What is a paradigm?

paradigm 3. A set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them, especially in an intellectual discipline.

Kuhn defines a paradigm as: “an entire constellation of beliefs, values and techniques, and so on, shared by the members of a given community”

Kangaroo Mother Care:
Restoring the Original Paradigm for Infant Care

Old Paradigm

child helpless

mother clueless

father useless

What is the current paradigm for infant care?
“Mothers’ arms – the past and future locus of neonatal care?”

“Our care) still views the infant as a solitary individual who sleeps most of the time in a bed.”

PARADIGM CONSTRUCT

Paradigm has internal
Intelligence
Honesty
Integrity
Consistency

BASIC ASSUMPTION:
= INFANT SLEEPS ALONE
FOUNATION / PLATFORM / BASE

Culture Producing Science Producing Culture:
How A Folk Myth Achieved Scientific Validation

#1: Initial test condition
infant sleeps alone, is bottle fed, and has little to no parental contact

#2: Derive measurements of infant sleep under these conditions

From James McKenna, Notre Dame Sleep Laboratory

Why babies should never sleep alone: A review of the co-sleeping controversy in relation to SIDS, bedsharing and breast feeding

James J. McKenna” and Thomas McDade

• CIRCULAR SCIENCE - A SELF-FULFILLING PROPHECY

Culture Producing Science Producing Culture:
How A Folk Myth Achieved Scientific Validation

#1: Initial test condition
infant sleeps in INCUBATOR, is FORMULA fed, SEPARATED

#2: Derive measurements of infant sleep under these conditions

#3: Repeat measurements across ages, defining “NEONATAL PHYSIOLOGY”

From James McKenna
**Paradigm Construct**

Paradigm: “in the philosophy of science, a generally accepted model of how ideas relate to one another, forming a conceptual framework within which scientific research is carried out.”

*MSN Encarta*

**Basic Assumption:**

- Incubators stabilize

**Foundation / Platform / Base**

---

**Genetics vs. Epigenetics**

Many new insights into mental illness have come from studying epigenetic modifications of genes, which differ from genetic mutations (loci). Both kinds of alterations can disturb the functioning of the brain and other tissues.

---

**The Neuroscience of Birth & Breastfeeding**

- **The DNA**
  - Epigenetics
- **The Brain**
  - Neurodevelopment
- **Behaviour**
  - Evolutionary Biology

**Environment**

- Adaptation
- Experience
- Reproductive Fitness

---

**Ink**

Scientific American, December 2011

---

**Cortisol**

**Histone Modification**

**DNA Methylation**

**MicroRNA**

**EpiGenes ...**

... controls on the DNA/gene "switches in the mind"

**Pencil**

"Phenotype" - specimen resulting from gene - environment interaction
“Phenotype” – specimen resulting from gene – environment interaction

200000 new nerve cells/min
Hammarberg 1896  Caviness 2008

The brain is not a computer, it is a jungle
G Edelman

Neuronal migration

JEFF LICHTMAN, a neuroscientist, is the current Ramón y Cajal Professor of Arts and Sciences at Harvard, carrying Cajal’s project into the 21st century.

From National Geographic Magazine April 2014

Each neuron has on average 10 000 synapses.
Convolutions of the cortex


11 weeks 15 weeks 20 weeks 24 weeks

20 weeks 23 weeks 28 weeks

Impulse

Presynaptic neuron

Vesicle

Transmitters

Synaptic cleft

Receptors

Postsynaptic neuron

Postsynaptic activity

fetal REM sleep

(or active sleep) seems to be particularly important to the developing organism...

