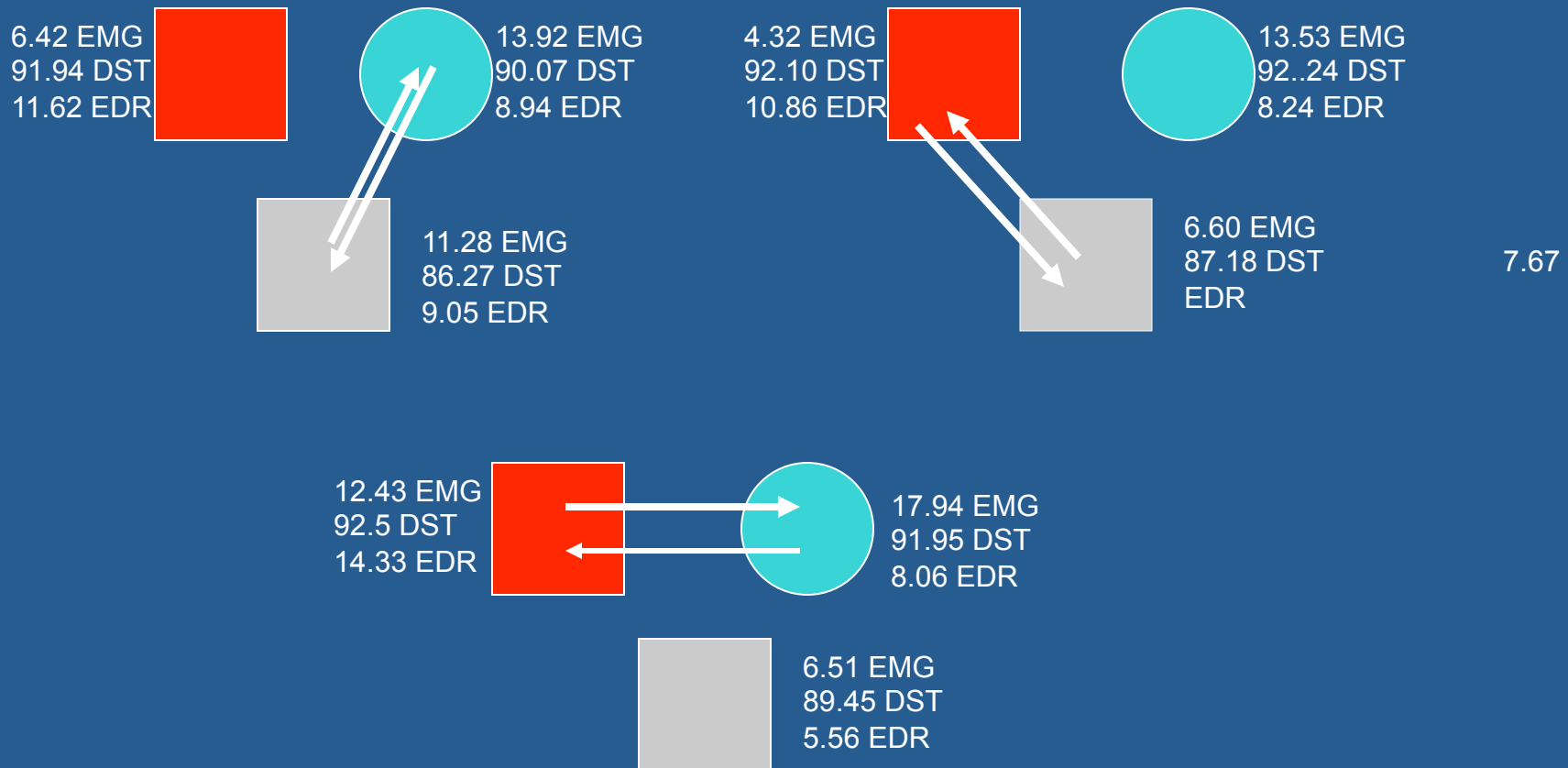
- Average of EMG, DST, EDR for each person over 12 minutes
- Average of EMG, DST, EDR for each person in 3 Minute Segments, according to M&C, F&C, M&F interacting
- Average of Total EMG, DST, EDR per triangle
- Comparison of Individuals (Mother to Father to Child and Child#1, Child#2 and Child#3 to each other)
- Line graph of simultaneous measures for each triangle with 3 Minutes of M&C, F&C, and M&F designated
- Videotape of accelerated EEG spectrum
- Audiotape recording of interaction segments

