

Guide to Designing Tactile Illustrations for Children's Books



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Contents

- Purpose of the Guide..... 4
- Role of Illustrations in Children’s Books..... 4
- When a Child Has a Visual Impairment 5
- Role of Tactile Illustrations in Children’s Books 7
- Types of Tactile Illustrations 9
- Challenges and Limitations of Tactile Illustrations 12
- Principles of Good Tactile Design..... 13
- Designing a *Meaningful* Tactile Illustration..... 14
 - 1. Begin with the Child..... 14
 - 2. Consider the Story/Text..... 16
 - 3. Design the Tactile Illustration 17
 - 4. Present the Tactile Illustration 18
 - 5. Evaluate the Tactile Illustration 18
- Sequence of Difficulty for Types of Tactile Illustrations..... 19
- Last Words 23
- Summary: Design Considerations for Types of Tactile Illustrations 24
 - Creating Tactile Illustrations Using Real Objects 24
 - Creating Tactile Illustrations Using Thermoformed Images of Objects 25
 - Creating Tactile Illustrations with Raised Lines and Shapes 26
- References 28
- Appendix A: Tools and Materials for Creating Tactile Illustrations for Children’s Books..... 30
- Appendix B: Related Products from APH 34

Purpose of the Guide

Whether you are a teacher, transcriber, or caregiver of a child with a visual impairment, this guide is intended to help you learn more about

- the role of illustrations—both visual and tactile—in books for a young child
- challenges and limitations of tactile illustrations
- factors that contribute to *well-designed* tactile illustrations
- considerations that must be addressed in order to design *meaningful* tactile illustrations
- information supporting an overall sequence of difficulty for various types of tactile illustrations
- types of tactile illustrations and the tools and materials needed to create them

It is hoped discussion of these will assist you, whether you are designing tactile illustrations for an existing children’s book, a book you have created, or are evaluating tactile illustrations in tactile books produced by others.

Role of Illustrations in Children’s Books

A quick glance at children’s books on library and bookstore shelves reveals a wide range of storybooks and informational books filled with colorful, interesting pictures. People who study how to engage young children in books and in reading believe visual illustrations in children’s books play several important roles.



- As an adult reads a book aloud, visual illustrations give the child a fuller understanding of the book’s events and *meaning*. They provide instant information and often add detail or humor that is not included in the book’s text.
- Visual illustrations attract and hold a young child’s attention long before he is able to read—or perhaps even understand—all of the words of the text. Bright colors, appealing characters and expressions, familiar and unusual settings add *interest* as an adult reads aloud.
- Visual illustrations act as *conversation-starters* for the child and adult: What does the picture show? What is the character [doing, feeling, wearing]? Is this thing round like the other things in the picture? These conversations are an important way to engage a young child in books, helping him build oral language skills and learn the meaning of unfamiliar words (Whitehurst, Falco, et. al, 1998; National Early Literacy Panel, 2006).
- Talking about a book—its text and pictures—also models for the child how to think about what is being read in order to make sense of it (*comprehension strategies*). Later, when he learns to read independently, he may use similar strategies to increase his own reading comprehension (Gold & Gibson, 2001).

- Books with visual illustrations encourage development of *book-handling* skills: learning to hold the book right side up, turning pages to view the pictures. Even though a young child cannot read the words of the story, pictures can encourage early, independent enjoyment of the book.
- By drawing the child into handling and exploring books, pictures may also increase his *exposure to nearby written words*. As a young child looks for pictures, he may also notice the print text, *critical* to learning about books and reading.
- Once the words of a book are familiar, a child may use what he sees in a book's pictures as a guide to help him *pretend read*. Pretend reading is when a child says aloud words of the story, using a reading tone of voice as he turns pages. Although the child's words may not match the words in the book, it is clear he thinks of himself as a reader, an important early step on the way to literacy.
- And at a later stage, when a child is truly beginning to read, pictures continue to support his learning by providing clues that allow him to fill in gaps between what he is able to read and words he does not yet know.



For a young child who is not yet a reader, visual illustrations are an important bridge, helping a young child take a more active role in book reading, as a listener and later, as a beginning reader.

When a Child Has a Visual Impairment

It is clear that visual illustrations in children's books engage and assist a child with typical vision. But what if a child cannot see a book's pictures? How can adults engage a young child with a significant visual impairment as books are read-aloud? What can add meaning to the words of the book, especially if the child's language skills are still limited?

- For a child who will read braille, children's books in braille offer important braille exposure and a degree of tactile interest. Long before he can read, a child may enjoy the *feel* of braille as adults read aloud. He can begin to learn that the braille "tells the story" and may imitate the hand movements for reading braille.
- Books that use rhyme, "catchy" language, or repeated words may be interesting to listen to, even if a child cannot view their pictures.
- And if a book does not depend too heavily upon pictures, adults can briefly describe some of the most important illustrations, using language at the child's level and relating their description to things the child has experienced.

However, exploring braille may not hold the attention of a young child for long periods, and lengthy descriptions of pictures can take away from rather than add to a child's interest.

Furthermore, unlike exploring a picture, listening to a description is a passive activity. A key goal of reading aloud is to engage the child as an active participant.

Given the young age of the audience, and the limitations just discussed, many teachers and parents of preschoolers with visual impairments have chosen to use story box objects and tactile illustrations as a way to add interest and meaning to some books they read aloud (Miller, 1985; Stratton & Wright, 1991; Newbold, 2000; Lewis & Tolla, 2003).

Story Box Objects

Story box objects are real objects, related to the book, given to the child to handle and explore as the book is read aloud. The items are usually collected together in a box or bag. Story boxes (or bags) offer a good first step for sharing books with a very young child who cannot view pictures. Although it takes time to find books featuring common objects that can be easily gathered up, most children enjoy using story boxes and often like to help choose and collect the items to include.

However, story box objects are not part of the book. They are examined alongside the book, and therefore, may not engage the child in exploring and handling the book to the same degree as visual pictures (Lewis & Tolla, 2003). In fact, story box items may draw a child's attention away from the book itself, limiting his exploration of the book and the written words it contains.



