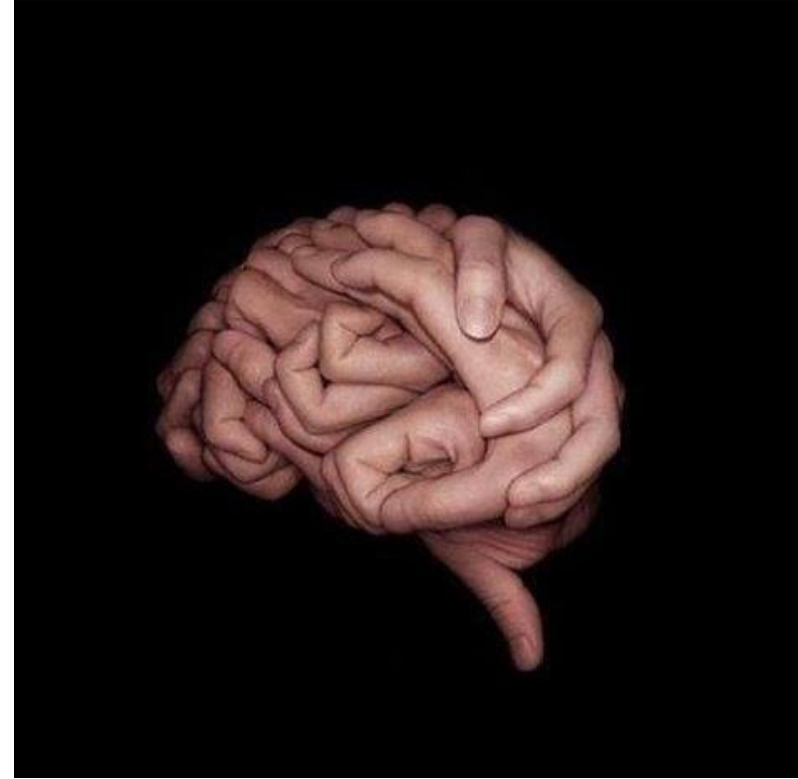




nathan**wallis**  
*conscious intelligence*



# Ka Tikaka o Ka Roro

## The Developing Brain



[booknathanwallis@gmail.com](mailto:booknathanwallis@gmail.com)



[@nathanwallisxfactorededucation](https://www.facebook.com/nathanwallisxfactorededucation)





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*conscious intelligence*



# The Developing Brain

## X Factor Education



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# The Decade of the Brain

The 1990's were called the '*decade of the brain*' due to significant advancements in brain scanning technologies.

## What did we find out?

- \* The growth of the frontal cortex is *experience dependent*.
- \* The first thousand days **ARE** the most important.

Cozolino, Louis (2006). *The neuroscience of human relationships: Attachment and the developing social brain*. New York, NY, US: W. W. Norton & Co.

*Me ohu tātoa, kia whai hua te ao*



# Weight of a brain at 0, 3 & Adult



300 350 400 500 600 700 800 900 1 kilo 1.1 1.2 1.3 1.4

**Newborn  
baby brain**  
*350 grams*

**Three year  
old brain**  
*1.2 kilos*

**Adult brain**  
*1.4 kilos*

*Me ohu tātoa, kia whai hua te ao*



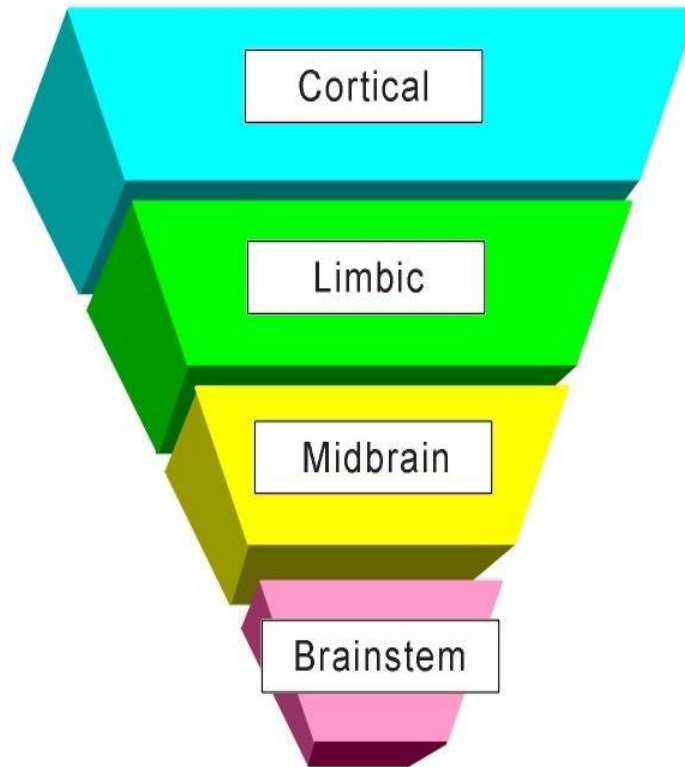
# The Human Brain



*Me ohu tātoa, kia whai hua te ao*



# Perry's Neuro-sequential Model



**Empathy - Controlling  
Yourself - Literacy**

**Emotional Response**

**Coordination -  
Movement**

**Heart Rate  
Fight – Flight - Freeze**

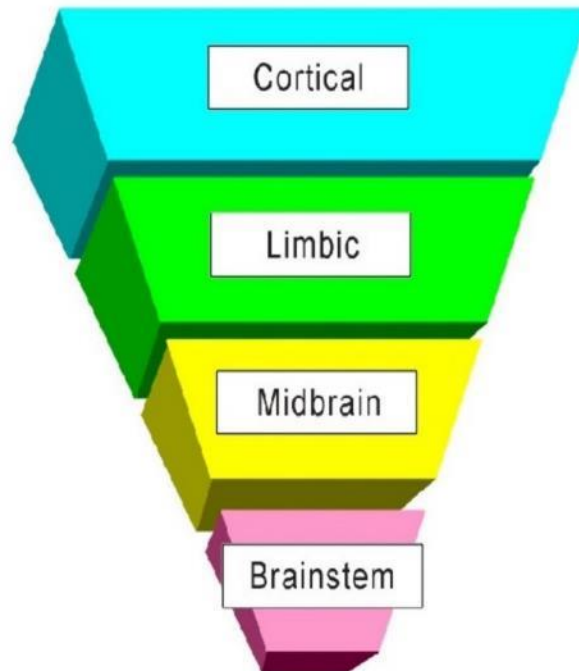
Perry, B.D. (2002). *Brain Structure and Function 1: Basics of Organisation*. Adapted in part from "Maltreated Children Experience, Brain Development and the Next Generation (W.W. Norton & Company)

