

THE NEUROSCIENCE OF PLAY

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WHAT IS PLAY?

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WHAT IS PLAY?

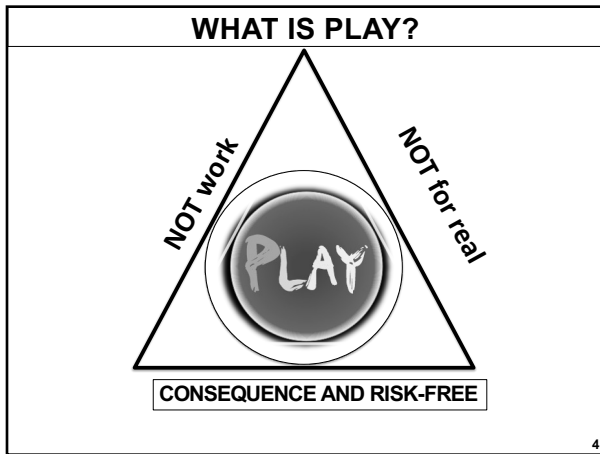
	PLAY	WORK
<i>the focus</i>	the ACTIVITY	the OUTCOME
<i>what engages</i>	the ACTIVITY	the OUTCOME
<i>where the fun is</i>	the ACTIVITY	the OUTCOME

Activities more likely to be Work or be made into Work

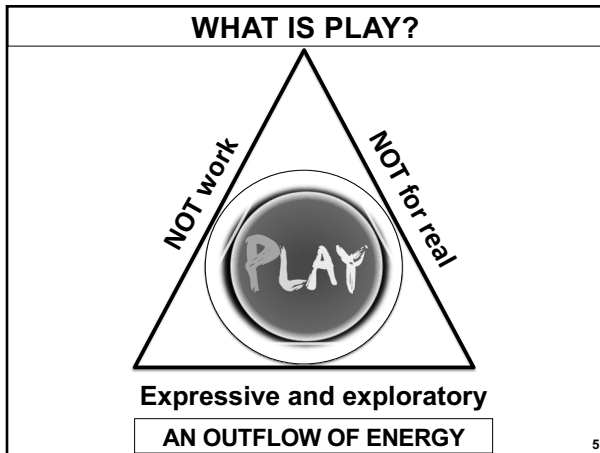
- Craft activities requiring a specific outcome
- Singing a song to learn the words for a reason
- Where the outcome will be praised or rated
- Most screen time (computer, iPad, tablets etc.)

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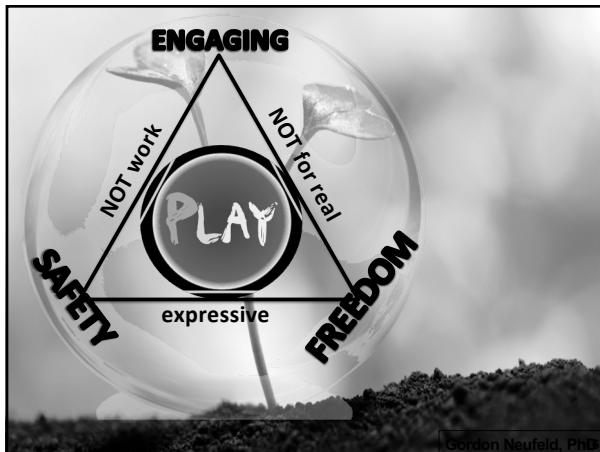
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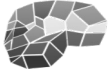


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 **KEY CONCEPT # 1**

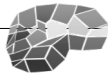


THE BRAIN TAKES TIME TO DEVELOP

- Many parts of the brain need to create connections to work together
- We must create the conditions for growth of all the parts of the brain

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 **BRAIN DEVELOPMENT**

HOW LONG DOES IT TAKE TO “GROW” A FULLY FUNCTIONING HUMAN BRAIN?

