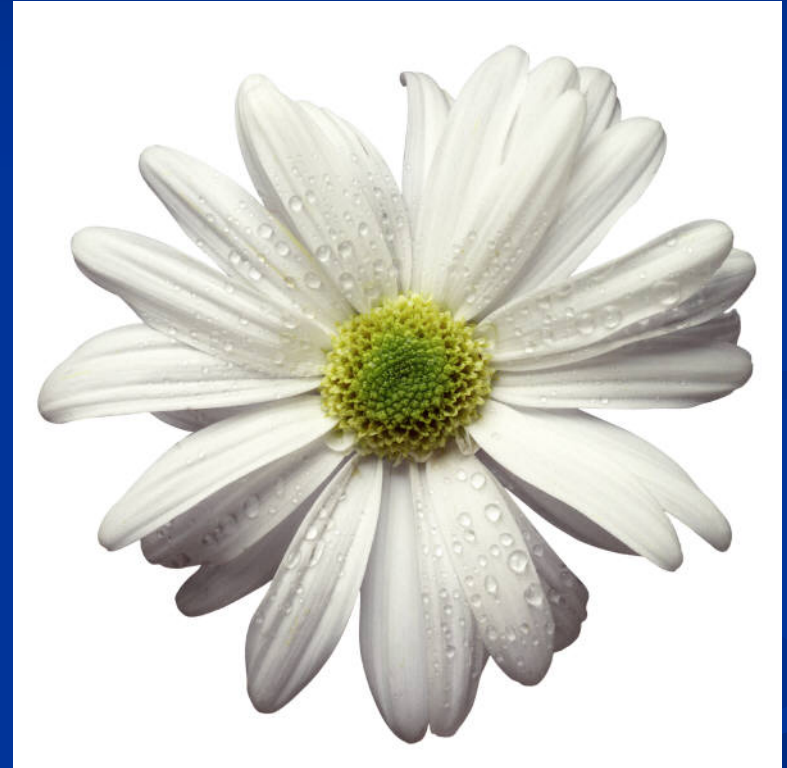


# Physical Development and Motor Skills for School Readiness



# Introductions

- Kanchan Pandey,  
B.Sc.(OT), MHS.(OT)
- Kari Olesen, B.Sc.(Kin),  
B.Sc.(PT)



# Introductions

- Who are you??
- Questions you would like addressed...



# Outline

- Introductions
- General Development and Skill Acquisition
- Gross Motor
  - GM Milestones
  - Why Does Gross Motor Matter?
  - Red Flags
- Fine Motor
  - Progression of Skill Acquisition
  - Fine Motor Learning Through Play

# Outline (cont'd)

- Fine Motor (cont'd)
  - Printing/Written Output
- Ready, Set School!!!
- Wrap up-- Review participants questions
- Discussion
- Evaluation

# Vancouver Regional Pediatric Team (VRPT)

In schools, we work to promote **Development** and **Independence** in the areas of Play, Learning, and Self-Care Activities.

We follow a consultative model. We provide teachers, SSSWs and parents with information and suggestions of activities to meet the child's needs.

# VRPT cont'd

## Occupational Therapy

OTs focus on fine motor skills, handwriting, organization and attention, feeding, and sensory-motor strategies.

## Physiotherapy

PTs focus on gross motor skills, equipment needs (wheelchairs, walkers, splints etc.), mobility needs, lifts and transfers, movement programs

# General Development

Stability – proximal to distal

Trunk ➡ Shoulder ➡ Elbow ➡ Wrist ➡ Hand

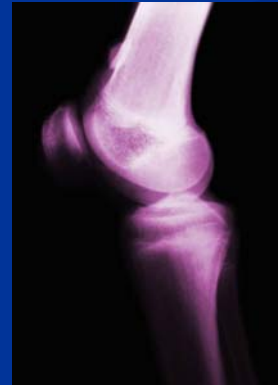




# General Development cont'd

Stability – proximal to distal

Trunk → pelvis/hips → knee → ankle/foot



# Gross Motor Milestones

## Infant

- 5-6 months rolls
- 6-7 months sits alone
- 8-10 months crawls
- 10-11 months cruises around furniture
- 11-12 months pulls to a standing position, starts to take some independent steps
- 15 months walks alone well
- 18 months runs, but falls easily



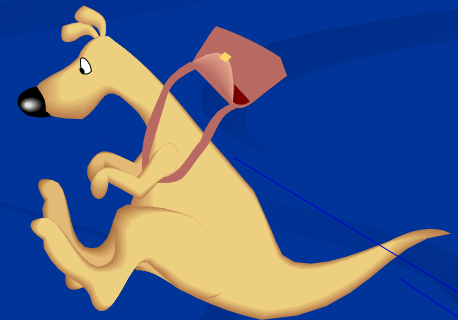
# 2 year old

- Walks and runs well
- Walks backward
- Walks on tiptoe
- Jumps with both feet
- Climbs stairs without support
- Kicks a ball
- Catches a rolled ball



# 3 year old

- Runs fast, avoiding obstacles
- Balances on one foot for a few seconds
- May begin hopping on one foot
- Standing broad jump 10-24 inches
- Catches a large ball
- Throws a ball overhand with some accuracy



# 4 year old

- Runs, jumps and climbs well
- Beginning to skip
- Hops on one foot
- Walks on a line heel-to-toe
- Catches a ball reliably (in hands only)
- Rides a tricycle
- Beginning somersaults



# 5 year old

- Skips on alternate feet
- Jumps rope
- Kicks a rolling ball
- Rides a bicycle
- Beginning to skate and swim
- Climbing well



# Why Does Gross Motor Matter?

- Once the basic GM skills have been acquired further development is not necessary for adult life
- Consider changes in society and lifestyle over the last 100 years



# Why Does Gross Motor Matter?

- Who exercises regularly?  
(i.e. 3 -5 times/week for 30 minutes or more at a moderate intensity)
- WHY??





