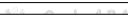



Growing Evidence Based Early Childhood Intervention

Associate Professor Iona Novak
Head of Research
Cerebral Palsy Alliance
Research Institute



How early is early?

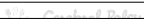
Early diagnosis
Early intervention



Are we doing
the right
things?

Are they
being done
the right
way?

Are they
being done
at the right
time?



“I saw the angel in
the marble and
carved until I set
him free”

early intervention continuum



**At what age can the diagnosis of
autism be reliably made?**

- A) Unsure
- B) 3 years
- C) 1 year
- D) 3 months

Phagava et al 2008



**At what age can the diagnosis of
cerebral palsy be reliably made?**

- A) 2 years
- B) Unsure
- C) 3 months
- D) 1 year

Burger & Louw, 2009

At what age can the diagnosis of intellectual disability be reliably made?

- A) 3 months
- B) 3 years
- C) 5 years
- D) Unsure

Bruggink & Van Braeckel

General Movements

WHAT

- spontaneous movement
- complex, frequent, observable
- Involve whole body
 - variable
 - wax & wane: intensity | force | speed
 - beginning & end

WHEN

- early fetal life - 4 months

 Cerebral Palsy
ALLIANCE

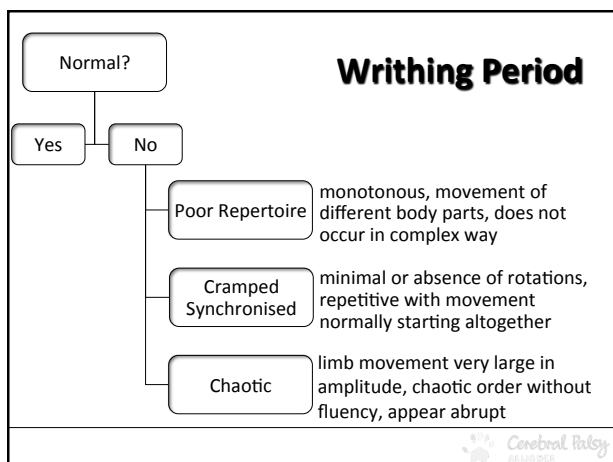
Types of General Movements

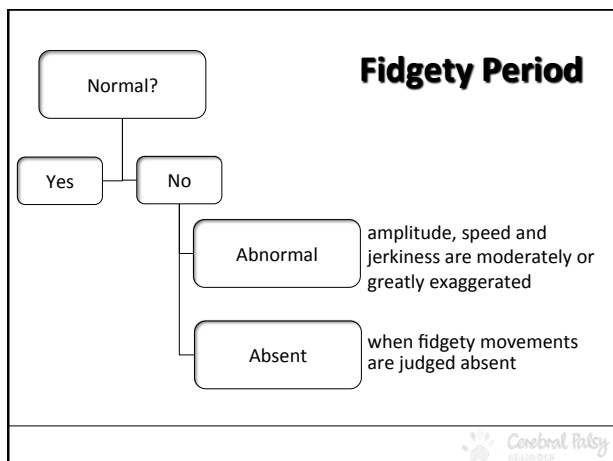
TYPE	PERIOD	DESCRIPTION
PRETERM	28 wks to 36-38 wks	Variable movements including pelvic tilts and trunk movements
WRITHING	36-38wks – 46-52wks	Variable large amplitude movements. Forceful and slow
FIDGITY	46-52wks – 54-58wks	Continuous flow of small elegant movements occurring irregularly all over the body

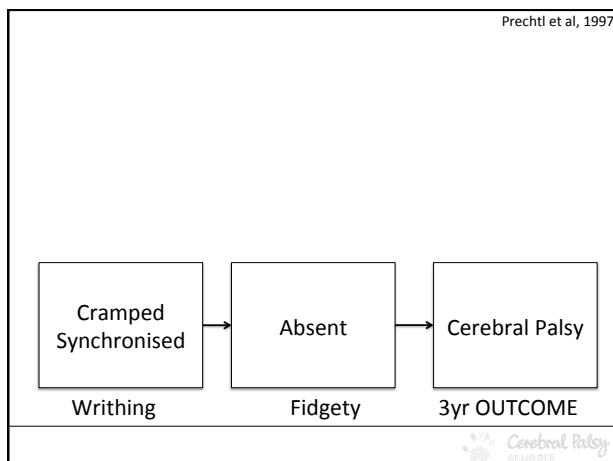
Normal GM's show participation of all body parts and movement complexity and variation

