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# Understanding Neurobiology of Complex Trauma

## KWY

### Kinship Carers

### February 2023

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The Australian Childhood Foundation acknowledges Aboriginal and Torres Strait Islander people as the traditional custodians of this land and we pay our respect to their Elders past, present and future.



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### Take care of you today....

The content of this training can evoke strong emotions and may trigger **personal experiences of trauma**. Please be mindful of your own wellbeing during this training and if you need support please do what you need to do to feel safe. We are happy for you to talk to the facilitator if you need to.





Image: Hellovector.com



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**Our journey today....**

- Importance of relationships and culture
- Brain development
- Understanding the impacts of trauma
- Creating Safety
- 5 Parenting Systems
- Repairing the impacts of trauma all the way through today



Image: Aboriginal Art Store

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**Importance of relationship and culture**



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**A collective view of relationships**



Community  
Skin Group  
Clan Moicity Totem  
Parents Siblings  
Child

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**I need connection to my CULTURE**

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**The Importance of Culture**

**A protective factor**

**Safety:** Belonging  
**Relationships:** Connection  
**Meaning making:** identity

Our culture influences our brain development.  
How has it influenced yours? Think about:

- Sense of safety
- Relationships
- Meaning making

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**The five cultural capabilities**

Image: Griffith University 2016

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Southern Cultural Immersion

Mukapanthi

Kauria Warra Pintyanthi

Uncle Rod O'Brien

Kauria owned and operated

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Living in two worlds

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Brain Development

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### Brain development

- The brain develops through a mix of genetics and environmental factors.
- Key to this development are relationships
- The brain develops sequentially from the bottom up



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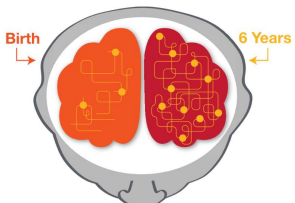
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### Neuronal connections

- The neural system has the ability for one neuron to communicate with up to 10,000 other neurons
- The newborn brain has approximately 100 billion neurons



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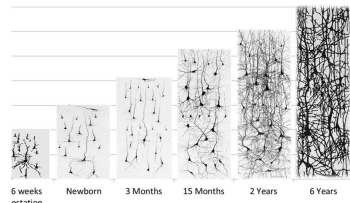
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### Neuronal development



- Rapid growth occurs from birth to 6 years
- **Critical period** of development
- Healthy neuronal development occurs through **relationships, regulation, repetition**

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### Neuronal development

- Early years – period of **rapid growth**
- Followed by onset of puberty in which **synaptic pruning and formation of new neurons** occurs.

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### Sequential brain development – building blocks

- The Thinking brain**  
3-5 Years
- The Emotions and Memory Brain** - Birth to 4 years
- The Movement Brain**  
Birth – 2 years
- The survival brain**  
Pre birth to 8 months

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### Brainstem - basic life functions

- Basic life functions
- First part of our brain to develop
- This is the most developed brain part at birth
- Responsible for our heart beat, breathing, sucking, temperature control, blood pressure

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**Cerebellum- movement and balance**

- Helps us to know where our body is in space
- Helps us with our posture and balance
- Helps us not to fall over and to control our movements
- Has its own connective pathways between the 2 halves- cerebellar vermis



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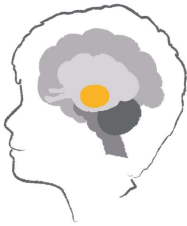
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**Diencephalon - sorting & sending centre**

- This area of the brain develops mainly after birth
- It sorts out messages coming into the brain and sends them
- It uses hormones to send signals to body
- Hormonal signals tell your body what it needs, eg. food, water, love



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**Limbic lobe- emotional gateway**

- The part of the brain that helps us attach an emotion to an experience or memory
- This part of the brain is particularly involved with the emotions of fear and anger
- Also heavily involved in attachment processes
- This area develops mainly after birth



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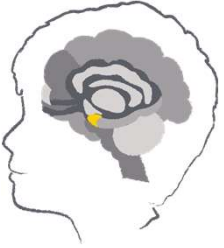
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### Amygdala – smoke alarm

- Detects threat
- Develops from birth
- Learns by association
- Involved in implicit memory processes