# Gross Motor Matters!!!

Burdette and Whitaker (2005)

- **Definition of play:** Spontaneous activity in which children engage to amuse & occupy themselves. It is also a way to optimize their own brain development.
- Between 1981 and 1997 children's free play decreased by 25% due to increases in structured activity
- Within unstructured time is more sedentary activity: T.V., computer, video games

# Gross Motor Matters!!

- In young children  
    physical activity = Gross Motor PLAY!
- Preschool children are most physically active in outdoor play.

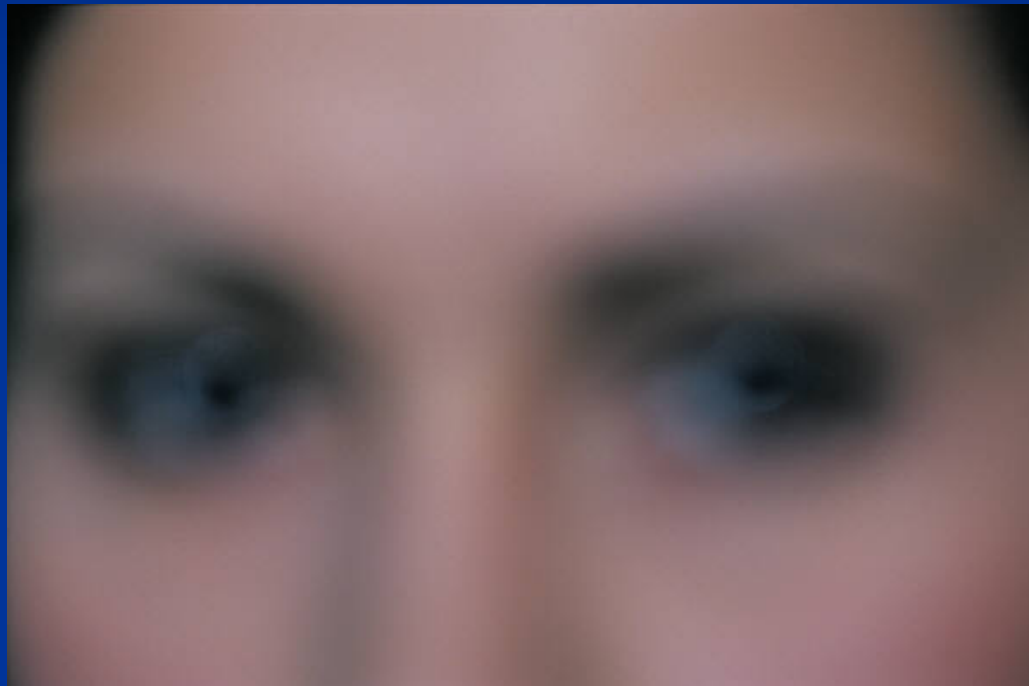
# Gross Motor Matters

1. **Health:** Due to the increase in childhood obesity (and type 2 diabetes) there is an increased focus on physical activity
2. **Attention:** A Survey of 500 teachers and 800 parents in the USA found 90% teachers and 86% of parents believed active kids are better able to learn and better behaved in the classroom
3. **Affiliation:** play involves solving social problems, EQ
4. **Affect:** potential to improve emotional well being, decreases anxiety, depression, aggression and sleep problems

# Factors that Influence GM skills

- GM problems → why??
  - Vision
  - Hearing (balance organ)
  - Cognition/language
  - Attention focus
- Vision and hearing testing
- Accommodate to needs, i.e. verbal instruction verses visual demonstration

# Vision



# Vision

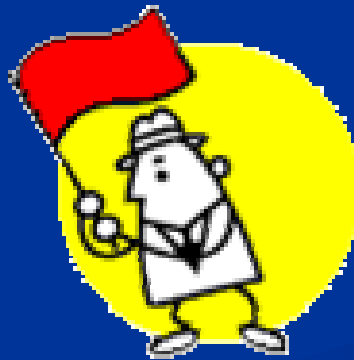
- Vision is thought to be the primary incentive for movement → sound is not a substitute
- Visual impairment may effect the specific **sequence** of gross motor milestone development (Project PRISM)
- The **rate** of gross motor milestone development may be influenced by a visual impairment

# Vision

<u>Skill</u>	<u>Sighted Child</u> (Months)	<u>Blind Child</u> (Months)
Lifts head in prone	1	4
Prone on elbows	4	8.75
Prone on forearms with reaching	3 to 5	9 to 12
Rolls supine to prone	3 to 5	5 to 9
Sits alone	6 to 8	6 to 9
Raises from floor to sitting	8	11
Stands at furniture	6 to 8	10 to 16
4 point crawling	9 to 11	13
Stands alone	11	13