Sibling Physiology



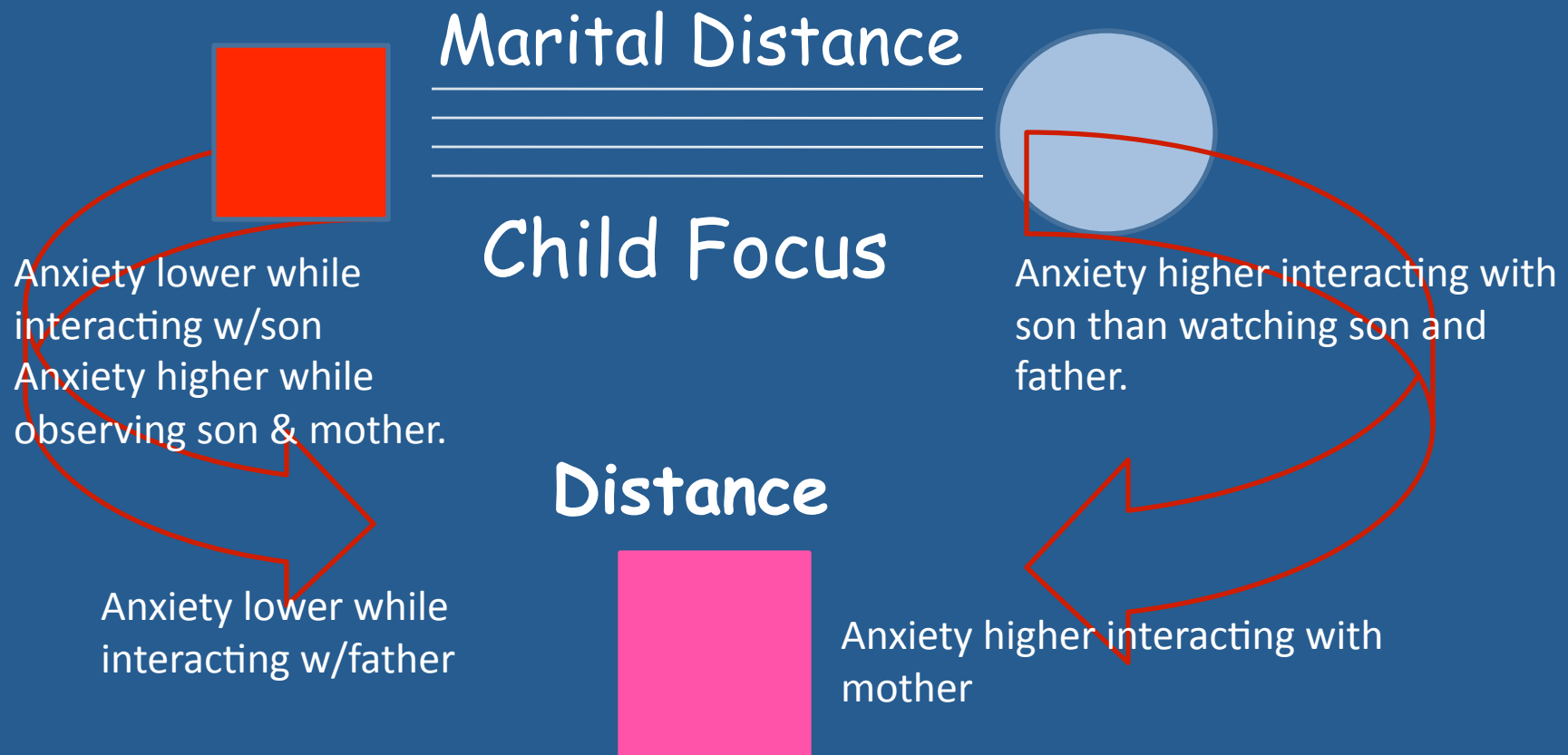
Triangle # 1

Mother and Father and Adult Child #1



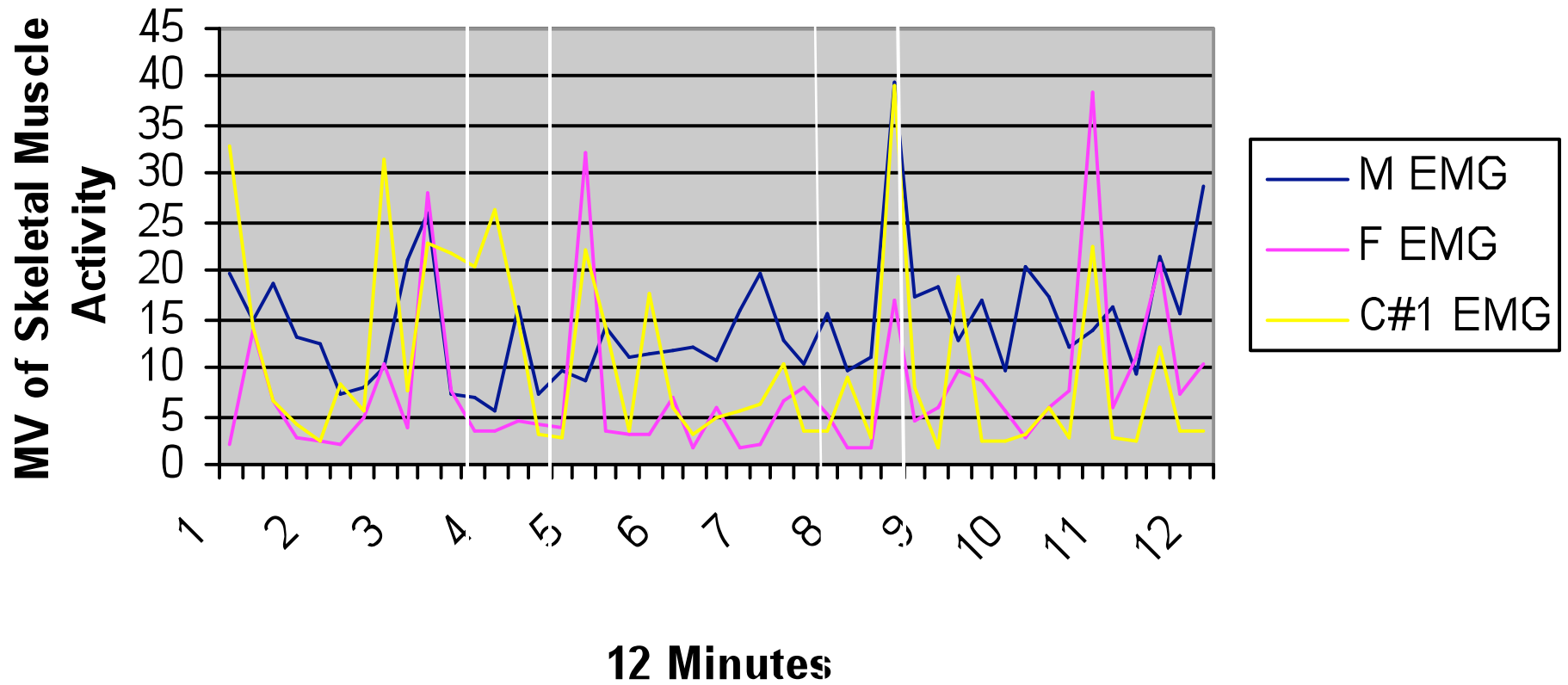
Physiological Reactivity & Anxiety in Triangle # 1: Mother-Father-Child #1

Anxious Physiology highest while interacting with each other



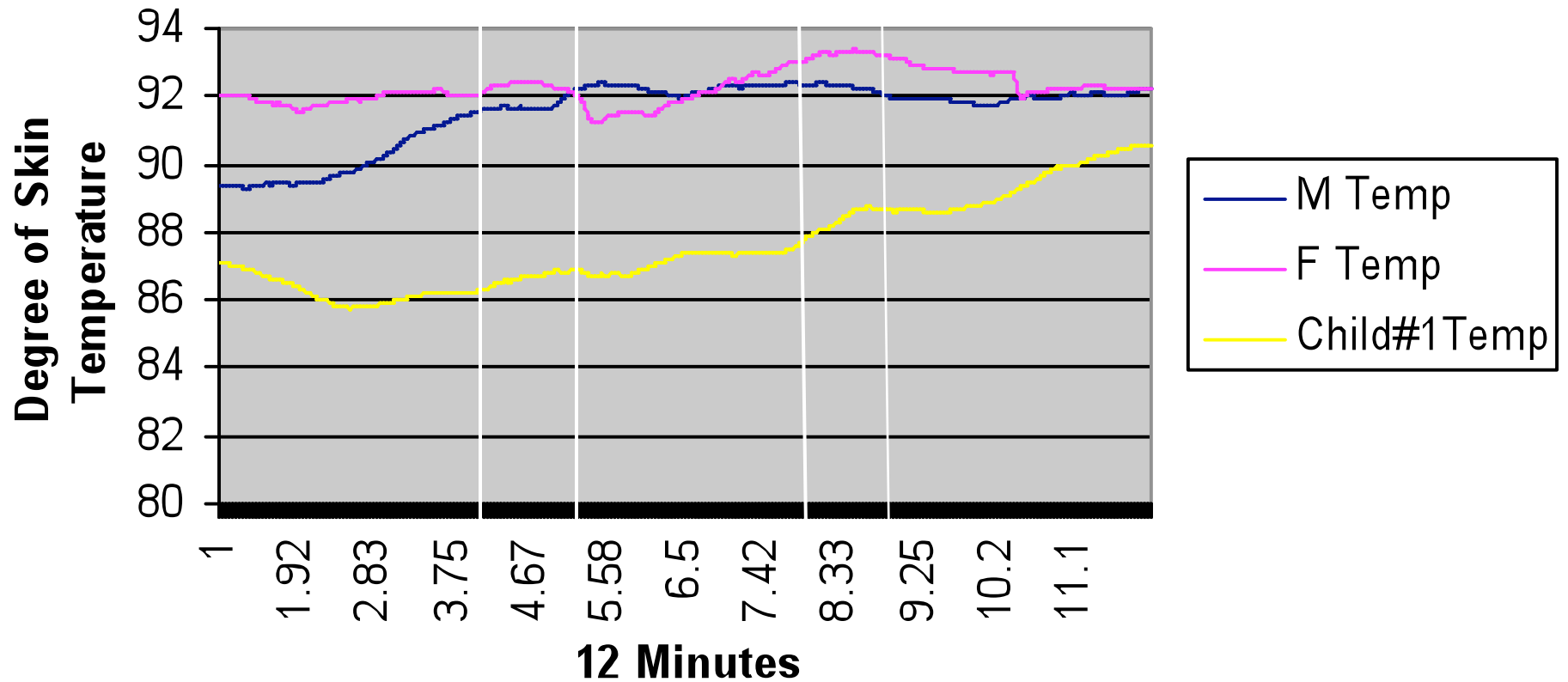
Anxious Physiology V/s while observing parents interacting