*Me ohu tātoa, kia whai hua te ao*

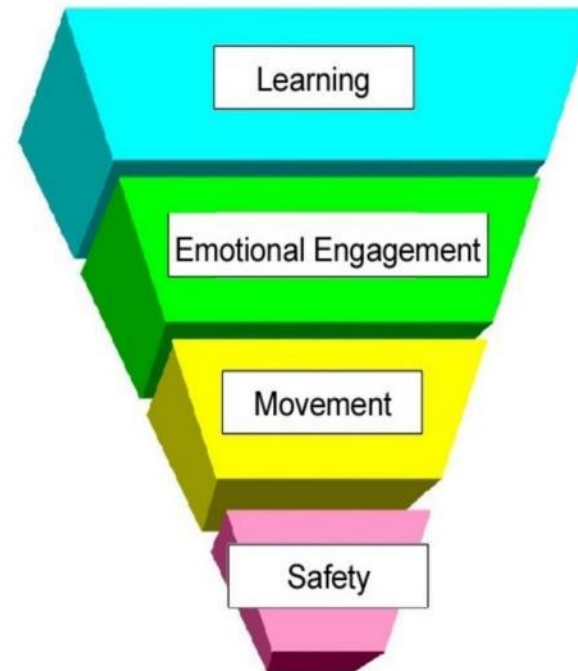


# Brain & Pedagogy

## BRAIN



## NEEDS

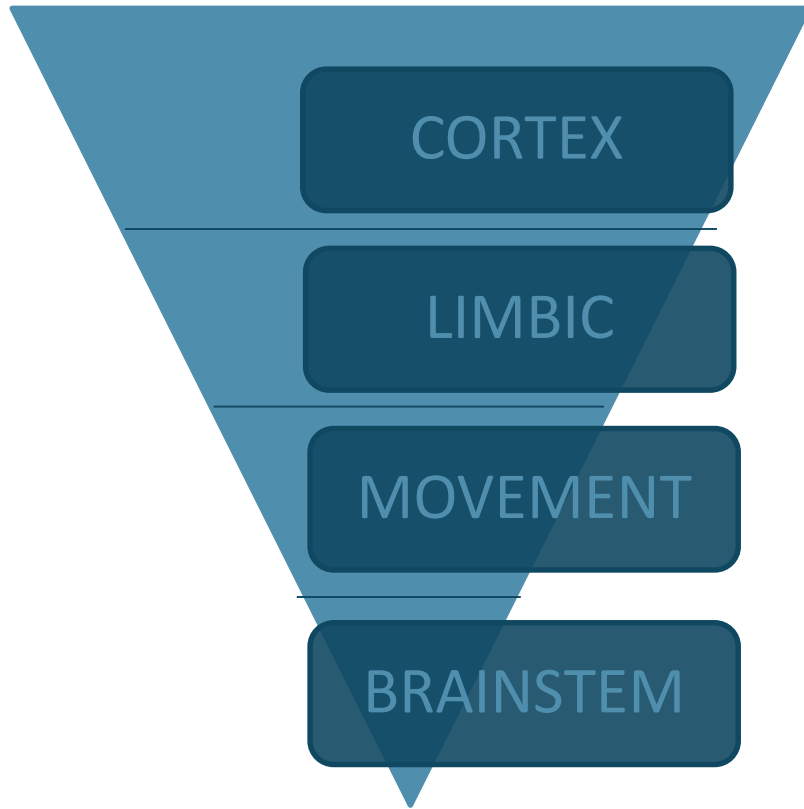


Adapted from: McCaleb, M. & Mikaere-Wallis, N. *Relationship-shaping: Teacher consistency and implications for brain development*. *The First Years/Ngā Tau Tuatahi: New Zealand Infant and Toddler Education*, 7(2), 21-25