# Red Flags

- GM skill development follows a general typical path of development, with some variation from child to child
- Atypical GM development may simply be a slight delay or can also indicate a more serious problem



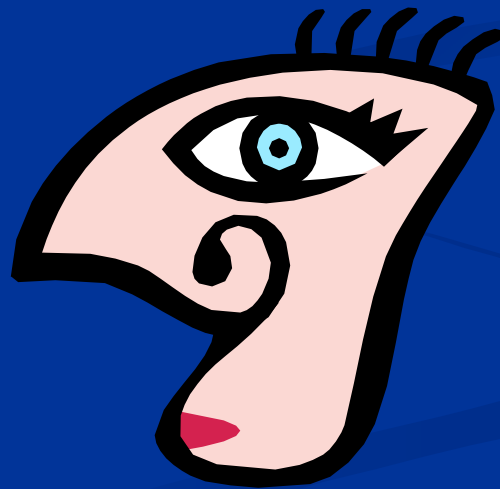


# Red Flags

- Asymmetry
- Decline in function/skill/endurance
- Inconsistency in performance
- Toe-walking
- W-sitting
- In-toeing/ tripping and falling
- Excessive Clumsiness (DCD)

# Asymmetry

- Everyone develops sidedness (i.e. Right vs. Left) but frank asymmetry is a concern especially in functional tasks or if a child tends to neglect one side.
- CP-hemiplegia



# Decline in function/skill/endurance

- Some disorders/diseases do not present until later in childhood and/or are progressive
- Asthma
- Diabetes
- Duchenne's Muscular Dystrophy

# Inconsistency in performance

- Lack of retention—  
Learning disability
- Other external influences
  - Vision, hearing, cognition, attention, sleep, nutrition, health issues, home issues



# Toe Walking

- Toe walking is associated with:
  - neurological disorders such as CP and MD
  - Shortness of achilles tendon
  - Idiopathic (hereditary/habitual)
  - Other disorders (hyperactive or language disorders such as autism)

# Toe Walking cont'd

- Mild toe-walking usually resolves on its own
- Intervention for moderate/severe toe-walking may include:
  - Physiotherapy (exercises, stretching, gentle reminders)
  - Medical/surgical intervention



# Toe-Walking cont'd

- What's wrong with toe walking??
- Usually doesn't bother the kids
- Definitely bothers parents/teachers
- If chronic/severe may result in foot and ankle pathology in adulthood
- Treatment should not be worse than disorder

Dr. R. Beauchamp

# W-sitting

- What is it? (demo)
- Why do children w-sit?
  - Position provides added trunk and hip stability allowing for easier toy manipulation and play (esp. children with low tone)
- Concerns:
  - Does not allow trunk rotation and lateral weight shifts important for further GM development
  - Orthopedic concerns: hip dislocation, muscle tightness, stress on knees



# W-Sitting cont'd

## How much is too much?

- No physical benefits from using this posture
- No W-sitting is best! Especially if the child has orthopedic or developmental issues
- Prevention! Gentle reminders, “fix your legs!”
- Not as great a concern if child uses a variety of sitting postures and moves in and out of them easily.

# In-toeing/tripping and falling

- Also referred to as “Pigeon-Toed”
- Can be a result of poor hip joint development or alignment
- May require orthopedic surgery



# Developmental Coordination Disorder (DCD)

## Diagnosis

- Marked impairment in development of motor coordination that significantly interferes with academic achievement and activities of daily living
- Not due to an underlying medical condition (CP, MD, PDD)
- Not consistent with child's intellectual ability

DSM IV (315.4)

# DCD Myths

- They are just clumsy kids
- They will grow out of it
- They just aren't trying
- Nothing works

# DCD—The reality

- At least 6% of children aged 5-11 present with DCD
- More time and effort is required to learn age appropriate tasks
- Affects GM, FM or both
- There is a high incidence of associated problems
  - Especially language disorders (expressive and receptive)
- DCD is usually chronic and permanent
- Children do not improve without intervention
- Long term psychosocial issues (lower self worth and higher anxiety)



# DCD –The Reality

- Randomized controlled study by Johnson et al (2002) has shown that postural muscle activation is altered in children with DCD when performing a reaching task. **NOT lazy!!**
- Intervention **DOES** make a difference
- Mandich and Polatajko (Ontario!!) have developed a cognitive strategy that has been shown to be effective.



# Teaching Ball Skills

- Rolling → throwing → catching
- Starting sitting and progress to standing

Sitting



Standing





# Ball Skills cont'd

- Start with large ball → smaller ball
- Light ball → heavier ball



# Ball Skills cont'd

- Overhand throw → underhand throw
- 2 hand catching → 1 hand catching



# Teaching Jumping

Jumping improves muscle strength, balance, and coordination

- Demonstrate jumping (exaggerated)
- Start with child on a springy surface (cushion)