 Cerebral Palsy
ALLIANCE

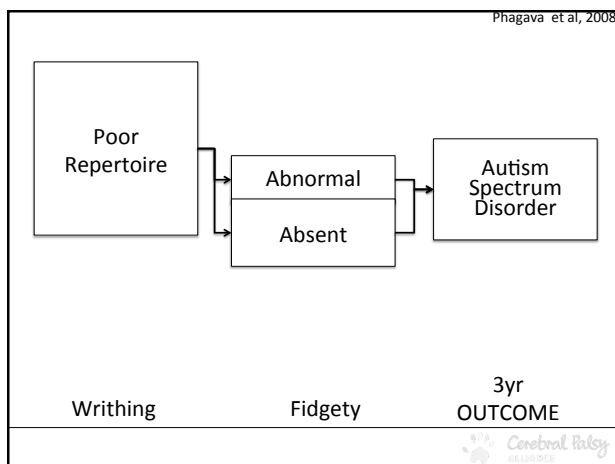
Early Intervention: Evidence and New Directions Address

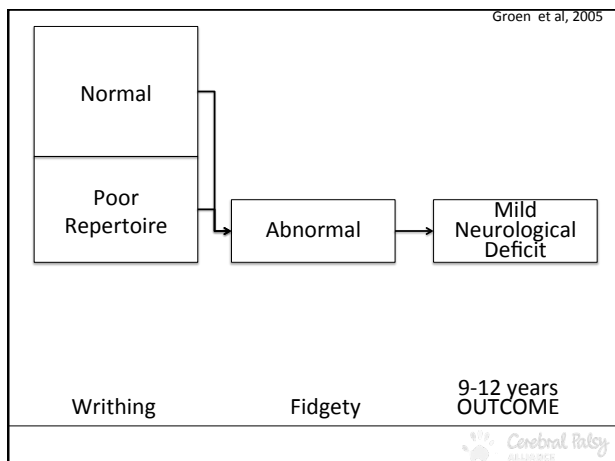


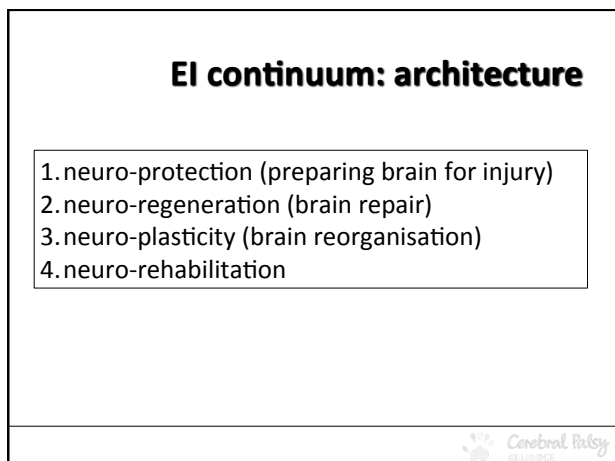




Early Intervention: Evidence and New Directions Address







Early Intervention Aims

- Lessen severity of disability
- Promote independence and function

- prevent brain cell death
- enhance nerve cell growth
- promote brain cell reorganisation



