

THE BRAIN AND EARLY CHILDHOOD: THREE WAVES

The Waves: Distinguishing features

◎ Source

- Advocacy groups/policy think-tanks
- Politicians
- Media
- Academic Scientists

◎ Strength of claims

- Strong deterministic claims (e.g., critical period(s))
- Weaker (semi-)deterministic claims (e.g. sensitive periods)

◎ Use of scientific language

- Literal
- Metaphoric

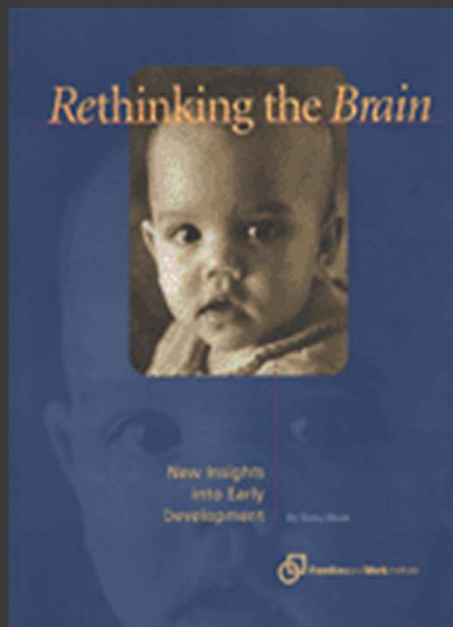
The Waves: Common Features

- All documents contain abundant references to behavioral science (psychology, psychiatry)
- Purported explanations are always materialistic (*their term*), not mentalistic
 - Talking about the brain's 'hard-wiring' and synaptic 'circuits' presented a mechanistic image that appealed to both men and women and could be used to frame issues in early childhood development.
 - Among the key recommendations was the importance of moving from a "mentalist" communications perspective to a "materialist" perspective. The former focuses on subjective, abstract mental experiences (thoughts, feelings, emotionality, willfulness) while the latter emphasizes the physical changes that take place in a child's brain (pruning, circuits, hormones, chemicals).

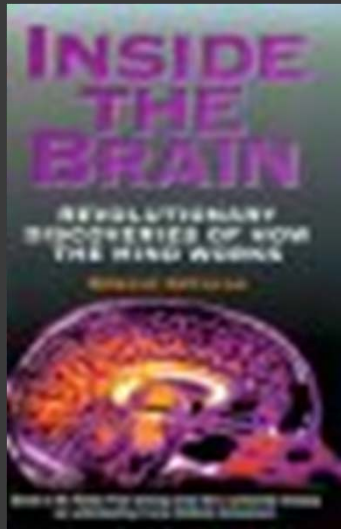
What's wrong with mentalism?

- “The mentalist perspective does not include the important notion of a “damaged system” (i.e. the idea that a person might behave a certain way because of a damaged internal system rather than a moral failure);
- it excludes certain kinds of causality, such as the lasting effects of chronic stress;
- and it tends to imply a kind of “all or nothing” perspective, in which personhood emerges full-blown even in very young children, rather than developing through the growth of individual parts and systems.”

1st Wave (1994 – 2000): Source



1st Wave (1994 – 2000): Source



Newsweek



Your Child's Brain



1st Wave (1994 – 2000): Strength of Claims

- ◎ Strongly deterministic
 - “By the age of ten, your brain is cooked.” (Reiner)
 - Early experiences are so powerful ... “they can completely change the way a person turns out.” (H. Chugani)
 - ... “critical periods ... are windows of opportunity that nature flings open, starting before birth, and then slams shut, one by one, with every additional candle on the child's birthday cake.” (Begley)
- ◎ Critical periods in development
 - Narrow and rigid interpretation of critical periods
 - Birth to three is *the* critical period for brain development

1st First Wave (1994 – 2000): Explanation & Language

◉ Literal use of language

- Talk of synapses, circuits, neurotransmitters, mechanisms is intended to convey a literal understanding of neuroscience
- Journalists would use figurative language for color and emphasis

1st Wave's Central Message

◎ “The Myth of the First Three Years”

- The first three years of life is a period of rapid **synapse formation**.
- This is the **critical period** in brain development, during which learning is easiest and most efficient.
- During the critical period, **environmental enrichment (or deprivation)** has profound, irreversible effects on the brain.