... spontaneous synchronous firing

Marks et al 1995

“Neurons that fire together wire together while those which don’t, won’t”

Hebb/Carla Shatz

Panksepp 1998

Siegel 2005
**REM, NR1, NR2, NR3, NR4**

**ACQUISITION**
Poly-sensory input
Short-term memory
Stored cortex

**CONsolidation**
Transfer information
"SNR" strong signals
Amygdala / Hippocampus

**MEMORY FORMATION**
Processes assigned to neocortex
Organized REM

**AWAKE and REM**
Stanley Graven 2006
Brain Architecture and Skills are Built in a Hierarchical “Bottom-Up” Sequence

- Neural circuits that process basic information are wired earlier than those that process more complex information.
- Higher circuits build on lower circuits, and skill development at higher levels is more difficult if lower level circuits are not wired properly.

Table 1: Definition of phases-behaviours identified

<table>
<thead>
<tr>
<th>Phases</th>
<th>Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth cry</td>
<td>Intense crying just after birth</td>
</tr>
<tr>
<td>Relaxation phase</td>
<td>Infant rooting, recovering, no activity of mouth, head, arms, legs or body</td>
</tr>
<tr>
<td>Awakening phase</td>
<td>Infant begins to show signs of activity, small thrusts of head up, down, from side to side, small movements of limbs and shoulders</td>
</tr>
<tr>
<td>Active phase</td>
<td>Infant moves limbs and head, is more determined in movements, rooting activity, ‘pushing’ with limbs without shifting body</td>
</tr>
<tr>
<td>Crawling phase</td>
<td>‘Pushing’ which results in shifting body</td>
</tr>
<tr>
<td>Reclining phase</td>
<td>Infant rests, with some activity, such as mouth activity, sucks on hand</td>
</tr>
<tr>
<td>Familiarization</td>
<td>Infant has reached areola/ nipple with mouth positioned to brush and lick areola/nipple</td>
</tr>
<tr>
<td>Suckling phase</td>
<td>Infant has taken nipple in mouth and commences sucking</td>
</tr>
<tr>
<td>Sleeping phase</td>
<td>The baby has closed its eyes</td>
</tr>
</tbody>
</table>

Slide by: Jack P. Shonkoff, M.D.

AT BIRTH, the brain has TWO CRITICAL SENSORY NEEDS:

- SMELL & CONTACT

...as a strategy of neuroprotection. SSC appears to accelerate EEG-sleep state organization and maturation as a non-pharmacologic neuroprotective intervention when compared with two non-SSC cohorts. The prolonged benefits of these non-pharmacologic interventions are yet to be determined.

DEFENCE | NUTRITION | REPRODUCTION

HORMONES | NERVES | MUSCLES

eンドリンス | 自容NS | 柔免

HIGHLY CONSERVED NEURO-ENDOCRINE BEHAVIOR

endocrine | autonomic NS | somatic

AT BIRTH, the brain has TWO CRITICAL SENSORY NEEDS:

- SMELL & CONTACT

...as a strategy of neuroprotection. SSC appears to accelerate EEG-sleep state organization and maturation as a non-pharmacologic neuroprotective intervention when compared with two non-SSC cohorts. The prolonged benefits of these non-pharmacologic interventions are yet to be determined.
These data indicate that pups have a unique learning circuit relying on the olfactory bulb for neural plasticity and on the hyperfunctioning noradrenergic locus coeruleus flooding the olfactory bulb with norepinephrine to support the neural changes.

APPROACH RESPONSE

... learned prenatally, reinforced both during the birth process and repeatedly throughout the postnatal period, supported by a unique neural framework ... a system that ensures rapid and robust maternal odor learning.

SMELL: vanilla / colostrum / water (control)

read NIRS activity: FRONTAL LOBE

• This was confirmed by demonstration of a statistically significant negative correlation between changes in [Hb O2] and postnatal age (r = 0.64, p < 0.001) with 95% confidence interval) (Fig. 4). Those babies showing the greatest increase in [Hb O2] were between 6 and 24 h old at testing.

• In the 14 babies older than 24 h there was no significant difference between the changes in [Hb O2] during control and colostrum exposure.

The first hours after birth are a CRITICAL PERIOD

Those babies showing the greatest increase in [Hb O2] were between 6 and 24 h old at testing.