A long-time favorite, “If You Give Mouse a Cookie,” by Laura Joffe Numeroff, features a demanding mouse with a growing list of needs for milk, a straw, a napkin, crayons, tape, and more—items that are easily found around the house for inclusion in a story box.

Tactile Illustrations

In addition to story box objects, tactile illustrations—pages with illustrations designed to give tactile (touch) information related to the book's story or topic—also have the potential to add meaning and interest to books for a preschooler who cannot view the book's pictures.

Tactile books (books with tactile illustrations) vary in the types of tactile illustration they use and are available from different sources.

- Many tactile books are custom-made for a child by a teacher, caregiver, braille transcriber, or volunteer.
- Some publishers of print books produce children’s books that include tactile features. These are designed for a visual learner who can also view the surrounding print picture; the meaning the tactile features have for a child with a visual impairment may be limited.
- Some braille publishers add braille labels to tactile books produced for visual learners. This does not change the fact that the visual illustrations (with tactile features) were designed for a child with typical vision. The books do have, however, the advantage of offering important braille exposure and something to touch, even if the tactile illustration falls short of having true meaning for a young child with significant vision loss.
- A few braille producers publish tactile books specifically designed for children with visual impairments. In most cases, the tactile illustrations are also visible. Because the text is both print and braille, these books are appropriate for a range of audiences: children with significant visual impairments, typically sighted children, children with low vision, and adult readers who are braille or print readers.



Assortment of tactile books from the American Printing House for the Blind featuring a variety of types of tactile illustrations. Each book is designed for and evaluated with children with visual impairments, yet also provides visual images for children with limited or typical vision. Text is both large print and braille.

Role of Tactile Illustrations in Children’s Books

To be effective, a tactile illustration should provide the child with a tactual experience that, along with the book’s words, triggers a connection with the child’s own experience of the object in everyday life (Wright & Stratton, 2007).

Like visual illustrations, tactile illustrations can serve several functions as books are read-aloud.

- They have been observed to add interest and meaning to story reading for many children (Miller, 1985; Stratton & Wright, 1991; Norman, 2003).
- They offer a child opportunities to *actively* explore and think about what he discovers in the illustration and relate it to the words of the text.

- Because tactile illustrations are part of a book, they are more likely to involve the child in handling the book and as he does so, in encountering its written text.
- Like visual pictures, tactile illustrations can also act as conversation-starters as adult and child touch and comment on what the tactile illustration contains and relate this to the story.
- Some children, once they are familiar with a book and its tactile illustrations, use tactile illustrations to pretend read—similar to a child using visual illustrations to pretend read.



In addition, books with tactile illustrations give a child with a visual impairment opportunities to learn how to examine and interpret tactile displays. This is important knowledge since a variety of tactile displays (tactile maps, diagrams, charts, and graphs) accompany school textbooks.

Children with typical vision seem to interpret visual pictures and many other types of graphic displays, such as diagrams or maps, almost automatically. Since infancy, their world has supplied a steady stream of images on signs and labels, in books, and on television. They have had many chances to observe as adults use a variety of visual displays.

For a child with a visual impairment, however, learning to interpret tactile illustrations and displays is *not* automatic; it requires practice, support, and instruction. Many abilities—hand skills, tactual exploration skills, and cognitive skills—develop over time and combine to help a child explore and interpret tactile displays. There are also conventions or rules of practice that require explanation and associated concepts to be learned. Many adults with visual impairments report dissatisfaction with their own preparation for interpreting tactile displays.

For a number of children, exploring and enjoying books with well-designed tactile illustrations may be a valuable, early step in their preparation for using tactile maps, diagrams, and other tactile graphic displays. It is possible experience with well-designed tactile illustrations provides a foundation both by building skills and by helping the learner form a positive attitude about tactile displays.

Every book does not need to be accompanied by a story box or tactile illustrations, and not every child enjoys them. But many children with visual impairments demonstrate interest and enthusiasm for tactile illustrations (Miller, 1985; Stratton & Wright, 1991; Wright, 1991; Swenson, 1999; Norman, 2003).

Interest in tactile books

Tactile storybooks developed at the American Printing House for the Blind (APH) are evaluated with young children with visual impairments to assess children's interest in them. More than 18 storybooks have been developed for the *On the Way to Literacy* series, featuring a range of types of tactile illustrations. From 16 to 37 children, ranging in age from 2 ½ years up to kindergarten level or age 7, participate in the evaluation of each book. Questionnaires returned by their teachers indicate most children—both potential braille and large print readers—show a high level of interest in the books. Many have commented that a student with little previous interest in books (without tactile illustrations) showed increased interest in reading from the tactile books. In addition, teachers report that some students use the book's tactile pictures to help them pretend read (Wright, 1991). (Please see Appendix B for a listing of these and other tactile books produced by APH.)

Types of Tactile Illustrations

There are many different ways to represent objects and concepts in a tactile medium. We will discuss a possible order of difficulty for these later in the guide, as well as the tools and materials needed to create them. For now it is enough to become acquainted with basic types of tactile illustrations frequently used in tactile books designed for a young child.

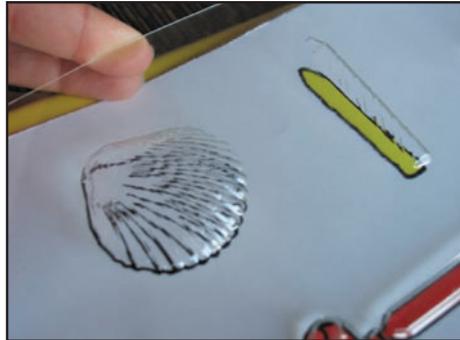
Tactile illustrations may be composed of:

- **Objects or parts of objects*** glued, tied, Velcroed® or otherwise attached to the page or enclosed in a bag, envelope, or pouch fixed to the page. (*Note that this does not refer to miniature models—such as a small toy car—used to represent a real car. A very young child may not understand the relationship between a small-scale model of an object and its real-life counterpart. For the purposes of this guide, tactile illustrations that use miniature models are not included in this category.)



A tube of toothpaste provided as an illustration in a book about bath time; it is enclosed in a plastic zip-lock bag stapled to the poster board page.

