



Dandy Hands

Strategies that Facilitate the Development of Hand Function for Blind and Deaf-Blind Babies

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"The brain discovers what the fingers explore." Matti Bergström

As a parent of a blind or visually impaired baby, you are likely aware of how important your baby's hands are for learning about him/herself, learning about others, and learning about the world. Like all babies' hands, your baby's hands will be the doer of things that need to be done and in addition, your baby's hands will fill the role of perceiver and observer, taking over where vision leaves off.

Where Do Parents Begin?

There are things parents, caretakers and educators can do to increase the likelihood that your baby will develop the tactile skills and hand-use skills that are necessary for learning about the world. The experiences your baby has through his/her hands will help develop vocabulary and concepts which may eventually lead to literacy, comprehension, and the ability to read Braille - if that is the reading mode determined to be appropriate.

This brochure gives a condensed overview of hand development. It all begins with understanding the importance of touch and teaching your child to "love those beautiful, dandy hands!"

The Sense of Touch

The sense of touch is important for all babies, but is especially important for children who are blind and deafblind. The hands take over where vision and hearing leave off: expressing, inquiring, discovering and staying connected. In the absence of vision, touch is the sense that becomes the integrator of other sensory input.

When blind children engage in experiences rich in tactile sensory input, the part of the brain that was allocated to perceive vision can be used to perceive touch. Brain mapping has shown that a significant part of the brain is designed to process input from our HANDS. This is good news for children who will observe the world tactually!

The brain does not discriminate against how it receives information. It just needs input. When the brain gets enough information it can organize and integrate it. What is essential for babies is what the brain observes, not what the eye can see (Cutter, 2007, p. 26).

Oh, Those Beautiful, Beautiful Hands!

Newborns don't know that their hands exist yet! Your job is to get your baby to fall in love with her hands by loving them for and with her.

- Bring your baby's hands to your face for kisses. Sighted babies will connect their mother's voice to her face visually. Blind babies connect their mothers' voice to her face through touch.
- Gently massage your baby's hands and fingers. Pair the massage with a voice connection (verbal hugs), cooing and praising, singing, and expressions of appreciation to your child and her hands.
- Newborns typically have a strong reflexive hand grasp. When she gets hold of your hair, she can't voluntarily let go. Keep your voice gentle and loving as you remove your hair from those beautiful, beautiful hands which will serve your child well in the future. Then put a rattle in her hand!
- "Your baby's hands become more functional when she begins to consciously grasp objects. She grasps things on her body by pulling at her clothes and puts her hands in the direction of her mouth. Her job is to notice her hands and what they can do. Children who are deafblind need partners who know how to have conversations with their hands, with their bodies, and with touch and movement (Remarkable Conversations, B. Miles)."
- If she has vision, make her hands more visible to her by putting bright red fingernail polish on her fingers or put a bracelet with a bell on her wrist to bring auditory attention to the movement and placement of her hands.
- Use a vibrating toy on different parts of her body, encouraging her to reach, explore, and grasp.
- Help your child's hands come to the midline of her body by putting rolled towels behind her shoulders when in a child seat, or by putting her on the floor in a side-lying position.
- Choose toys that your child's hand will fit around, such as rattles. Match the properties of the toys to your baby's preferences. Think about color, illumination, contrast, texture, and smell.
- Put your child on your stomach so your faces are inches apart and her hands are flat against your chest. Verbally encourage your child to lift her head to either make eye contact, or for a smooch with flavored lip balm.
- Physically guide hands to hold the bottle during feeding.

Developing Hand Manipulation Skills

Your baby needs to develop strength through his trunk (proximal stability) before he can reach out his hands to handle or grasp an object. Gross motor movements, such as rolling over or pushing up to raise their head and shoulders off the floor, helps your baby relax the hand's reflexive grasp so that the hand becomes more functional.

Children who lack experience with tactile pressure or weight-bearing on palms may keep their hands in a fist position, which may get in the way of using their hands to hold a crayon or stretch their fingers to push the keys on a braillewriter. Activities to increase core muscles and provide weight-bearing on palms include:

- Tummy time with or without supports such as boppy pillows.
- Rock your baby back and forth on a peanut ball and help him make contact with open palms on the forward roll.
- Patty-cake.

