

Mount Allison University

Sackville, NB

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**Council for Early Child Development:  
Putting Science into Action**

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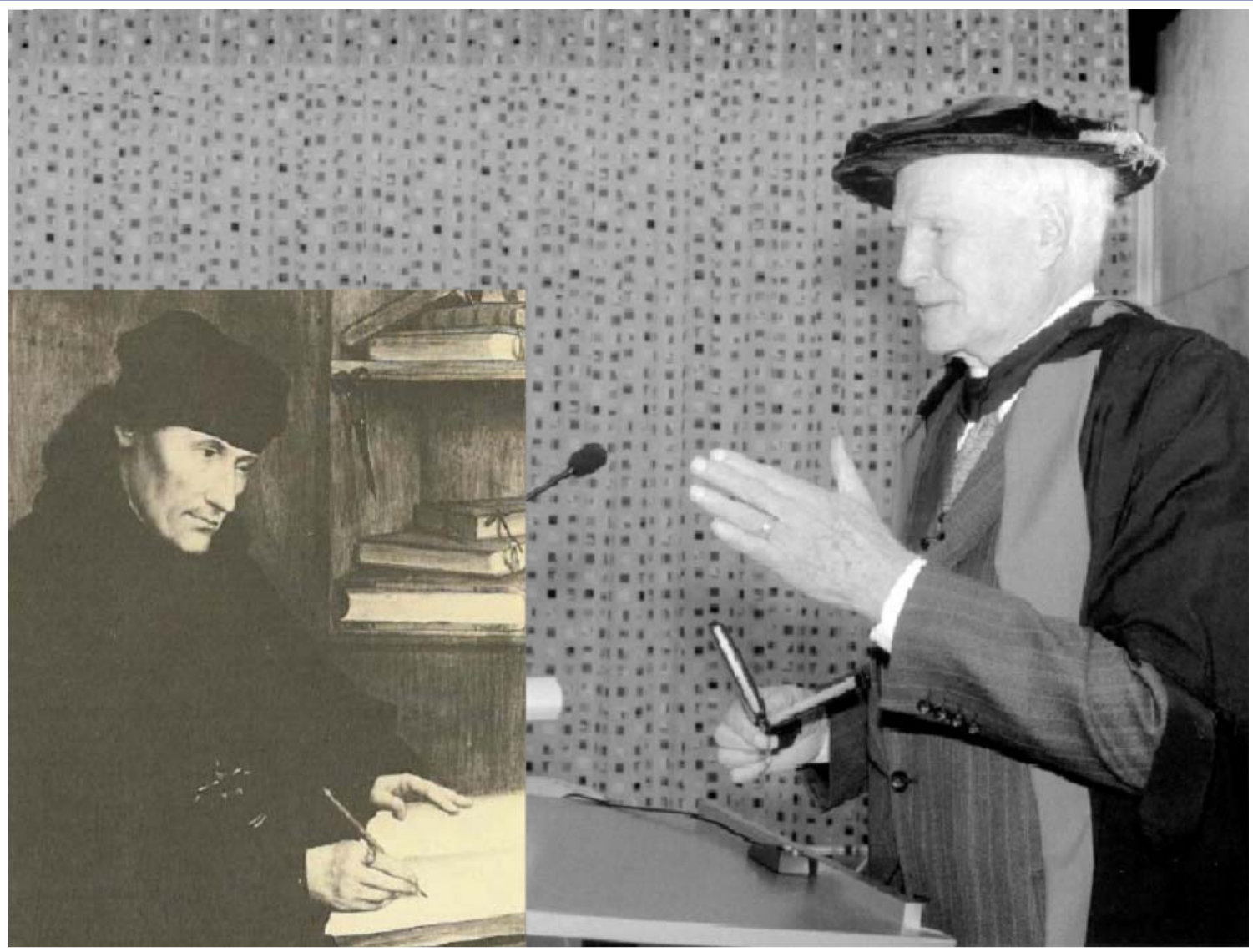
By J. Fraser Mustard  
Founding President, CIAR

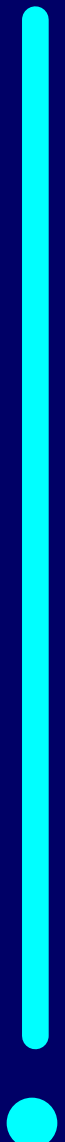
May 15, 2007

# Early Child Development – Role of the Council

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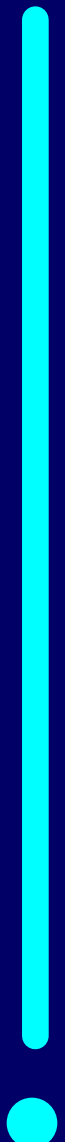
- Closing the gap between what we know and what we do
- A problem for society





“One cannot emphasize too strongly the importance of those first years for the course that a child will follow throughout his entire life.”

Erasmus (1529, p. 309)



500 years later there is  
still a gap between  
what we know and  
what we do.