In the 14 babies older than 24 h there was no significant difference between the changes in [Hb O2] during control and colostrum exposure.

9 steps “Skin-to-skin contact” is the salient stimulus for infant-parent behavior.
The newborn may appear helpless, but raises its own temperature, has a higher blood glucose, metabolic adaptation faster.

(Widstrom 1987)

METABOLIC ADAPTATION

SSC started in the first 20 minutes after birth

<table>
<thead>
<tr>
<th></th>
<th>SSC</th>
<th>Cot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose (1 hr)</td>
<td>3.17</td>
<td>2.56</td>
</tr>
<tr>
<td>Base excess drop</td>
<td>3.4</td>
<td>1.8</td>
</tr>
</tbody>
</table>

(Christenson 1992)

Warming, feeding and protection behaviours are intricately, inseparably linked to the right place.

(Alberts 1994)

Through “hidden maternal regulators”...

We concluded from these surprising results that warmth provided by the mother normally maintained the pup’s activity level and that her milk maintained her pup’s heart rate. Maternal warmth → activity level

milk → heart rate

“physiological set points”

internal working models

scripts - templates
Through “hidden maternal regulators”...

A mother precisely controls every element of her infant’s physiology, from its heart rate to its release of hormones, from its appetite to the intensity of its activity (Gallagher 1992).

Through “hidden maternal regulators”...

“physiological set points”

“internal working models’ scripts - templates”

The Neuroscience of Birth & Breastfeeding

The DNA
EPIDEMIOLOGY
The Brain
NEURODEVELOPMENT
Behaviour
EVOLUTIONARY BIOLOGY
ENVIRONMENT
ADAPTATION
EXPERIENCE
REPRODUCTIVE FITNESS
BIRTH
BABY
BONDING

When does the infant become conscious?

The "Stress" of Being Born

The stress of transitioning through the birth canal is an important neurological force that shapes the infant’s behaviour and can be influential in the infant’s survival (Gallagher, 1992).

Scientific American 1986
Scientific American Mind 2009

Awake at birth

Noradrenergic neurons from LOCUS COERULEUS may activate the whole brain during wakefulness.

You can never reach the same high levels of catecholamine levels during your whole life as at birth.

Noradrenergic neurons from LOCUS COERULEUS may activate the whole brain during wakefulness.

You can never reach the same high levels of catecholamine levels during your whole life as at birth.
Reduced catecholamine surge after C-section

---

**Why?**

Vaginal delivery  Elective C-section

**AT BIRTH,**

the brain has **TWO CRITICAL SENSORY NEEDS:**

**SMELL & CONTACT**

connect direct to the amygdala

---

**THE NEWBORN BRAIN**

**SKIN-TO-SKIN CONTACT**

fires and wires

the amygdala-prefronto-orbital cortical pathway (PFOC)

**Amygdala:** Emotional Processing Unit

**Prefrontal cortex**

Executive function

**AMYGDALA:** Emotional Processing Unit (CPU)

**SOCIAL and EMOTIONAL INTELLIGENCE**

---

**Social Intelligence**

**Emotional Intelligence**

Behavioural activation system

reward-based (dopamine)
In humans, oxytocin increases gaze to the eye region of human faces and enhances interpersonal trust and the ability to infer the emotions of others from facial cues. 

Interpersonal awareness
Emotions

Kerstin Uvnas-Moberg
Ross 2009

The newborn can imitate - Mirror neurons

Courtesy from Andrew Meltzoff’s experiments on Neonates’ imitation

As predicted, imitation and observation of facial expressions elicited activation of fronto-parietal mirror areas (vPMC, IPC, pars opercularis and IPL), STS, anterior insula, and amygdala.