Motivation to reach is typically a result of vision. Caregivers often struggle with non-visual methods for motivating reach. An auditory stimulus is not equivalent to a visual stimulus in promoting reach since children do not reach to sound sources until their eleventh month. Deaf children respond to vibration rather than sound. Purposeful reaching and grasping of an object usually happens between the seventh and ninth month for blind infants (Nielsen, 1994). Strategies that promote increased hand function include:

- Use of a Little Room that uses suspended toys and objects including those that vibrate for deaf children.
- Use of an active learning bib on which toys are attached at midline.
- Children who are deaf will reach for vibration against their bodies. An inflated balloon is a good conductor of vibration. Children reach on-body before off-body.
- Use hand-under-hand rather than hand-over-hand as much as possible to guide mutual tactual exploration.
- Play hand games such as patty cake (open palm); accompany your actions with descriptive words.
- Dropping objects from the high chair to the floor is practice for grasp-release. Embrace this game! It also helps develop depth perception and sound-distance awareness, the beginning of echolocation skills.
- Assess smallest object that the infant notices. If the object is too big to facilitate pincer grasp, then find glowing or other high contrast small objects (The Role of Vision in Development, L. Hyvarinnen). Pincer grasp develops at ~12 mos.
- Blind children need to be intentionally shown an object's function. Handling objects will help your child learn to flex and rotate his wrist, grasp and release, change thumb orientation for grasping, and adjust the power of his fingers.
- As soon as blind infants sit unsupported, provide play areas in which toys do not roll out of reach.

- Sound or vibration only has meaning if the child knows what object is producing it. When using sound as a motivator to look or reach, be sure the child has had previous experience with the object first.
- Teach songs and vocal play with hand movements. Blind children must be specifically taught movements for imitation activities.
- Crumple paper with your hands and then with your child. Emphasize turn taking.
- Read print/Braille books together; encourage your child to “find the Braille bumps” as you read the print. Encourage the child to turn the page. Emphasize positions such as the top or bottom of the page. Find places on the page that are “busy” and “quiet” to the fingers.
- Explore different textures together; different textures fire different receptors. Teach your child to press a switch with the palm of his hands to activate a toy or vibrator.
- Play finger isolation games such as “Where is the pointer?” Draw in shaving cream, pudding, sand or paint with individual fingers. Playing with a braillewriter can strengthen fingers and hands and help the child isolate fingers. This would be considered an emerging literacy skill. Finger isolation typically develops by 12 months.
- Encourage use of the spoon either passively (hand-under-hand) or actively (child holds spoon) during feeding.
- At about 15—18 months a sighted child will grasp a marker or crayon and begin to purposefully scribble. The non-visual alternatives for a blind child are to “scribble” using a braillewriter or a raised-line drawing kit.

Emerging Literacy

Q: What is literacy?

A: Communication through auditory, visual and/or tactual symbols.

Q: What is the foundation of literacy?

A: Meaningful language and/or communication are the foundations of literacy.

Q: What is the foundation of language?

A: Experiences are the foundation of meaningful language.

Q: How are concepts developed?

A: The interaction between words/symbols and experiences builds concepts

What does Newton have to do with it?

Being literate requires being able to understand or comprehend symbols that represent words, objects, and ideas. If you don't know the meanings and concepts that the words/symbols represent, then understanding doesn't take place. Take Newton's second law of motion, for instance, which states: “The amount of acceleration an object

has when you apply force to it is proportional to the force and inversely proportional to its mass.” Does the ability to read these words guarantee understanding it? The words represent concepts and if you’ve never been exposed to the vocabulary or concepts that the words represent, comprehension isn’t likely to happen.

Now think of Newton’s words using examples that you are familiar with. What Newton is really saying is: it takes more force to throw a shot put (which has more mass) as fast as a baseball (which has less mass); and, the harder you kick a soccer ball, the faster and farther it will go. This law of motion is better understood now because most of us have had the experience of kicking a ball, lifting a shot put, and throwing a baseball. We know it takes more strength to throw a shot put than a baseball. We have had experience with the real objects and developed the vocabulary and concepts that apply to them. We’ve stored the experiences and the words that go along with those experiences in our long-term memory.