AT LEAST
25 YEARS – IF ALL GOES WELL


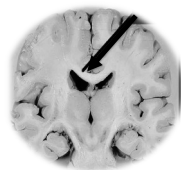

MUCH LONGER, ESPECIALLY IF EXPERIENCING STRESS AND TRAUMA

J. Giedd, L. Steinberg, etc.

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THE BRAIN

PREFRONTAL CORTEX	CORPUS CALLOSUM (THE BRIDGE)	LEFT & RIGHT HEMISPHERE
		
TWO THOUGHTS AT A TIME <small>only starts to engage at the age of 5 years-old</small>	CONNECTS THE LEFT AND RIGHT PARTS OF THE BRAIN	THE FACTS & THE WHOLE

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THE BRAIN


Birds and animals all have divided brains,

<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">LEFT HEMISPHERE</div> <p>for the <u>narrow attention</u> that enables them to lock onto whatever it is they need to get. e.g. seed amongst pebbles</p>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">RIGHT HEMISPHERE</div> <p>for <u>vigilant attention to the world at large</u>, so as to <u>make sense of it</u>, on the look-out for whatever else may exist – e.g. in order to avoid getting eaten</p>
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The Master and His Emissary: Iain McGilchrist 10


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THE BRAIN

<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">LEFT HEMISPHERE</div> <ul style="list-style-type: none"> • is used to <u>grasp and manipulate</u> • Its raison d'être is to <u>narrow things down to a certainty</u>. • It sees things as <u>fixed and static</u> and isolated and atomistic. 	 <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">RIGHT HEMISPHERE</div> <ul style="list-style-type: none"> • is used to <u>understand the world at large</u> and how things within it <u>relate to one another</u>, as well as our relationship with <u>it as a whole</u>. • Its raison d'être is to <u>open things up into possibility</u>. • It <u>appreciates that all things change and flow and are interconnected</u>.
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There is evidence that those of highest intelligence, whatever their discipline, may rely more on the right hemisphere.
McGilchrist 11

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THE BRAIN

The right hemisphere:

- **sees more**
- is more in touch with reality
- is more intellectually sophisticated.

The left hemisphere:


- **does not understand things**, so much as process them.

It is the **right hemisphere** that is the basis of understanding.

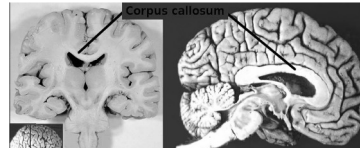
I believe there has been until very recently a blindness among neuroscientists to the contributions made by the right hemisphere. (p. 129) McGilchrist

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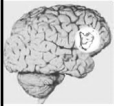
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THE BRAIN	
LEFT HEMISPHERE <ul style="list-style-type: none"> • learns facts • de-contextualized • focus is on details and rules • abstract • wants THE answer 	 RIGHT HEMISPHERE <ul style="list-style-type: none"> • looks at the <u>whole</u> picture • makes sense of the details • considers context • seeks understanding
<p>Right hemisphere is in rapid development during early childhood</p>	
<p>RIGHT HEMISPHERE REQUIRES EXPERIENCES NOT INFORMATION TO DEVELOP</p>	
<p>AND THUS, THE NEED FOR PLAY</p>	


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THE BRAIN
CORPUS CALLOSUM

<ul style="list-style-type: none"> • undergoes a growth spurt between ages 3 and 6, • results in improved coordination between right and left hemisphere tasks. <p>In comparison to other individuals, children younger than 6 demonstrate difficulty coordinating an Etch-A-Sketch toy because their corpus callosum is not developed enough to integrate the movements of both hands. (Kalat, 2016).</p>