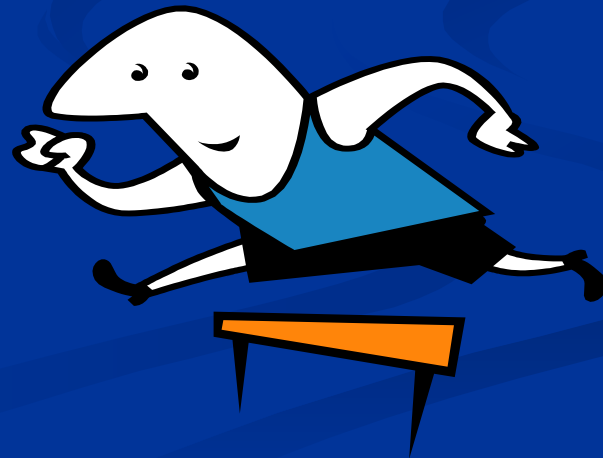
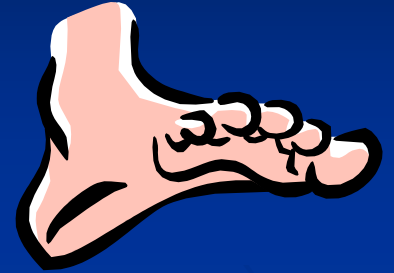
# Teaching Jumping cont'd

- 2 hands held → hold couch/table → 1 hand held → independent
- Jumping off a low step (2 hands → 1 hand → I)
- Gradually increase distance/height



# Teaching Jumping cont'd

- 2 feet:
  - Jump up as many times in a row as possible
  - Jump forward as many times as possible
  - Jump as far as possible
  - Run and jump
- 1 foot
- Forwards than backwards
- Sideways



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- Presentation by Mandich and Polatajko Nov 2002
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- [www.tsbvi.edu/Education/om-gross-motor.htm](http://www.tsbvi.edu/Education/om-gross-motor.htm)
- Burdette HL and Whitaker RC (2005). Arch Pediatr Adolesc Med, 159, 46-50.
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# Fine Motor Development and Writing



# General Development

**Stability** – proximal to distal

Trunk ➡ Shoulder ➡ Elbow ➡ Wrist ➡ Hand





# Progression of Skill Acquisition

Hand Skills – gross to refined

Reach



Grasp



Carry



In-Hand



Release



# Fine Motor Development

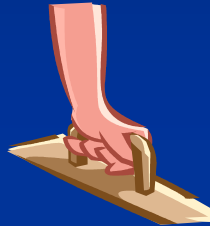
Whole Palm Grasp ➡ Refined Finger Pinch



Lateral “Power” Side ➡ Medial “Precision” Side

# Types of Grasps

Hook



Power



Spherical



Cylindrical



Disc



# Types of Pinches

Lateral



Three-Point



Two-Point



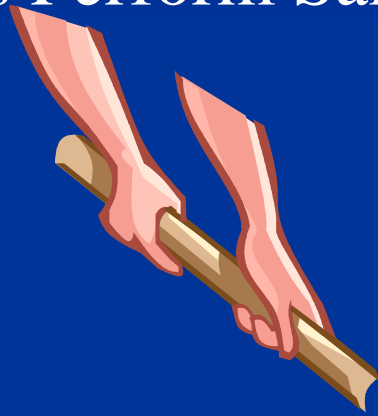
Tip-to-Tip



# Fine Motor Development

## Bilateral Coordination

Hands Perform Same Action



Hands Coordinate in “Do and Assist”



# In-Hand Manipulation

Translation – linear movement of the object from the palm to the fingers or vice versa

Shift – linear movement of the object on the finger surface to allow for repositioning of the object relative to the pads of the fingers

Rotation – involves turning or rolling an object

# Areas that Affect Fine Motor Skills

- Cognition
- Physical Factors
- Experience
- Behaviour
- Grasp
- Hand/Finger Dexterity
- Eye-Hand Coordination
- Bilateral Hand Skills

# Fine Motor Learning Through Play

## Playdoh Activity

### Making of the doh

1 cup flour,  $\frac{1}{2}$  cup salt,  $\frac{1}{4}$  cup water, food colouring  
Add food colouring to the water and put aside. Mix flour and salt. While slowly adding the coloured water knead the dough well. Store in ziploc bag or an airtight container.