The Myth (1999): Reception

- ⦿ Psychologists and neuroscientists positive
- ⦿ Policy advocates, attachment theorists, and pediatric psychiatrists negative
- ⦿ Attachment theory is central to this literature
 - A critical or sensitive period for socio-emotional development
 - Proponents overstate the extent of our knowledge about the neural bases for attachment in humans

Recognition of over generalization

- “The success of preschool programs and critical periods for first language learning have been used – and misused – to suggest that early experience *in general* is critical to brain development. (C.A. Nelson, 1999)
- “One example was the over generalization of research on critical periods that fueled the erroneous conclusion that human brain development is effectively solidified by the age of 3 years, despite the fact that critical (vs. sensitive periods) in the maturation of the human brain are the exception rather than the rule.” (J. Shonkoff 2000)

2nd Wave (2000 – 2011): Sources

Early Intervention:

Good Parents, Great Kids, Better Citizens

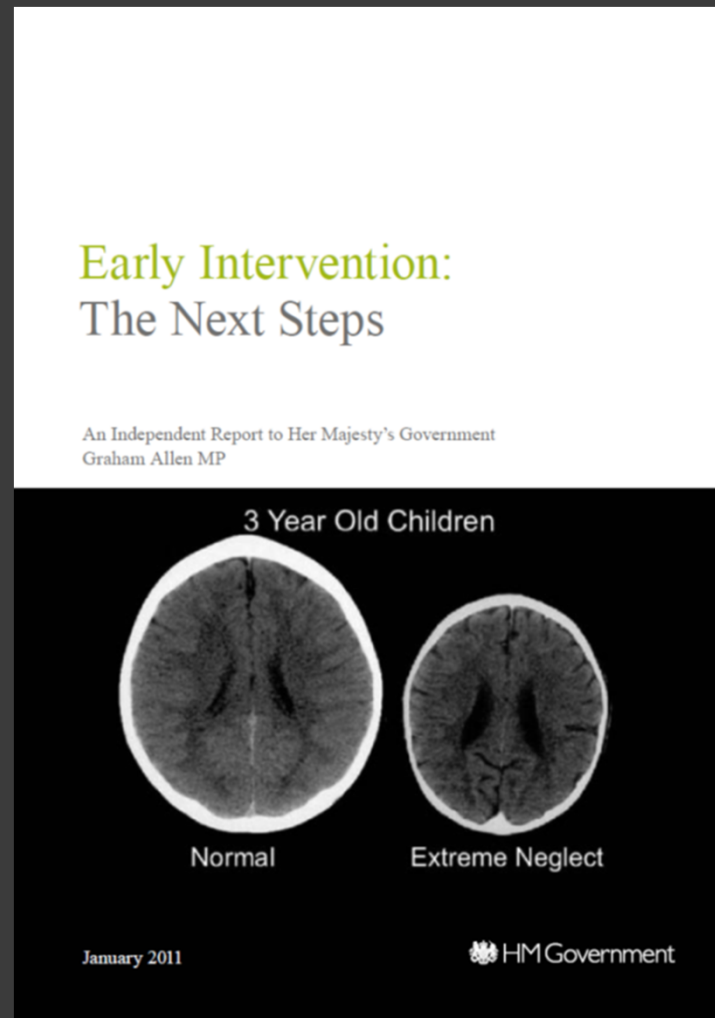
Graham Allen MP and
Rt Hon Iain Duncan Smith MP

The Foundation Years: preventing poor children becoming poor adults

The report of the Independent Review on Poverty and Life Chances

Frank Field

2nd Wave (2000 – 2011): Sources



2nd Wave (2000 – 2011): Strength of Claims

- ◎ Softer Determinism
 - Tend to speak of sensitive periods and windows, rather than critical periods
 - Recognize multiple “sensitive windows” in development, most often in reference to 0 to 18 months sensitive period for attachment and socio-emotional development
 - These emotional deficits become harder to overcome once the sensitive ‘window’ has passed. (Allen & Duncan Smith, 2008; Allen, 2011)
- ◎ The Foundation Years (Field 2010)
 - Mentions the brain only twice
 - Relies on behavioral science to discuss the effects of poverty and how those effects can be addressed
 - Retains the materialist notions of causality, personal development, and damaged systems