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THE BRAIN						
 PRE-FRONTAL CORTEX						
Allows for conflicting THOUGHTS and FEELINGS						
<table border="0"> <tr> <td style="border: 1px solid black; padding: 2px;">on the one hand</td> <td style="border: 1px solid black; padding: 2px;">on the other hand</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">my needs</td> <td style="border: 1px solid black; padding: 2px;">the needs of others</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">emotions</td> <td style="border: 1px solid black; padding: 2px;">reason</td> </tr> </table>	on the one hand	on the other hand	my needs	the needs of others	emotions	reason
on the one hand	on the other hand					
my needs	the needs of others					
emotions	reason					
<ul style="list-style-type: none"> • only starts to engage between 5 -7 years of age • does not stabilize until the mid 20's • is "glitchy" in the teen years • development is slowed by childhood trauma 						
<table border="0"> <tr> <td style="border: 1px solid black; padding: 2px;">DELAY OF GRATIFICATION</td> <td style="border: 1px solid black; padding: 2px;">TIME MANAGEMENT</td> <td style="border: 1px solid black; padding: 2px;">EMOTIONAL REGULATION</td> </tr> </table>	DELAY OF GRATIFICATION	TIME MANAGEMENT	EMOTIONAL REGULATION			
DELAY OF GRATIFICATION	TIME MANAGEMENT	EMOTIONAL REGULATION				

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 **KEY CONCEPT # 2**



PLAY PROVIDES THE IDEAL CONDITIONS FOR BRAIN DEVELOPMENT

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PLAY AND THE BRAIN

FOCUS and ATTENTION

Diamond, 2013

Sustained engagement in an activity demands the ability to stay selectively focused on the situation at present, tune out distractions, and hold the information in our heads.



Play provides the ideal situation for a child to develop this kind of focus


Liu – Neuroscience and Learning p. 15 17

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PLAY AND THE BRAIN

EXECUTIVE FUNCTIONS - ATTENTION

Lillard & Else-Quest, 2006, as cited in Carlson, Zelazo, & Faja, 2013)



They observed **the effects of active engagement on executive function skills** (EFs) in a study comparing children assigned to Montessori and non-Montessori schools.

The Montessori children, **who had fewer interruptions during their learning** (self directed play) **activities**, performed better at **EF tasks** than the other group

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PLAY AND THE BRAIN

PREFRONTAL CORTEX (PFC)

Panksepp 2007

In addition, in humans, play facilitates the maturation of the frontal lobe inhibitory skills that enable a child to reflect, look, listen, and feel before acting on primary-process emotional urges. This promotes empathy, imagination, and creative play.




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PLAY AND THE BRAIN

SELF-REGULATION AND READING SOCIAL CUES

“One function of play is to take you to the edge of your emotional knowledge, so you can learn what you can and cannot do to others.”
Jaak Panksepp: Brain World



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PLAY AND THE BRAIN

SELF-REGULATION AND READING SOCIAL CUES

Panksepp 2004; Pellis 2010

Behavioural neurobiologists have found that:

ROUGH AND TUMBLE PLAY, which can ride the edge of ambiguity and requires continual reassurances, generates the neural circuits that enable animals to **ACCURATELY READ AMBIGUOUS SOCIAL SIGNALS**, thus building their social intelligence and capacity for relationship.




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PLAY AND THE BRAIN

SELF-REGULATION AND READING SOCIAL CUES

According to complexity science, this **dynamic process of integration** occurs at the **edge of chaos**, with **enough order** to provide stability but **enough dynamism** for the system to continually adapt and grow.



Such an integrated state enables a system to move toward "**maximizing complexity**," a state that represents the system's optimal functioning.

According to Siegel (2001), optimal functioning systems are "**flexible**," "**adaptive**," "**coherent**," "**energized**," and **stable**" which he identifies through the acronym **FACES**.


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PLAY AND THE BRAIN

PREFRONTAL CORTEX (PFC)

Bell, Pellis, & Kolb 2010; for reviews also see Pellis & Pellis, 2007; Pellis, Pellis, & Himmler, 2014



Social interactions in **rodents** characterised as **ROUGH-AND-TUMBLE PLAY** appear to shape the **PFC (Prefrontal Cortex)** and have an impact on **self regulation and planning**


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PLAY AND THE BRAIN

Emily Freeman et al. 2022

Her study contributed to the field of child development by demonstrating strong links between father-child rough-and-tumble play and children's working memory capacity.