*Me ohu tātoa, kia whai hua te ao*



# Te Whānau Roro



**Tamaiti**

**Nga Mātua  
(me Nga Rangatahi!)**

**Kaumātua**

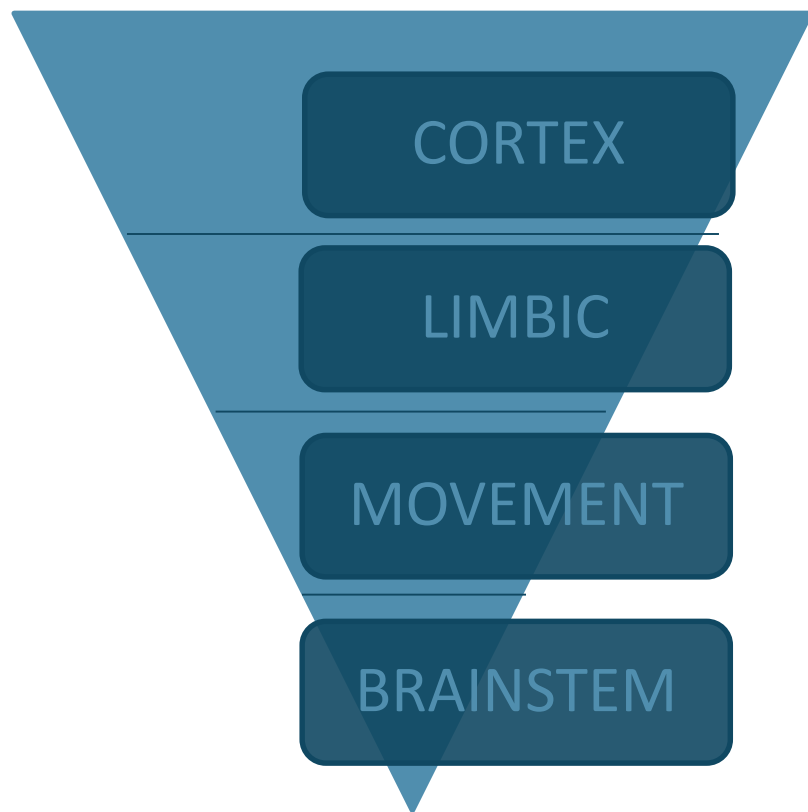
**ATTACHMENT**



**STRESS**







**Kai meets the needs of all FOUR**

**4. Learning (wananga)**

**3. Emotional Validation  
(whakawhanaungatanga)**

**2. Rhythm (waiata)**

**1. Safety (karanga & karakia)**

**ATTACHMENT**

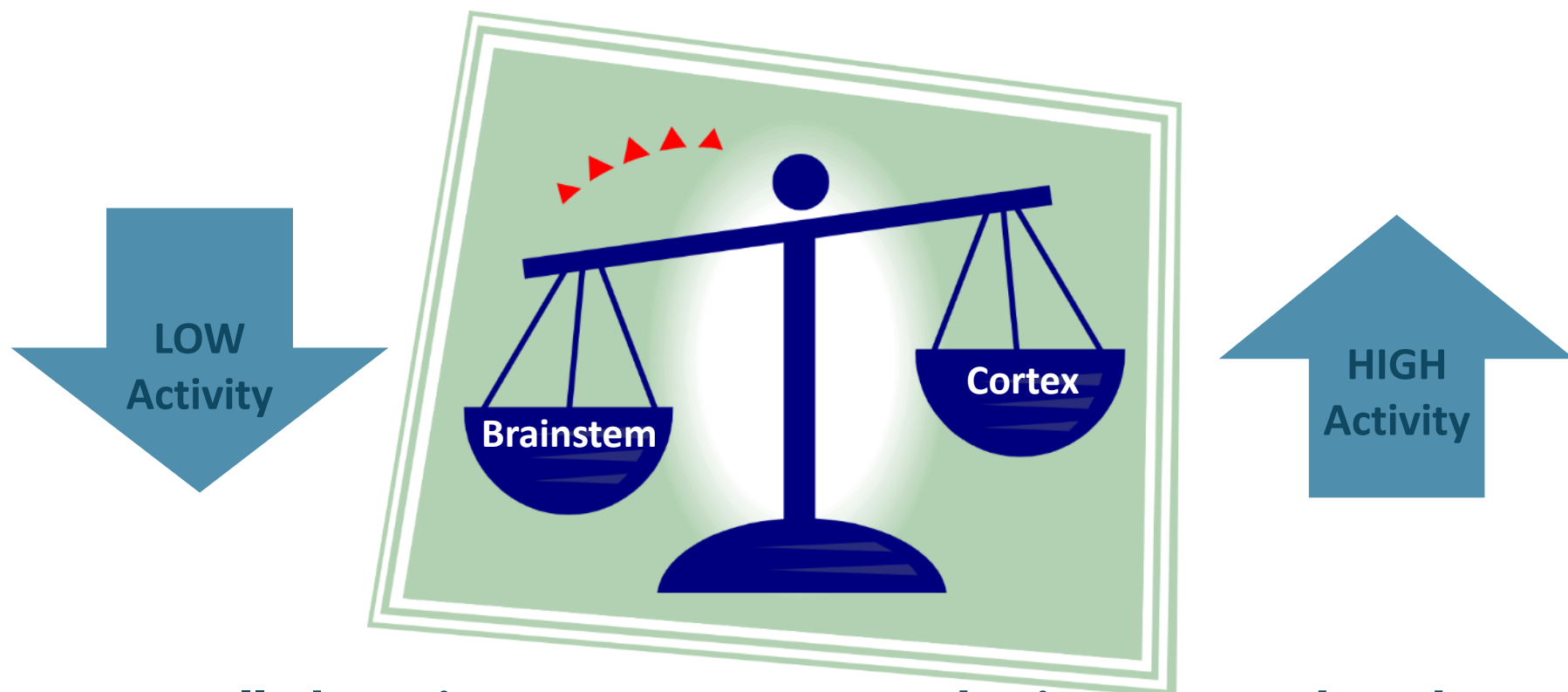


**STRESS**





**As one increases, the other declines – and vice versa**



**To really be using your cortex, your brainstem needs to be CALM.**

*Me ohu tātoa, kia whai hua te ao*



# Effects of Trauma, abuse & neglect on the developing brain



*Me ohu tātoa, kia whai hua te ao*



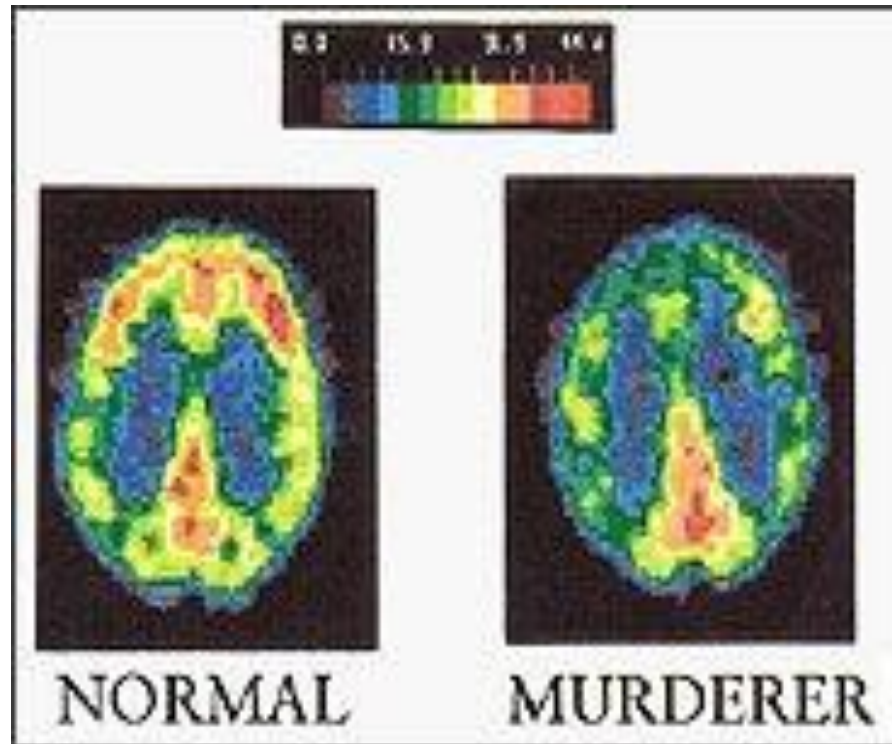


Image from Raine, A. (2009). *Murderous Minds: Can we see the mark of Cain?*  
Accessed from [www.dana.org/news/cerebrum/detail](http://www.dana.org/news/cerebrum/detail)

*Me ohu tātoa, kia whai hua te ao*



# Biology of Comfort

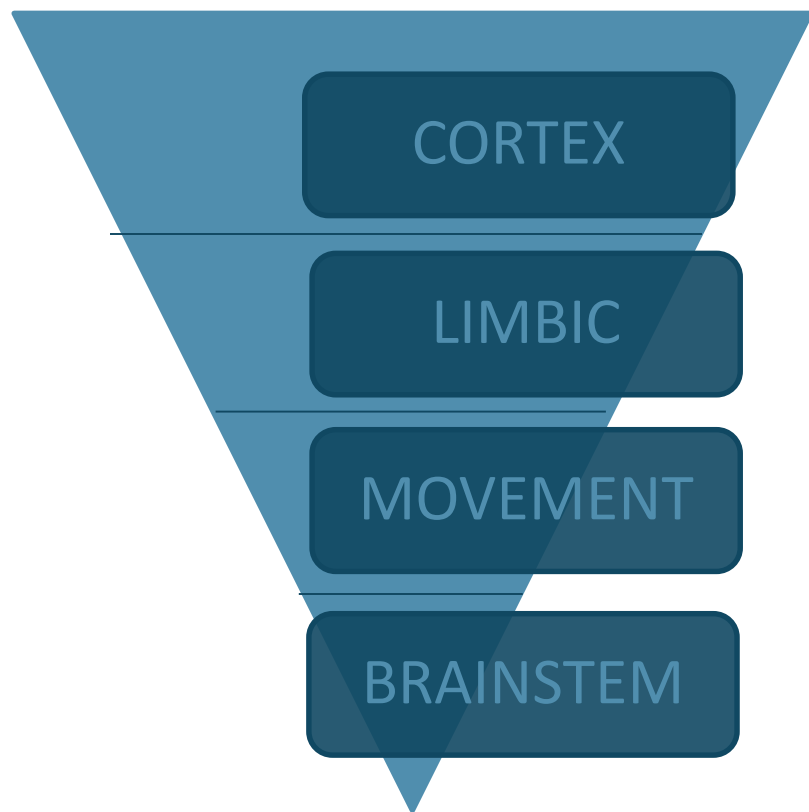
- **Links brain stem to heart, lungs and stomach.**
- **As a child is reassured, the heart, lungs & stomach settle.**
- **Alarm system dimmer switch: not just on/off.**
  
- **Good vagal tone linked to better emotional balance:**
  - **Better emotional balance**
  - **Clear thinking**
  - **Improved attention span**
  - **More effective immune system**