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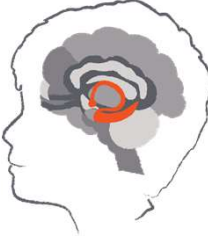
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### Hippocampus – Brain’s historian

- Explicit memory system
- Develops approximately 2-3 years of age
- Provides context to memory and embeds long term memory



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### Neuroplasticity is hope

- The brain is at its most plastic in early childhood
- In early childhood, the brain is most vulnerable to harm, but also has the greatest potential for healing
- Neuroplasticity gives us hope



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### Cerebral cortex- complex thinking

- The largest part of the brain
- Associated with higher brain function such as thought and action
- Examples of functions:
  - Reasoning
  - Logic
  - Judgement
  - Voluntary movement



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### The prefrontal cortex- executive function

- Responsible for executive functions, such as judgement, reasoning, and self-awareness
- Final part of the brain to reach maturity in one's mid 20s
- Under reconstruction in adolescents from the age of approximately 12 years



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A hand-drawn diagram on a whiteboard. It features a person and a child. The person is holding a large vertical list of icons. The child is holding a smaller list of icons. There are various other icons and text scattered around, including a heart and some illegible text. A hand is visible in the foreground, pointing at the diagram.

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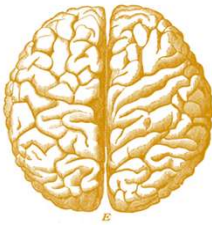
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### Lateral brain development


**Left Hemisphere**

- Evaluates language content
- Optimistic hemisphere
- Understands beginning, middle and end
- Learns from the past and expects the future
- Looks for patterns



**Right Hemisphere**

- In the present moment
- Eye contact
- Facial expression
- Tone of voice
- Posture
- Gesture
- Intensity
- Is mute
- Grasps the whole


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### Brain development metaphor - My Brain House

- We build our brain from the bottom to the top- like building a house
- We reinforce parts of our house as we grow, with our roof continuing to develop into our mid 20s.
- A student who is calm and focused at school will likely be functioning with a strong standing brain house, from foundation to roof.
- In times of great stress bits of our brain house can come down and require repair. This is achievable and our brain house can stand strong again.




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### Staged/Safe- A brain development metaphor - My Brain House

- Our brain house can experience adversity. This can effect its structural integrity. If we get rattled our thinking cap roof can come off, leaving our feeling walls exposed. This can lead to strong emotions coming out without our thinking cap to help us contain our feelings.
- When this happens we can struggle to find words to communicate as our words flew off with our thinking cap roof.
- If we are deeply shook our roof and walls might come down and leave only our foundation. Our foundation is very strong and reliable. In these times we have our basic life functions to focus on to get us through- eg. our breathing, our heartbeat.
- Everyone's rooves blow off from time to time. Given we have all built our own brain houses, we are all equipped to support each other to repair our houses together.



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### Understanding the impacts of trauma



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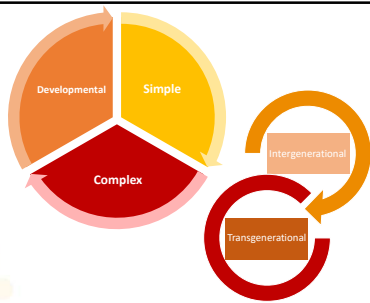
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### Defining trauma

Any single, ongoing or cumulative experience which:

- is a response to a **perceived threat**, usually to survival
- **overwhelms** our capacity to cope
- feels/is **outside our control**
- often evokes a **physiological** and **psychological** set of responses based on fear or avoidance



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### Intergenerational Trauma

- The prefix 'inter' is from the Latin meaning between, or among, together or mutually together

• Inter-generational trauma is passed down directly from one generation to the next



- Inter-generational trauma occurs directly through experiencing the trauma or from seeing or hearing about it



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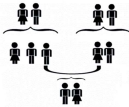
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### Transgenerational trauma

- The prefix 'trans' is from the Latin word meaning across or crossing, through, beyond or on the other side

• Trans-generational trauma is transmitted across a number of generations



"This type of trauma occurs without direct stimulus but is instead transmitted from a parent who has experienced a traumatic event"

(Davidson & Mellor 2001 as cited in Goodman, West & Cicciocioppo, 2008)



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### Culture and Transgenerational Trauma



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**Transgenerational transmission and cultural impacts**

Duran and Duran (1995) suggest that:  
 "...historical trauma becomes embedded in the cultural memory of a people and is passed on by the same mechanisms by which culture is generally transmitted, and therefore becomes 'normalised' within that culture."