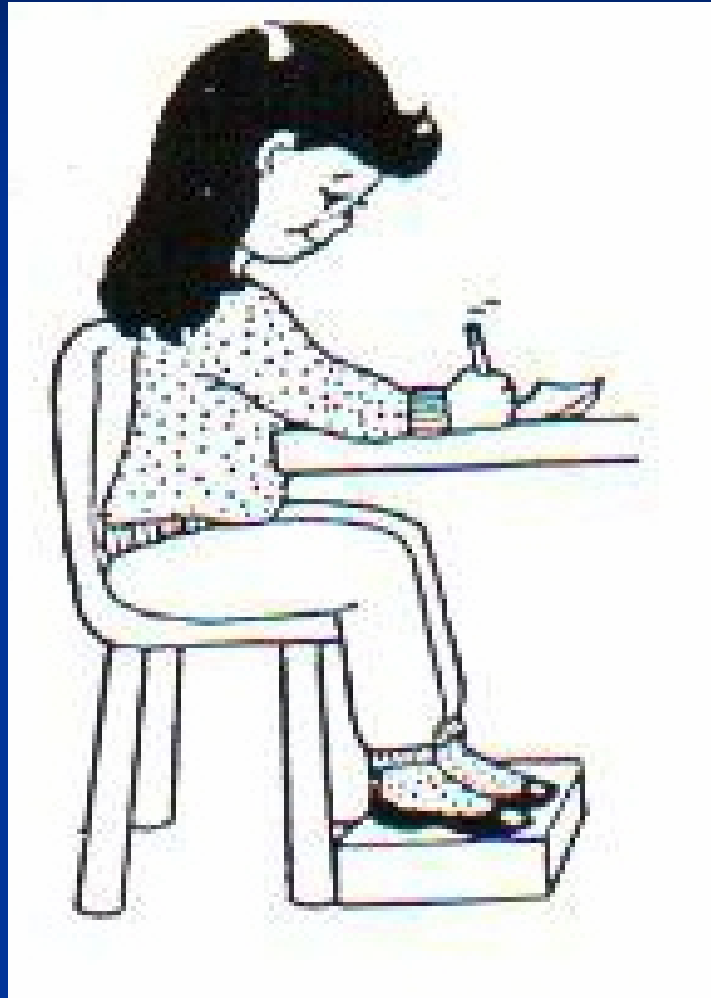
### Play Time

pebbles, bottle caps, twigs, cookie cutters, garlic press, toy utensils.  
Roll the dough and come up with projects!! **HAVE FUN.**



# Getting Ready to Write

## Posture



# Posture Preparation

Here's a warm up that's great for posture and a positive attitude.



Push palms



Pull hands



Hug yourself tightly



Reach high, one hand, then other  
Reach - make circles in the air

\* BLOCKS

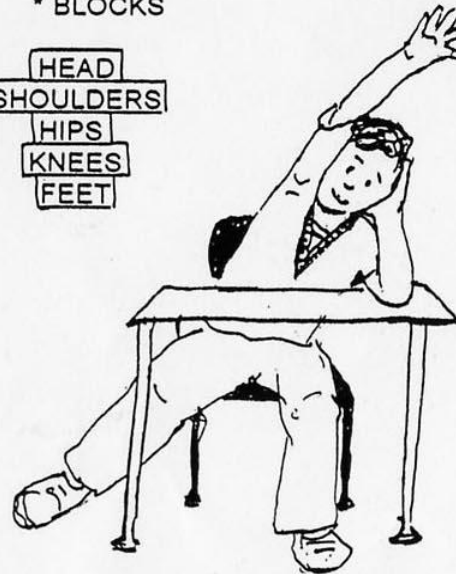
HEAD  
SHOULDERS  
HIPS  
KNEES  
FEET



Pull up on chair



\* Stack your blocks



Assume an outrageous posture

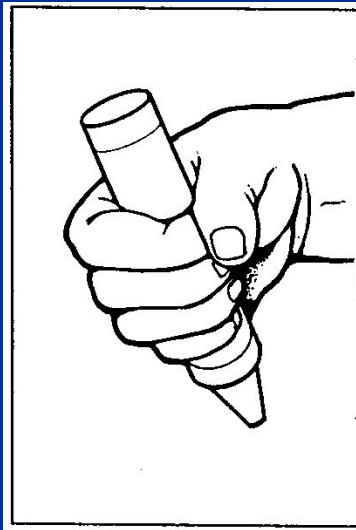


Stack your blocks again!

\*Thanks to Jacque Schfaasma,OTR for idea!

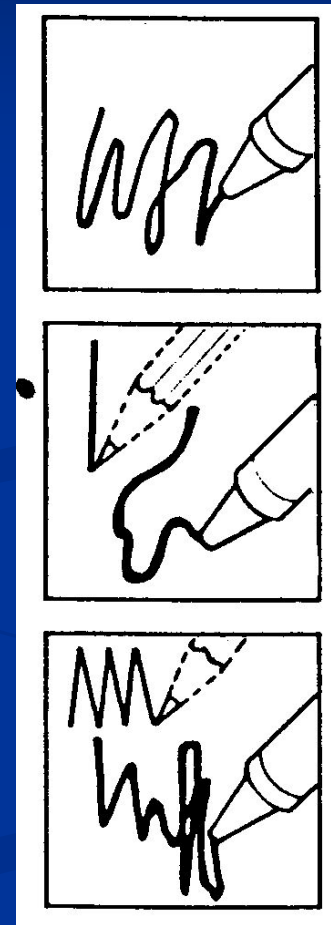
# Development of Grasps & Strokes

1 – 1 ½ years



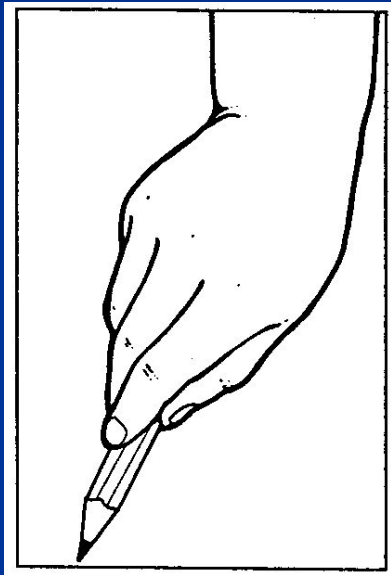
Fisted Grasp

- Imitating scribbles & strokes
- Spontaneous scribbling
- Whole arm moves as a unit