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**WHAT DO  
WE NOW KNOW?**

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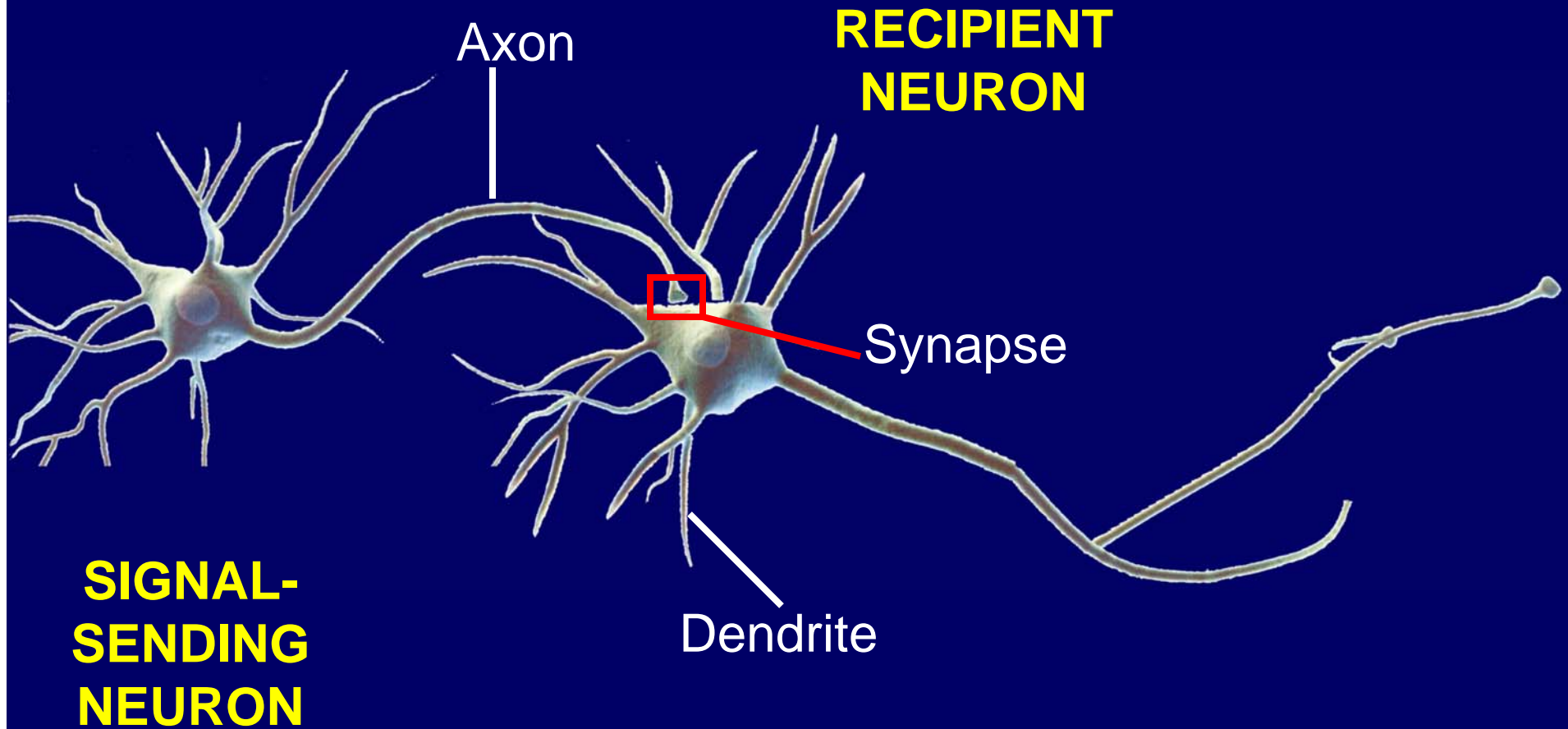
Experience-Based Brain Development in the early years of life sets neurological and biological pathways that affect throughout life:

- Health
- Learning
- Behaviour



The Hostage Brain, Bruce S. McEwen and Harold M. Schmeck, Jr., 1994.

# Two Neurons

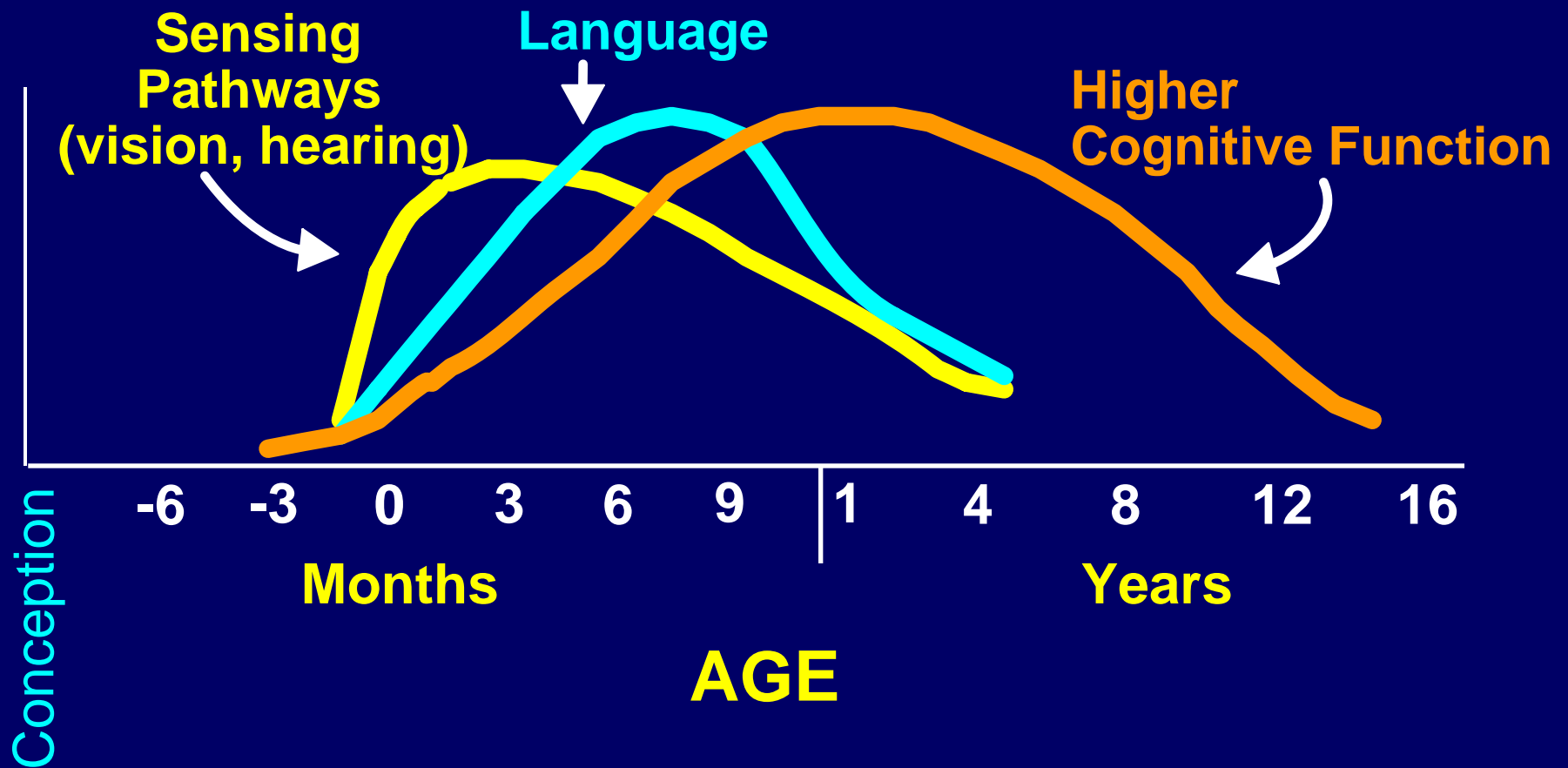


# Experience and Brain Development

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- Stimuli switch on genetic pathways that differentiate the function of billions of neurons
- Stimuli affect the formation of the trillion of connections (synapses) among the billions of neurons