The frequency and quality of rough-and-tumble play was associated with better working memory capacity and fewer working memory problems.

Jennifer St. George et al. 2021

The benefits of paternal play for the child's academic performance are in addition to other benefits for the child's emotional regulation, social adjustment, and mental health.²⁴

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THE ROLE OF PLAY IN DEVELOPMENT

EMERGENT PROCESS – THE SELF

Play is where the SELF is truly expressed.

THE CHILD'S

- desires
- want-to's
- curiosity
- intentions
- initiatives
- aspirations
- expression
- personal meaning



Where the child creates a sense of WHO he/she IS. 25

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THE ROLE OF PLAY IN DEVELOPMENT

INTEGRATIVE PROCESS - OTHERS

Play is where inner conflict first arises.

THE CHILD

- figures things out
- dares to make mistakes
- notices similarities & difference
- uses trial & error
- learns to get along with others



A leap from purity & impulsiveness into a world of inner conflict 26

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THE ROLE OF PLAY IN DEVELOPMENT

ADAPTIVE PROCESS - RESILIENCE

Playing with separation, lack and loss.


THE CHILD


- flirts with difficult emotions
- imagines the unimaginable
- feels sadness "one step removed"
- able to tolerate the adaptive process – going down and rebounding



A leap from weakness & fragility into strength & resilience 27

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 **KEY CONCEPT # 3**



A LACK OF PLAY TIME IN THE EARLY YEARS SEEMS TO AFFECTS MENTAL HEALTH, BEHAVIOURAL AND ACADEMIC OUTCOMES

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LOSING THE SPACE TO PLAY

David Elkind in the *Power of Play*

- over the past two decades, children have lost twelve hours of free time a week, including eight hours of unstructured play and outdoor activities.
- free unstructured play, spontaneous pickup games, and self-initiated dramatic play, are replaced by digital devices

Stuart Brown on the *Status of Play* (Encyclopedia of Play Science)

- outdoor play has decreased by 71% in one generation in both the US and the UK.

ESCALATING DIAGNOSES OF CHILDHOOD ANXIETY, DEPRESSION AND ADHD HAS PARALLELED THE LOSS OF PLAY

Peter Gray, 2011

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PLAY and EMOTIONAL WELL-BEING

When children are “stirred up” emotionally, their PLAY can reflect themes they are struggling with.

PLAY is how they naturally make sense of all the emotions they are experiencing.

In PLAY, pictures are drawn, structures are made, and games are engaged in to ALLOW EMOTIONS TO COME OUT in a way that feels “safer”.


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PLAY and EMOTIONAL WELL-BEING

Dr. Porges describes play as

- a “neural exercise” healing behavioral and emotional dysregulation.
- a necessary tool in our toolbox for supporting children with behavioral challenges.
- a neural exercise in that it flexes the “muscle” of emotional regulation through reciprocal interactions under conditions of safety with others.
- **It’s one of the most therapeutic things we can do with children.**



Stephen Porges, The Polyvagal Theory, 2011


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FACING ALARM IN PLAY

Play is like a release valve – it allows the emotions to move through.

- Covid tag
- playing with monsters
- being the monster
- scary stories (one step removed)
- pretending to be scared
- playing “disaster”
- playing hospital/being sick



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FACING SEPARATION IN PLAY

Play is a place to process their internal world


- hide and seek
- play the orphan
- play and replay the birth of a brother
- pretending to be a creature (for example, a dog or a cat) to get affection
- play baby or play sick to ask for care
- fairy tales where children are lost or face separation




“It is through play that children get to imagine how they will survive in the face of adversity.” Hannah Beach