neuro-protection

1



magnesium sulphate

1 in 63

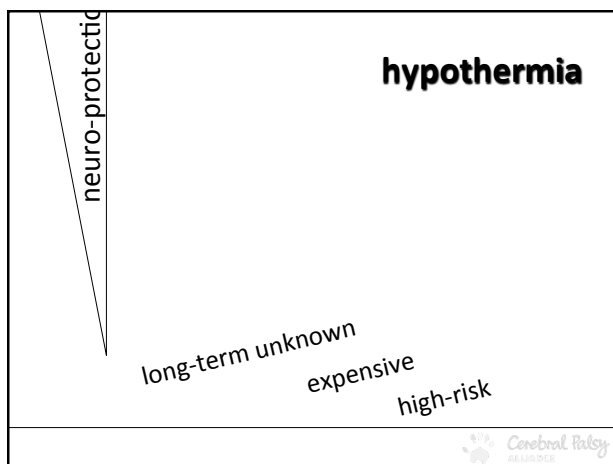
safe

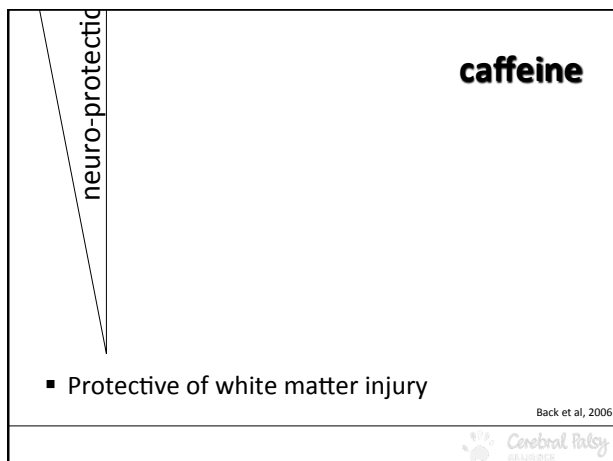
cheap

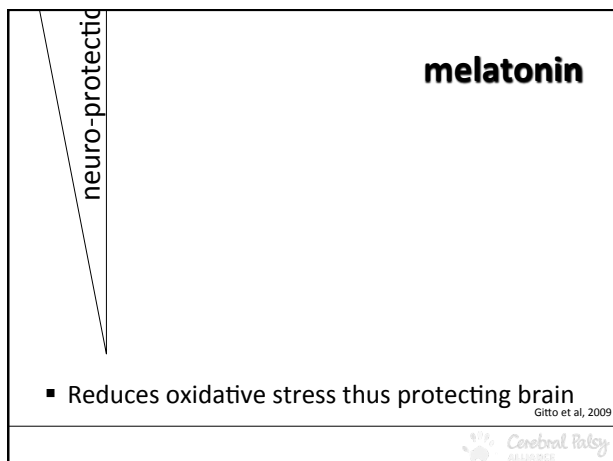
Crowther et al, 2010



Early Intervention: Evidence and New Directions Address








Early Intervention: Evidence and New Directions Address


neuroprotectio

erythropoietin



neuro-regeneration


2





neuro-regeneration


repair mechanisms

- Replace vs reorganise



neuro-regeneration	<h2 style="text-align: center;">Animal Studies</h2> <div> 1. Infusion of growth factors <ul style="list-style-type: none"> ▪ duplication & migration of precursor cells ▪ repairs post stroke damage </div> <div> 2. Implant human photo receptors (light cells in eyes) into blind mouse <ul style="list-style-type: none"> ▪ mice make own photo receptor cells ▪ Partial sight </div>
	


neuro-regeneration	<h2 style="text-align: center;">CP studies: published</h2> <div> Olfactory Ensheathing Cells in Cerebral Palsy: RCT N= 33 </div> <div> METHODOLOGICAL WEAKNESS <ul style="list-style-type: none"> ▪ Number of drop-outs [still alive?] ▪ Knowledge of treatment allocation ▪ Results < half of physiotherapy alone </div>
	<small>Chen et al, 2010</small> 

neuro-regeneration	<h2 style="text-align: center;">CP studies: in progress</h2>
	James Carroll [Medical College Georgia] Placebo-Controlled, Observer-Blinded, Crossover Study to Evaluate the Safety and Effectiveness of a Single, Autologous, Cord Blood Stem Cell Infusion for the Treatment of Cerebral Palsy in Children
	Joanne Kurtzberg [Duke University, South Carolina] Cord Blood Stem Cell Infusion for Neonatal Encephalopathy in first 2weeks of life
	Joanne Kurtzberg [Duke University, South Carolina] Cord Blood Stem Cell Infusion for the Treatment of Cerebral Palsy in Children RCT n=50
	