Simulation theory:
EMPATHY is generated by inner imitation of actions of others

Learning affective values for faces is expressed in amygdala and fusiform gyrus

CSdg⁻
CSdg⁺
CSag⁻
CSag⁺
Learning affective values for faces is expressed in amygdala and fusiform gyrus

Morphing emotion AMYGDALA ←→ FUSIFORM GYRUS

Fransson 2007

A primary visual areas,
B somatosensory motor cortex
C primary auditory cortex
D parietal cortex & cerebellum
E frontal anterior prefrontal cortex

key biological systems that contribute to maternal caregiving behaviour... the oxytocinergic and dopaminergic systems.

infant cues - suckling, vocalisation and tactile stimulation stimulate OXYTOCIN release in the hypothalamus, which may result in the activation of the dopaminergic reward pathway leading to behavioural reinforcement.
3-day separation:
induces physiological changes (immune system, heart rate, sleep, cortisol, loss of body temperature).

anaclitic depression:
• hyperactivity
• conservation-withdrawal
• death or recovery

Slide & photo from James McKenna

Artificial Weaning of Old World Monkeys: Benefits and Costs

CONCLUSIONS
Scientific findings do not support the perceived benefits of permanent, preweaning mother–infant separation.

Plasma CORTISOL response to STRESS (2y)

Maternal separation produces lasting changes in cortisol and behavior in rhesus monkeys

RESILIENCE: "capacity to maintain healthy emotional functioning in the aftermath of stressful experiences"
**Resilience**

(= Stress Resistance)

“Capacity to maintain healthy emotional functioning in the aftermath of stressful experiences”

---

**Emotion Control Centre**

---

**Positive Stress**

- Moderate, short-lived stress responses, such as brief increases in heart rate or mild changes in stress hormone levels.

---

**Tolerable Stress**

- Stress responses that could disrupt brain architecture, but are buffered by supportive relationships that facilitate adaptive coping.

- Generally occurs within a time-limited period, which gives the brain an opportunity to recover from potentially damaging effects.

---

**Toxic Stress**

- Strong and prolonged activation of the body’s stress management systems in the absence of the buffering protection of adult support.

Disrupts brain architecture and leads to stress management systems that respond at relatively lower thresholds, thereby increasing the risk of stress-related physical and mental illness.

---

**Cortisol**
Disrupts brain architecture and leads to stress management systems that respond at relatively lower thresholds, thereby increasing the risk of stress-related physical and mental illness.

Components (e.g., nutrient, thermal/metabolic, or sensorimotor) of the infant’s previous interaction with its mother and that the complex response to separation was due to the withdrawal of all these components at once.

Unsafe environment activates HPA axis (autonomic nervous system, ANS).
The Neuroscience of Birth & Breastfeeding

The DNA
The Brain
EPIGENETICS
NEURODEVELOPMENT
BEHAVIOUR
ADAPTATION
EXPERIENCE
EPIGENETIC
ENVIRONMENT
REPRODUCTIVE
FITNESS
SEPARATION
EARLY DEPRIVATION
PRIMATE SEPARATION
STRESS
OXOTOCIN
CORTISOL

Primate separation studies

Primate Early Life Stress Leads to Long-Term Mild Hippocampal Decreases in Corticosteroid Receptor Expression


Maternal separation paradigm

Early Deprivation (ED) vs Control (CON)

ED n 11
Mat 0d → 2d → 28d → 48w

CON n 4
Mat → → → → 48w

Repeated short separations:
LOW gene expression
Correlate to human adult depression

Maternal support in early childhood predicts larger hippocampal volumes at school age

Fig. 2. Hippocampus volume by preschool depression severity and maternal support.
Adults with depression, suicides:
LOW gene expression
smaller hippocampal volume
reduced expression frontal lobe

These findings translate previous results from rats / monkeys to humans

Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse

Adults with depression, suicides:
LOW gene expression
smaller hippocampal volume
reduced expression frontal lobe