Triangle #1 EMG



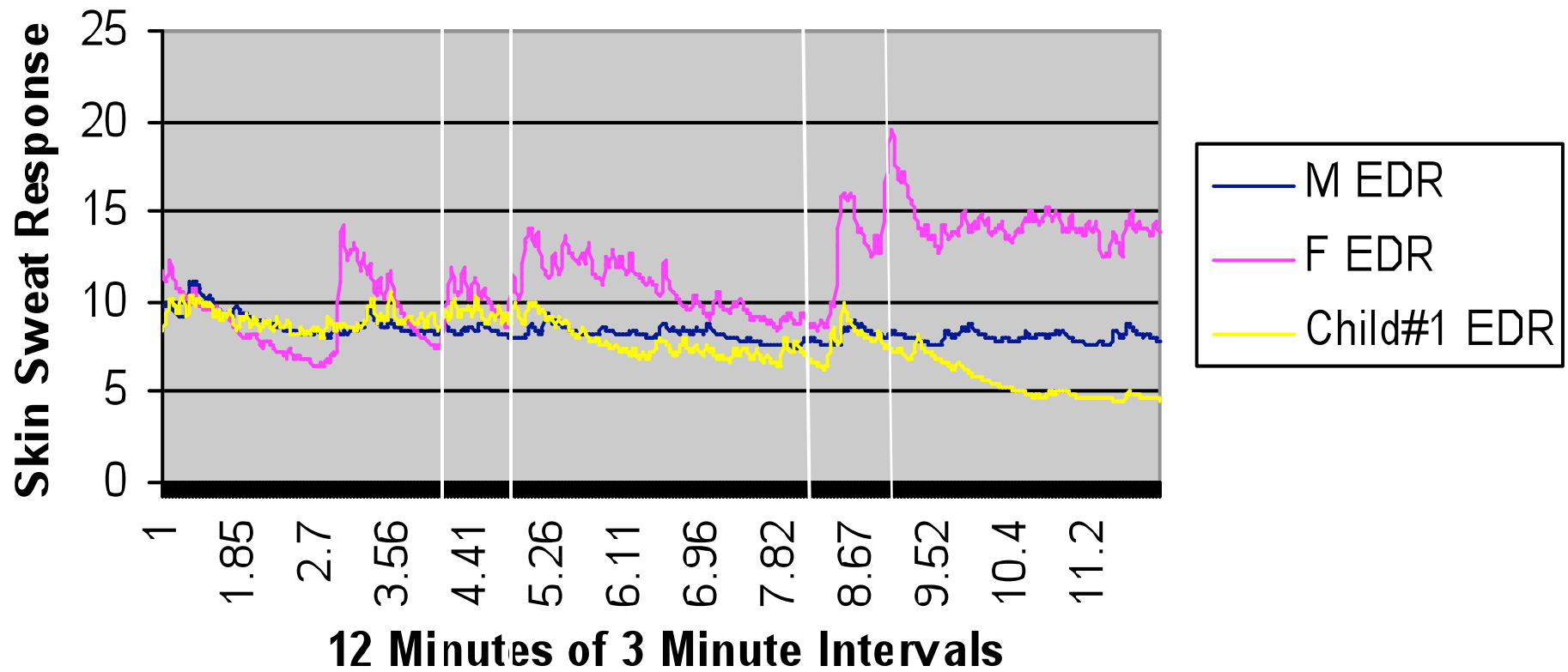
Family Physiology: Triangle 1

Triangle #1 DST



Family Physiology: Triangle 1

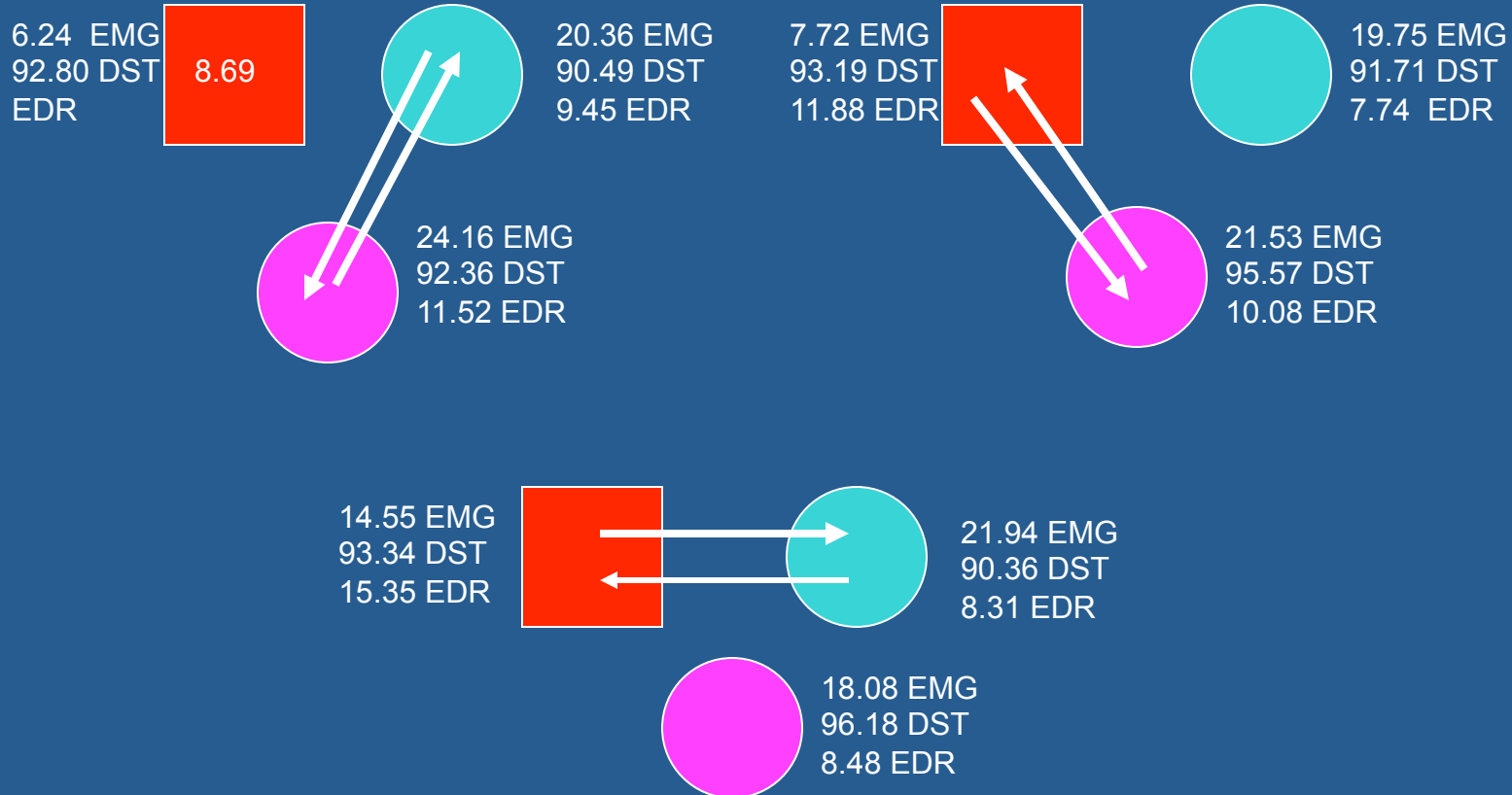
Triangle #1 EDR



Family Physiology: Triangle 1

Triangle # 2

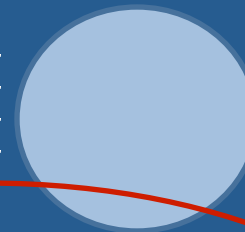
Mother and Father and Adult Child #2



Physiological Reactivity & Anxiety in Triangle # 2: Mother-Father-Child #2