neuro-plasticity


Development
Experience
Damage

3





Plasticity Options

- neuronal competition
- activity dependent

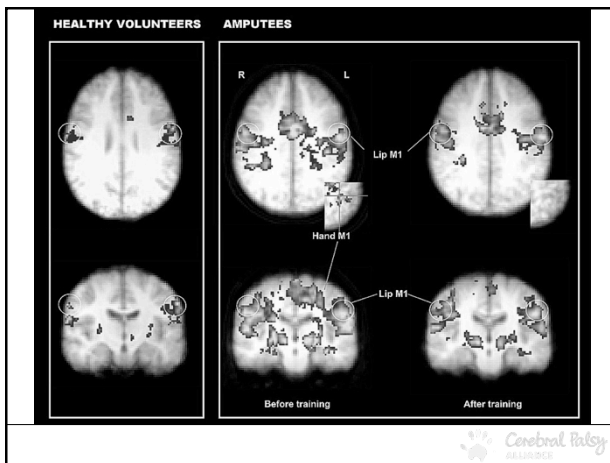


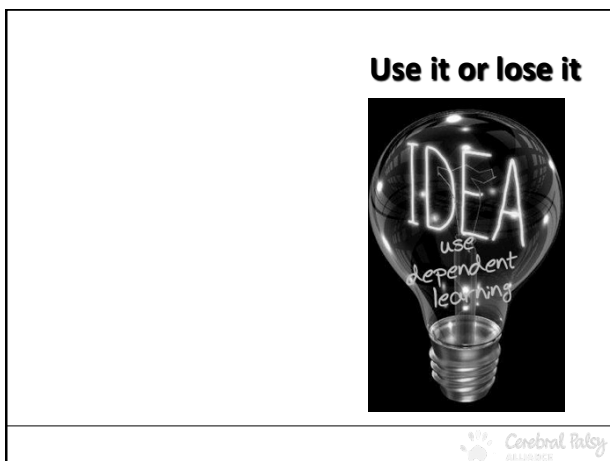
Real-estate

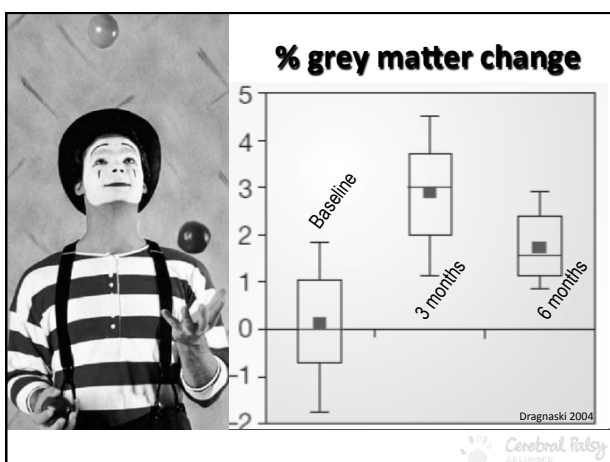




Early Intervention: Evidence and New Directions Address

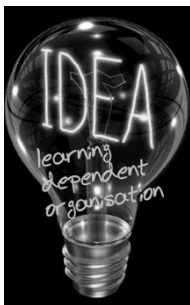






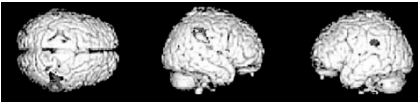


Practice makes...

- How you practice matters



Cerebral Palsy Alliance

Task oriented vs non-specific training

Before			
After			
Control			

Nelles 2001


Cerebral Palsy Alliance

neuro-rehabilitation

Existing knowledge

New directions

4



Cerebral Palsy Alliance

EI Theories

- 1. Neuro-maturational:** gradual unfolding of a predictable sequence of developmental skills [hard-wired & genetically determined]
- 2. Systems:** emphasizes the importance of learning. Environmental experiences enable interactions and problem solving, thereby stimulating new skills. Therefore enriched environments are sought (Majnemer 1998)