Atkinson, J., *Trauma Trails: Recreating Song Lines*, 2002



**Culture and development**

- Our culture influences our brain development
- Our relationships influence our culture and our culture influences our relationships
- Sensory data is interpreted according to our culture long before our ability to think about and understand our culture

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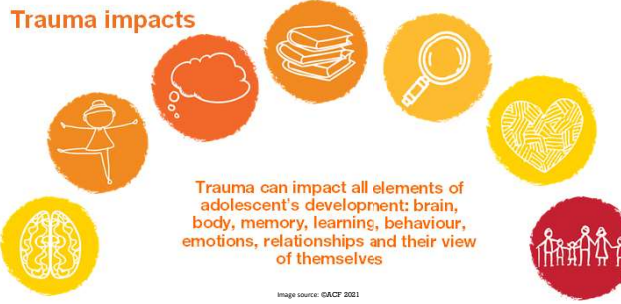
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**Trauma impacts**



Trauma can impact all elements of adolescent's development: brain, body, memory, learning, behaviour, emotions, relationships and their view of themselves

Image source: GACF 2021

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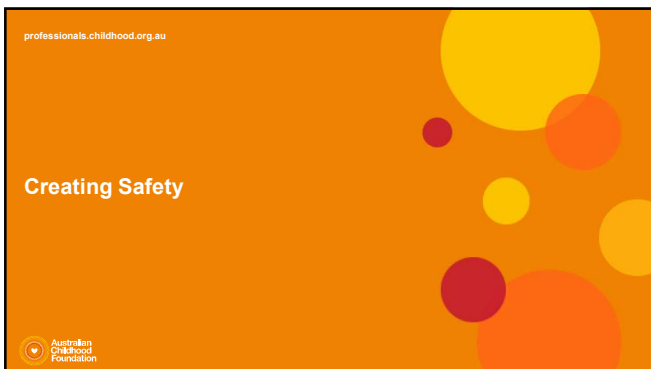
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**Creating Safety**



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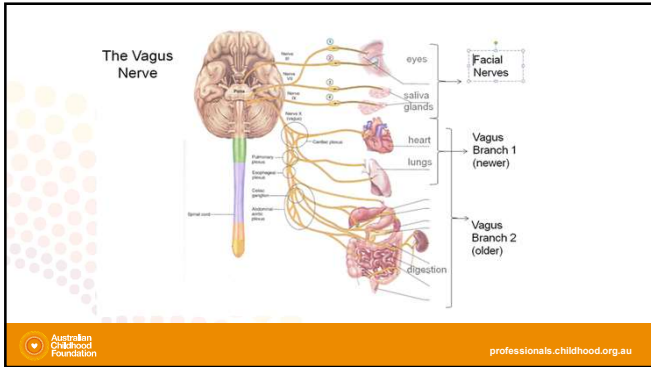
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Behavioural Functions	Body Functions
<b>Social Engagement</b> Soothing and calming Indicates safety	<ul style="list-style-type: none"> <li>Lowers or raises vocalisation pitch</li> <li>Regulates middle ear muscles to perceive human voice</li> <li>Changes facial expressivity</li> <li>Head turning</li> <li>Tears and eyelids</li> <li>Slows or speeds heart rate</li> </ul>
<b>Mobilisation</b> Fight or Flight Active Freeze Moderate or extreme danger	<b>Hyper arousal</b> <ul style="list-style-type: none"> <li>Increases heart rate</li> <li>Sweat increases</li> <li>Inhibits gastrointestinal function</li> <li>Narrowing blood vessels - to slow blood flow to extremities</li> <li>Release of adrenaline</li> </ul>
<b>Immobilisation</b> Collapse or submission Death feigning Increased pain threshold Conserves metabolic resources Life threatening situations	<b>Hypo - arousal</b> <ul style="list-style-type: none"> <li>Slows heart rate</li> <li>Sweat decreases</li> <li>Constricts bronchi</li> <li>Stimulates gastrointestinal function</li> </ul>

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**When I am terrified**

- Containment- help me feel back in my body
- Grounded- Help me feel present in the Here and Now.
- Present- Stay with me, help me know I am not alone in my distress

**Notice and name**

5 things you can see  
 4 things you can hear  
 3 things you touch/sense  
 2 things you can smell  
 1 thing you can taste



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### Creating Safety

A young person's cortical capacity is impaired by trauma-as a result subcortical functioning becomes dysregulated

In order to regain cortical capacity, essential for learning, we must restore emotional regulation.