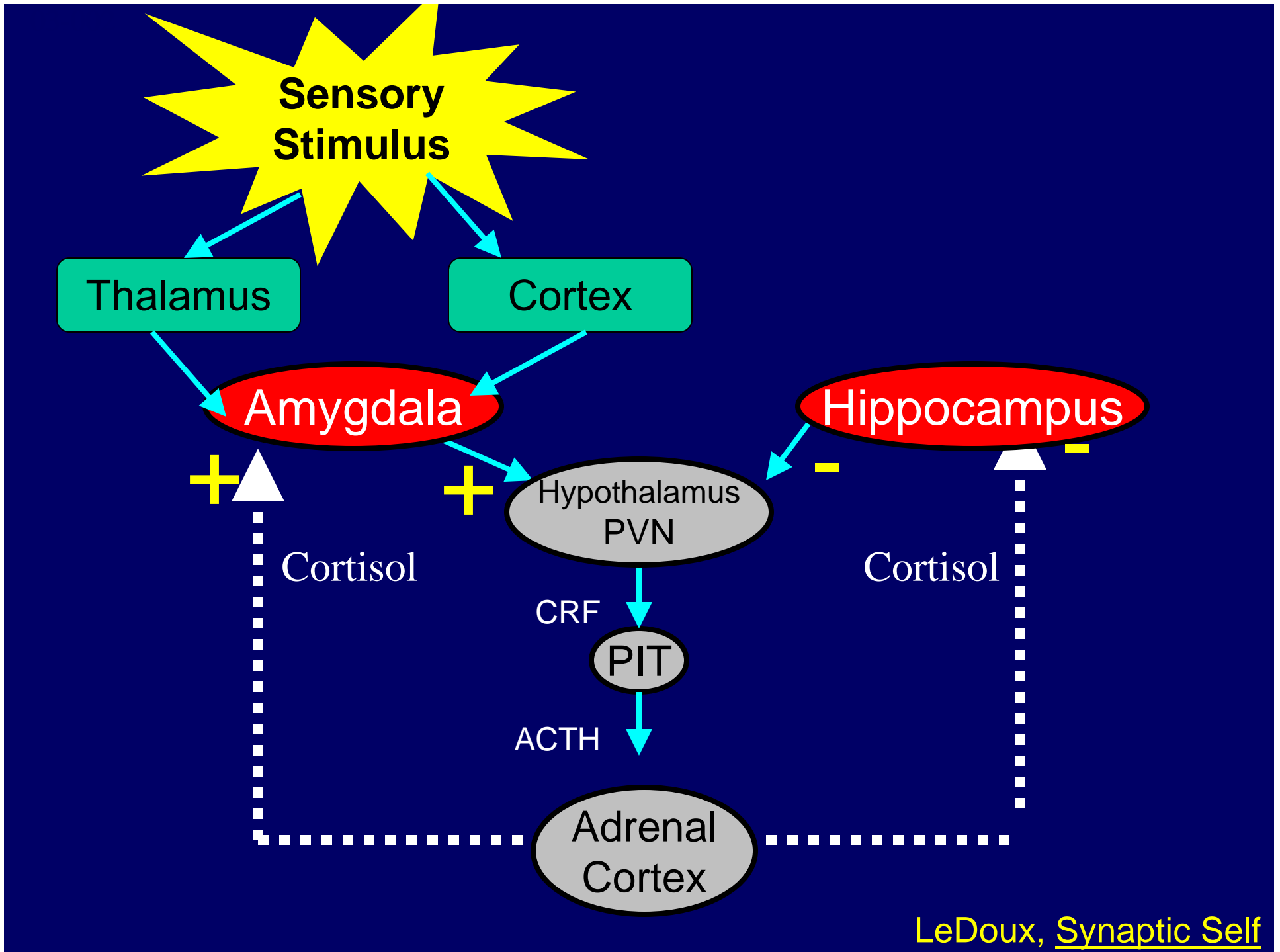
# Human Brain Development – Language and Cognition