Sunderland, M. (2006) *The Science of Parenting* London: Dorling Kindersley

*Me ohu tātoa, kia whai hua te ao*





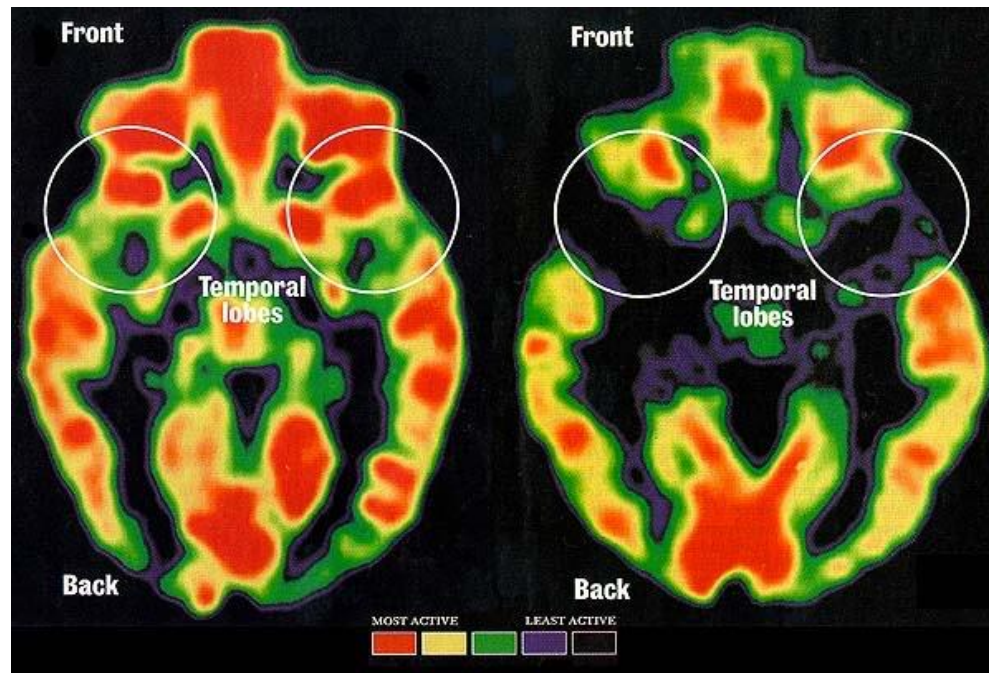


*Me ohu tātoa, kia whai hua te ao*





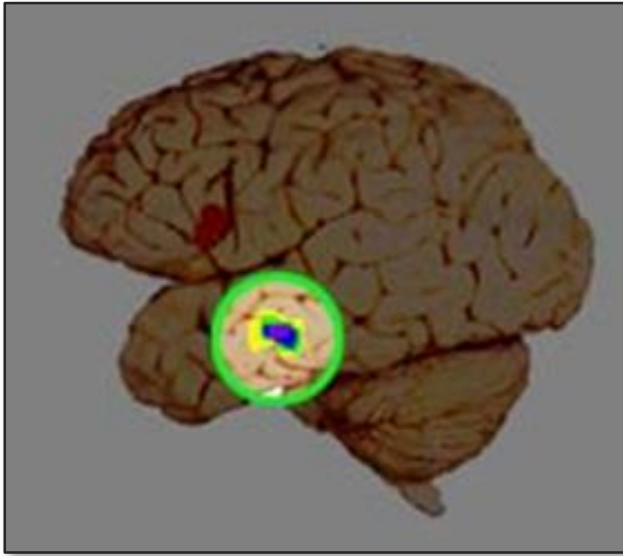
# Effects of Trauma, abuse & neglect on the developing brain



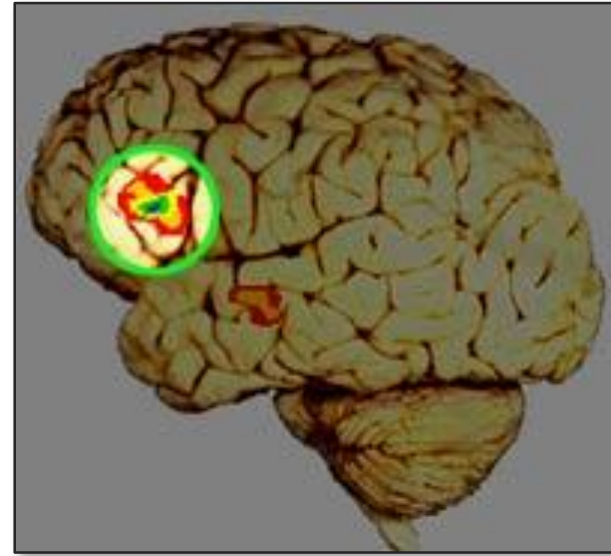
*Me ohu tātoa, kia whai hua te ao*



# Effects of Trauma, abuse & neglect on the developing brain



**Adolescent**



**Adult**

Yurgelun-Todd, D. (2002) Frontline interview "Inside the Teen Brain" on [www.pbs.org/wgbh/pages/frontline/shows/teenbrain/interviews/todd.html](http://www.pbs.org/wgbh/pages/frontline/shows/teenbrain/interviews/todd.html)

*Me ohu tātoa, kia whai hua te ao*



# Amygdala vs Frontal Cortex



**Reading  
Facial  
Expressions**

**Fusiform  
Gyrus**

Yurgelun-Todd, D. *Emotional and cognitive changes during adolescence*. Current Opinion in Neurobiology 2007, 17:251-257

*Me ohu tātoa, kia whai hua te ao*



# Memory and Alcohol

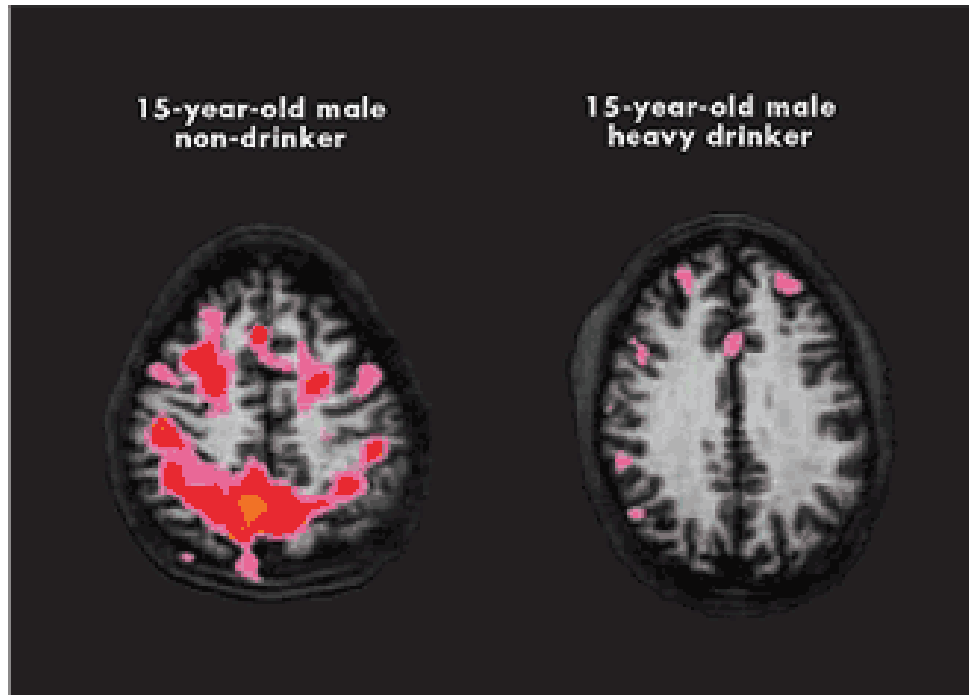
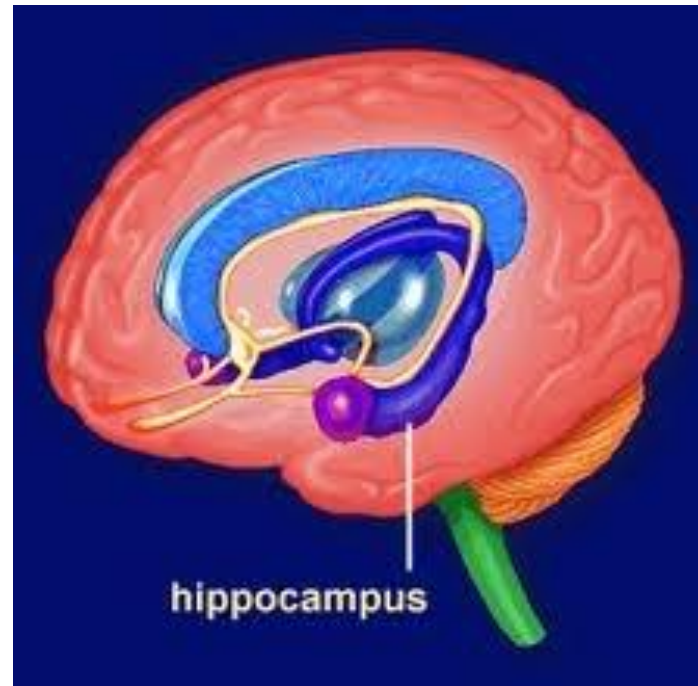