- **Forms of objects** molded in a thin plastic sheet (clear or opaque) by heating the plastic in a special machine. This process, called thermoforming, leaves an almost three-dimensional, highly realistic image of the object. Forms can also be molded from modeling compounds that dry to create a permanent form.



A thermoformed image of a shell in clear plastic; beneath the thermoform is a print drawing of the shell provided for visual learners.

- **Flat shapes** cut from textured fabric, paper, foam paper, and a wide variety of other textured materials, and then applied to the page. These usually depict the outer shape of an object, and the texture chosen may resemble the texture of the real object. Shapes can also be layered or “collaged” to vary thickness.



Fake fur fabric, cut in the shape of a child’s teddy bear, glued to a paper page.



A jack-o-lantern shape cut from thick foam paper and glued to a highly contrasting, black paper page.

- **Raised lines and shapes** embossed on a paper page, thermoformed on a plastic page, or created using special paper that swells when heated (swell paper). Raised lines can also be created by gluing string or yarn in place, drawing with thick fabric paints, poking holes in thick paper—and more. Textures associated with the real object will not be present. Because raised lines provide only an outline of the object, the outline is often “filled” with a pattern (called an areal pattern).



An unfilled raised outline of a spoon, thermoformed on a white plastic page.



A raised outline of a hand, filled with a dotted areal pattern, embossed in paper.

Raised outlines of geometric shapes created by drawing with a felt tip pen on sponge paper (Quick Draw Paper available from the American Printing House for the Blind).



Challenges and Limitations of Tactile Illustrations

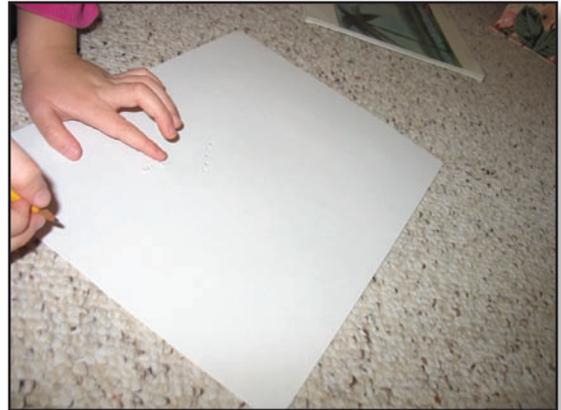
The purpose of a tactile illustration is to communicate an idea or information—not to reproduce a visual picture in a tactile form.

There are key reasons to include books with tactile illustrations among the many types of books you make, borrow, or buy to share with a young child with a visual impairment. However, it must be emphasized: a tactile illustration is not the same as a visual picture and does not replace it.

A tactile illustration can never be as complete as a visual picture or understood as instantly and completely.

Even adults with visual impairments often find tactile illustrations challenging to interpret. There are more than a few explanations for why this is so, and it is important to be familiar with them before attempting to create or evaluate tactile illustrations—especially if your intended audience is a young child:

- **Tactile illustrations cannot be seen at a glance as visual pictures are.** The “viewing area” is limited to what is beneath a fingertip (Loomis, Klatzky, & Lederman, 1991). Larger areas can be felt with the whole hand, but detail will be missed. And a young child’s hands and fingers are smaller than an adult’s. In most cases, the child must examine each part of a tactile illustration separately. Then he must think about all of the parts and how they fit together. Only then will he be able to understand the tactile illustration as a whole.
- **The child’s experience of how an object actually feels can seldom be duplicated, making it difficult for him to make a connection between the tactile illustration and the object it is intended to show.** An object’s three-dimensional shape feels very different from a flat representation of it. For example, an outline of a cat’s shape shown in a side view does not feel at all like the squirming cat the child has held, perhaps with his hands around the cat’s middle.
- **Context is critical, in part because the same shape can be interpreted in many different ways.** Is a raised outline of a circle meant to show a ball, cookie, saucer, orange, a wheel, the merry-go-round at the park, or the moon? Tactile illustrations must be given a context—either provided in the book’s written text, through verbal explanations, or both.
- **Like shape, texture can provide the child with clues but does not usually give enough information to identify a thing.** A cat is furry, with a scratchy tongue and claws. Some of these textures can be imitated—a patch of fake fur, scratchy sandpaper—but these could be confused with many other things that have a similar texture.
- **Differences in size between an object and its tactile illustration can be especially confusing.** As an example, a child may tactually recognize a table by its height and



how long it takes to feel along its edge as he turns each corner; a page-sized, flat representation of the table seems very unlike the real thing. (In a similar way, miniature models often confuse a young child.)

- **Spatial relationships are difficult to show and to interpret in a tactile illustration.** Showing where objects are in relation to one another on an illustrated page is quite different from how the child has experienced positions like *above*, *under*, *behind* in his tactile explorations of objects in the everyday, three-dimensional world.
- **Both visual and tactile displays use certain conventions; being familiar with these is critical to interpreting tactile illustrations.** Examples include the use of different perspectives (side view, overhead, cross-section), use of arrows to indicate movement, indicating an object is behind another object by not fully showing the object in the rear (not fully showing the wheels on the “back side” of a wagon). A young tactual learner will not be acquainted with these. In addition, there are many underlying concepts a child with a visual impairment may be lacking (Aldrich & Sheppard, 2000).

Principles of Good Tactile Design

In addition to the challenges and limitations just mentioned, a child’s ability to interpret a tactile illustration can also be seriously impaired if the designer has not followed key principles of good tactile design. If you are making your own tactile illustrations, it is *critical* to become familiar with and follow principles of good tactile design. If you are selecting a tactile book—one that is ready-made, knowledge of these principles can guide you in avoiding tactile books whose tactile illustrations are poorly designed.

Basic guidelines of good tactile design

To make tactile displays easier to interpret:

- Use textures, shapes, lines, and symbols or items that **feel distinctly different** from one another.
- **Simplify**—many lines or elements in an illustration make it confusing to examine by touch. Leave out unnecessary details and lines. A tactile illustration should show only a few of an object’s most important, identifying tactile details, such as the stem on an apple to distinguish it from an orange.
- **Avoid clutter**—place items no closer than $\frac{1}{4}$ inch apart; lines closer than $\frac{1}{8}$ inch apart are not felt as being separate.
- Avoid many intersecting lines. Lines that do meet and cross over one another should be tactually distinct from one another (e.g., dotted versus solid).
- Shapes should be at least $\frac{1}{2}$ inch on a side, no smaller, if they are to be recognized.
- “Fill” large outlined shapes or areas with a “fill pattern” (areal pattern) or texture to help the child tell what is inside and what is outside the shape.
- If your tactile illustration has many objects or elements, break it into two or more separate illustrations. For a young child, a tactile illustration should show only one to a few objects per illustration.