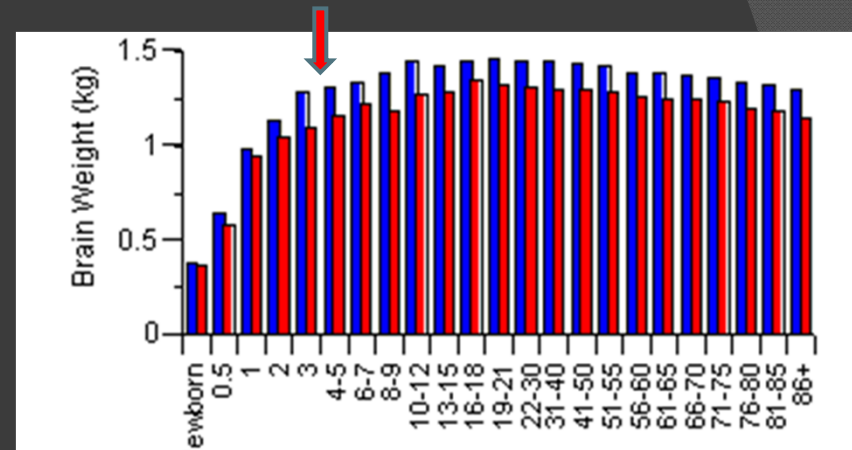
Brain Size versus Brain Development

... the human brain has developed to 85 per cent of its potential at age three (and 90 per cent at age four). (Allen and Duncan Smith 2008)

By the age of three, a baby's brain is 80% formed and his or her experiences before then shape the way the brain has grown and developed. (Field, 2010)

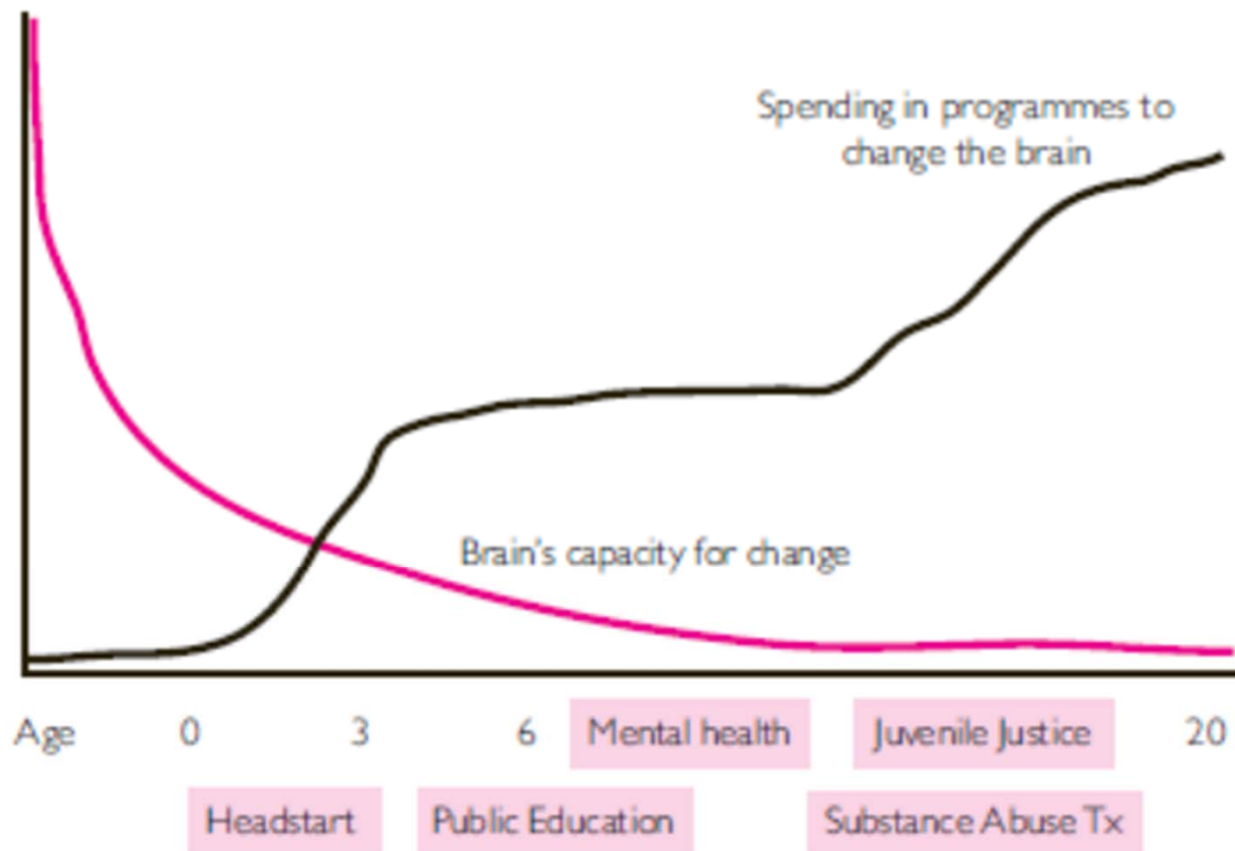
A key finding is that babies are born with 25 per cent of their brains developed, and there is then a rapid period of development so that by the age of 3 their brains are 80 per cent developed. (Allen, 2011)