# **Allostasis & Allostatic Load**

**(Stress)**

**Triune Brain (oldest part)**

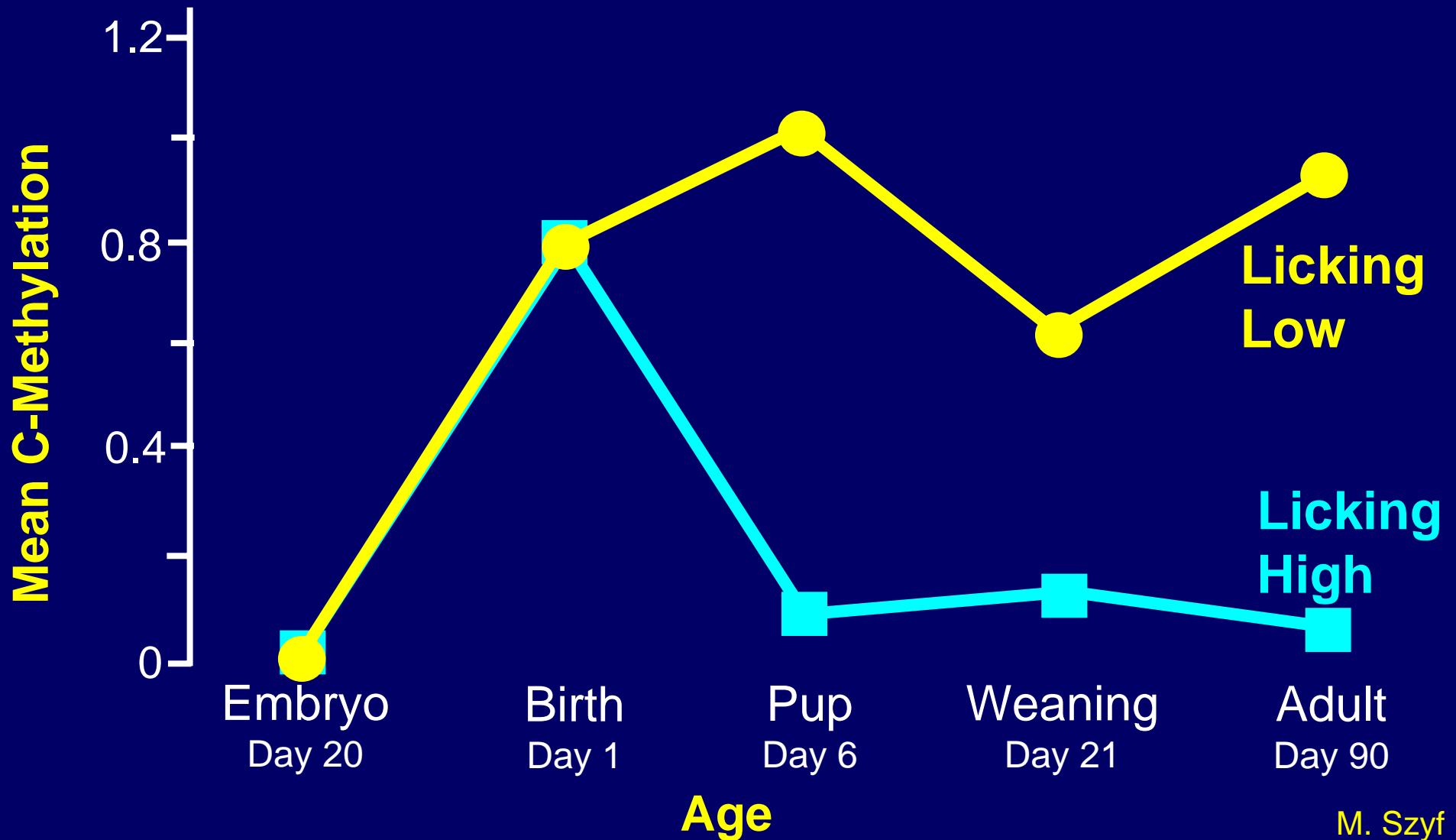


# Epigenetics

According to Dr. Szyf, epigenetic modifications in response to maternal care occur during the critical period early after birth.

The effects are stable and persist into adulthood.

# Hippocampal GR(1<sub>7</sub>) Region 16 (5' NGFI-A RE) Methylation Timeline



# Serotonin Transporter Gene Experience in Early Life - Depression

Depression  
Risk

Age 26



Early Childhood

A. Caspi, Science, 18 July 2003, Vol 301.

# Early Experience and Brain Architecture

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- Affects gene expression and neural pathways
- Shapes emotion, regulates temperament and social development
- Shapes language and literacy capability
- Shapes perceptual and cognitive ability
- Shapes physical and mental health and behaviour in adult life
- Shapes physical activity (e.g. skiing, swimming, etc.)

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HEALTH

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# Swedish Longitudinal Study – Early Child Development (ECD) and Adult Health

Number of Adverse ECD Circumstances\*

0

1

2

3

4

**Adult Health**

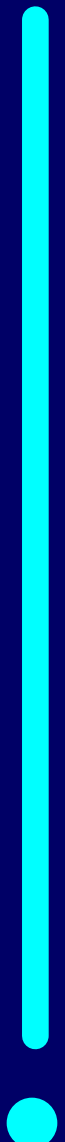
**Odds - Ratios**

General Physical	1	1.39	1.54	2.08	2.66
Circulatory	1	1.56	1.53	2.91	7.76
Mental	1	1.78	2.05	3.76	10.27

\* Economic, family size, broken family and family dissention

# Health Problems Related to Early Life

- Coronary Heart Disease
- Non-insulin Dependent Diabetes
- Obesity
- Blood Pressure
- Aging and Memory Loss
- Behaviour
- Mental Health (depression)



"Follow up through life of successive samples of birth has pointed to the crucial influence of early life on subsequent mental and physical health and development."

Acheson, Donald - Independent Inquiry into Inequalities in Health, 1998

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BEHAVIOUR

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# Early Development and Behaviour

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- Antisocial
- Attention-Deficit Hyperactivity Disorder (ADHD)
- Autism
- Mental Health (Depression)
- Addiction to drugs and alcohol

## Behaviour

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“The aftermath ... [of poor early child development] can appear as depression, anxiety, suicidal thoughts or post-traumatic stress – or as aggression, impulsiveness, delinquency, hyperactivity or substance abuse.”

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*Martin Teicher*  
*Scientific American, 2002*

# Substance Abuse and Childhood Abuse

## *Odds Ratios for Drug and Alcohol Use*

### **Exposure to Child Abuse\***

### **Drugs**

### **Alcohol**

<b>0</b>	<b>1.0</b>	<b>1.0</b>
<b>1</b>	<b>2.7</b>	<b>2.0</b>
<b>2</b>	<b>2.9</b>	<b>4.0</b>
<b>3</b>	<b>3.6</b>	<b>4.9</b>
<b>4+</b>	<b>4.7</b>	<b>7.4</b>