Systematic Reviews

choice

Randomised Controlled Trials

Controlled Trials

Expert
Opinion



Levels of evidence



**Evidence
Alert**

Stop

Quality evidence
proving ineffective

Measure

Insufficient evidence
therefore evaluate

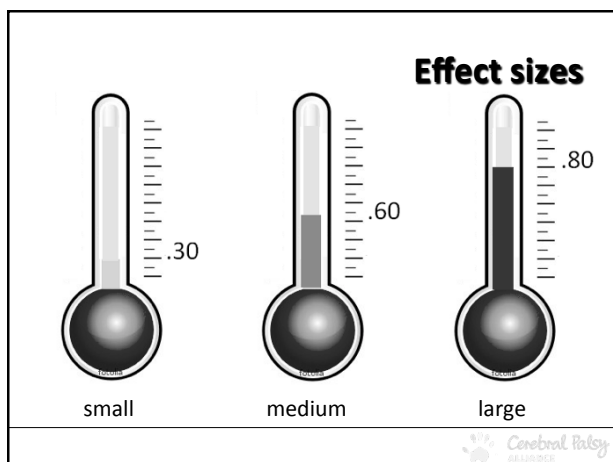
Go

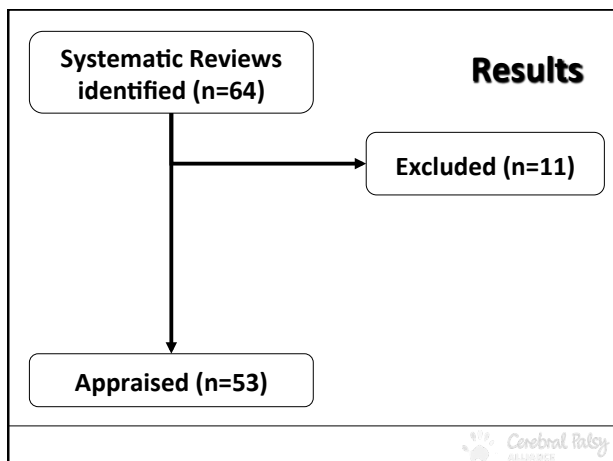
Quality evidence
proving effective

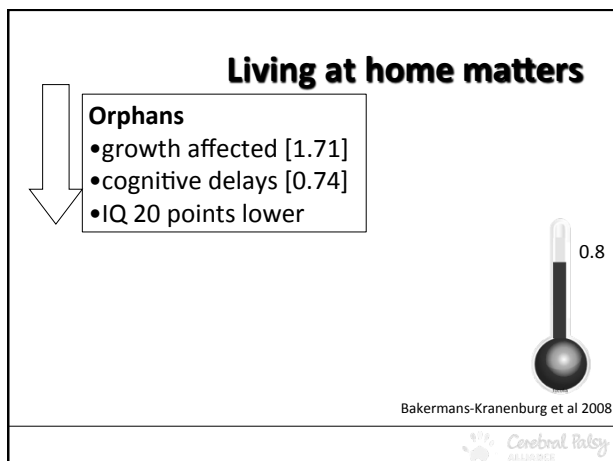
Novak & McIntyre, 2010



Early Intervention: Evidence and New Directions Address



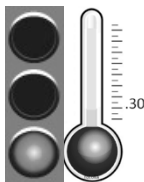




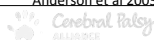
Cognition & IQ improves

HeadStart

- Prevents cognitive delay [.35]
- Increases readiness to learn [.38]
- Lowers social risk [.60]

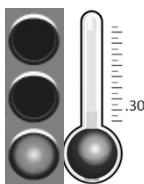


Anderson et al 2003



Parent-Child Attachment

- Early intervention on parental sensitivity [0.33] and on infant attachment security [0.20] is effective



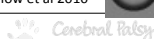
Bakermans-Kranenburg 2003



Group-based parent training

improves the emotional and behavioural adjustment of children

Barlow et al 2010



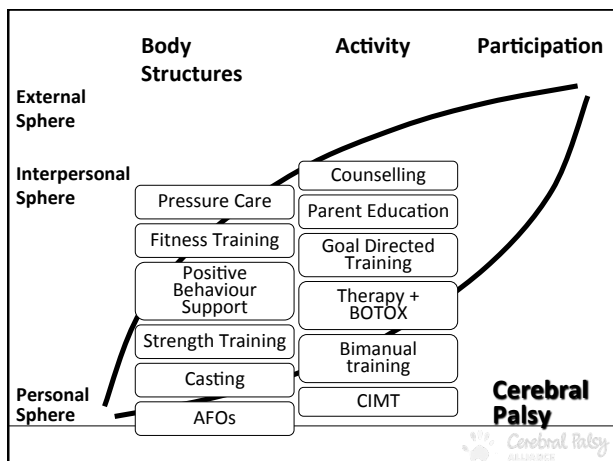
Pre-term Infants

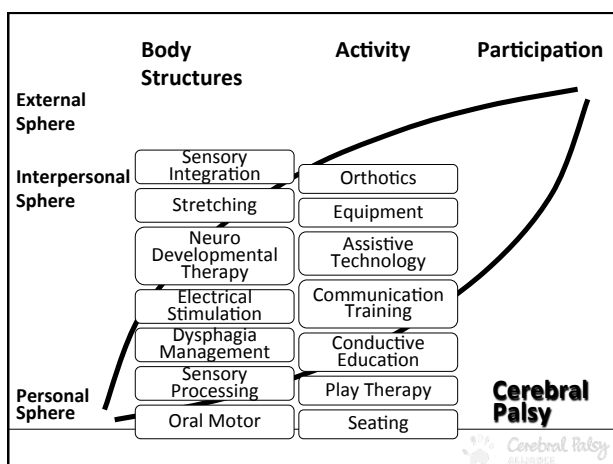
- NIDCAP (Newborn Individualized Developmental Care and Assessment Program) in & IHDP (Infant Health and Development Program) produce similar effects:

- parent & child involvement = best results
- improved cognitive outcomes
- improved child–parent interactions
- Results best in low education families