Anxious Physiology highest while interacting with each other

Marital Distance



Child Focus

Anxiety ^ interacting with daughter & slightly lower observing mother & daughter

Slight V in anxiety watching Anxiety ^ interacting w/daughter

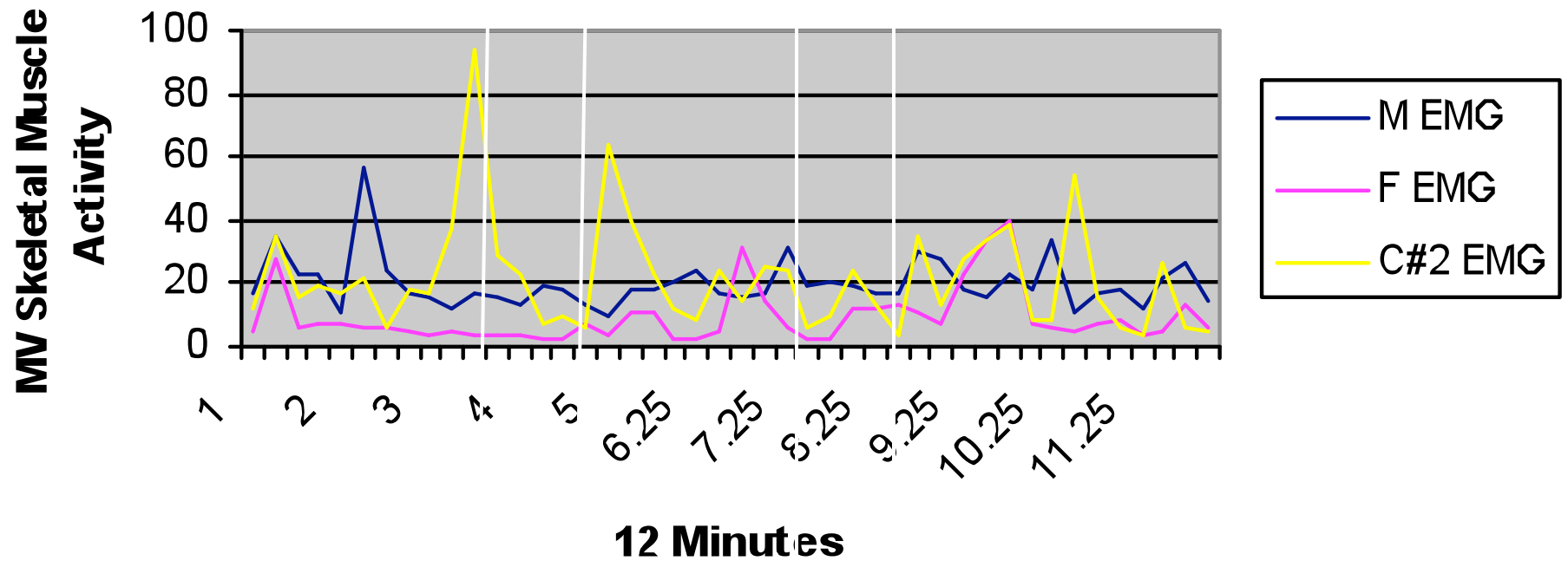
Anxiety ^ interacting w/father



Anxiety ^ interacting w/mother

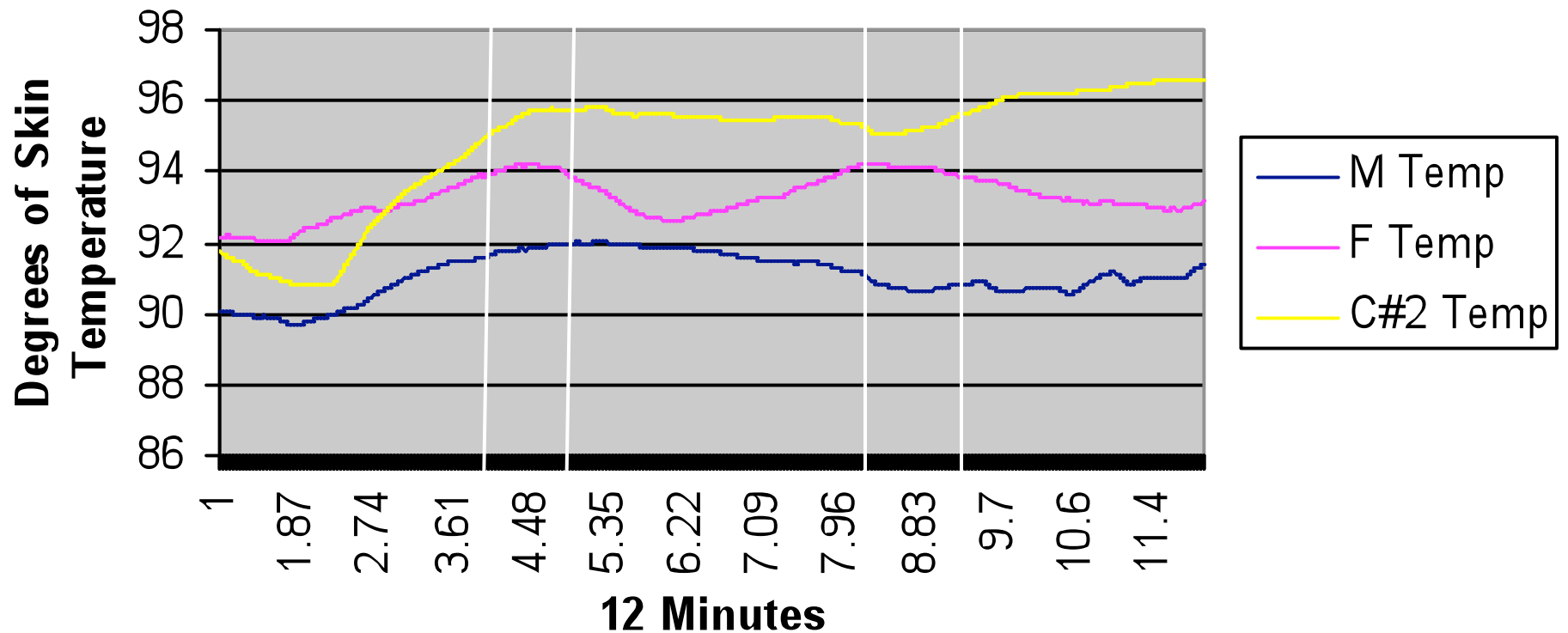
Only slight V in anxiety while observing interaction of parents