- If it is important that a number of objects be shown together, or if an object has a number of parts, build toward the final, complete illustration by creating several illustrations, adding one or two new elements to each subsequent illustration.

(American Printing House for the Blind, 1997)

Additional reading and sources regarding the principles of good tactile design include:

The Good Tactile Graphic: A two-tape video presentation and booklet. Louisville, KY: American Printing House for the Blind.

Barth, J. L. (1981). *Tactile graphics guidebook.* Louisville, KY: American Printing House for the Blind.

Edman, P. K. (1992). *Tactile graphics.* New York, NY: American Foundation for the Blind.

Otto, F. (1997). *Guidelines for design of tactile graphics.* Louisville, KY: American Printing House for the Blind.

Otto, F. & Poppe, T. (1994). *Tactile graphics starter kit guidebook.* Louisville, KY: American Printing House for the Blind.

Research and Development Institute (2006). *Tactile displays and graphics: Guidelines for designing tactile displays.* Sycamore, IL: author. Available online at: <http://s22318.tsbvi.edu/mathproject/ch6-sec1.asp>

Sheppard, L. & Aldrich, F. (2000). Tactile graphics: A beginner's guide to graphics for visually impaired children. *Primary Science Review*, 65, 29 - 30.

Designing a Meaningful Tactile Illustration

Yet even when a tactile illustration uses principles of good tactile design and has a context, it still may not trigger, for the child, an association with the real object/s or concepts he knows. If a child is unable to associate a tactile illustration with his own experience of the object and relate this to the words of the story, the illustration will be more decorative than *meaningful*. It may be tactually interesting, but it will not support the child's understanding of the text, engage him in meaningful conversation about the story, or build skills for learning to interpret tactile displays.

Designing and creating a truly meaningful tactile illustration for a book requires careful consideration of many elements: the child, the story or text, type of tactile illustration, principles of good tactile design, as well as the tools and materials needed to produce the illustration.

The following summarizes questions and factors that must be considered as part of the process of designing a meaningful tactile illustration for a young child.

1. Begin with the Child

Begin with the child in mind—considering his previous experiences, background knowledge, and abilities.

- Has the child had firsthand experience with the object/s you plan to include in the tactile illustration?

Provide hands-on experience first. *A young child cannot be expected to understand a tactile illustration of an object he has never before felt or examined.*

- Think about the child’s tactual experience of the object you plan to represent. What was most significant to the child when he felt the real object—its texture, shape, size, a key feature or detail, its function?

Design your tactile illustration to include these, even if this results in an illustration that is not visually like the object. It is a very common mistake to create a tactile illustration based on the visual features of an object—such as a raised outline of a teddy bear. This visual “point of view” is less likely to trigger a connection with a young child’s tactual experience of his own teddy bear, which he may identify by its fuzzy texture, floppy arms and legs, or button nose.

- What are the child’s tactual discrimination abilities? Can he tactually discriminate objects? Shapes? Thick as well as thin raised lines? Fine as well as gross differences? Both small and large shapes?

Design a tactile illustration that corresponds with the child’s abilities. If textures, raised shapes, or raised lines are used, differences should be clear and obvious unless the child is skilled at detecting small differences. Will the child be able to discriminate differences in the specific textures, shapes, objects, or line types you plan to provide? Checking this beforehand can save valuable time.



- How well developed is the child’s ability to tactually explore? Does he explore in a systematic manner or haphazardly? Does he know how to “scan” a tactile illustration to preview its overall size and major parts? Can he separate his fingers to explore fine detail? Can he follow a raised line with his finger/s? Does he know how to trace around the outline of a shape without overlapping his starting and ending points?

Create tactile illustrations that are in keeping with the child’s ability to explore and be prepared to help him explore carefully and completely.

- How well does the child understand part-whole relationships? Can he hold in mind various parts of a tactile illustration he has explored until he has fully examined each part? Can he then make associations among these parts in order to understand the illustration as a whole?

Create tactile illustrations that are in keeping with the child’s cognitive ability to fit together the information he gathers into a meaningful whole. Illustrations that show only one object with little detail are usually easier to “piece together” than illustrations with many elements or ones that show a large object with a complicated shape.

- What previous experience does the child have with tactile illustrations? What types has he encountered? Has he ever created a tactile illustration of his own? Has he explored tactile illustrations that show spatial relationships among two or more things? Is he familiar with conventions and different types of perspective that may be used?

Design your illustration to build upon his previous experiences with other tactile illustrations; talk about how the current illustration is like or unlike others he has explored. Be prepared to explain conventions/rules of practice used in the illustration.



One of the surest ways to create a tactile illustration that has meaning for a child is to involve the child in choosing how to illustrate a particular thing or concept.

2. Consider the Story/Text

Whether you intend to add tactile illustrations to a published children’s book or illustrate a book that you have written or the child has dictated, carefully consider aspects of the book’s text.

- Will the book’s text provide enough information—a context—to help the child identify and understand the tactile illustration?

*Select stories whose text gives enough information to support the meaning of the tactile illustration or be prepared to add this information as you read the book aloud. Even if a tactile illustration shows a familiar object with its most significant tactile features, a child still needs a **context** to make a meaningful interpretation. Although there are picture books for typically sighted children that have little or no text, this is not a successful format for tactile books. In tactile books, the meaning of a tactile illustration depends upon the words of the story (Stratton & Wright, 1991).*

It has been said that while “a picture may be worth a thousand words”—a tactile illustration without words isn’t worth anything!

- Identify the central objects and concepts in the story or text. What type of tactile illustration—if any—will best depict these (objects, textures, cutout shapes and textures, raised and filled outlines, unfilled outlines)? Is this type of illustration also appropriate for the child with whom you will be sharing the tactile book?