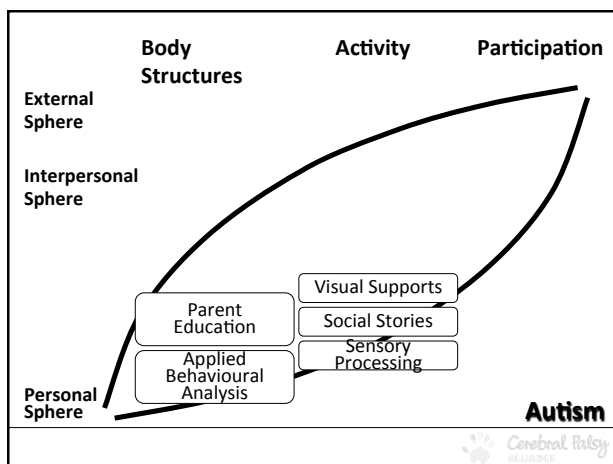
Blauw-Hospers 2000 & Bonnier 2008

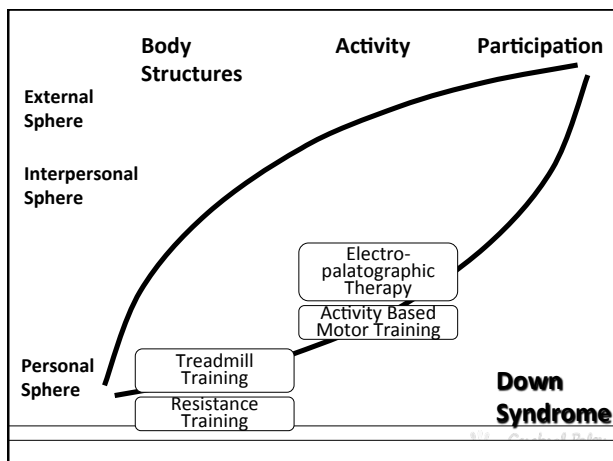


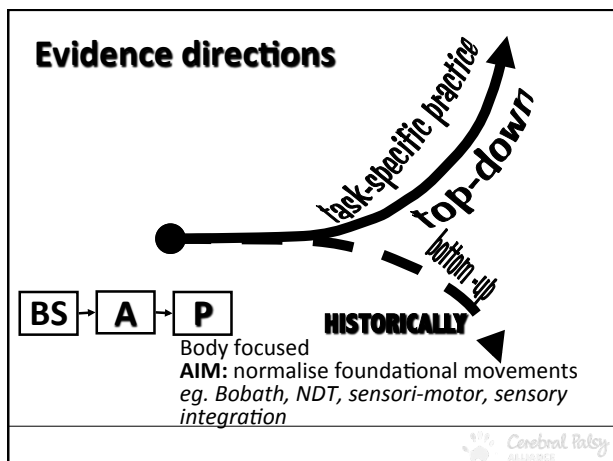




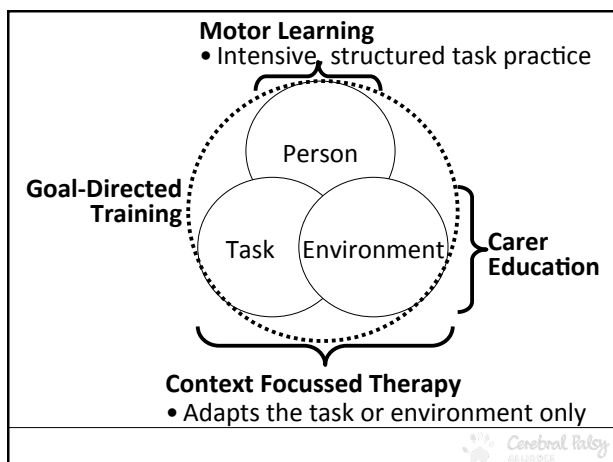
Early Intervention: Evidence and New Directions Address