Image from Susan Tapert PhD. University of California, San Diego.

*Me ohu tātoa, kia whai hua te ao*



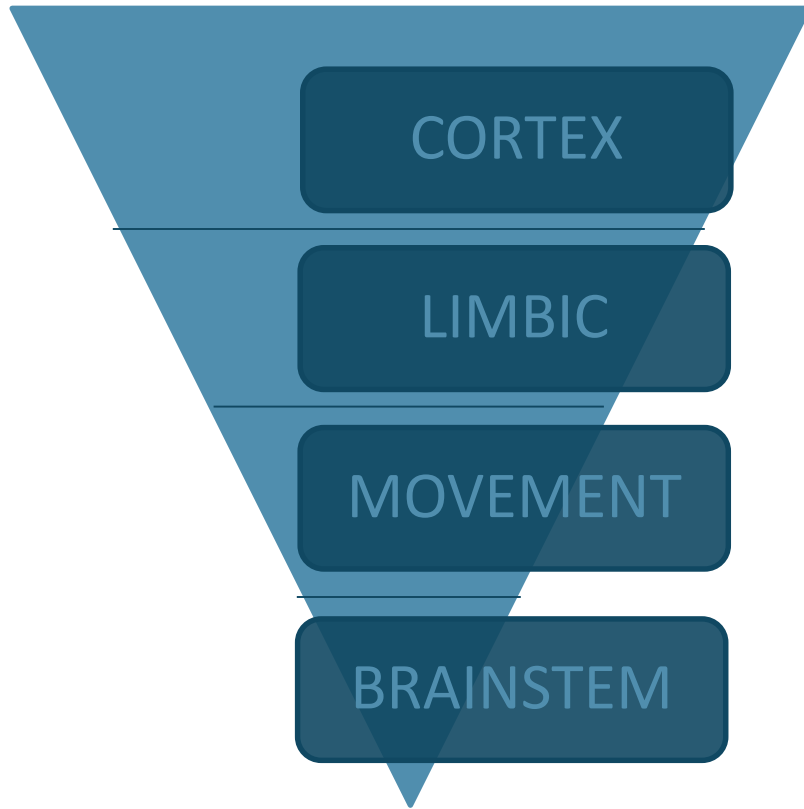
# Hippocampus



*Me ohu tātoa, kia whai hua te ao*



# Neuro-sequential Needs



**4. Executive Functions**

**3. Self Esteem, Dispositions  
& Emotional Connection**

**2. Rhythmic Patterning  
& Lateralisation**

**1. Calm the HPA Axis**

**ATTACHMENT**



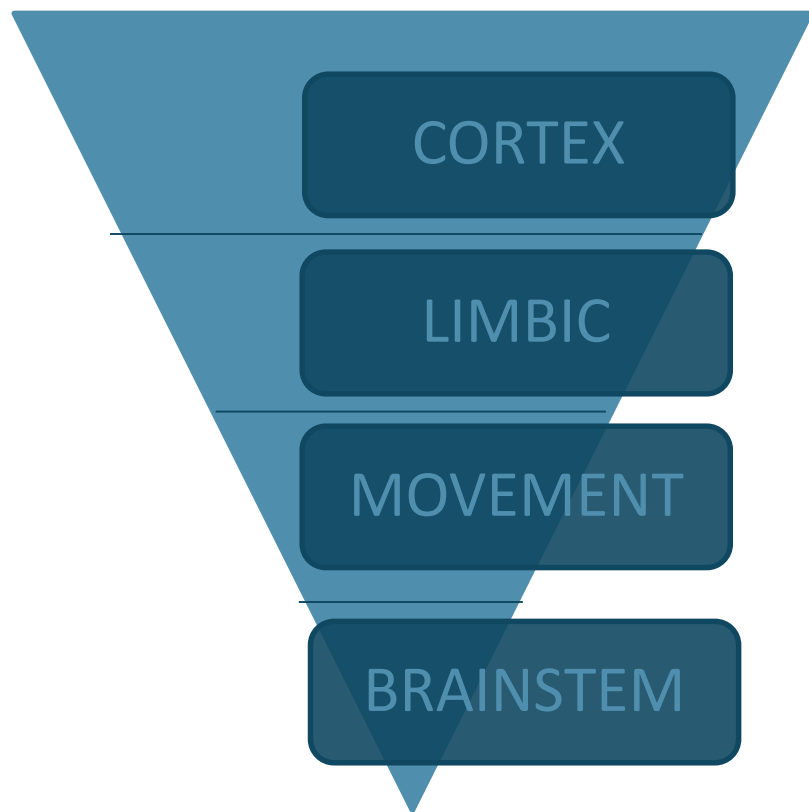
**STRESS**

*Me ohu tātoa, kia whai hua te ao*





# Trauma Background



**Kia meets the needs of all FOUR**

**4. Learning**

**3. Emotional Validation**

**2. Rhythm**

**1. Safety**

**ATTACHMENT**

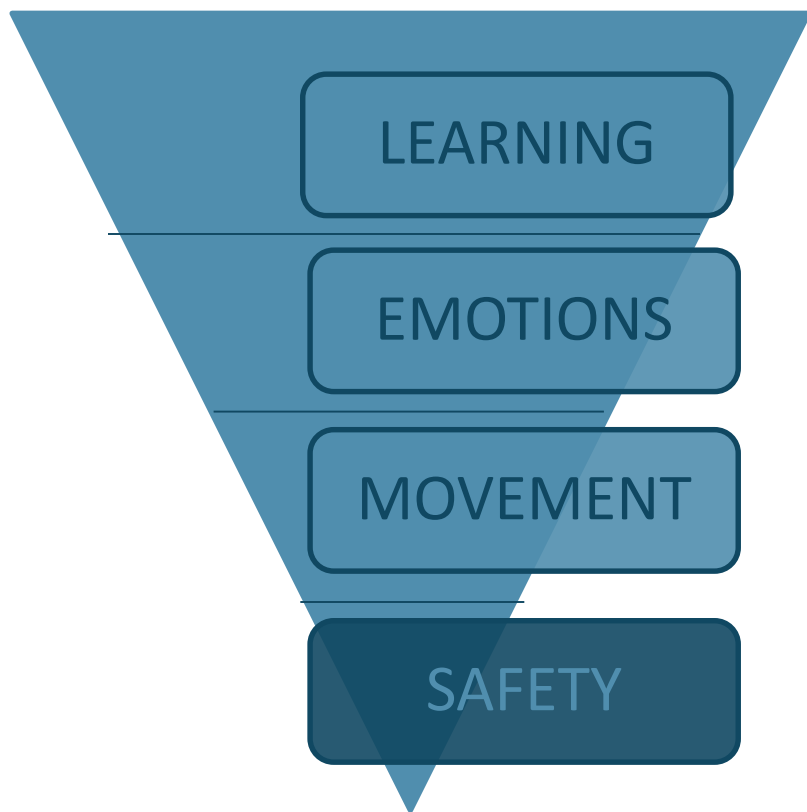


**STRESS**

*Me ohu tātoa, kia whai hua te ao*