$$1.25/1.5 \times 100 = 83$$



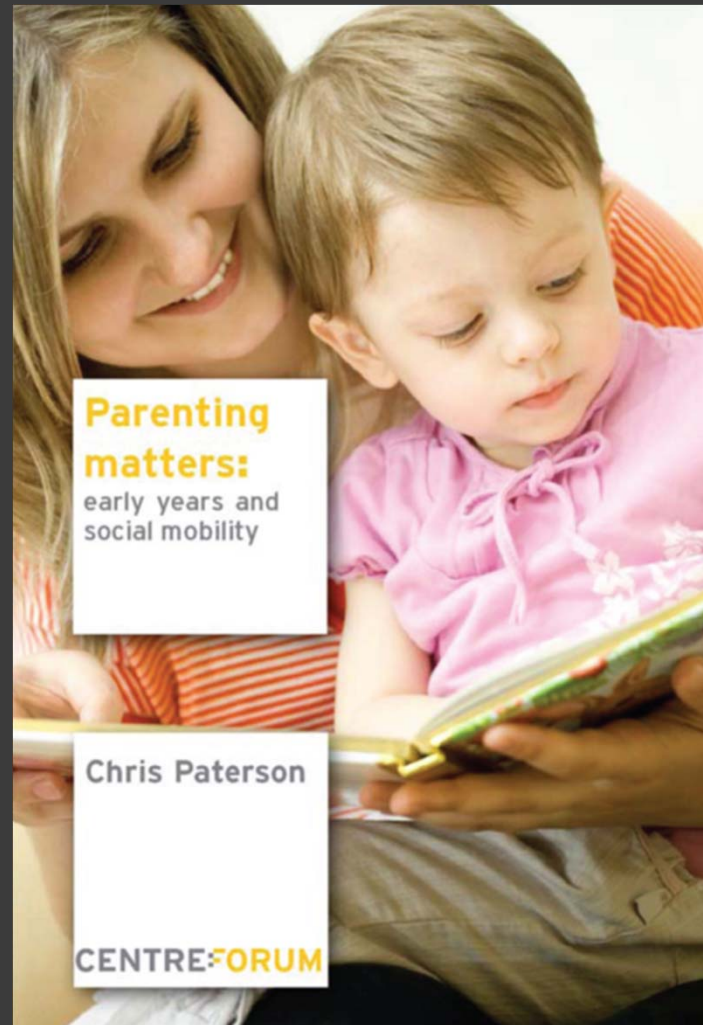
- Fact: By age 3 the human brain has reached around 85 per cent of its mature weight (or volume).

Brain's capacity to change versus public spending on programmes for change



Source: Wave Trust

3rd Wave (2010 –): Source



3rd Wave (2010 –) : Strength of Claims

◉ Guarded Determinism

- “Although ‘windows of opportunity’ for language and skill development and behavioural adaptation remain open for many years, trying to change behaviour or build new skills on a foundation of brain circuits that were not wired properly when they were first formed is much harder and requires more intensive effort.”
- The brain’s capacity for change decreases with age.

◉ Sensitive periods

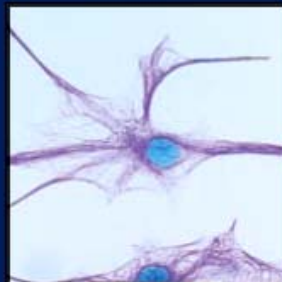
- The term ‘*critical period*’ does not appear.
- “Brain architecture is built over a succession of ‘sensitive periods’, each of which is associated with the formation of specific circuits that are associated with specific abilities.”

3rd Wave (2010 –): Power of metaphor

- Relies on neuroscience to provide a materialistic/mechanistic explanation of learning, development, and mental illness.
- However, language has become figurative: Metaphors are used to explain the implications of neuroscience to a lay audience.
 - Brain architecture
 - Serve and return
 - Toxic stress
- Where did this metaphoric language come from?

The Science of Early Childhood Development

Closing the Gap Between
What We Know and What We Do



National Scientific Council
Center on the Developing Child at Harvard University
www.developingchild.net



◎ Parenting Matters

- **Brain architecture** and developing abilities are built from the bottom up over time.
- The interactive influences of genes and experience shape the developing brain. (**serve and return**)
- **Toxic stress** damages developing brain architecture
- The brain's capacity for change decreases with age.