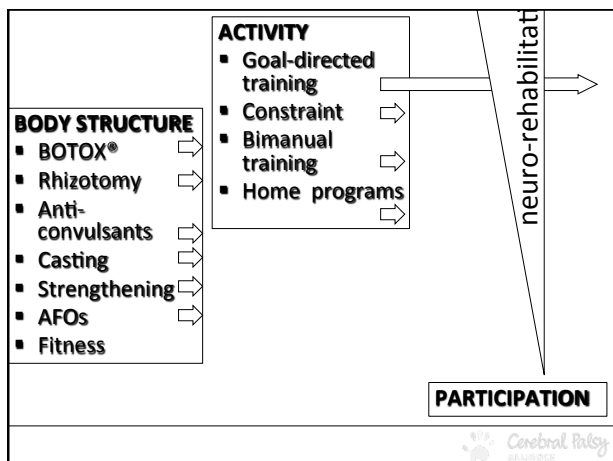


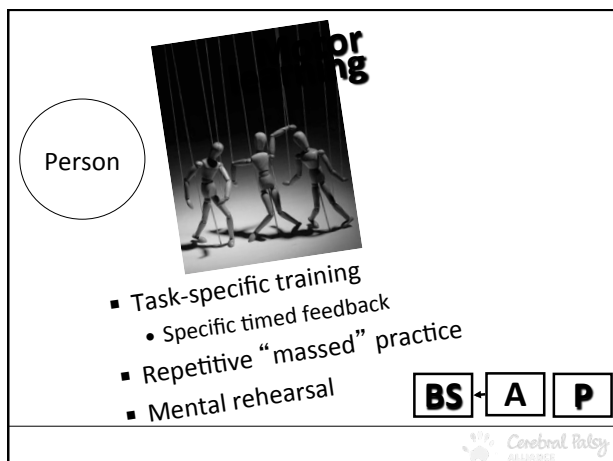





Early Intervention: Evidence and New Directions Address









Take home

WHAT:

- learn something you like
- practice what you want to learn


HOW:

- use task specific practice
- practice at an appropriate level of difficulty
- repeat the practice often

Cerebral Palsy Alliance

Carer Education

Environment



mothers felt the therapist as a person was often more important, than the therapy itself

BS A P
E P

Hinojosa, 1990

Cerebral Palsy Alliance

Mother's view as:

- a friend
- an advocate
- a mentor
- a trouble shooter
- a source of information
- a primary source of support

Washington & Schwartz, 1996

Cerebral Palsy Alliance

Families learn about caregiving by:

- watching professionals interact with their child
- seeking reassurance & feedback from professionals

Thompson, 1998
Hinojosa & Anderson, 1991


Parent
Education

+

Goal-Directed
Training

Level I evidence

- Home program intervention for either 4WEEKs or 8WEEKs led to clinically meaningful improvements in:
 - a. **functional activities performance**
 - b. **satisfaction with function**for children with cerebral palsy, compared to children who did not use a home program

Novak, Cusick, L





“

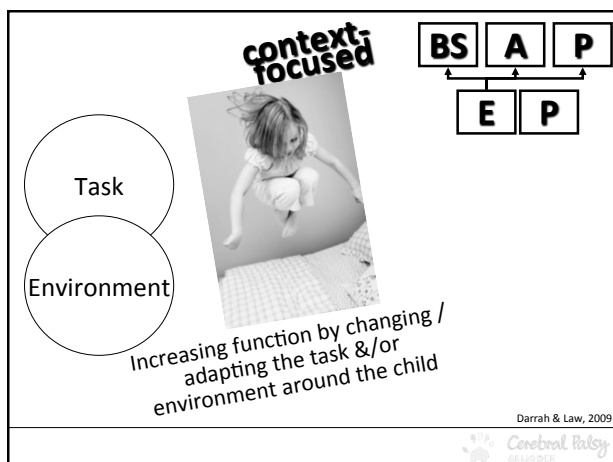
contact at different intervals, keeps you motivated and I guess keeps you focussed on what exactly you are doing and trying to achieve.”

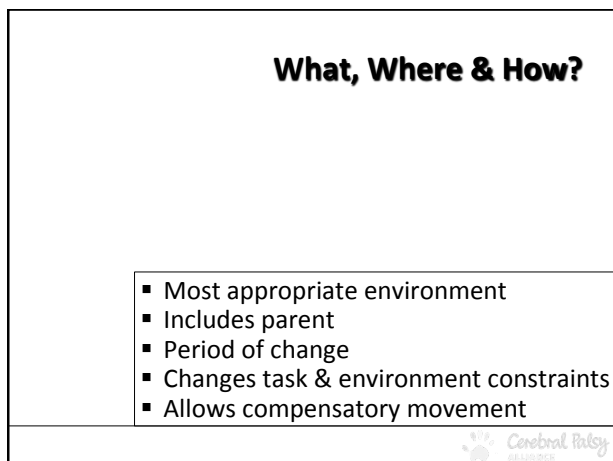
- What you say, how & where you say it matters!