# Four parts of the brain - Brainstem



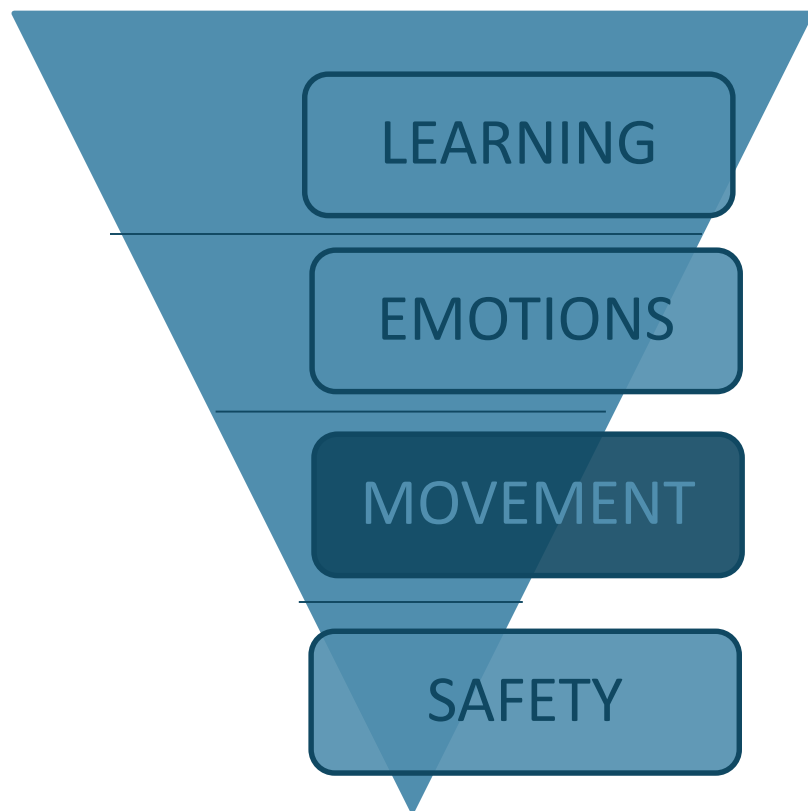
- **Karakia**
- **Kaumatua**
- **Touch (mirimiri)**
- **Sensory Pathways**
- **Predictability (karaka)**
- **Autonomy**
- **Water & kai**
- **Dyadic Relationship**



*Me ohu tātoa, kia whai hua te ao*



# Four parts of the brain - Movement



- **Rhythmic Patterning**
- **Routine**
- **Ritual**
- **Waiata**
- **Motivation**
- **Kapa Haka**
- **Movement Autonomy**
- **Corpus Callosum**

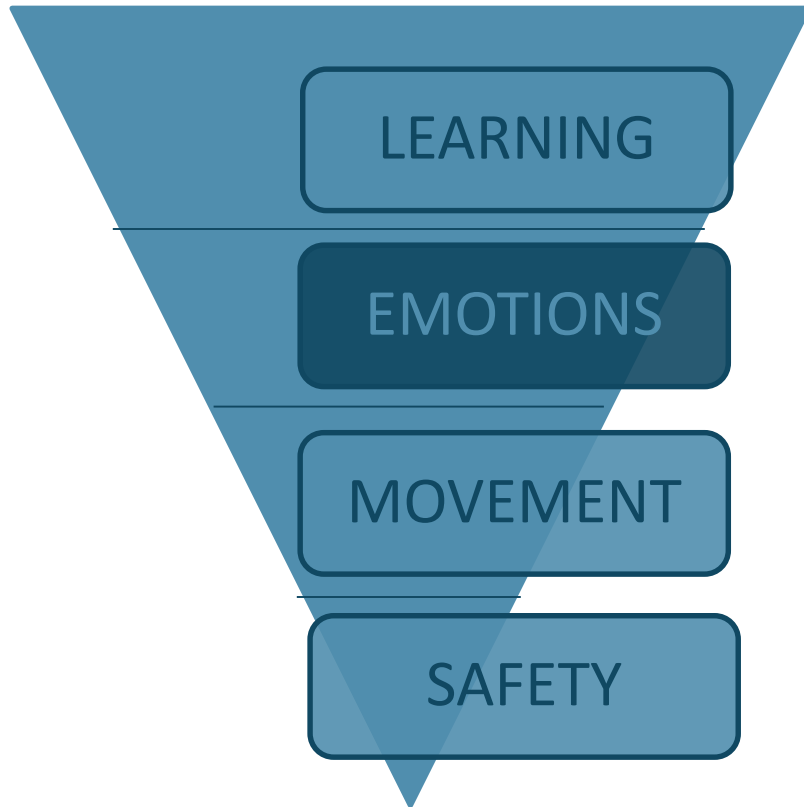


*Me ohu tātoa, kia whai hua te ao*





# Four parts of the brain - Limbic



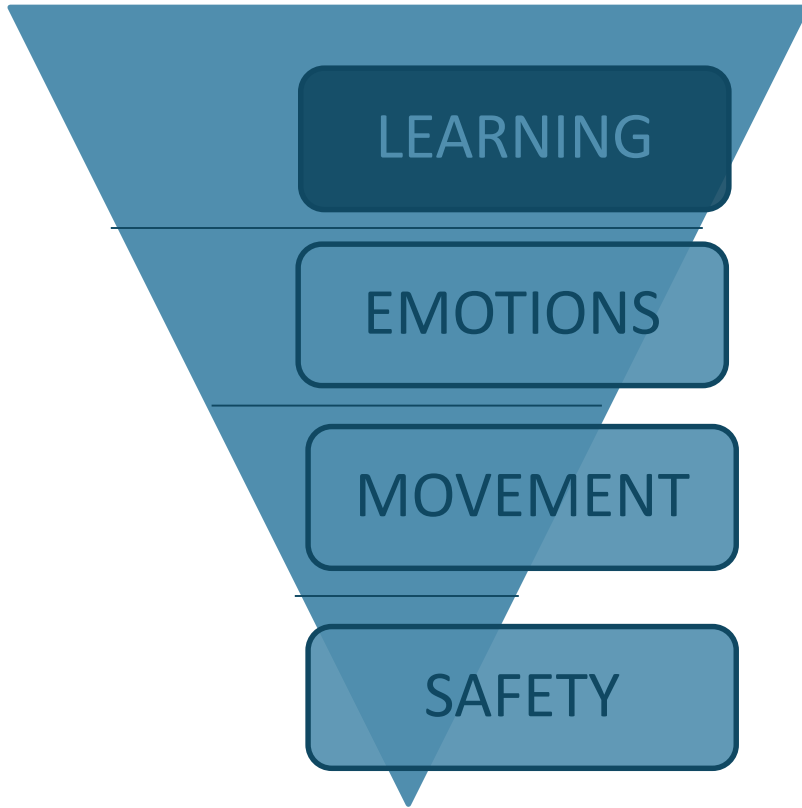
- **Validation**
- **Self Esteem**
- **Dispositions**
- **Naming emotions**
- **Reframing**
- **Risk Taking**
- **Cultural Validation & Restoration**