\* Scale: 0 none  
4 intense

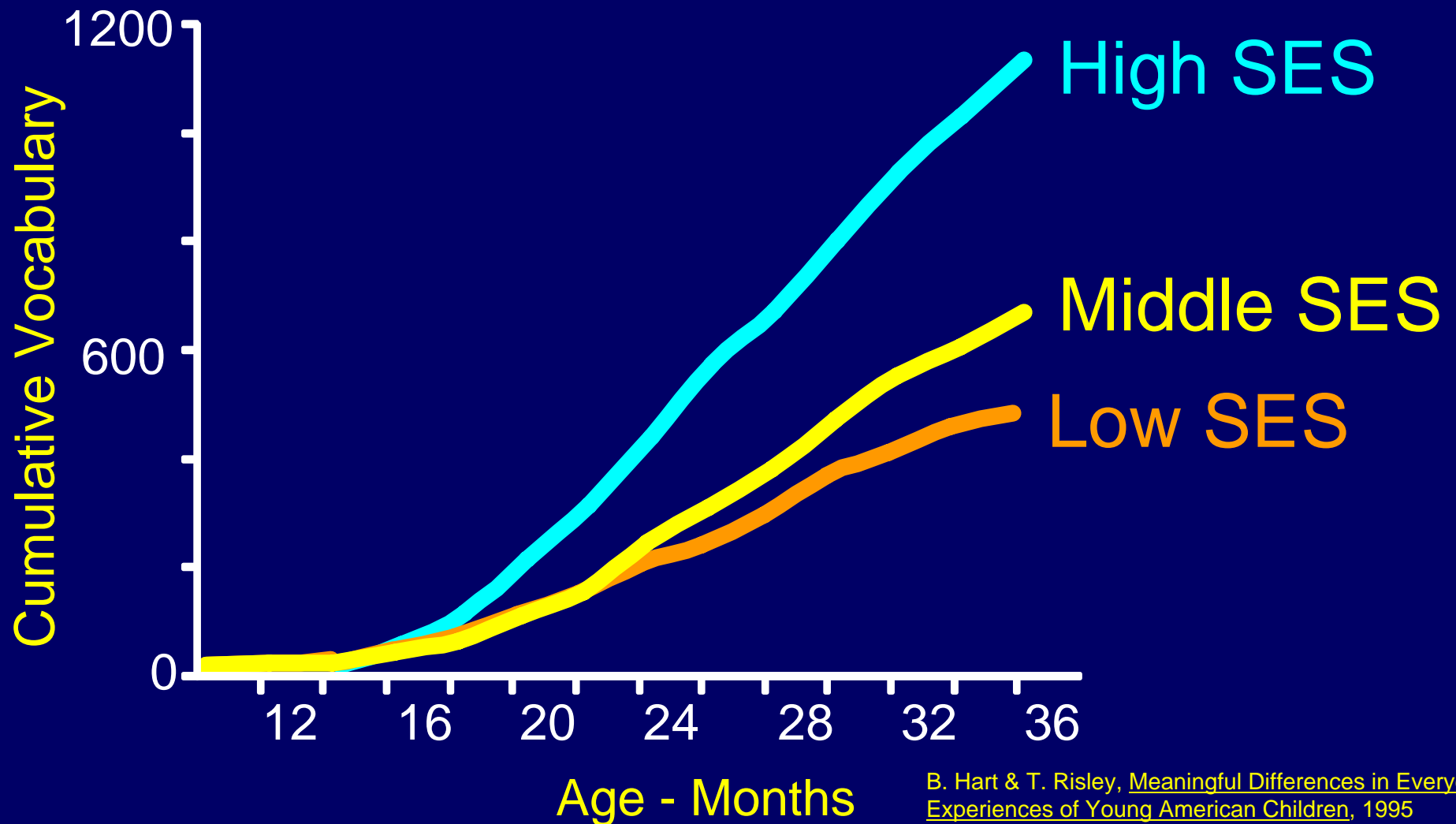
# Language & Literacy

# Early Child Development and Language

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- Brain development starts early – first 7 months
- Sets capability for mastering multiple languages
- Sets literacy and language trajectory by age 3

# Literacy – Early Vocabulary Growth



B. Hart & T. Risley, Meaningful Differences in Everyday Experiences of Young American Children, 1995

# Levels of Literacy: A Reflection of ECD

**Level 1:** indicates persons with very poor skills.

**Level 2:** people can deal with material that is simple.

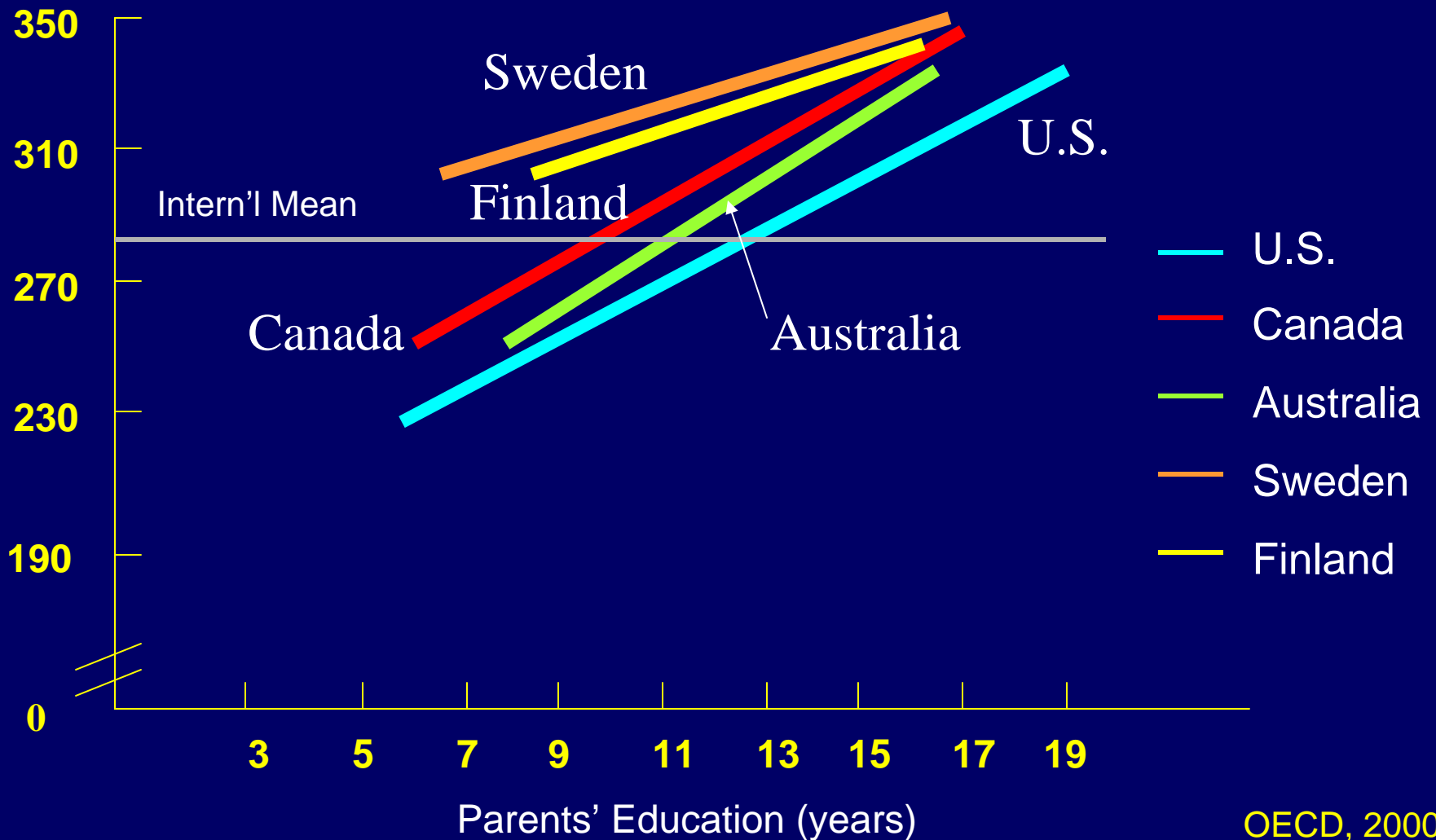
**Level 3:** is considered a suitable minimum for coping with the demands of everyday life.