Select books that allow you to illustrate significant things or events using tactile illustrations suited to the child’s abilities and experience. However, even if you choose books with care, you may find that you cannot illustrate all of a book’s most important objects/concepts. This leaves several options: creating a tactile illustration of another, less significant object; including fewer tactile illustrations; rewriting the story to include something that you can represent with a tactile illustration.

- Are there a number of important things in the book that are so fanciful or visual that it will be hard to link them to something the child has experienced firsthand?

It is difficult to create a meaningful tactile illustration of imaginary or nonexistent things like castles and dragons. Largely visual things, like a rainbow, also present a significant challenge. Attempts to illustrate these with a tactile illustration are unlikely to hold much meaning for a young child. Better to choose another book or use descriptions to give an older child some sense of these. In some cases, you may be able to illustrate something else from the story that the child has experienced—a bean for “Jack-and-the Beanstalk,” rather than the castle or the giant.

3. Design the Tactile Illustration

In considering the child’s abilities and the objects you plan to represent, you will have given thought to the overall type of tactile illustration you hope to use: objects, thermoformed objects, textures, cutout shapes and textures, raised and filled outlines and lines. You may even have chosen specific textures and materials that you plan to use.

As you complete your design, there are many other details that must be weighed and considered, then rechecked against what is appropriate for the child and what best illustrates the story. The following are some basic questions you will need to answer. As you do, other more specific questions will arise.

- How much space is available for tactile illustrations?
- How will the tactile illustrations be bound into the book and where will they appear in relation to the text?
- Can objects be shown at their actual size (recommended), or must you reduce their size to fit the page? If so, by how much? And will the child for whom the illustration is intended be able to understand the size transformation?
- Can you consistently use the same representation for a given object (size, shape, texture, type of illustration) throughout the book’s tactile illustrations (recommended)?
- If an illustration has many elements or is crowded, can you break the illustration into two or more illustrations to show all that you have in mind?
- What perspective will you use: an overhead/aerial view, side view, magnified view, cross section view? Will this be consistent (recommended) throughout the book?
- If more than one thing is represented in the tactile illustration, is their relationship to one another (above, below, behind, near, far) important? If yes, how will you show important spatial relationships?
- What materials will you need for the illustration (paper, plastic, fabric, glue, yarn, fabric paint, etc.)? Where can these be obtained?
- What tools are required (scissors, tracing wheel, embossing equipment, thermoforming equipment)? Are these available?

With each step involved in creating the illustration, it is important to reassess: Does my tactile illustration follow the guidelines that govern good tactile design?

4. Present the Tactile Illustration

Even if an object is familiar to a child, it will be helpful to have him touch and examine the object just before encountering its tactile representation.

- If possible, compare the object and the tactile illustration side by side. As you do, talk about the object's identifying characteristics and uses. Point out similarities between the object and its tactile illustration (Stratton & Wright, 1991).
- If an object is too fragile, too large, or faraway to examine firsthand you may be able to prepare an older child by allowing him to explore and compare the object to something that he can touch and handle. For example, you could discuss how an inaccessible object like the moon is like and unlike a ball. Allow the child to explore the ball, and then compare the ball to a tactile illustration of the moon, shown as a raised circle. A young child, though, is likely to have great difficulty linking comparisons of the moon, to a round ball, to a flat circle representing the moon in a tactile illustration. There are limits to how meaningful these links can be until the child's language, concepts, and cognitive skills develop further.

First, and always, provide hands-on experiences with the real thing before presenting a tactile illustration of it.

5. Evaluate the Tactile Illustration

Before you include the illustration in the book and use it with the child, it is an excellent idea to try out the illustration yourself—with your eyes closed! Better still, “test drive” your illustration with someone who has never before seen or touched the illustration. Provide your test subject with a context by reading the book's text, watch as he tactually explores the illustration (with eyes closed, if he is sighted), and ask him to “talk through” his examination and interpretation of the illustration. What you learn can be valuable—and surprising! If an adult or older child has difficulty examining and understanding your illustration, it is all but certain that a young child will also have trouble. If this happens, redesign your illustration to correct the problems you discovered.

Once you do complete and use the tactile illustration with the young child, be a careful observer.

- How does the child explore it—quickly, haphazardly, slowly, incompletely, with ease, or is he tense?
- Does he have trouble locating some of the elements or objects shown?
- Does he recheck certain features over and over again?
- Does he seem to be “hung up” on parts that may be tactually distracting in some way, for example, an areal pattern that is too pronounced?
- Does he comment?
- Can he answer questions about the tactile illustration after he has finished examining it?

An older child should be able to reflect on the illustration and his examination of it. This is valuable information for you, the designer!





The observations and comments you collect may help you to design a better tactile illustration the next time, introduce the illustration in a more meaningful way, or may indicate areas where the child needs to develop more skill.

Sequence of Difficulty for Types of Tactile Illustrations

As mentioned earlier, base your selection of the *type* of tactile illustration you will use on what is most appropriate for the child, taking into account his skills and previous experience. We have pointed out characteristics that make any tactile illustration more difficult to explore and understand—having many elements, showing complex spatial relationships, sizes that differ from the size of the actual object. These add difficulty, regardless of the type of illustration used.

However, the question remains: Is there an overall sequence of difficulty when it comes to introducing various types of tactile illustration? Are tactile illustrations that use real objects easier to explore and interpret than thermoforms of objects, and are thermoforms easier to understand than illustrations that use raised lines? We do not have a great deal of research to “spell out” a sequence of difficulty among types of illustration, but we know some of the factors involved. Some are best explained in terms of the tactile illustration, others, in terms of the child.

Child’s Development of Necessary Skills

As far as a young child is concerned, research shows a child’s tactual discrimination skills and fine motor skills develop gradually, following an overall sequence during the early years of life. A very young child’s ability to examine things with his hands is at first limited by a whole-hand style of exploration (Griffin & Gerber, 1981). At this stage, he can grasp objects and notice large areas of texture, but may not be able to separate his fingers to examine a flat shape or use his fingers to follow a raised line or outline. Tiny shapes and details may not be noticed or adequately explored by a child at this stage of development. Therefore, at first, illustrations that use objects and have larger areas of texture or larger shapes usually function best.