How do we create:

- Regulation (calm)
- Engagement
- Connection
- Control

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### Working with nervous systems

Increase Resources – Regulatory Capabilities

**Social Engagement**

**Offer...**

- Heat snap pack
- Something weighted
- Something rhythmic
- Reduction in stimulus
- Physical task

**Mobilising**

**Offer...**

- Heat snap pack
- Gentle sensory/spine engagement
- Chewing on a sweet or sour lolly, drinking cold or sweet

**Offer...**

- Punching bag
- Screwed up paper to kick / throw
- Change environment
- Pool noodle

**Offer...**

- Drip cold water on the skin i.e. palm initially
- Music, hum
- Voice of safe person
- Seek small movement

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### Polyvagal Theory

	I am showing you.....	On the inside.....	I need you to.....
<b>SOCIAL ENGAGEMENT</b>	<p>Feeling safe, showing an relationship, connection oriented</p> <p>You might see I am:</p> <ul style="list-style-type: none"> <li>• Making eye contact</li> <li>• Listening</li> <li>• Engaging in play and exploration</li> </ul>	<p>I see feelings:</p> <ul style="list-style-type: none"> <li>• Safe, Calm, Happy, Soak, Annoyed, Reflective, Proud, Curious</li> </ul> <p>My body says:</p> <ul style="list-style-type: none"> <li>• Approach others</li> <li>• Sit still</li> <li>• Breathe deeply</li> </ul>	<p>Help me to stay engaged:</p> <ul style="list-style-type: none"> <li>• Play and have fun with me</li> <li>• Have model positive relationships</li> <li>• Set boundaries and natural consequences</li> <li>• Use reflection and problem solving skills so I can learn from you</li> <li>• Notice and acknowledge my strengths and my skills</li> </ul>
<b>IMMOBILISATION</b>	<p>Fight, Flight, Freeze, Break, Action oriented</p> <p>You might say I am:</p> <ul style="list-style-type: none"> <li>• Aggressive</li> <li>• Loud</li> <li>• Fighting</li> <li>• Running away</li> <li>• Hyperactive</li> </ul>	<p>I see feelings:</p> <ul style="list-style-type: none"> <li>• Anxious, Frightened, Lonely, Hurt, Confused, Overwhelmed</li> </ul> <p>My body says:</p> <ul style="list-style-type: none"> <li>• Run away</li> <li>• I'm hot</li> <li>• I can't sit still</li> <li>• I need to move</li> </ul>	<p>Help me to be more regulated:</p> <ul style="list-style-type: none"> <li>• Keep me safe</li> <li>• Co-regulate - be safe, attuned and responsive to me</li> <li>• Use movement - big then smaller, jumping, hanging, swinging, climbing, etc</li> <li>• Create a safe space near you where I can retreat to and calm down</li> <li>• Notice and validate</li> <li>• Repair our relationship - "we are ok and our relationship is strong"</li> </ul>
<b>IMMEDIATE</b>	<p>Withdrawn, Calmness, Submission, Dissociation, avoidant oriented</p> <p>You might say I am:</p> <ul style="list-style-type: none"> <li>• Withdrawn</li> <li>• Avoiding contact</li> <li>• Distant</li> <li>• Overwhelmed</li> <li>• Hiding</li> </ul>	<p>I see feelings:</p> <ul style="list-style-type: none"> <li>• Disconnected, Untrusting, Flat, Withdrawn, I'm disappearing</li> </ul> <p>My body says:</p> <ul style="list-style-type: none"> <li>• I'm not in my body</li> <li>• I want to hide</li> <li>• Curl up in a ball</li> </ul>	<p>Help me to not regulate:</p> <ul style="list-style-type: none"> <li>• Co-regulate - be safe, attuned and responsive with me</li> <li>• Tell me I am safe and demonstrate it with your actions, gestures and tone of voice</li> <li>• Help me to connect to the room we are in by looking at the roof or something on the floor, something on the wall to feel my body to moving different parts, such as my feet on the floor and my bottom on the chair</li> <li>• Repair our relationship - "we are ok and our relationship is strong"</li> </ul>

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## Hand to Hand Attunement

Let's work together to hold an object up between our hands or fingers and *not* let it fall.