◎ SECD

- Both **brain architecture** and developing abilities are built “from the bottom up,” with simple circuits and skills providing the scaffolding for more advanced circuits and skills over time.
- The interactive influences of genes and experience literally shape the architecture of the developing brain, and the active ingredient is the “**serve and return**” nature of children’s engagement in relationships with their parents and other caregivers in their family or community
- **Toxic stress** in early childhood is associated with persistent effects on the nervous system and stress hormone systems that can damage developing brain architecture and lead to lifelong problems in learning, behavior, and both physical and mental health.
- Creating the right conditions for early childhood development is likely to be more effective and less costly than addressing problems at a later age.

Science Does Not Speak for Itself: Translating Child Development Research for the Public and Its Policymakers

Jack P. Shonkoff
Harvard University

Susan Nall Bales
FrameWorks Institute

Science has an important role to play in advising policymakers on crafting effective responses to social problems that affect the development of children. This article describes lessons learned from a multiyear, working collaboration among neuroscientists, developmental psychologists, pediatricians, economists, and communications researchers who are **engaged in the iterative construction of a core story of development, using simplifying models (i.e., metaphors) such as “brain architecture,” “toxic stress,” and “serve and return”** to explain complex scientific concepts to nonscientists. The aim of this article is to stimulate more systematic, empirical approaches to the task of knowledge transfer and to underscore the need to view the **translation of science into policy and practice as an important academic endeavor in its own right.**

FrameWorks Institute

- ⦿ “The mission of the FrameWorks Institute is to advance the nonprofit sector's communications capacity by identifying, translating and modeling relevant scholarly research for framing the public discourse about social problems.”
- ⦿ “Understanding which frames serve to advance which policy options with which groups becomes central to any movement's strategy. The literature of social movements suggests that the prudent choice of frames, and the ability to effectively contest the opposition's frames, lie at the heart of successful policy advocacy.”

<http://www.frameworksinstitute.org/mission.html>

FrameWorks Original Simplifying Models

In the course of harvesting research findings from FrameWorks' work with the National Scientific Council on the Developing Child (now at Harvard University's Center on the Developing Child), we recommended a set of “**Simplifying Models**” to help plug these cognitive holes:

- **Brain Architecture** as a way to capture the material nature of the developmental foundation;
- **Interaction**, as a way to elevate the dynamic process between child and environment; and
- **Stress-Related Chemicals in the Brain**, as a way to make vivid the damaging effects of exposure to stress.

FrameWorks Revised Simplifying Models

Since this research was conducted for PCAmerica in 2003, FrameWorks has tested all three Simplifying Models in both qualitative and quantitative research and has improved the latter two models:

Interaction has been updated to **Serve and Return**, in which the interactive nature of the child and his environment is equated with a game of tennis.

Stress-Related Chemicals in the Brain has been expanded to differentiate between positive, tolerable and **toxic stress** in order to help people understand the buffering effects of caring adults and the deleterious effects of unrelieved exposure.

PNAS July 5, 2006 vol. 103 no. 27 10155–10162

Economic, neurobiological, and behavioral perspectives on building America's future workforce

Eric I. Knudsen*†, James J. Heckman‡, Judy L. Cameron§, and Jack P. Shonkoff¶

Summary and Issues

- Strength of claims – from hard determinism to softer determinism
- Language – literal but over-simplified to models and metaphors
- Persistent themes
 - Materialist, mechanistic explanations throughout
 - Affinity for attachment theory and purported neural underpinnings
 - Underlying neuroscience carefully chosen
 - Not much advance in the neuroscientific bases for claims.

Summary and Issues

◎ Source

- 1st wave:
 - from advocates outside the academy (with active assistance of some academic scientists)
 - Advocates oversimplifying science
- 3rd wave:
 - from academy (with active assistance of experts on advocacy)
 - Scientists oversimplifying science

Questions

- ◎ To what extent is the brain early childhood campaign like and unlike other public health campaigns? (smoking, avian flu, immunization, breast feeding)?
 - Depth and strength of underlying science
 - Link between the science and proposed policy
 - Extent of social agreement on the policy end apart from the science
- ◎ Is translation of science into policy an important academic endeavor in its own right?
- ◎ Is “framing” an appropriate way to translate science for nonscientists?
- ◎ If so what are the academic community’s responsibilities in conducting and reviewing such translations?