*Me ohu tātoa, kia whai hua te ao*



# Four parts of the brain - Cortex



- **Academic Achievement**
- **Empathy**
- **Self regulation**
- **Problem Solving**
- **Inhibitory control**
- **Working memory**
- **Metacognition**
- **Detachment**

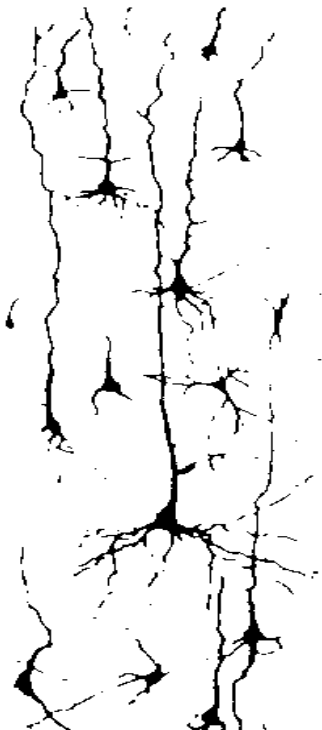


*Me ohu tātoa, kia whai hua te ao*



# Pruning

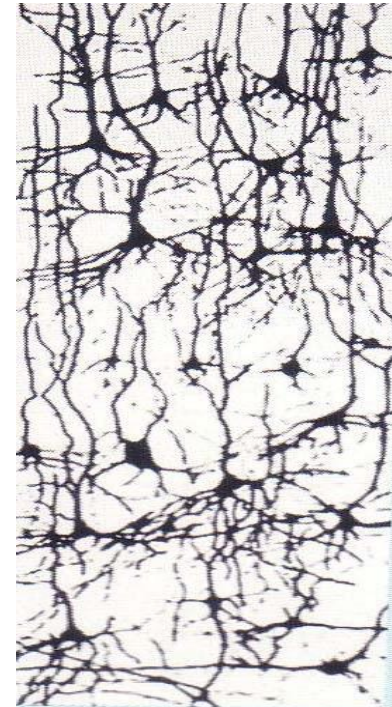
**At Birth**



**3-6 years**



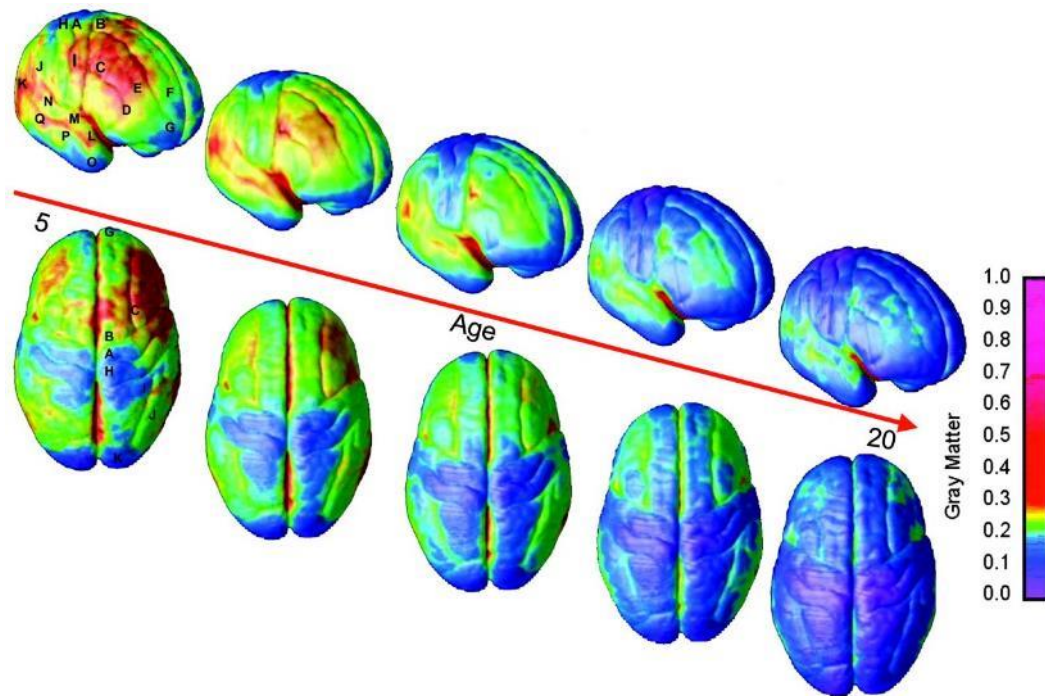
**14 years**



*Me ohu tātoa, kia whai hua te ao*



# Changes to the Cellular Architecture of the Brain in Adolescence



*Me ohu tātoa, kia whai hua te ao*



## If we imagine the brain as a tree...

**Endorphins  
=  
Fertilizer**

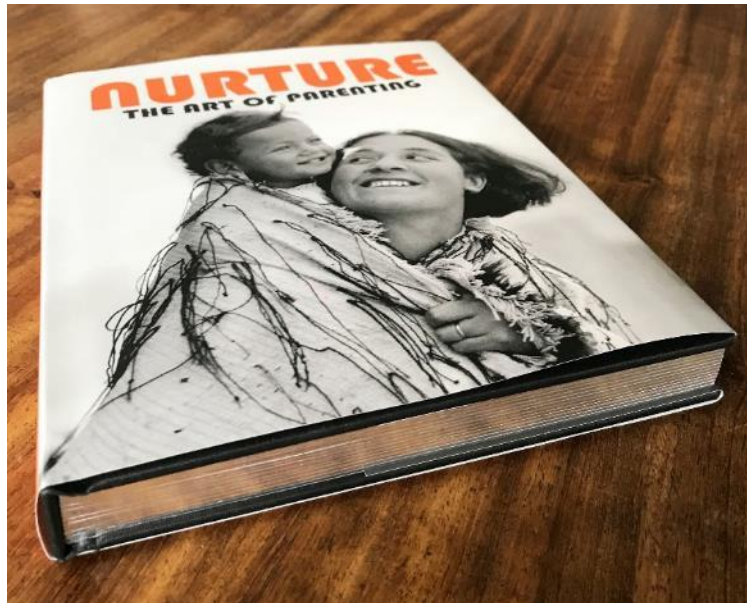


**Cortisol =  
Weed Killer**

*Me ohu tātoa, kia whai hua te ao*



## NURTURE – by Peter Alsop & Nathan Wallis



*"By opening our hearts and minds to ideas – both sharing them and receiving them – we embrace a timeless truth: it takes a village to raise great children"*

Available at [www.pottonandburton.co.nz/store/NURTURE](http://www.pottonandburton.co.nz/store/NURTURE)

*Me ohu tátoa, kia whai hua te ao*





New App available on iPhone & Android  
just search

## ***Parenting Baby's Brain***



New Book by Peter Alsop & Nathan Wallis

## **NURTURE – The Art of Parenting**

*Available at [www.pottonandburton.co.nz/store/NURTURE](http://www.pottonandburton.co.nz/store/NURTURE)*



New Documentary series

## **An Anxious World: Children**

<https://attitudelive.com/watch/An-Anxious-World-Children-Part-1>

<https://attitudelive.com/watch/An-Anxious-World-Children-Part-2>



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# Love Grows Brains



[wrightfamilyfoundation.org.nz](http://wrightfamilyfoundation.org.nz)