We will need to synchronise our movements and attune to one another. What object feels right to hold between us? A big gum ball? A sports ball? A cushion? A balloon? A pencil? Let's try moving the object around. What is that like for you? As you move together, notice if one person is leading or if the movement initiation is sweeping between you. Play around with this. When you become accomplished, add another object so you are using both of your hands to hold up two objects between you. What does it feel like to be in synchrony with another person?

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### Reflection

- What do you need to feel safe and secure with your KWY worker?
- What are the things that make you feel at ease?

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### Activity

How can we create safety for the children, young people we are caring for?



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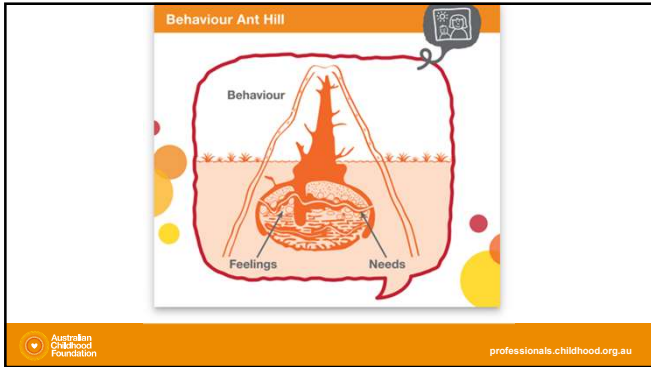
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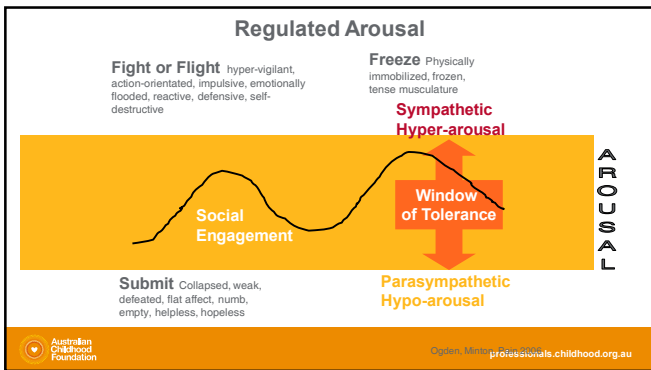
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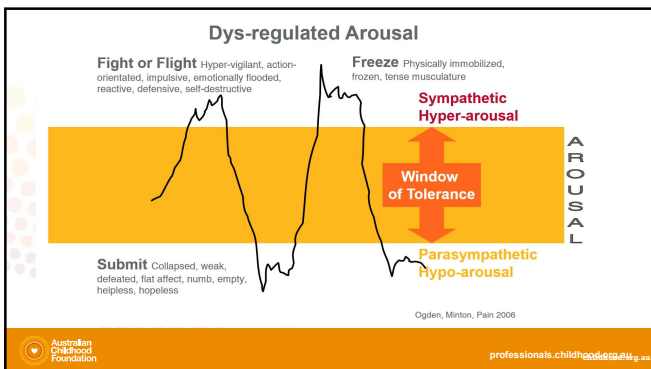
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## The 5 Parenting Systems



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### Relationship is the key! .....Brain systems that support parenting

**Parental Approach System**

- Get close to the child without becoming defensive.

**Parental Reward System**

- Enjoy interacting with the child.

**Parental Child Reading System**

- Understand the mind of the child.

**Parental Meaning Making System**

- Make sense of our experiences with the child and our social life.

**Parental Executive System**

- Regulate interpersonal conflicts between approach and avoidance, pro-social and defensive reactions.