Once a child is able to examine objects more fully using his fingers and more sensitive fingertips, he can detect more about their shape and texture. As the child develops greater sensitivity, fine motor control, and the ability to think about the tactual input his senses bring, he will be better able to explore the details of tactile illustrations that use flat shapes, raised lines, and outlines.

Sequence of tactual discrimination skills

Kershman (1976) found evidence supporting the gradual emergence of a sequence of tactual discrimination skills in a study of 60 children whose level of vision was categorized as light perception or less. Children ranged from 5-12 years of age. Each child was required to tactually examine four items and indicate which one was “not the same.” Children were first able to pick out which item was “not the same” when examining **3-dimensional objects**. As age increased, greater numbers of children correctly picked out the item that was “not the same” as they examined **flat shapes**. This was followed by proficiency in detecting differences in **raised shapes and lines**, and last of all, variations in **braille shapes**.

Richness of Clues Contained in the Illustration

From the standpoint of the illustration itself, many clues to an object’s identity are lost in creating a tactile illustration of it; however, some types of tactile illustration result in more lost clues than others. For this reason, some types of illustration are likely to be more difficult to interpret, especially for a child who is inexperienced with tactile illustrations. Stratton (1990) offers the following example of how various types of illustration—objects, raised shapes, raised outlines—offer progressively fewer tactile clues to help a child connect the illustration with the object it represents.

“Lost in translation”

Most young children are very familiar with socks and the business of putting them on and taking them off. A young child’s tactual experience of sock probably includes the impression that it is soft, that he can place his hand or foot inside the sock, and that he can scrunch it up or stretch it.

- The same sock, with one side glued flat to the page to serve as a tactile illustration, has lost one or two clues to its identity: it cannot be scrunched or stretched. The child can still put his hand inside it but it will be hard to fit on his foot!
- Gluing down a cutout in the shape of a sock, even if it is cut from the same sock material, further reduces the tactual information available to the child. The child can detect the texture and shape, but can no longer fit his hand inside or scrunch and stretch the sock.
- Thermoforming the sock in a sheet of plastic results in the loss of another very significant clue to its identity: the feel of plastic has replaced the original texture of the sock. In the case of a sock, its texture may well have been the best single piece of tactual information.
- Representing the sock as a raised outline formed by embossing the outline in paper or gluing string to outline the sock’s shape (as seen in a side view) has very few clues to trigger a connection to the child’s experience of a real sock. It isn’t the same texture. If the outline shape is unfilled, the child may even have difficulty determining what is “inside” the outline and what it is “outside” and so arrive at a very different impression of the shape being presented.



- Moreover, reducing the size of the sock in any of these types of tactile illustrations removes yet another critical clue.

A child needs a great deal of experience and a context in order to make sense of a tactile illustration when so many familiar clues are missing!

(Stratton, 1990)

It is always possible that providing a key detail can make even a more difficult type of tactile illustration easier to interpret, and the reverse is also true. An illustration that uses objects is not necessarily easier to interpret, if, for example, it is cluttered. Nonetheless, information we have about children's development and the richness of clues provided by different types of tactile illustration does suggest an *overall* sequence of difficulty.

Object Illustrations—First

Tactile illustrations that feature objects—real object illustrations—are likely to provide the best introduction to tactile illustrations, both because a young child has the fine motor skills, tactual discrimination skills, and cognitive abilities needed to explore them and because they contain more significant clues to the object's identity.

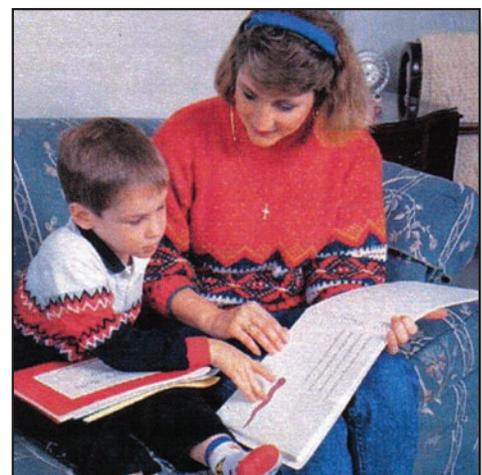


A two-year-old explores a real object illustration in a tactile book, unzipping a small purse attached to the book's page.

Raised Line Illustrations—Later

Given what we know about children's development of tactual discrimination and exploratory skills, as well as the number of tactile clues missing from raised line illustrations, it is reasonable to expect raised lines/raised shape illustrations to be more difficult to interpret than other types of illustrations. Raised line drawings, in most cases, should be reserved for use with a preschooler who has had successful experiences with other types of tactile illustrations.

A four-year old uses his fingers to examine a very simple raised line illustration as his caregiver reads aloud.



Intermediate Steps . . .

Between real object illustrations and raised line illustrations, however, are other types of tactile illustrations that seem to be of intermediate difficulty. They may lead a child in making the transition from real object illustrations to raised line illustrations. Or they may simply offer an alternate means of providing more, and richer tactile clues.

Thermoformed objects

Barth (1984) first suggested that tactile illustrations featuring thermoformed objects might serve as an intermediate step between identifying objects and interpreting illustrations with raised shapes and outlines. Poppe (2004) also utilizes this progression in a set of training materials designed to help students transition from exploring 3-dimensional objects to interpreting 2-dimensional raised line illustrations. Thermoforming may be a good choice for representing objects whose shape is an important identifying clue. However, if thermoforming eliminates texture as a clue, it loses some of its effectiveness. A thermoform of a comb may be highly recognizable; it is very like a real comb. A thermoform of a fuzzy stuffed animal, however, has lost its most important clue—its texture.

Parts of objects

Using part of an object in a tactile illustration can provide a good or a poor means of representing an object, depending on the specifics. Evaluate each case carefully based on the child's familiarity with the whole object and its parts, his ability to understand part/whole relationships, and how distinctive or unique the part is. A tab from a soda pop can is a key part of the real object, but may not signal soda pop can to a young child who has never opened his own pop cans! Placed alone on the page, it may not be understood, even if the story supplies a context.

