

THE HANDS OF A CHILD

Fine Motor Skill Development

Ailish Kelly - Occupational Therapist - October 2010

**THE HAND
IS THE
CUTTING EDGE OF THE
MIND**

Jacob Bronowski

Look at your own hand....

Some Numbers

plus or minus

29 major or minor bones

29 major joints

123 named ligaments

34 muscles

17 palm - 18 forearm

48 named nerves

3 major

24 sensory branches

21 muscular branches

30 named arteries

And nearly as many smaller branches

We work our fingers by

Remote control

Hand and Brain

About $\frac{1}{4}$ of the motor
cortex in the human
brain is devoted to the
muscles of the hands.

Fingers are special

There are
no muscles inside the fingers

The muscles

which bend the finger joints are located in the

palm

and

forearm

These muscles

are connected to the finger bones by

Tendons

which pull on and move the fingers

like

strings on a puppet

Finger Strength

The muscles which power the fingers are
strong...

...strong enough for some people to climb
vertical surfaces
supporting their entire weight
at times by a few fingertips.

Finger Strength - Life Skills

- Pulling on socks
- Squeezing a sponge
- Peeling an orange
- Opening a jar
- Closing a school bag

Thumb Movement

Look at you hand again.

Imagine your hand without it.

The Thumb

Is controlled by

9 individual muscles

which are controlled by all

3 major nerves

Thumb Moves

There are

6 separate moves

of the thumb.

Can you try them all out ?

Quotable Quote

“in the absence of
any other proof,
the thumb alone
would convince me of
God’s existence”

Sir Isaac Newton

Opposition

The ability of the
small and ring fingers
to rotate across the
palm
to meet the thumb.

Life Skills

Buttons, Zips, Snaps.

Passing coins from the palm
to the finger tips.

Pencil grasp.

Scissors.

Picking up small items.

Where does it all start ?

First Four Months

- Sucking the hands
- Watching own hands
- Grasping reactions
- Involuntary Movements
- Reflex actions

Asymmetrical Tonic Neck Reflex

A.T.N.R.

Head turns towards
extended arm.

Opposite arm and leg flex.

Baby is not yet aware that
the hands are part of
himself.

Eyes, head and hands are
all locked together in a
single movement.

A.T.N.R.

- Prepares the body for rolling and crawling.
- Facilitates early reaching movements.
- Beginning of hand-eye co-ordination.

A.T.N.R.

- Integrated at about 6 months
- Resurfaces temporarily if balance or posture becomes insecure as in learning to sit or stand.

A.T.N.R.

If poorly integrated.....

- Eye Tracking problems
- Poorly developed midline orientation
- Impact on refinement of balance and bi-lateral skills

Between 4 and 12 months

Eye – hand
co-ordination emerging.

Reflexes becoming
Integrated.

Voluntary attempts at
reach, grasp,
manipulation.

Symmetrical Tonic Neck Reflex

S.T.N.R.

- Alternating flexor and extensor tone on upper limbs and lower limbs.
- Rocking on hands and knees while supporting the head.
- Creeping on knees and hands.
- Eyes scanning environment and coming to midline

Retained STNR

Effects on

- Sitting and standing posture.
- Poor hand-eye co-ordination when movements toward or away from self are required (ball games and self-feeding and reaching with extended arms).
- Upper and lower body co-ordination – swimming, forward rolls.
- Judging speed and timing of fast approaching objects.
- Copying and vertical eye tracking.

Hand Development

In the absence of difficulties with the senses and postural control most children...

acquire the full range of hand function skills
by approximately

15 months

Fifteen Months

Skills in

Reach - Grasp - Manipulation

and

Precision

are all in place and lead to further skill
acquisition and refinement

Reasons for Referral

- Hard to get started
- Frustration with self
- Things that should be easy are difficult
- Avoidance of activities
- Tires very easily
- Very cranky after school
- Handwriting, shoe laces, knife and fork, lego, clothes fasteners

O.T. Assessment

- Parent and Teacher Observations
- Developmental History
- Handwriting Samples
- Clinical Observations – postural control, eye movement, sensory processing
- Standardised Assessments

Other Difficulties

- Language Comprehension
- Attention Span
- Tactile Defensiveness
- Sensory Integration difficulties
- Sequencing and Memory problems
- Tremor and motor control difficulties.