These findings translate previous results from rats / monkeys to humans

ALLOSTASIS

SAFE UNSAFE

STRESS RESPONSE

EMOTION CONTROL CENTRE
ALLOSTASIS

ANY STRESS:
Psychological
Neurological
Endocrine
Immune

STRESS → RESPONSE
ALLOSTATIC STATE

HEALTH

ALLOSTASIS

ANY STRESS:
Psychological
Neurological
Endocrine
Immune

STRESS → RESPONSE
ALLOSTATIC STATE
ALLOSTATIC LOAD

HEALTH

ALLOSTASIS

ANY STRESS:
Psychological
Neurological
Endocrine
Immune

STRESS → RESPONSE
ALLOSTATIC STATE
ALLOSTATIC LOAD
ALLOSTATIC OVERLOAD

HEALTH

ALLOSTASIS

ANY STRESS:
Psychological
Neurological
Endocrine
Immune

STRESS → RESPONSE
ALLOSTATIC STATE
ALLOSTATIC LOAD
ALLOSTATIC OVERLOAD

DISEASE

RESILIENCE

VULNERABILITY

WELL-BEING ➔ SUSCEPTIBILITY ➔ MORBIDITY ➔ MORTALITY

Elevated activity of mediators, with return to baseline and no impact on health.

Elevated activity - sustained over time, or severe...

Changes the "set points" for homeostasis (e.g. increasing blood pressure, change in cholesterol level)

http://www.imr.no/copewell/work_packages/wp3/en

RESILIENCE
(= STRESS RESISTANCE)

“capacity to maintain healthy emotional functioning in the aftermath of stressful experiences”

key biological systems that contribute to maternal caregiving behaviour: the oxytocinergic and dopaminergic systems.
... there is considerable overlap in the brain structures associated with these neural mechanisms... functional interactions among the circuits.

An overly responsive fear circuit... may negatively influence functioning of the reward system.

... a properly functioning reward circuit may be necessary for... positive social behaviors.

**RESILIENCE**

(= STRESS RESISTANCE)

"capacity to maintain healthy emotional functioning in the aftermath of stressful experiences"

**PARADIGM CONSTRUCT**

Paradigm has internal Intelligence
Honesty
Integrity
Consistency

**Basic Assumption:**

= INFANT SLEEPS ALONE

**Foundation / Platform / Base**

**MATERNAL-INFANT SEPARATION**

HAS NO SCIENTIFIC FOUNDATION.
WHAT IS KMC??

Kangaroo Mother Care: Restoring the Original Paradigm for Infant Care

Toxic Stress

- Strong and prolonged activation of the body’s stress management systems in the absence of the buffering protection of adult support.
- Disrupts brain architecture and leads to stress management systems that respond at relatively lower thresholds, thereby increasing the risk of stress-related physical and mental illness.

Slide by: Jack P. Shonkoff, M.D.

CORTISOL

MATERNAL DEPENDENCE

“buffering protection of adult support”

MATERNAL DEPENDENCE

DEPRIVATION

SENSORY
SOCIAL
STIMULATION

BASIC
BIOLOGICAL
NEEDS

PREMATURE
A controlled trial of skin-to-skin contact in extremely preterm infants


Mother-infant skin-to-skin contact after extremely preterm birth resulted in neither benefit nor adverse consequences. Although there is no reason to dissuade mothers who wish to provide STS contact, we are unable to recommend resource allocation for the implementation of STS programmes for extremely preterm infants in a neonatal intensive care unit setting.

Miles et al 2006

THE NEUROSCIENCE OF KANGAROO CARE

TOO LITTLE, TOO LATE ..

KANGAROO MOTHER CARE:

KMC (in the world) – Skin-to-skin contact WHEN STABLE !!!
Exclusive breastfeeding
Technical support added
(Early discharge – followup)

BSSC
Birth (or Immediate) Skin-to-Skin Contact
GOOD & QUALITY SURVIVAL
“Non-pharmacological reduction of hypercortisolaemia in preterm infants”
(Modi & Glover 1998, Mooney et al 1997)

Preterm infants experience prolonged severe stress with tenfold increases in stress hormones. Stress hormones at such levels are neurotoxic.