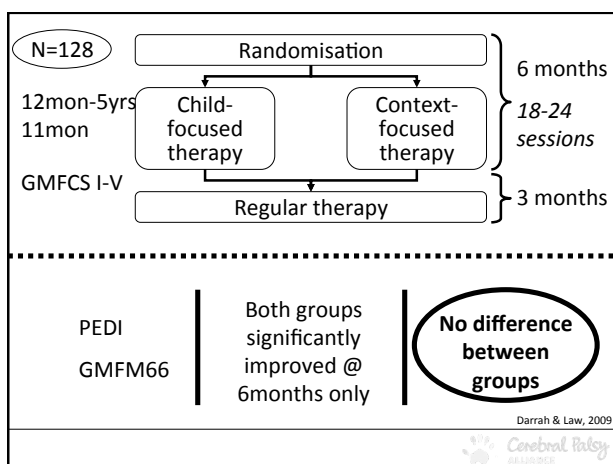
Novak, Cusick, Lannin 2009



Early Intervention: Evidence and New Directions Address





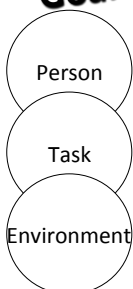


Take home...

- Changing task & environment = changing the person
- Use both!



Goal-Directed Training



Goal Directed Training is:

...an activity-based approach to therapy. Meaningful, client-selected goals are used to provide opportunities for problem solving and to indirectly drive the movements required to successfully meet the task demands. This is in contrast to interventions that focus on changing body functions.



Mastos, 2007



Early Intervention: Evidence and New Directions Address

steps

1. selection of a meaningful **goal**
2. analysis of **baseline** performance
3. intervention/**practice** regime
4. **evaluation** of outcome



progress updates

"have someone document what you say when you say it . Because you tend to forget what your child does or how you feel at that particular moment, and looking back you probably wouldn't remember that your child wasn't doing something so...8 weeks ago or 12 weeks ago I would have forgotten that that wasn't normal so having that documented makes you realise well, hey she really has improved, you know"



Novak, Cusick, Lannin 2009



Take home...

- Growing body of evidence to support goal-directed task-specific training in children



Early Intervention: Evidence and New Directions Address

COPM

Issue

Initial Assessment

Problems

	Performance 1	Satisfaction 1	Performance 2	Satisfaction 2
1. Reach	2	1		
2. Grasp	1	1		
3. Rolling	2	2		
4. Immigration	3	5		

Reassessment

Performance 2	Satisfaction 2

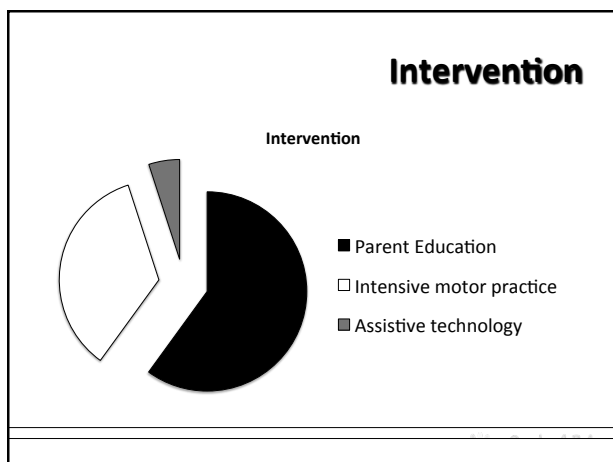
Reach for toy

Much greater than expected	Moves arm towards a toy and is successful 76-100% of the time	+2
Greater than expected	Move arms towards a toy and is successful 51-75% of the time	+1
Expected outcome	Attempts to move arm towards a toy, is successful 0-50% of the time	0
Less than expected	Initiates an attempt to move an arm towards a toy but unsuccessful	-1
Baseline	Does not attempt to move arm towards a toy	-2

Holds toy

Much greater than expected	Holds cylindrical object >4-10 seconds	+2
Greater than expected	Holds cylindrical object >3-4 seconds	+1
Expected outcome	Holds cylindrical object >2-3 seconds	0
Less than expected	Holds cylindrical object >1-2 second	-1
Baseline	Holds cylindrical object 0-1 second	-2

Early Intervention: Evidence and New Directions Address



Reach for toy

Much greater than expected	Moves arm towards a toy and is successful 76-100% of the time	+2
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Less than expected	Holds cylindrical object >1-2 second	-1
Baseline	Holds cylindrical object 0-1 second	-2

Hands Off!

1. Plasticity
2. Hands-off
3. Readiness



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Early Intervention: Evidence and New Directions Address

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