Triangle # 2 EMG



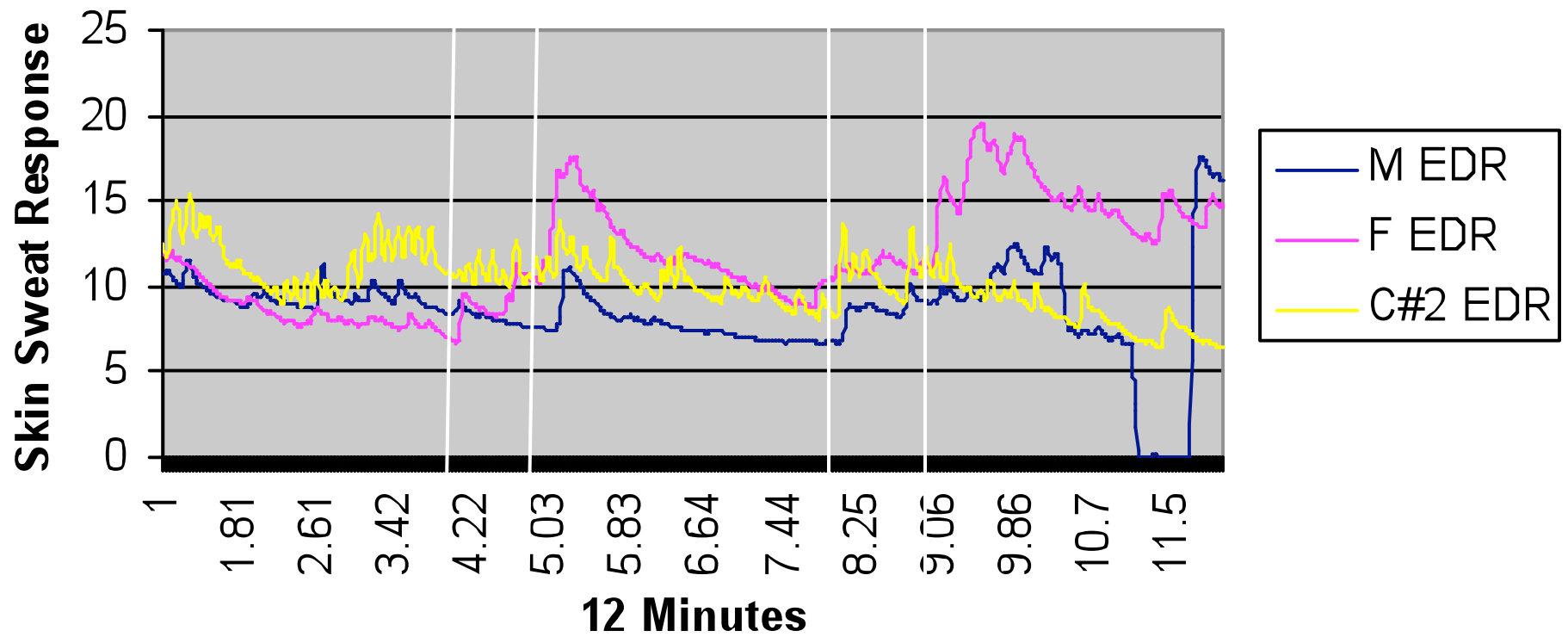
Family Physiology: Triangle 2

Triangle #2 Temperature



Family Physiology: Triangle 2

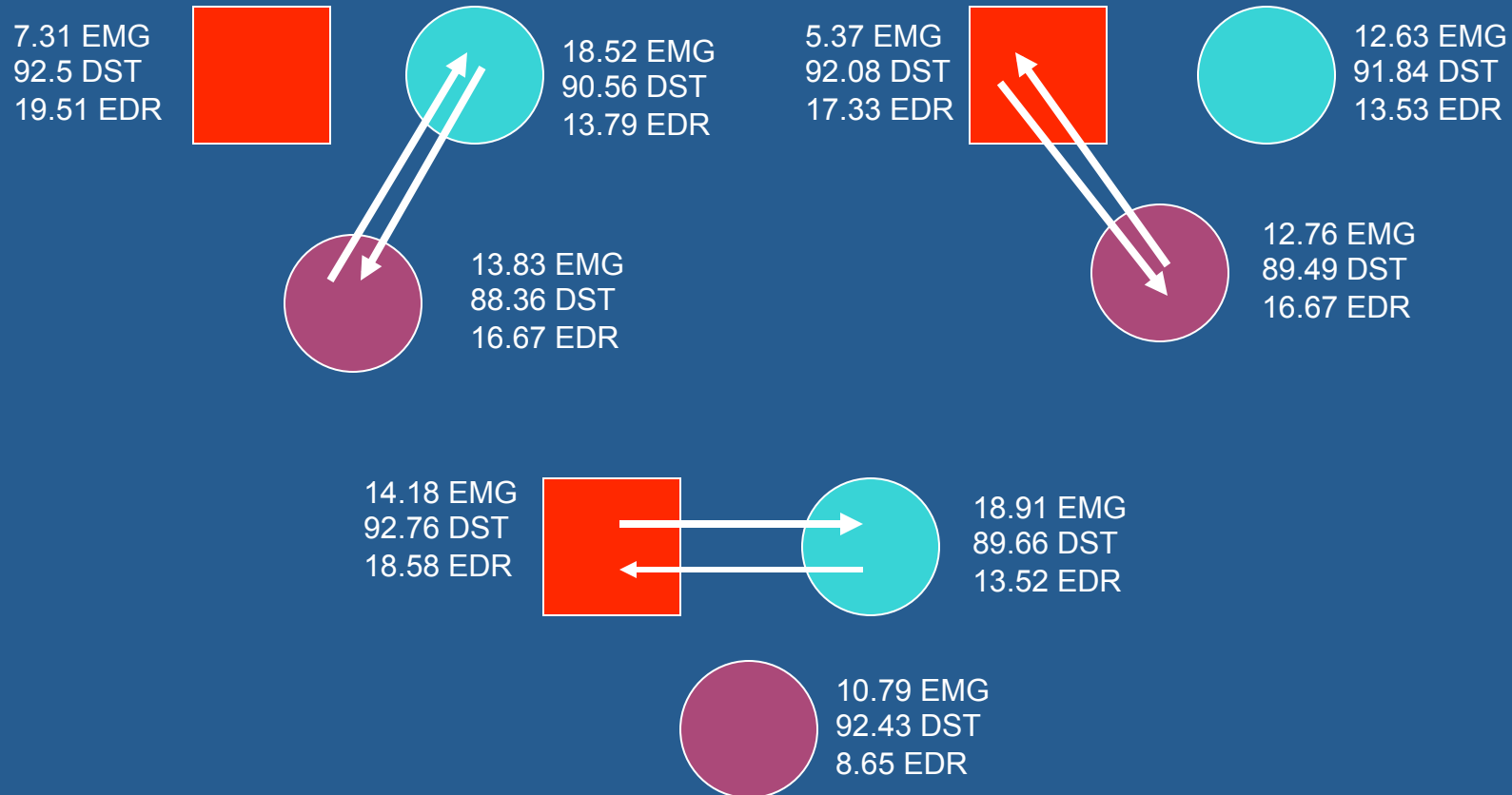
Triangle #2 EDR



Family Physiology: Triangle 2

Triangle # 3

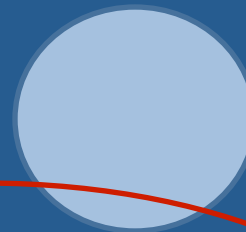
Mother and Father and Adult Child #3



Physiological Reactivity & Anxiety in Triangle # 3: Mother-Father-Child #3

Anxious Physiology highest while interacting with each other