RCT on methods to reduce of stress (at one hour):
- Cortisol
- Endorphin
- Massage: slightly lower no change
- Soft music: no change no change
- Skin-to-skin: 66% lower 74% lower

The Neuroscience of Birth & Breastfeeding

**USA use:**
- WHO def’n
- NINO use:
- KMC
- KC: position + nutrition + discharge

The DNA: Epigenetics, Neurodevelopment, Behavioural Development, Evolutionary Biology

**ENVIRONMENT:**
- Adaptation
- Experience
- Reproductive Fitness

**BABY:**
- Bonding

**SEPARATION**
- Baby
- Experience

**BIRTH**
- Environment
- Adaptation
- Experience

**THE BRAIN HAS 3 PROGRAMMES**
- Defence
- Nutrition
- Reproduction

AM I SAFE HERE??

MATERNAL DEPENDENCE

HABITAT
- MOTHER
- OTHER

MATERNAL SEPARATION

MATERNAL DEPENDENCE

HABITAT
- Maternal Mother
- Other
- Alternate
THE PLACE MODEL
SKIN-TO-SKIN CONTACT

SKIN-TO-SKIN CONTACT FROM BIRTH COMPARED TO CONVENTIONAL INCUBATOR CARE

Primary hypothesis
SSC (skin-to-skin contact) from birth is superior to incubator care for low birthweight infants.
ONLY HABITAT DIFFERS.

Reference
RCT of skin-to-skin contact from birth versus conventional incubator care for physiological stabilisation in 1200- and 2199-gram newborns.

Bergman NJ, Linley LL, Fawcus SR. Acta Paediatrica 2004 Vol 93(6); 779-785

Results
Minimisation technique ensured groups balanced for confounders.

Control

Intervention

( n = 34)

Mean weight 1813g 1866g
Mean GA 34.2w 35.3w
Approp' GA 65% 64%
Male 60% 50%

(p 783)
**Research hypotheses**

<table>
<thead>
<tr>
<th></th>
<th>Stabilising DURING 6h</th>
<th>Stabilised AT 6 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BAILOUT</strong></td>
<td>H1a</td>
<td>H1b</td>
</tr>
<tr>
<td><strong>SCRIP</strong></td>
<td>H2a</td>
<td>H2b</td>
</tr>
</tbody>
</table>

**BAILOUT points ... INSTABILITY**

"physiological parameters exceeding normal limits, requiring medical assessment and or intervention"

1. Skin temp consistently <35.5°C
2. Heart rate <100; or > 180 bpm
3. Apnoea longer than 20 seconds
4. O₂ sats below 89% (x2), (CPAP/60% O₂)
5. Blood glucose < 2.6mmol/l, (laboratory)

*Bergman et al 2004*

**H1b (SPECIFIC)**

Doctor summoned: Stable

**INCUBATOR**

92% 8%

**SKIN-TO-SKIN**

17% 83%

*Bergman et al 2004*

**THE PLACE MODEL**

SKIN-TO-SKIN CONTACT

83% “STABLE”

SEPARATION

8% “STABLE”

**“Stability of Cardio-Respiratory system In Preterm Infants”**

<table>
<thead>
<tr>
<th>SCRIP SCORE</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate</td>
<td>Regular</td>
<td>Deceleration to 80-100</td>
<td>Syst. &gt;80 or &lt;200 bpm</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>Regular</td>
<td>Apnoea &gt;10s or periodic breathing</td>
<td>Apnoea &gt;10s Tachypnoea &gt;60 pm</td>
</tr>
<tr>
<td>Oxygen saturation</td>
<td>Regular &gt;87%</td>
<td>Any fall to 80-87%</td>
<td>Any fall below 80%</td>
</tr>
</tbody>
</table>

Score allocated for a five minute period of continuous observation, maximum six for period

Fischer et al, 1988

**SCRIP**

Heart rate
Oxygen saturation
Respiratory rate

DASH 3000 monitors continuously
THE PLACE MODEL
SKIN-TO-SKIN CONTACT

MOTHER

100% STABLE

OTHER PROTEST: STRESS SURVIVAL or DESEPAIR

46% STABLE

SEPARATION

"100% SCRIP STABILITY"