Image source: Dreamtime



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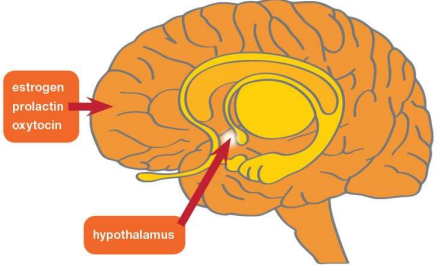

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### Approach System

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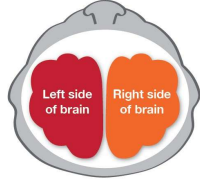
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### Early Adversity impacts our Parenting ability

The environment we grow up in can shape how we use our right and left brain systems of avoidance and approach. If we begin life exposed to insensitive caregiving our right brained harm avoidance system is likely to be used a lot. Instead of feeling protected and connected with our caregiver, we are more likely to need to shift into a defensive state of protest or collapse in order to try to protect ourselves.



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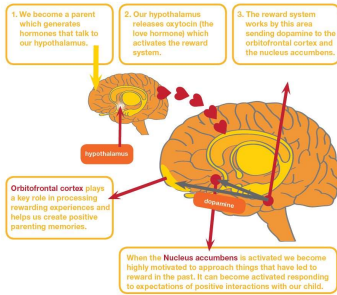
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### Reward System



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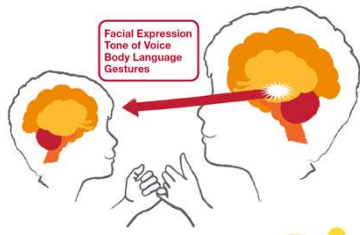
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### Child Reading System



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**Meaning Making System**

**Well-Connected Brain**  
Utilizing the front part of the brain



Open Flexible and Adaptive

**Stressed out Brain**  
Utilizing the more primitive middle region of the brain



Closed and Rigid

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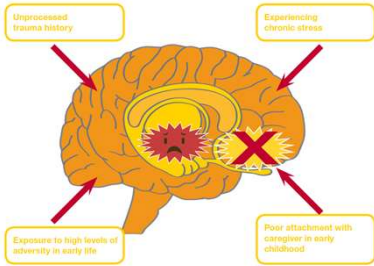
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**Blocked Executive System**



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**Repairing the impacts of trauma**



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**Repairing the impacts of trauma**

- Relational** (safe)
- Relevant** (developmentally-matched to the individual)
- Repetitive** (patterned)
- Rewarding** (pleasurable)
- Rhythmic** (resonant with neural patterns)
- Respectful** (of the child, family, and culture)

Bruce Perry, as cited by <https://attachmentdisorderhealing.com/developmental-trauma-3>




Image: hellovector.com

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**Safety and listening the child**

- Model attunement
- Ensure that the child is seen and kept in focus throughout the assessment and that account is always taken of the child's perspective
- Are they ready-how long can you sit and wait
- Validate what the child is feeling
- Check meaning
- Make sense of what is happening for the child
- What will have meaning

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**PACE**

- **Playfulness**
- **Accepting**
- **Curious**
- **Empathetic**



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**PACE Helps**

- The social engagement system come online
- Connect the prefrontal cortex (thinking brain) to the lower regions of the brain (emotional and survival brain)
- Calm the threat sensing amygdala by sending a message of safety.
- Connect children and their caregivers
- Aid the growth of regulation skills.
- Build the ability to reflect
- Develops the child make meaning of themselves, their stories and their behaviour.

**PACE uses all 5 parent brain systems (approach, reward, child reading, meaning making and executive)**



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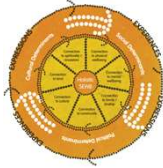
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**Key considerations**

- There is no magic wand!
- It takes time and patience: persistence and repetition is a must
- You matter in this work!
- Your relationship with the child is key
- Each child is individual which adds to the complexity
- Trial and error is common
- A titrated approach is important



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**Respect diversity in cultures and child rearing practices while keeping child safety paramount**

Respecting diversity should be taken to mean 'having the same aims for people's wellbeing and safety but finding different ways to achieve them' that are more appropriate to the person's different perspective.

- Being child-safe respects cultural difference:
  - thinks about safety and wellbeing concepts from a cultural perspective
- takes steps to develop cultural competence to respond in a culturally appropriate manner
- takes guidance from experienced others (for example, seek advice from recognised Aboriginal or Torres Strait Islander organisations in regards to the needs of children from these backgrounds), and
- approach family cultural contexts with sensitivity.



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Thank you for coming today...



Image: Pinterest

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