Texture-added illustrations

Adding texture to raised line illustrations—either through cutting shapes from textured materials or adding textures as “fill” patterns—has the potential to boost the richness of clues in an illustration. Research shows even typically sighted preschoolers pay special attention to texture (Abravanel, 1970). When an object's texture is distinctive, it can be a powerful clue to its identity. Sometimes, it may even be able to “stand alone” as an effective illustration.

Distinctive details

Similarly, distinctive details of an object, if there is a way to represent them, can greatly increase the ease with which an illustration is interpreted. Regardless of which type of illustration you are using, be on the lookout for these “telling” details or clues and how you can show them tactually. Just one can “jumpstart” recognition and make a “more difficult” type of illustration, such as raised line drawing—easier to interpret.

Future research may offer guidelines about the best times and ways to introduce various types of illustrations, including, which are most appropriate for a given need, and how they may be combined.



Last Words

It is helpful to frame our thinking about tactile illustrations and young children by recalling that *both* development and experience play important roles in learning to explore and interpret tactile illustrations and displays. Not only must an illustration be well designed, the right type of tactile illustration must be presented in the right way at the right time for a particular child.

Responsibility rests with the adult to:

- determine the child’s abilities, previous experience, and knowledge
- decide what the tactile illustration will attempt to illustrate
- select the most appropriate type of tactile illustration
- provide a context for the tactile illustration
- use principles of good tactile design
- present the illustration, associating it with hands-on experience with real objects
- support the child’s exploration of the tactile illustration
- observe and reflect on the child’s use of the illustration

The central question should be: how meaningful will this illustration be for the child in the context in which it is supposed to function?

Tactile illustrations, while serving a role in sharing some books with a young child with a visual impairment, are not necessary for every—or perhaps—most books. They provide one way to add meaning and enjoyment to read aloud stories. And tactile books offer a child opportunities to begin building a foundation for interpretation of tactile displays contained in geography, science and math textbooks.

In many cases, however, you will discover that a tactile illustration cannot convey the information you wish to convey. This is not a failure on anyone’s part. There are many ways to enrich book reading that do not involve pictures. Closeness, quiet time together, and the sounds of language read aloud—these are a powerful part of sharing books with every child.

And as one individual with a visual impairment remarked, “I don’t have to enjoy things in the same way as a sighted person. I’m happy with the things I enjoy! Once my friends were describing the view from the hill we had just climbed, going to great lengths to put into words the colors of the sunset. I was happy feeling the breeze on my face, the chill air as night fell, and the sounds of approaching night. So I suggested to them they go ahead and enjoy their “view” while I enjoyed mine . . .”

Summary: Design Considerations for Different Types of Tactile Illustrations

The next section summarizes information for creating specific types of tactile illustrations—those created using real objects, those that use thermoformed images, and those that consist of raised shapes, lines, and outlines. Tactile displays that primarily use abstract symbols, such as those used in maps and identified in a map key, will not be discussed. Information about designing abstract, symbolic tactile graphics can be found in a number of sources, including those listed on page 14.

Creating Tactile Illustrations Using Real Objects

At first, a young child is usually most successful discriminating three-dimensional forms (Kershman, 1976). At the earliest levels of tactual discrimination, he is more likely to notice gross differences in texture and size (Griffin and Gerber, 1981). Before the age of 2 years, or in a child who has not done much exploring due to early tactile defensiveness, you may notice a tendency to explore with the whole hand, instead of using his fingers separately. Even preschoolers have been observed to prefer exploring objects in this way. Tactile illustrations that feature real objects are appropriate choices at this initial level.

- Select objects that are familiar to the child. Use the real thing; using miniature replicas of objects is not recommended at this stage.
- Choose objects with distinctive textures; textures greatly assist recognition.
- It may be easier if objects selected have simple forms, unique shapes, or distinctive features—such as bristles on a brush.
- If your child is beginning to use fingers separately and together to investigate details, objects that are more detailed and have more complex contours can be used.
- At first, primarily use objects that are the size of or smaller than the child’s hands. It can be more difficult to identify large objects that must be examined by moving the hands from one part of the object to another.
- When the real object is too large to fit on the page, it may be successful, if the book’s words provide enough supporting information, to attach a texture like that of the object. (e.g., a story character has a soft, fuzzy blanket. Provide a large swatch of blanket material, attached at one edge rather than glued down, so it can be “crumpled” and feels more like a blanket might actually feel.)
- Objects that feature actions the child can perform—a purse that opens up, a comb Velcroed® to the page that he can detach and use—may assist recognition.
- Objects can be attached to the page (glue, Velcro®, or tied through holes cut in a page made from stiff poster board), enclosed in an envelope, or placed in a zip-lock bag fixed to the page. Objects are more difficult to recognize if they cannot be detached from the page, however this may be a step toward recognizing thermoformed (molded) plastic images.
- Limit each tactile illustration to one or two objects per page, unless you are showing multiples of the same object. Even in such a case, use only a few items. For tactile

readers of every age, clutter is the “number one enemy” of interpreting tactile displays. Less is more for the tactile reader! If you must show more than a few items, consider showing them in separate displays.

- Space objects so there is room between them; things positioned too closely together may seem to merge, to the sense of touch, into one object. But do not scatter objects so widely that the child is likely to miss one positioned off to itself.
- *Always try out the tactile illustration yourself, with eyes closed—or try it out on a willing volunteer as you read the story.*
- *Ask the child to suggest objects to create tactile illustrations to go with the story!*

Creating Tactile Illustrations Using Thermoformed Images of Objects

If certain guidelines are followed, tactile illustrations made by thermoforming real objects may help bridge the gap between recognizing real objects and interpreting tactile illustrations that use raised lines to represent objects (Barth, 1984; Stratton & Wright, 1991, Poppe, 2004). A thermoform image of an object is made by heating a thin sheet of plastic, vacuum forming it over the object or a molded form of the object using a device called a thermoform machine. The resulting molded plastic image closely follows the contours of the original object and shows details, such as surface markings and indentations. Before thermoforming an object, however, it is very important to consider its identifying features *from the child’s point of view*. What clues will be lost? A thermoformed image shows shape very well, but is hard and has the surface texture of the plastic medium. If a fuzzy texture or pliability is an object’s most significant tactile feature then thermoforming the object is not likely to produce an effective tactile illustration for a young child. Beyond this, many of the same guidelines for creating an effective tactile illustration using real objects can be applied to tactile illustrations showing thermoformed objects. In fact, many of the same objects suited to real object illustrations are also suitable for thermoforming.