<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>S</th>
<th>C</th>
<th>C</th>
<th>M</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200g to 2200g</td>
<td>1 - 6h</td>
<td>56%</td>
<td>11%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>@ 6h</td>
<td>100%</td>
<td>46%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200g to 1800g</td>
<td>1 - 6h</td>
<td>44%</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>@ 6h</td>
<td>100%</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stabilisation first 6 hours, average hourly SCRIP score

5.1
5.2
5.3
5.4
5.5
5.6
5.7
5.8
5.9
6
6.1
2nd 3rd 4th 5th 6th
KMC all
KMC <1800
CMC all
CMC <1800

Stabilisation 1200g - 1800g

Hourly average of SCRIP score, 2nd to 6th hour

Stabilization 1200g – 1800g

INCUBATORS DE-STABILISE NEWBORNS

THE PLACE MODEL
SKIN-TO-SKIN CONTACT

MOTHER

STABILISATION

OTHER PROTEST: STRESS SURVIVAL or DESEPAIR

DYS-REGULATION

SEPARATION

CORTISOL

Stabilization

SKIN-TO-SKIN

Bergman et al. 2004

STABILISATION

CORTISOL

THE PLACE MODEL
SKIN-TO-SKIN CONTACT

MOTHER

STABILISATION

OTHER PROTEST: STRESS SURVIVAL or DESEPAIR

DYS-REGULATION

SEPARATION

CORTISOL

Bergman et al. 2004

**PROTEST – DESPAIR**

Causes
The impact of separation from the mother is quite profound in the infant primate and is well-documented in infant mammals. They typically display a biphasic response characterized by an initial stage (“protest”) of hyperactivity associated with distress vocalizations, followed by a depressive stage (“despair”) featured by social withdrawal, a decrease in play, and the development of a typical sloshed posture (Miner and Sozzi, 1976; Capitanio, 1986). This is accompanied by physiological disturbances in the regulation of heart rate, body temperature, sleep patterns, control systems, and the immune system (Lundslager et al., 1998).

**DYSREGULATION**

**WHY IS EARLY MATERNAL SEPARATION STRESSFUL?**

Separation dysregulates cortisol.

**SAFE UNSAFE**

Premature babies are not in incubators because they are unstable.

Premature babies are unstable because they are in incubators.

**REGULATION vs STIMULATION**

Expected vs Unexpected
Ecologic salience vs Potential threat
Resource growth vs threat readiness

**OXYTOCIN vs CORTISOL**

**HOMEORHESIS vs HOMEOSTASIS**

*MOTHER vs OTHER*

**Our NORMAL biology**

Skin-to-skin contact is more essential for premature newborns!
intricately, inseparably linked to the right place.

(Alberts 1994)

Maternal absence causes neonatal instability.

Maternal presence (SSC) regulates preterm physiology.

“It is a serious mistake to assume that the principles derived from careful animal studies do not apply to human infants. The risk of suppression or disruption of needed neural processes... is very significant and potentially lasts a lifetime.

"Bonding"

Paradigm: “in the philosophy of science, a generally accepted model of how ideas relate to one another, forming a conceptual framework within which scientific research is carried out”

BASIC ASSUMPTION:
= INCUBATORS STABILIZE

FOUNDATION / PLATFORM / BASE
PARADIGM CONSTRUCT

THE INCUBATOR

HAS NO EVIDENCE BASE !!