Marital Distance



Child Focus

Anxiety ^ observing mother & daughter interacting
Anxiety V interacting w/dgt

Anxiety ^ interacting w/daughter
Very slight V in anxiety observing father & daughter

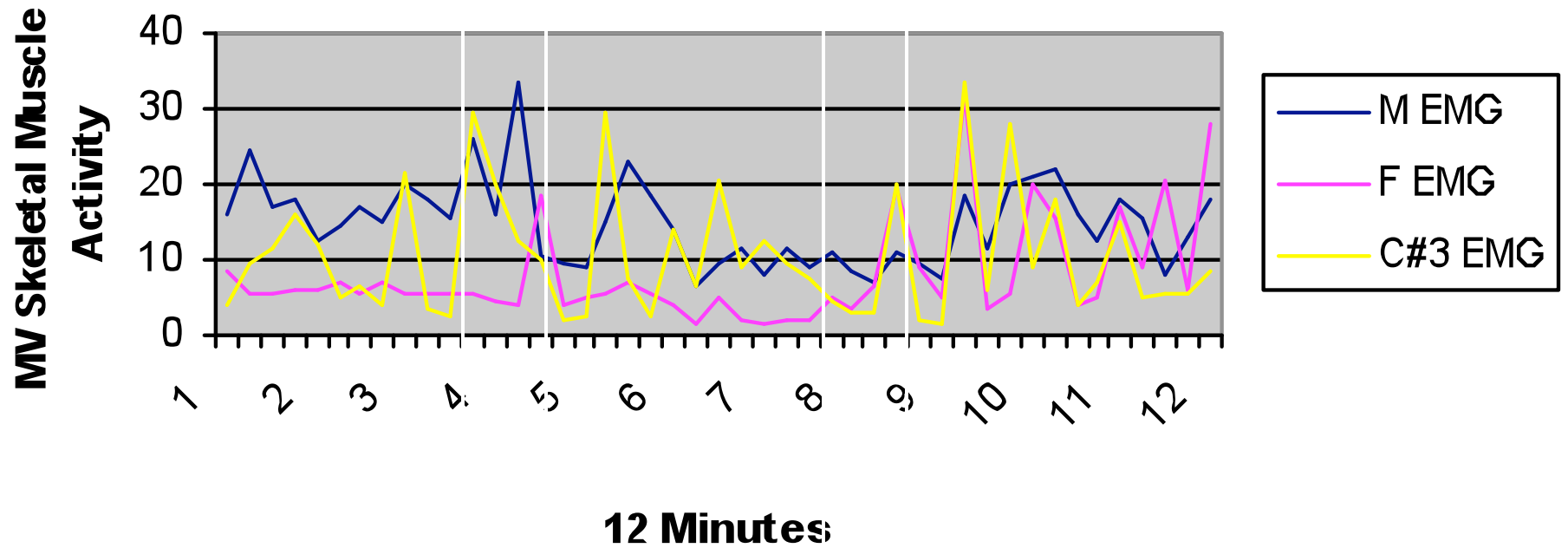
Very slight V in anxiety while interacting w/father



Anxiety ^ interacting w/mother

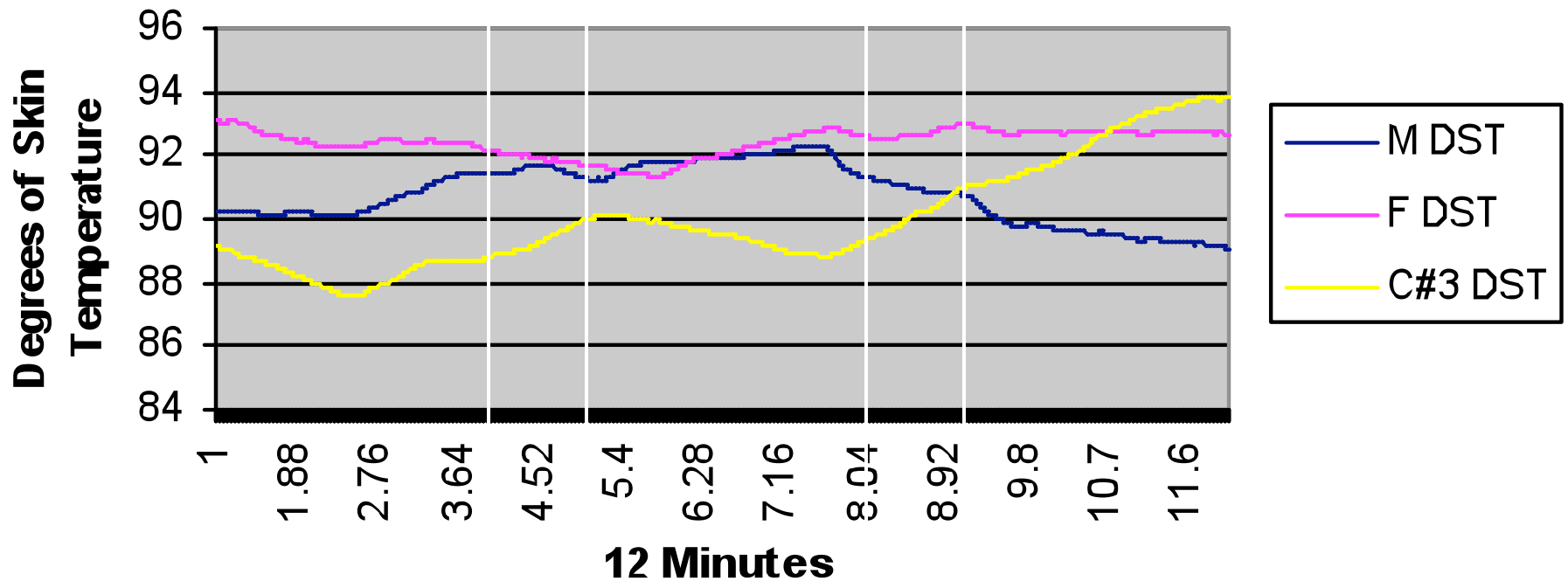
Anxious Physiology V/s while observing parents interacting