This example shows that when we interact with objects and environments, and are given the language and vocabulary to describe them, we have a picture/idea come to our mind when we hear other people use those words or when we read them in a book. We make associations between the words we hear and the experiences we have had.

This is how we “make meaning” in our brain. Comprehension is dependent upon the background knowledge that is stored in our brains.

Whether your child will be a Braille reader, print reader, or use a tactile or picture communication system, early literacy experiences are essential. Children with sensory impairments need multiple hands-on experiences with objects and features in their environments to develop concepts. The concepts that a child develops helps him/her to find meaningful connections between symbols and experiences.

Experiences in meaningful contexts = concept development = literacy comprehension.

What are the Implications for Children with Sensory Impairments?

Whether your child is visually impaired, blind or deafblind, s/he needs lots and lots of experiences with real objects in authentic environments paired with language or a communication system in order to develop the background knowledge necessary to understand written, oral, or tactile language. This understanding through a

communication system can be considered literacy. Language and concept development happen simultaneously. Vocabulary development takes place in shared social and situational contexts, because people provide information about the meanings of words. Using novel words without the real object or action is ineffective.

Tips and Strategies that Support Vocabulary and Concept Development

- Young children use at least two senses together to verify information received from the other senses in order to form impressions. The tactile system (touch) is most important for giving context to and integrating the other senses together (Cutter, 2007). It is critical to provide a second sensory experience when our children cannot access it for themselves.
- Give your child playtime with real objects; demonstrate their function and provide the language that describes each object. Give labels to your child's sensory experiences. Joint attention is a powerful motivator.
- Build literacy experiences and language around routines that are part of his/her day. Calendar box systems can be used with non-verbal children to build vocabulary associated with routines and teach concepts about space and time.
- Don't assume that children see literacy happening around them; be intentional about modeling. If your child is expected to use a communication system, you use it too!
- Take your child with you when you go places; let him/her experience the world.
- Read books together and use book boxes with items that represent the story line and characters.

Braille Instruction

About Braille: Those Raised Bumps on a Page

The braille cell consists of two vertical rows of three dots each totaling 6 dots. Any combination of those 6 dots within the cell can represent a letter, a group of letters, a whole word, punctuation, numbers, symbols, and musical notation. Uncontracted Braille uses one cell for each letter—in effect; it spells out the whole word one letter at a time. Contracted Braille uses contractions and part- or whole-word signs and takes up less space on the paper.

The machine that produces Braille manually is called a Braillewriter. Computer programs can translate print into Braille by means of an embosser. There are many rules about when contractions or symbols can be used, and how Braille should be formatted on the page - that is why there are certified Braille transcribers. Parents or any sighted individual can learn to read Braille with his/her eyes. Books with both print and Braille are available for blind children whose parents and siblings read print with their eyes.

Sighted children as young as a year old are already learning the basics of reading; they recognize the "M" in McDonald's or the "C" on their box of Cheerios.

Getting Ready to be a Braille Reader (Pre-braille or Braille Readiness)

Principle 1: Children who will be Braille readers should experience Braille in their environment at the same time or earlier than when sighted children notice printed letters in their environment.

- Use a Braille-label gun to label familiar objects in the home, i.e. bed, table, etc.
- Read favorite stories in Braille together; make stories about your child with tactile objects glued to pages. Connect Braille to sign language skills.

- Familiarize your child with his/her name in Braille. Long before Braille-character recognition occurs, s/he may recognize the length of his/her name compared to words much longer or shorter.

Principle 2: Children who are sighted develop along a typical visual-skills continuum long before they learn to read. Children who are blind may need specific intervention in infancy in order to develop their sense of touch and the ability to use their hands to perceive information if they are to be ready for Braille reading. Check with vision professionals and Occupational Therapists for specific strategies to enhance hand-function.