BASIC ASSUMPTION:
= INCUBATORS STABILIZE

FOUNDATION / PLATFORM / BASE

**Kangaroo Mother Care:**

Restoring the Original Paradigm for Infant Care

**SENSATIONS THAT WIRE BRAIN**

- SEES
  - Mum's eyes
- SMELLS
  - Mum's milk
- TASTES
  - Mum's milk
- TOUCH
  - Mum's skin
- SKIN-TO-SKIN CONTACT
  - Mum's arm holding
- BACK FEELS
  - Mum's arm holding
- WARMED on
  - Mum's front

**The Neuroscience of Birth & Breastfeeding**

- The DNA
- The Brain
- Behaviour
- Neurodevelopment
- Evolutionary Biology
- Environment
- Experience
- Reproductive Fitness

**Psychobiological Roots of Early Attachment**

- Slide from JILL BERGMAN
John Bowlby
secure attachment
"a safe base from which
to explore the world".

Safe Haven
Secure base
Proximity
maintenance
Separation
distress

BONDING components
Social
Emotional
Physical
ANS

BONDING consequence
Adult: Attachment ANXIETY to partner
Child: Insecure attachment
CORTISOL
Adult: Higher CORTISOL and lower immunity (CD4 cells)

Jaremka 2013

The Neuroscience of Birth & Breastfeeding
ENVIRONMENT
ADAPTATION
SCIENCE
REPRODUCTIVE FITNESS

ENVIRONMENT
BIRTH
BEYOND
BREASTFEEDING
Sensitization
Secured attachment
Attuned parenting

The DNA
EPIDEMIOLOGY
Neurodevelopment
EVOLUTIONARY BIOLOGY

Critical period concept:
"Windows of opportunity in early life when a child's brain is
exquisitely primed to receive sensory input in order to develop
more advanced neural systems."

a mother's brain ...
SENSITIZATION
RESILIENCE
(= STRESS RESISTANCE)
“capacity to maintain healthy emotional functioning in the aftermath of stressful experiences”
Kangaroo Mother Care: Restoring the Original Paradigm for Infant Care

BIRTH

BEYOND

BREASTFEEDING

Secure Attachment

Attuned Parenting

Resilience

HEALTH

DISEASE

The Neuroscience of Birth & Breastfeeding

THE DNA

The Brain

NEURODEVELOPMENT

EPIGENETICS

BEHAVIOUR

EVOLUTIONARY BIOLOGY

ENVIRONMENT

ADAPTATION

EXPERIENCE

REPRODUCTIVE FITNESS

“Absence of the buffering protection of adult support”

Do not measure how much skin-to-skin contact you are doing. Measure minutes of separation → Your dose of TOXIC STRESS

“Absence of the buffering protection of adult support”

“needed neural processes”
“except in the light of mother’s body.”
Why don’t Irish women breastfeed?

If you never see other mothers doing it, you’re never going to think it’s normal.

... because we separate them ...

BREASTFEEDING IS A BEHAVIOUR OF THE NEWBORN

Kangaroo Mother Care:
Restoring the Original Paradigm for Infant Care

ZERO SEPARATION

START @ BIRTH

ZERO SEPARATION

The GOLDEN HOUR

Premature birth

Being flexible, willing to question routines
FAMILY CENTERED CARE ➔ DO IT LITERALLY!!

Triplets ... requires a team

Positive effect on breastfeeding

From the resuscitation room to the delivery room
In the delivery room showing
the boy before going to the NICU
From the delivery room
just entering the NICU

Perinatal neuroscience and neonatal care: the new science of being born.

The neuroscience of birth – and the case for Zero Separation

The boy before going to NICU

In the delivery room showing

From the delivery room

Just entering the NICU

ENVIRONMENT EXPERIENCE REPRODUCTIVE FITNESS

SEPARATION

VIOLATES

the innate agenda

of mother and baby

Toxic stress

Disordered attachment

Vulnerability

DISEASE

A mother and baby

BIRTH

BABY

MOTHER

DYAD

are a single

psychoneurobiological

organism

BONDING

Sensitization

BEYOND

BREASTFEEDING

Feed & Assure

Secure attachment

Attuned parenting

Resilience

HEALTH

IT MATTERS

HOW WE ARE BORN

Nelson Mandela

... in describing the measure of a nation, he has argued that:

"There can be no keener revelation of a society’s soul than the way in which it treats its children."