**Level 4:** people who demonstrate command of higher-order processing skills.

**Level 5:** competence in sophisticated reading tasks, managing information and critical thinking skills.

# Socioeconomic Gradients for Document Literacy Scores

Mean Scores



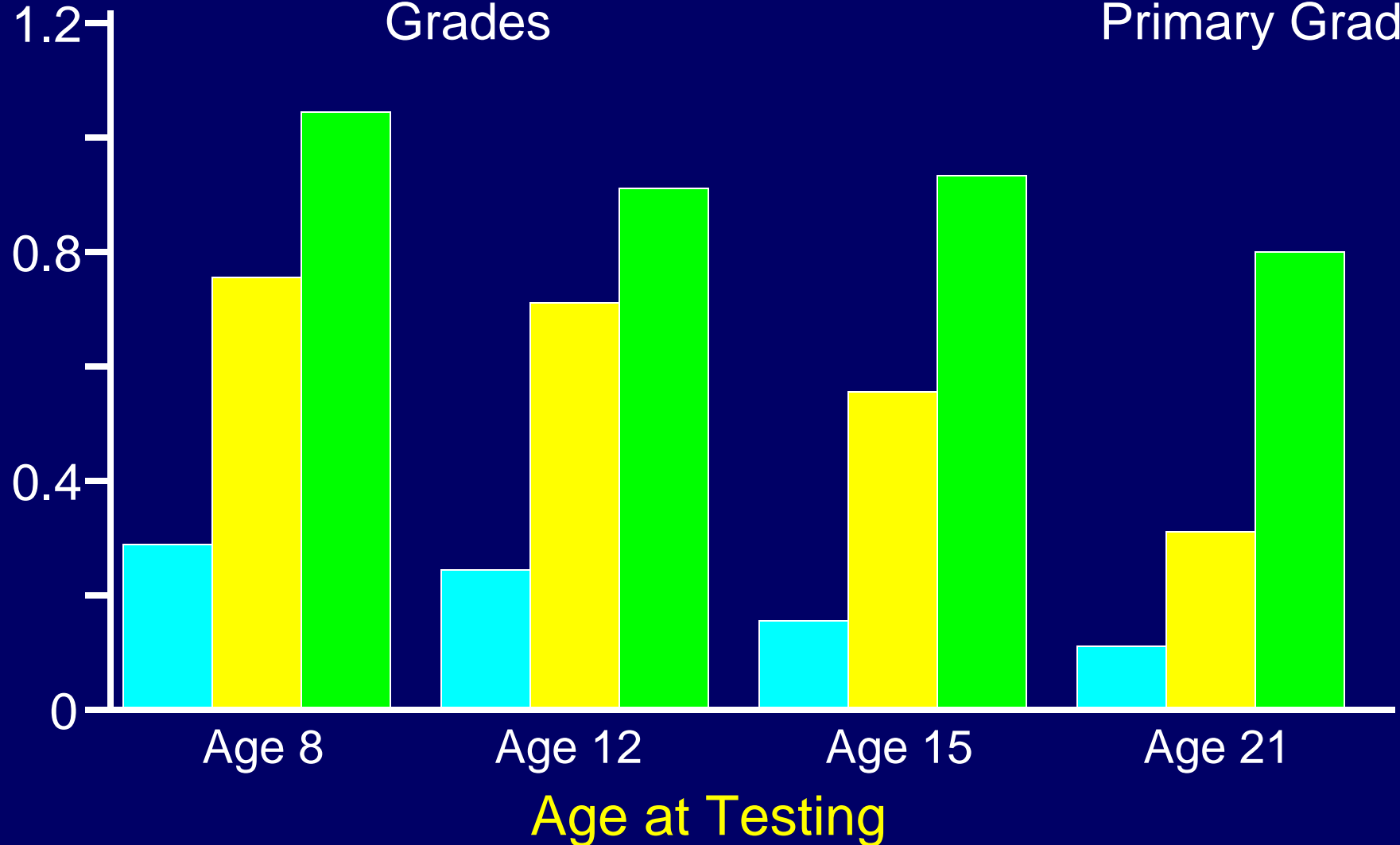
# Abecedarian Study – Reading

Effect Size

Primary  
Grades

Preschool

Preschool &  
Primary Grades



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# OUTCOME MEASURES

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# Early Development Instrument (EDI)

- Physical health and well-being
- Social knowledge and competence
- Emotional health/maturity
- Language and cognitive development
- Communication skills and general knowledge