*Me ohu tātoa, kia whai hua te ao*



# References

The Mediational Role of Neurocognition in the Behavioural Outcomes of a Social-Emotional Prevention Program in Elementary School Students: Effects of the PATHS Curriculum. Nathaniel R. Riggs et al. in *Prevention Science*, Vol. 7, No. 1 pages 91-102; March 2006

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Behavioral and Neural Correlates of Delay of Gratification 40 Years Later. B.J. Casey et al. in *Proceedings of the National Academy of Science USA*, Vol. 108, No. 6, pages 14,998-15,003; September 6, 2011

Computerized Training of Working Memory in Children with ADHD- A Randomized, Controlled Trial. T. Klingberg, E. Fernell, P.J Olesen, M. Johnson, P. Gusstafsson, K. Dahl-strom, C.G Gillberg, H.Forssberg and H. Westerberg in *Journal of the American Academy of Child and Adolescent Psychiatry*, Vol. 44, No. 2, pages 177-186; February 2005

Improving Fluid Intelligence with Training on Working Memory. Susanne M. Jaeggi, Martin Buschkuhl, John Jonides and Walter J. Perrig in *Proceedings of the National Academy of Sciences USA*, Vol. 105, No. 19, pages 6829-6833; May 13, 2008.



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*Can Training in a Real-Time Strategy Video Game Attenuate Cognitive Decline in Older Adults?* C. Basak, W.R. Boot, M. W. Voss and A. F. Kramer in *Psychology of Aging*, Vol. 23, No. 4, pages 765-777; December 2008

Differential Effects of Reasoning and Speed Training In Children. Allyson P. Makcey, Susanna S. Hill, Susan I. Stone and Silvia A. Bunge in *Developmental Science*, Vol. 14, No. 3, pages 582-590; May 2011

Short- and Long-Term Benefits of Cognitive Training. Susanne M. Jaeggi Marton Buschkuehl, John Jonides and Priti Shah in *Proceedings of the National Academy of Sciences USA*, Vol. 108, No. 25, pages 10,081-10,086; June 21, 2011

Short-Term Music Training Enhances Verbal Intelligence and Executive Function. Sylvain Moreno, Ellen Bialystok, Raluca Barac, E. Glenn Schellenberg, Nicholas J. Cepeda and Tom Chau in *Psychological Science*, Vol. 22, No. 11, pages 1425-1433; June 21, 2011

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A Bidirectional Model Of Executive Functions and Self Regulation. Clancy Blair and Alexandra Ursache in *Hand-book of Self-Regulation: Research, Theory, and Applications*. Second edition. Edited by Kathleen D. Vohs and Roy F. Baumeister. Guilford Press, 2011.

Child Development in the Context of the Adversity: Experiential Canalization of Brain and Behavior. C. Blair and C. C. Raver in *American Psychologist*, Vol. 67, No. 4, pages 309-318; May-June 2012



## Further Reading

Perry, Bruce D. and Szalavitz, Maia (2006) *The Boy Who Was Raised as a Dog: And Other Stories from a Child Psychiatrist's Notebook*, Basic Books

Perry, Bruce D. And Szalavitz, Maia (2010) *Born for Love: Why Empathy is Essential – And Endangered*, Harper Collins

Siegel, Daniel (2013) *Brainstorming – The Power and Purpose of the Teenage Brain*, Penguin Group

Gluckman, Sir Peter (2011) *Report: Improving the Transition*, Prime Minister's Science Advisory Committee

Doidge, Norman (2015) *The Brain's Way of Healing*, Scribe Publications



## The traditional Maori whanau

The major socialisation fact in the pre-European Maori family as reported by the earliest European observers, *was the place of the nurturing warrior – the father as carer along with the mother*. The whole whanau contained multiple parents in grandparents, uncles and aunts and minders in older cousins as well as siblings. *All were committed to raising the children*, very much in the model left from the primal whanau.

*The children participated in kaumatua (elders) councils*. Both men and women were of chiefly status. Children were trained to do the varied roles of adulthood – warriors, judges, food producers, artists, builders and caregivers. They witnessed all forms of cannibalism and slavery. Many slaves, however, were treated as members of whanau. *All the observers commented that the children and youth were years ahead of European children and youth in all aspects of life*.

Te Kahui Mana Ririki, Auckland, New Zealand, May 2011

*Me ohu tātoa, kia whai hua te ao*



# What were the traditional techniques used in learning? Principles of child rearing.

## Rev. Samuel Marsden 1814-

'I saw no quarrelling while I was there. They are kind to their women and children. *I never observed either with a mark of violence upon them, nor did I ever see a child struck*' [ed. Elder, J.R., *The Letters and Journals of Samuel Marsden*, 128]

'The New Zealanders *do not correct their children lest they should abate their courage or subdue their violent passions*. Hence the children are in no subjection to their parents.' [ed. Elder:479]

Compiled by Rawiri Taonui

*Me ohu tātoa, kia whai hua te ao*



## Joel Polack 1838

'The New Zealand *father is devotedly fond of his children, they are his pride, his boast, and peculiar delight*; he generally bears the burden of carrying them continually within his mat.

*The children are seldom or never punished*; which consequently, causes them to commit so many annoying tricks, that continually renders them deserving of a sound, wholesome castigation.

The father performs the duty of a nurse; *and any foul action the embryo warrior may be guilty of, causes a smile rather than a tear from the devoted parent.* [I:374] *Manners and Customs of the New Zealanders*

Compiled by Rawiri Taonui

*Me ohu tātoa, kia whai hua te ao*



***They also ask questions in the most numerous attended assemblies of chiefs, who answer them with an air of respect, as if they were a corresponding age to themselves.***

I do not remember a request of an infant being treated with neglect, or a demand from one of them being slighted.' [*Manners and Customs of the New Zealanders*, I:378-9]

Compiled by Rawiri Taonui

*Me ohu tātoa, kia whai hua te ao*





## George French Angas 1847

'Both parents are almost idolatrously fond of their children; and the *father frequently spends a considerable portion of his time in nursing his infant*, who nestles in his blanket, and is lulled to rest by some native song.

The children are cheerful and lively little creatures, full of vivacity and intelligence. *They pass their early years almost without restraint, amusing themselves with the various games of the country*' [Angas, 1847:313-4]

Compiled by Rawiri Taonui

*Me ohu tātoa, kia whai hua te ao*



## Edward Shortland 1856

'Curbing the will of the child by harsh means was thought to tame his spirit, and to check the free development of his natural bravery. *The chief aim, therefore, in the education of children being to make them bold, brave, and independent in thought and act, a parent is seldom seen to chastise his child, especially in families of rank.*

Were he to do so, one of the uncles would probably interfere to protect his nephew, and seek satisfaction for the injury inflicted on the child by seizing some of the pigs or other property of the father.' [156]

Compiled by Rawiri Taonui

*Me ohu tātoa, kia whai hua te ao*



## William Colenso 1868

'Their love and attachment to children was very great ... They certainly *took every physical care of them; and as they rarely chastised (for many reasons) of course, petted and spoiled them.*

The father, or uncle, often carried or nursed his infant on his back for hours at a time, and might often be seen quietly at work with the little one there snugly ensconced' [On the Maori Races of New Zealand,' *TNZInst* I, 30]

Compiled by Rawiri Taonui

*Me ohu tátoa, kia whai hua te ao*