Occupational Therapy

- Sensory Integration Approach
- Developmental – ages and stages
- Skill Development - Fine Motor Skills
- Environmental Aids – writing boards, seating, lighting, pencil grips, laptop computers

Sensory Integration

What do we mean ?

- All the information we receive about the world comes to us through our senses.
- We commonly think that our senses include :

Vision	Taste
Hearing	Smell
Touch	

Sensory Integration Theory

Also includes the 'senses' of

- Balance
- Body Awareness

Sensory Integration

- Is the organization of sensory input for use.
- It allows us to organize, plan and execute skills.
- It influences our ability to perform these skills in a refined and efficient manner.

Hand Function

- Reach
- Grasp
- Power
- Precision
- In-hand manipulation

REACH

- Eye-hand co-ordination
- Postural Control and Stability
- Positioning

Reach - Life Skills

- Pulling out a drawer.
- Taking something off a shelf.
- Preparing to throw or catch a ball.
- Taking a jug up from the table.
- Putting a jumper over the head.
- Sweeping the floor.
- Climbing on a playground.
- Pulling up the duvet when making the bed.

Power - Life Skills

- Lifting heavy objects
- Pulling on a coat – socks – shoes
- Lifting a chair out or in
- Putting laundry in the washing machine
- Taking the top off a bottle
- Pulling the lid off a lunch box
- Turning a key
- Pulling on the handle of a door

Precision -Life Skills

- Clothes fasteners
- Threading beads
- Turning pages
- Colouring In and Tracing
- Folding paper
- Playing card games
- Putting coins in a money box
- Use of scissors

Types of Grasp

- Hook
- Power
- Lateral Pinch
- Tip Pinch
- Palmar pinch

Hook Grasp

Lunch carry bags and suitcases

Power Grasp

Spades

Tools

Trays

Heavy objects

Pushing a wheelbarrow

Lateral Pinch

Used to exert power on

or

with a small object.

Shoelaces – buttons –

Zippers – Screwdriver –

Scissors – knife and fork

Tip Pinch

Opposition of thumb

and index finger so that

a circle is formed.

Pencil – coins – cling film

zippers- yogurt lids –

tops of drink bottles - keys

Palmar Pinch

In a variety of situations
the thumb is opposed to
the pad of at least one
finger.

Palmar Grasp - Life Skills

- Opening a glasses box.
- Turning a door knob
- Folding a T-shirt
- Holding a big book
- Lifting a plate

In-Hand Manipulation

The process of
adjusting objects
within the hand
once it has
been grasped.

In-Hand Manipulation Life Skills

Playing with pegs / beads / small
pieces of lego

Balls of playdough in the palm of the
hand.

Coins or small toys from the pockets

Shoes Laces

Coins in your pocket

Art and craft activities.

Quote

We can land men on
the moon,
but for all our
mechanical and
electronic wizardry,
we cannot reproduce an
artificial fore-finger
that can feel as well as
beckon.

John Napier

What's Next

- Age appropriate choice of activities and toys.
- Limiting time in front of screens.
- 'Just Right' challenge to promote confidence.
- Cause and Effect Toys – musical, remote control
- Sensory explorations – sand, water, playdough, dry pasta, hide and seek (hands only)
- Music and Movement – finger games

Making progress possible

- Task Analysis – think about the ‘steps’ of the task.
- Backward chaining – encourage success by starting with the last step first.
- Short experiences repeated often.
- Nature Walks, scrapbooks, collections, certificates, photographs
- Fun, Fun, Fun.

Hands are also for.....

- Hugs
- Holding
- Helping
- Stroking
- Tickling
- Clapping
- Pretending
- Making a mess

Any many other discoveries

References

- 'Building Blocks of Sensory Integration' – Shiela Frick
- 'The Well Balanced Child' - Sally Goddard Blythe
- E-hand-The Electronic Textbook of Hand Surgery
- Improving Upper Body Control – Regi Boehme
- Sensory Integration Theory and Practice – Bundy, Lane and Murray

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Services Available

- Assessment – intensive or over a number of sessions.
- Assessment reports appropriate for use by government departments.
- One to one therapy services with the child and parents are always welcome.
- Written review reports provided following six sessions.
- School Visits and consultations.
- Age Group - Babies to young adults of 21 years of age.
- In-service Training for professionals in child-care, education and health services.