Triangle #3 EMG



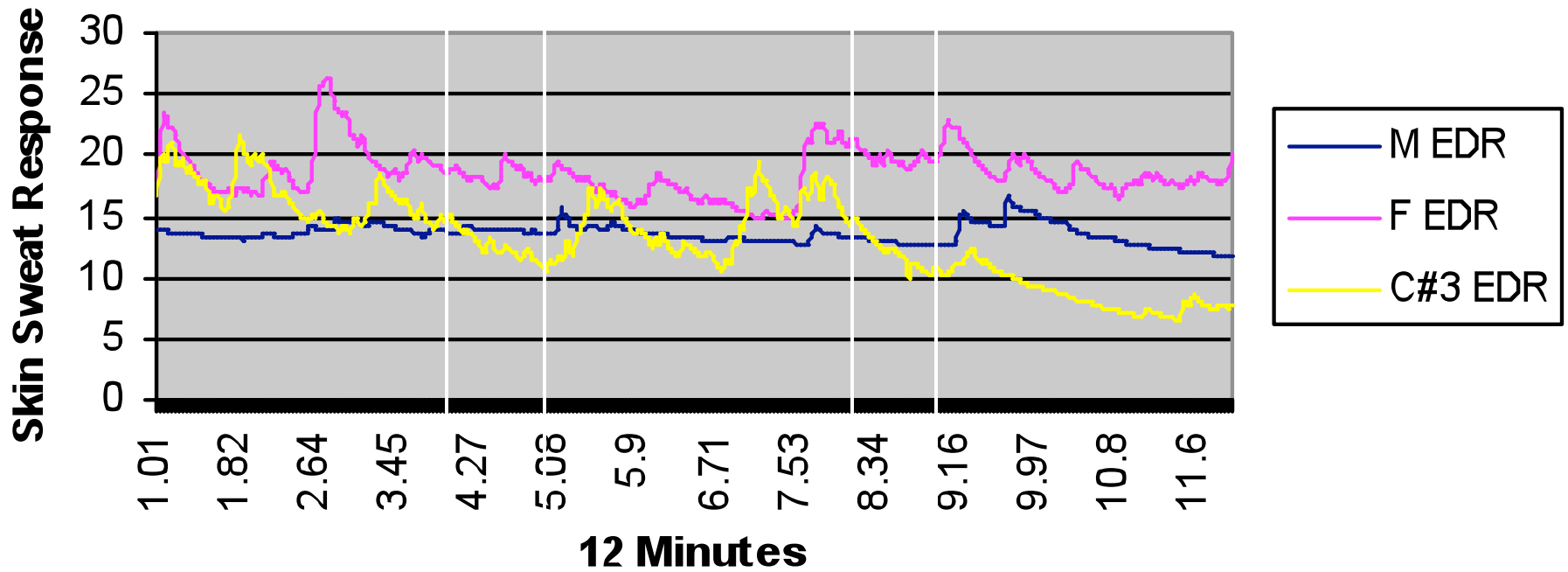
Family Physiology: Triangle 3

Triangle #3 DST

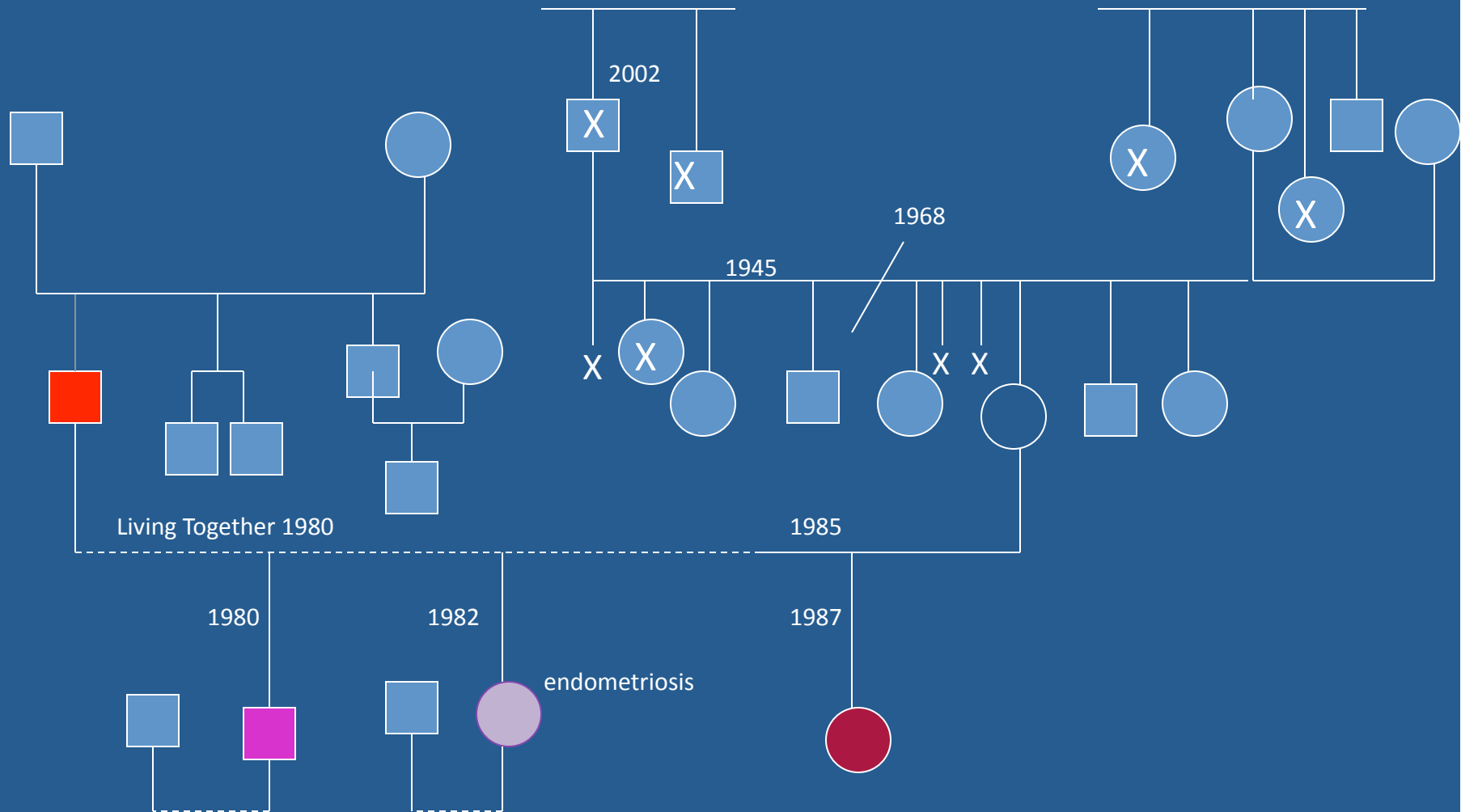


Family Physiology: Triangle 3

Triangle #3 EDR



Family Physiology: Triangle 3



No physical/psy Sx
 MA \$\$ self-sufficient
 Most distant from family
 "Loner" with older male lover
 Surrogate father of daughter
 By lesbian couple