# Development of Grasps & Strokes

2 - 3 years

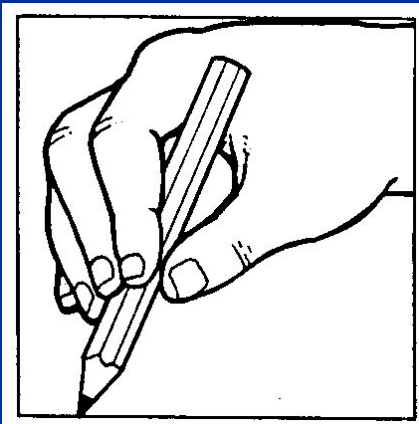


Digital grasp

- Copying    |    —    ○
- Utensil stabilized in palm
- Hand and forearm move as a unit
- More refined movement from elbow

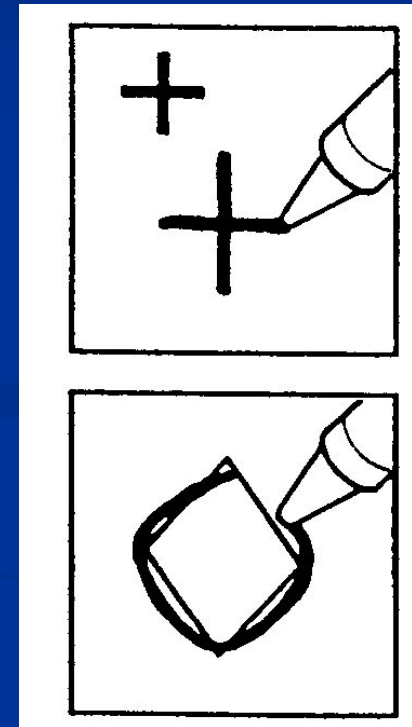
# Development of Grasps & Strokes

3 ½- 4 years



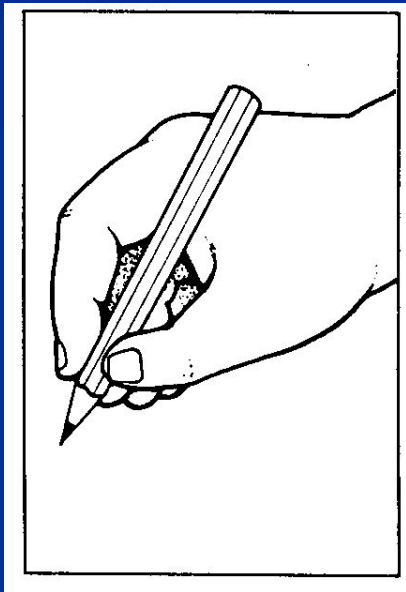
Emerging  
tripod grasp

- Copying cross
- Tracing diamond with rounded corners
- Movement primarily from wrist
- Hand functions as a separate unit from forearm



# Development of Grasps & Strokes

4 ½ - 6 years



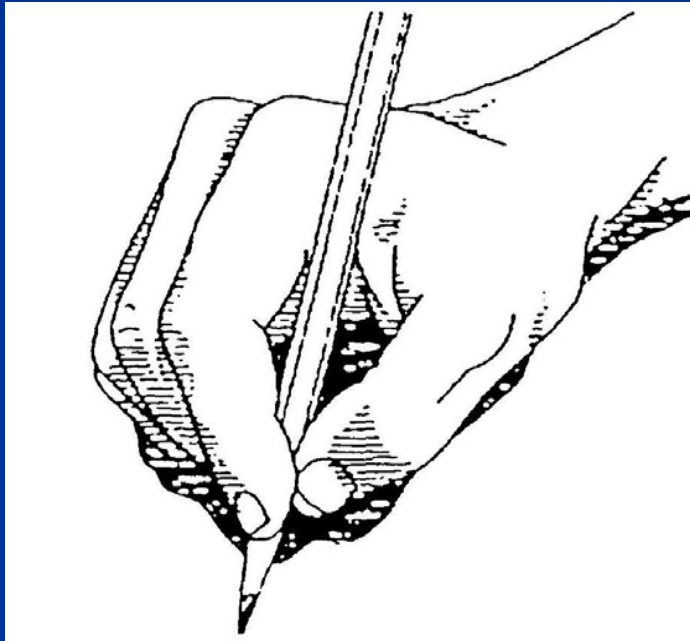
Tripod grasp

- Copying square, triangle, diamond
- Child begins to separate finger movements from hand/wrist movements
- Wrist moves into raised angle (extension) for increased stability
- More controlled directional changes