Principle 3: Sighted children see adults reading and modeling literacy skills on a daily basis. Children who are blind should have blind role models who use Braille on a daily basis. Contact the Wisconsin Center for the Blind and Visually Impaired Outreach Department or local teachers of the visually impaired for help in finding a Braille-reading role model.

Tactual Readiness for Braille

A child who is ready for Braille instruction is likely to:

- Match or separate cards covered with various textured materials.
- Sort familiar objects such as buttons, clothespins, coins, and eating utensils.
- Locate the Braille in a book.
- Turn the pages of the book.
- Tactually identify similarities and differences among real objects in the environment.
- Tactually categorize real objects according to:
 - Physical properties, i.e. size, shape, weight, texture, and density.
 - Operational functions, i.e. things to stir with, things to stack, and things that are used to eat.
- A component part of a whole, i.e. this is part of a table setting; this tail belongs to the cat; this leg is part of a table.
- Determine the relative position of his body to objects in his immediate environment, ie: I am under the table; the chair is to my left; I am behind the bookcase.
- Have developed finger dexterity and hand strength; let child "scribble" on a braillewriter to promote hand skills.

Source: Mangold, 1994

Mechanical Readiness for Braille

A child who is ready for Braille instruction is likely to:

- Have finger dexterity and wrist flexibility; stack and sort blocks, string beads, fold paper, and cut with scissors.

- Imitate finger and hand positions; simulate “tracking” along raised lines of glued yarn or popsicle stick trails.
- Use only enough finger or hand pressure for a given task; have a light finger touch.
- Demonstrate tactile perception and discrimination skills.

Components for Hand Function

- **Neuromotor:** muscle tone, muscle strength, positioning, trunk stability, range of motion, balance, reach, use of two hands together, sensory integration, visual perception, motor planning, sense of touch.
- **Hand Development:** muscles of the hand, shoulder and wrist stability, supination, grasp patterns, release, separation of the two sides of the hand, arches of hand, finger isolation, thumb opposition, in-hand manipulation.
- **Cognitive:** sequencing skills, psychosocial skills
- **External Factors:** characteristics of object-size, shape, weight; orientation of object on a surface or being held in space; stability of the object.

Source: Bridgeman, 2002

Recipe for Book Boxes

Ingredients: story book, shoebox, real objects relating to story, comfy chair, and child of choice.

Directions:

- Take one simple story of your choice.
- Find objects that relate to the story (may include characters, textures, smells, sound makers).
- Put objects in shoebox along with book (if it fits).
- Sit in comfy chair with child of your choice. Read the story and interact with objects in shoebox at appropriate time.
- Snuggle and put book box in designated location.

Fine Motor Development Chart for Blind & Visually Impaired Babies & Children

Age Group	Milestones
B-3 months	<ul style="list-style-type: none"> • Plays with hands • Uses hands for purposeful action • Retains object placed in hand • Plays with toys that produce sound
4-6 months	<ul style="list-style-type: none"> • Reaches for object in contact with body with one hand • Places objects in mouth • Uses pads of fingertips to grasp small objects • Transfers object from hand to hand

	<ul style="list-style-type: none"> • Brings object to midline • Pulls objects out of container
7-9 months	<ul style="list-style-type: none"> • Uses purposeful reach to explore different textures • Places object in container • Pulls string to activate toy • Plays pat-a-cake
10-12 months	<ul style="list-style-type: none"> • Places one peg repeatedly into hole • Uses pincer grasp • Releases objects into air using full arm muscles to throw
18 months	<ul style="list-style-type: none"> • Begins to develop in-hand manipulation skills until age 7 • Stabilizes object w/one hand while other is manipulating it
22-24 months	<ul style="list-style-type: none"> • Stacks large objects • Adjusts finger opening according to size & shape of object
24 mos. - 3 yrs	<ul style="list-style-type: none"> • Closes Ziploc bags • Manipulates objects with both hands simultaneously • Uses hands for complex tasks • Throws a ball
4 years	<ul style="list-style-type: none"> • Buttoning and unbuttoning • Appropriate age to begin scissor skills
5 years	<ul style="list-style-type: none"> • Tripod grasp on pencil

Adapted from: <http://www.wonderbaby.org/articles/development-charts> and Bridgeman, 2002

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