Severe chronic GI Sx + Endo
 Depression Far more dep. On family
 BA in Education wants to teach
 Plans to marry man unemployed

Jr. in high school Drinking too much
 Poor grades No physical Sx
 Poor functioning boyfriends

Clinical Implications of Research:

More accurate understanding of symptom development & of changes that occur through work on
Differentiation of Self

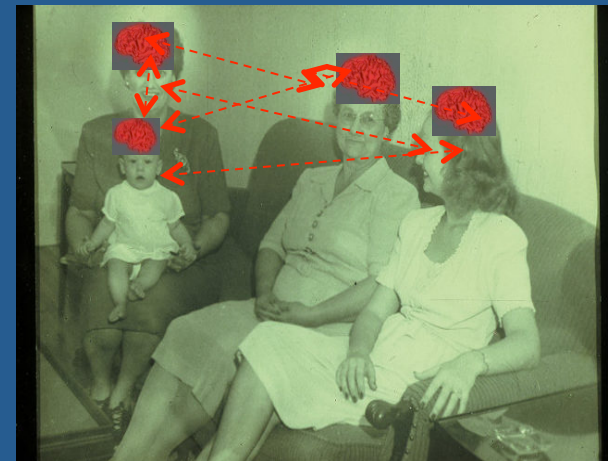
- Physiology in individual a product of reactivity in emotional triangles
- Increased regulation of anxiety within self by any one family member interrupts transmission of anxiety in many ways.
- Less chronic & ever present anxiety reactions for all
- Fewer & less severe symptoms
- Greater separateness or independence is evident

“There are varying degrees of fusion between emotional and intellectual systems in the human. The greater the fusion between emotion and intellect, the more the individual is fused into people around him. The greater the fusion, the more man is vulnerable to physical illness, emotional illness, and the less he is able to consciously control his own life.” Murray Bowen, FTCP, 305

“It is possible for man to discriminate between the emotions and the intellect and to slowly gain more conscious control of emotional functioning.” Murray Bowen, page 105

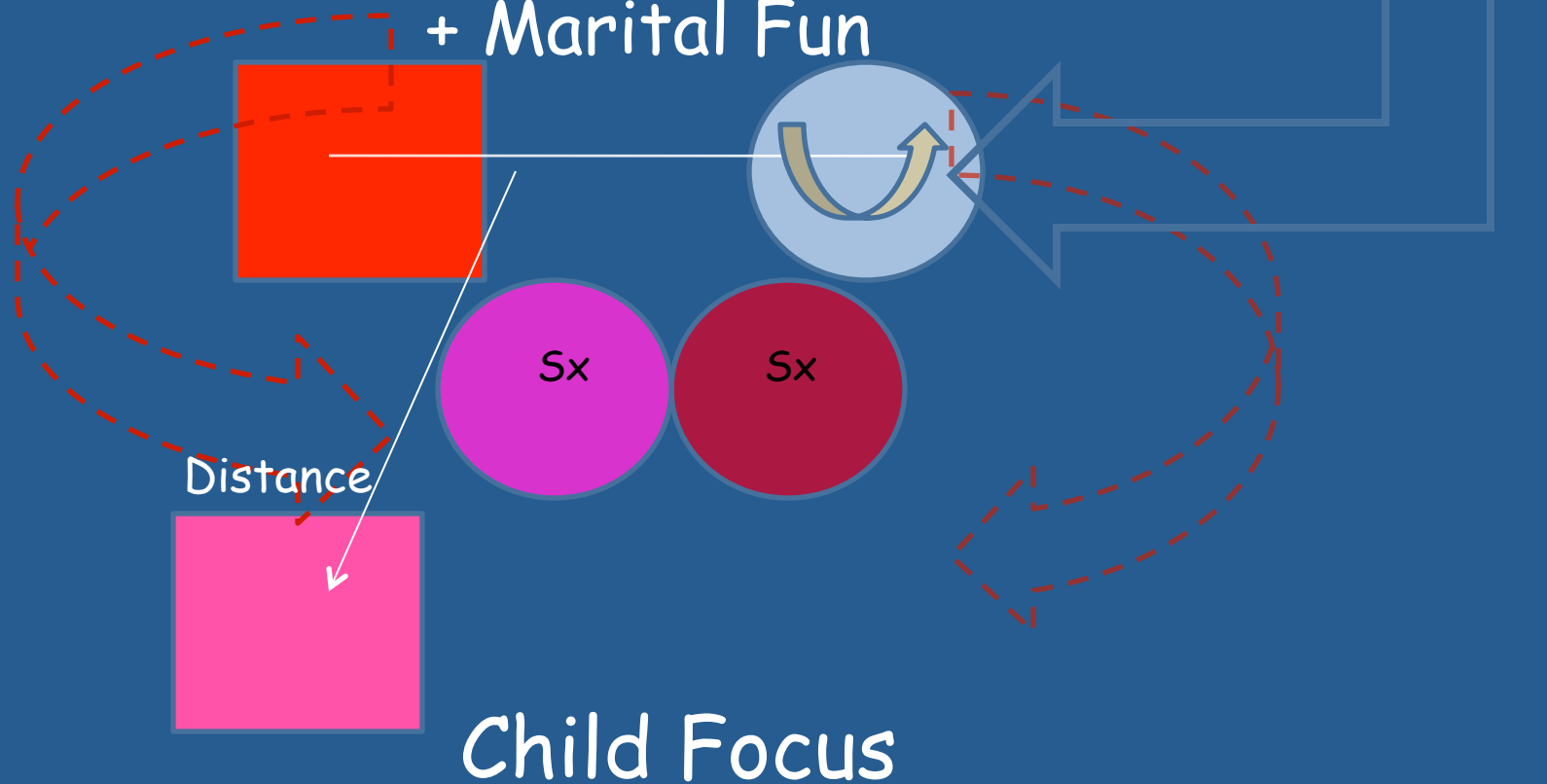
“Any effort toward assuming responsibility for one’s own distress, toward containing one’s own needs a little better, toward blaming the other less, or toward controlling one’s emotional responsiveness to the other is a step toward (differentiation of self).”

Murray Bowen, 234



Marital Distance
+ Marital Conflict
+ Marital Fun

Work on Self in
Family of Origin



Clinical Implications of Research:
Work on Differentiation of Self

“There is some evidence that the human can actually determine the function of his own emotional system through the control of his own emotionality. ... It leads me to believe human behavior will become a science by the middle of the next century. The human will be richer if the favorable trend continues.”

From “The Odyssey Toward Science” the Epilogue by Murray Bowen in *Family Evaluation* by Michael Kerr.

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