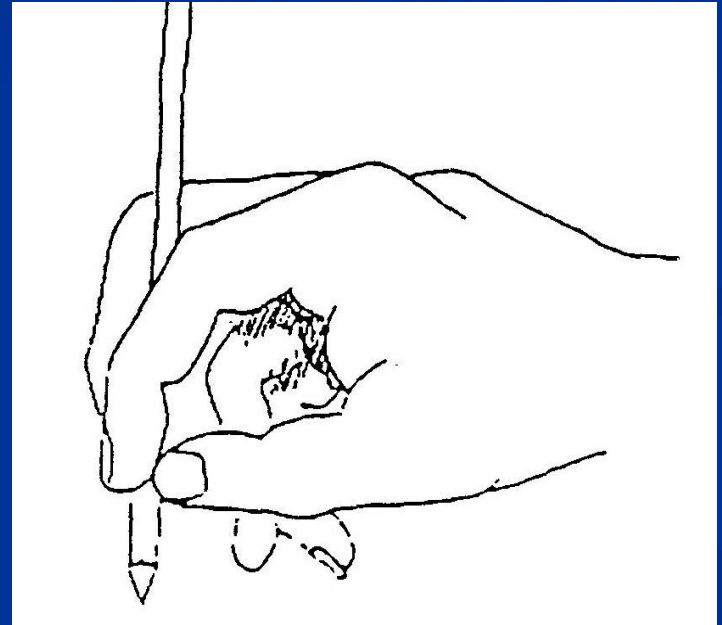


# Getting Ready To Write

## Efficient Grasps



**Dynamic tripod**



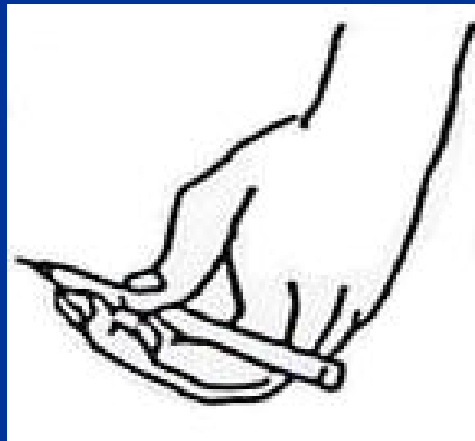
**Architect's grasp**

# Getting Ready To Write

## Incorrect Grasps



Thumb wrap



Supinate

– wrist is hooked



Quadropod

- 4 fingers on pencil



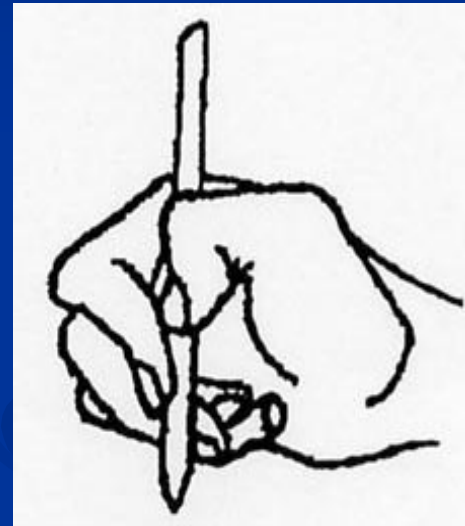
# Getting Ready To Write

## Incorrect Grasps



**Modified tripod**

– long finger below  
index

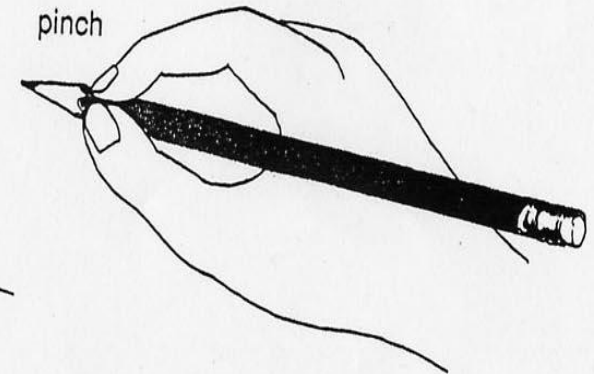
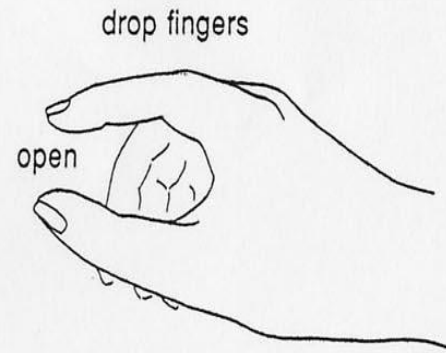
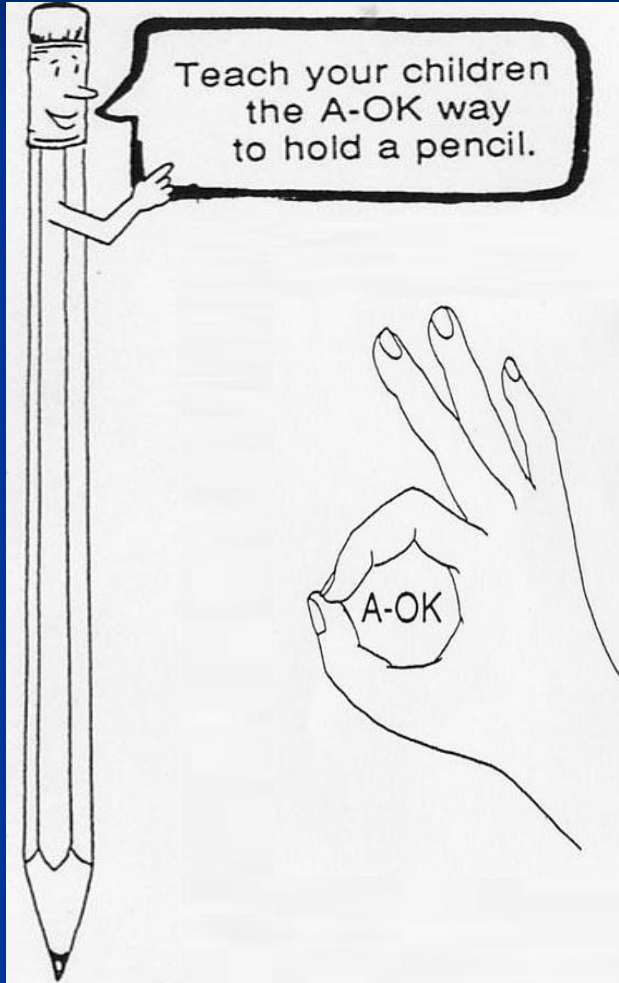