# EDI Results – Vancouver Districts

District	Income \$	EDI Results % scoring in bottom 10%
1	12,000-24,000	34.5
2	24,000-37,000	27.5
3	37,000-49,000	21.5
4	49,000-62,000	15.0
5	62,000-74,000	8.5



# Vancouver

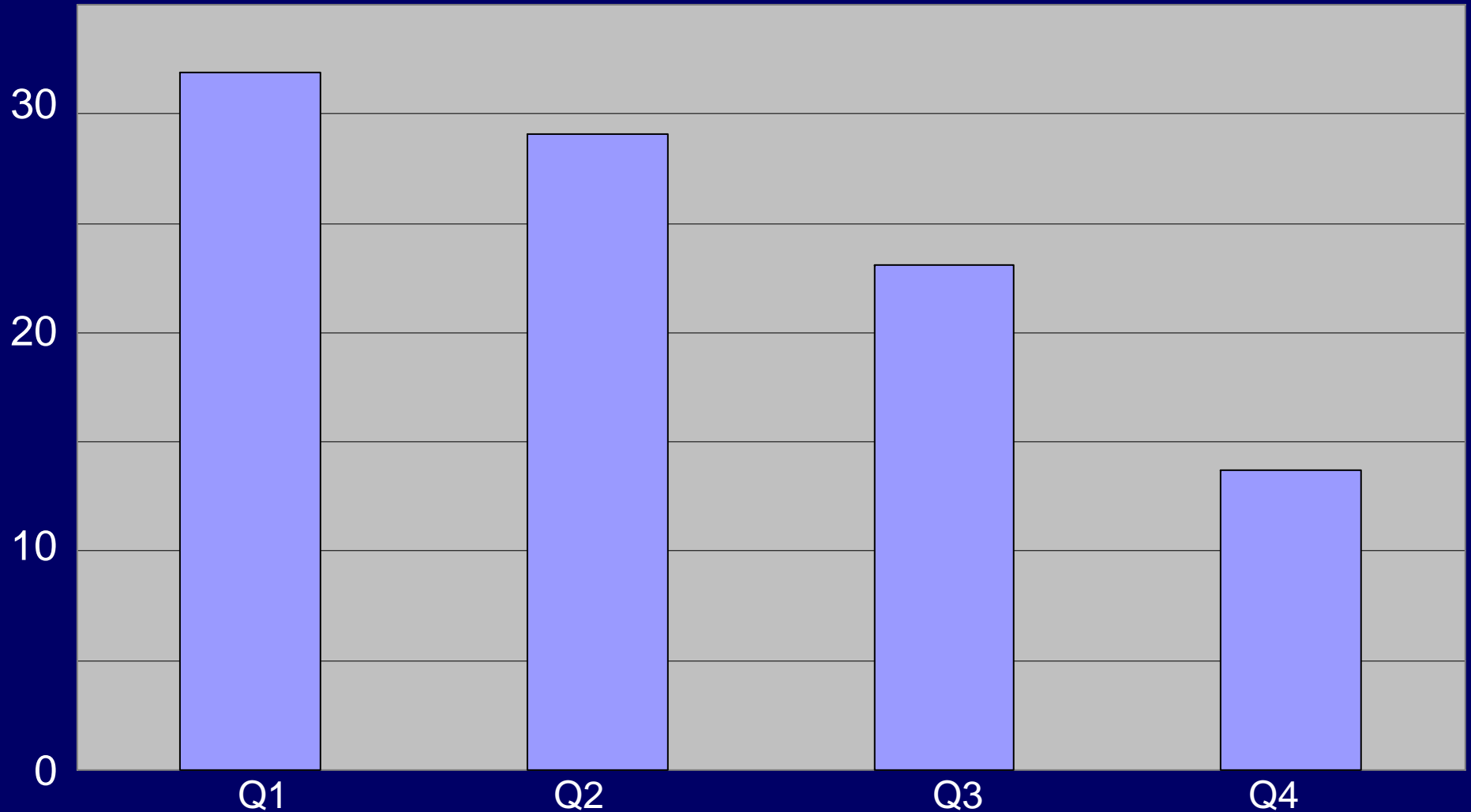
## Grade 4 and Grade 7 Tests

Proportion of children failing to meet Grade 4 and Grade 7 test standards correlates strongly with proportion of children vulnerable on the EDI index at time of school entry.

# Vulnerability - Canada – EDI

## Children 5-6 yrs

% Vulnerable



SES - Income

Adapted from NLSCY/UEY 1999-2000;  
EDI 1999-2000

# AEDI Perth Western Australia

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Community	% Vulnerable	
	2003	2006
Floreat	16.6	2.4
Wembley	18.4	6.6
Other communities – No intervention – No change		