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TAKING FRUSTRATION INTO PLAY	
Playing out the impulses to MAKE THINGS WORK	
<ul style="list-style-type: none"> • building – Lego, blocks, robots • making things perfect – puzzles • constructing and crafts 	
<p><i>When children can't make their world work, let's give them a chance to make other things "work".</i></p>	
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TAKING FRUSTRATION INTO PLAY	
<u>PLAYING OUT</u> the impulses to ATTACK or DESTROY	
<ul style="list-style-type: none"> • destroying and demolishing • hitting and throwing • kicking and screaming • war games • attacking games • play fighting 	
<ul style="list-style-type: none"> • reduces levels of frustration • decreases aggression and violence in real life 	
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PLAY AND LEARNING	
<p>Durkin, K et al., 2022</p> <p><i>The impact of a territory-wide pre-kindergarten program on the academic achievement and behavior of children up to sixth grade.</i></p> <p>Data collected from state school records through sixth grade showed that children who were randomly assigned to attend pre-kindergarten:</p> <ul style="list-style-type: none"> • Scored lower on state assessment tests in grades 3-6 compared to children in the control group; the negative consequences being most marked in the sixth year. • A negative impact was also identified in terms of disciplinary offences, school attendance and use of special education services. 	
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PLAY AND LEARNING

Suggate, 2012

Research comparing early versus late readers found later readers


- catch up to comparable levels later on
- slightly surpassing the early readers in **comprehension** abilities.

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PLAY AND ADHD



Jaak Panksepp – Asking himself questions:

Have ADHD children experienced less social play in childhood? This has never been documented.


But what if it turned out that a substantial percentage of ADHD kids currently receiving psychostimulants are simply normal kids who have excessive, unsatisfied desires to play, and ADHD symptoms would diminish with play supplementation?

Panksepp 2007

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PLAY AND ADHD



Panksepp 2007


In our informal efforts to evaluate this, we (at the Memorial Foundation for Lost Children in Bowling Green, Ohio) **routinely counseled fathers in families with young ADHD children** to expend special effort to have **daily periods of happy rough-and-tumble play** with their children. Their feedback was consistently that **such daily activities were beneficial.**



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PLAY AND ADHD



Panksepp (2007) has noted:

- **psychostimulants REDUCE** the natural play urges of human children (Beatty 1982 and 1984)
- a regular diet of physical play, each and every day during childhood, should alleviate ADHD-type symptoms in many children and diminish numbers of kids on the “clinical” track;
- **play** will have long-term pro-social benefits for children’s brains and minds, **that are not obtained with psycho-stimulants**;


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CREATING THE CONDITIONS FOR PLAY

1. ANSWER THE HUNGER FOR CONTACT AND CLOSENESS

The younger the child, the more often they need to feel CONNECTION.




When children feel safe, they will play out what they need the most.

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CREATING THE CONDITIONS FOR PLAY

2. CREATE STRUCTURE, RITUAL AND ROUTINE TO PROTECT PLAY



Limit the number of children in an area Assign play stations

Create signals for beginning and end of play time

If the daily schedule must change keep play as the PRIORITY DO NOT CANCEL PLAY TIME

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CREATING THE CONDITIONS FOR PLAY

3. CREATE VOIDS TO BE FILLED UP

Provide time for SOLITARY PLAY

Provide items that are NOT TOO SPECIFIC



• PLAY TIME SHOULD NOT BE EARNED it should be scheduled and protected.

• The more the child is IN TROUBLE, the MORE HE/SHE NEEDS PLAY TIME.

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CREATING THE CONDITIONS FOR PLAY

4. DON'T TURN PLAY INTO WORK WITH PRAISE OR REWARDS

When children are engaged, their play is FOR THEM, it is THEIR AGENDA.



When we praise play it now is about US, it becomes our agenda.



This turns play into WORK or a performance.

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RESPECT THE IMPORTANCE OF PLAY

Play is **essential** for development well-being and mental health of children.



LET THE CHILDREN PLAY

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