**Modified tripod**

– with closed web  
space

# Getting Ready To Write

## Pencil Grasp

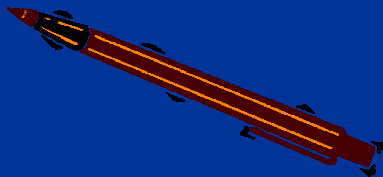


# Writing Instruments

Thick vs. Thin shaft

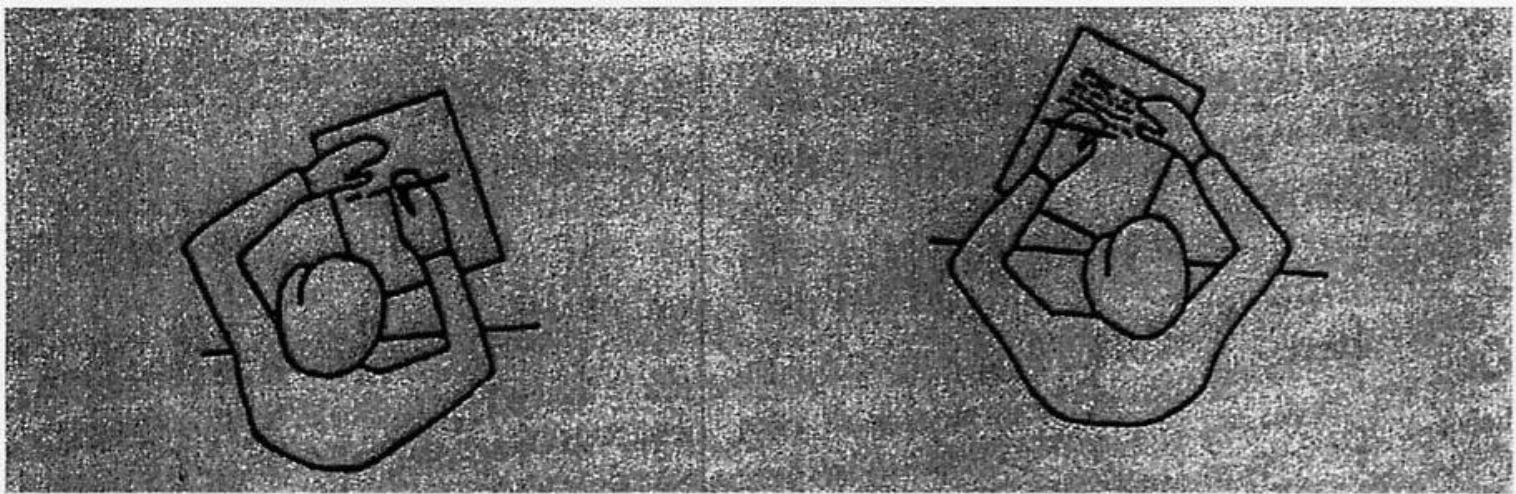
Short vs. Long shaft

Mechanical Pencils, Markers, Crayons, etc.



# Getting Ready To Write

## Paper Position



### **Right Handed**

- angle the paper 20-30° to the left
- right corner higher

### **Left Handed**

- angle the paper 20-30° to the left
- left corner higher

\*\*\*The writing tool is held below the writing line and the wrist is in neutral alignment

# Getting Ready To Write

## Paper Position

### Why slant the paper?

1. Enables hand to slide more freely along paper.
2. Enables the child to see what is being written.
3. Prevents smearing of writing.

## Non-Writing Hand

### What does it do?

1. It is not stuck in one place but moves freely to adjust the paper, moving it closer to the writing hand or out of the way.
2. It is flat but not still to promote relaxed writing.
3. It encourages good sitting posture.

# Pre-requisites to Writing

- Physical stability & Posture
- Grasps & Strokes
- Writing instrument
- Paper placement

# Printing/ Written Output

Upper Case Letters  
(Grouped by formation)

F E L H T I  
D P B R J U  
O Q C G S  
V W M N A K X Y Z

Lower Case Letters  
(Grouped by formation)

l h b k t f  
i r n m p j u  
c a d g q s e o  
v w x y z



# Proud To Be Printing

5th EDITION

A developmental multisensory  
printing program

*Developed by the occupational therapists on the  
Vancouver Regional Paediatric Team, in conjunction  
with the Vancouver School Board.*



# READY, SET, SCHOOL

## Gross and Fine Motor Skills

- generally not cause to hold a child back
- being **motor ready** promotes a positive school experience
- promotes good social and emotional development
- work at the child's level and gradually progress

**MOST IMPORTANTLY--- HAVE FUN !**

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