# Barriers to Implementing ECD-P Programs

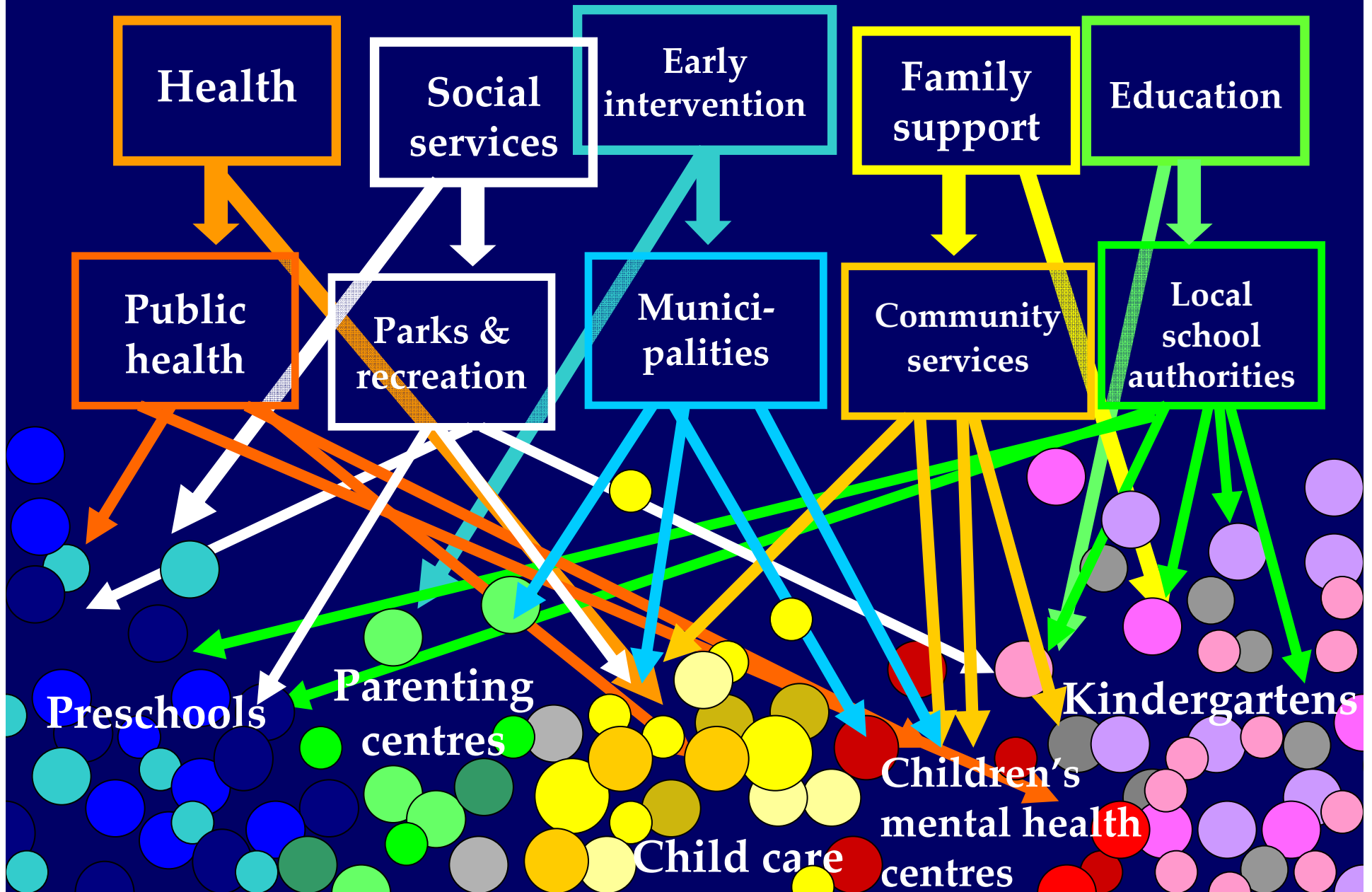
1. Economics
2. Lack of understanding (public and professional)
3. Lack of qualified staff
4. Lack of community ECD data
5. No commitment to equality of opportunity for all young children

# What Provides the Best Results for Early Child Development?

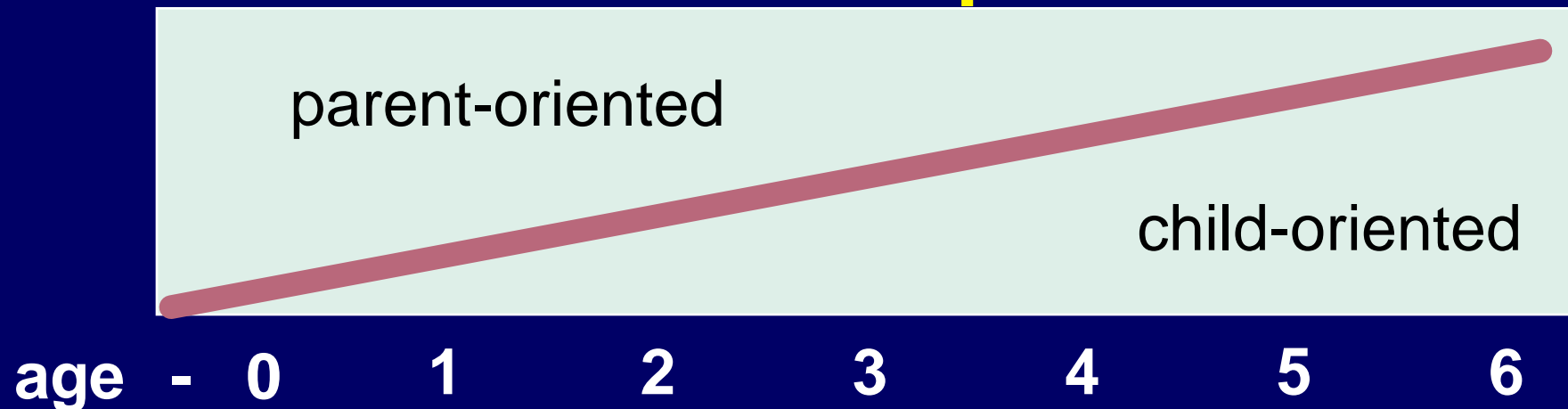
**Full year Centre-based ECD-P programs that:**

- Start early
- Involve parents
- Home visiting
- Qualified staff in neuroscience and development
- Provide non parental care

# Chaos



# ECD and Experience-Based Brain Development



## Components of Early Childhood Development and Parenting Centres:

- Universal – available, accessible, affordable and optional
- Parental and non-parental care
- Parent- and child-oriented
- Quality early child development environments
- Responsive relationships and parent involvement
- Detect development problems early

# Cost of ECD-P Centres (Estimate Canada)

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Age 0 to 6 Population

Universal (2,500,000 children)

**Cost** \$18.5 Billion (1.5% of GDP)

Present Expenditure 0.25% of GDP

# Cost to Individuals and Canadian Society of Poor Early Child Development (estimates)

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Crime	\$120 Billion/year
Mental Health and Behaviour	\$100 Billion/year

# Early Child Development, Human Evolution and the Continuing Evolution of Civilizations in the 21<sup>st</sup> Century

- Improve health and well-being of populations
- Improve ability and the competence and capability of populations
- Continue evolution of democratic, tolerant, pluralistic, sustainable societies
- Improve equity in health, literacy and income

# Council for Early Child Development Putting Science Into Action

*The Council envisions community-based early child development and parenting centres linked to the primary schools and available to all families with young children. These centres are designed to support early brain and child development.*

*Early Years Study 2  
McCain, Mustard & Shanker, 2007*

*[www.founders.net](http://www.founders.net)*

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