- Use objects that are familiar to the child.
- Use actual size objects rather than miniatures. Size is still an important clue to preserve. (If the real object will be damaged by thermoforming, in some cases you can shape a replica from self-hardening clay. Take care that the replica resembles the object in size, shape, and significant details.)
- At first, choose objects that fit beneath the child’s hands and have simple forms or a distinctive, unique form. If your child uses fingers to investigate details, objects that are more detailed and have more complex contours can be used.
- Keep to just a few objects per page, spacing objects so there is room between them without scattering them too widely.
- *Again, remember to try out the tactile illustration yourself, with eyes closed—or with a willing volunteer as you read the story.*
- *Ask the child to suggest objects to thermoform for tactile illustrations that will illustrate the book.*

Creating Tactile Illustrations with Raised Lines and Shapes

A preschooler may continue using tactile illustrations created with real objects and thermoformed images of real objects. He may also be ready to explore and interpret tactile illustrations that feature raised lines and flat, cutout shapes glued to the page. (Recall Kershman’s levels of tactual development described under Sequence of Difficulty for Types of Tactile Illustration.) This type of tactile illustration will require him to use his fingers separately, tracing along lines with fingertips. He will also be required to notice finer tactual differences. Ideally, lots of experience with real objects, textures, and other types of tactile illustrations has prepared him for this step. Raised lines are often used to show the outline of an object, such as the outer shape of an apple. Unfilled outlines present a problem, however, for most young tactile learners. It can be difficult to tell what the outline encloses, especially if several objects are presented. For this reason, outlined shapes are usually filled with an areal pattern. An areal pattern is a repeating pattern of raised dots or other small raised marks; this tactual pattern “fills in” the area inside the outlined shape. Think of it as “coloring-in” an outline to help define the shape being presented. A cutout shape solves this problem of filling an outline; in addition, if it is cut from material that is similar to the texture of the real object, this preserves an important clue. Raised lines, areal patterns, and cutout shapes are sometimes used together in a tactile illustration—as long as the resulting illustration is not cluttered and each type is used in a consistent manner. Raised lines, outlines, and cutout shapes can be created using a variety of methods and materials.

- When deciding upon objects to represent, continue to choose objects that are familiar to the child or that he can examine before reading the story. If something is too fragile for the child to feel first-hand—a butterfly, for example—you may be able to show the child a three-dimensional, actual size model, explaining how the model differs from the real thing. Your preschooler may be able to use your verbal explanation, combined with the model, to gain an understanding of the object before moving to a two-dimensional tactile illustration of the object. Experience with the actual object is always preferable, though, when this is practical and safe.
- Continue to show objects at their actual, real-life size. Until a child understands the idea of scaled sizes, avoid making tactile illustrations of things that are very big, such as a house. Your scaled down representation will not resemble the parts of the house he has felt—and it’s doubtful he has explored the roof! A preschooler quite likely has an unclear idea of how all the parts of the house go together. In the case of larger objects, you may try using a miniature model with verbal explanations to demonstrate relationship of the parts, but the child’s understanding will probably have inaccuracies.
- When you select objects to be shown, always consider the tactile clues that will be lost, particularly when creating tactile illustrations using raised outlines or cutout shapes. If texture is an important clue, use shapes cut from a similarly textured material to preserve this clue.

- Choose objects that have a characteristic outline that is not complex. For example, the outline of an apple may be easier to recognize than the outline of a shoe—in part because shoes vary so much in shape and because the shoe’s outline will differ greatly, depending upon which perspective (side view or top view) you choose to create the “outline.”
- In deciding which perspective to use in creating an outline, consider the child’s tactual experience of the object in real life. Is this an object, like a plate, which is usually presented and felt from above? Is a critical, identifying detail only obvious in a side view—such as a cup’s handle? Many considerations must be balanced in selecting the best perspective.
- Think about what is important to show—*then eliminate all unnecessary detail*. In particular, it isn’t necessary and can be misleading to show details that are primarily visual—such as colored stripes on a ball. Do show one or two defining details, such as the apple’s stem or the eraser at the top of the pencil.
- In most cases, present only a few objects per page to avoid cluttering the page. Space objects so there is room between them, without scattering them too widely. Leave about a “child’s finger width” between objects and at least 1/4 inch between all raised lines. Research has shown that lines closer than 1/8 inch are usually not felt as separate lines. Young children may need even more space.
- If you use an areal pattern, the raised lines that form outlines in the illustration should be higher (more raised) than the pattern itself. This way, they are less likely to distract from the child’s examination of the overall shape.
- After a child understands that objects can be represented with raised lines on a tactile display—the next step is to represent spatial relationships between objects. Again, demonstrate the spatial relationship with actual objects before showing the raised line drawing.
- If a tactile illustration has multiple parts, consider breaking the illustration into several different illustrations. A growing plant could be shown first as a single stalk, then shown as a stalk plus branches, and finally as a stalk plus branches plus leaves.
- *Enlist the child’s help in selecting the side of an object to be outlined or represented with cutout shapes; discuss how you might position elements in the tactile illustration to show spatial relationships.*
- *Remember to try out the tactile illustration yourself, with eyes closed—or with a willing volunteer as you read the book.*

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Appendix A

Tools and Materials for Creating Tactile Illustrations for Children's Books

Remember—safety first!

- Keep in mind that small parts may present a choking hazard. It is important to make sure that each tactile piece is securely attached to the page. Furthermore, a child should always be supervised when using a tactile book that contains small ingestible pieces.
- All glues, adhesive materials, markers, and paints should be nontoxic. Refer to the product label for details.
- Be aware of sharp edges or corners on objects. Efforts should be made to round these to prevent cuts and scratches.
- Some objects or parts of the illustration may be breakable. If this is the case, remember to check for possible sharp, jagged edges or corners, or small pieces that could present a choking hazard or be harmful if ingested.
- If a child is allergic to certain materials or foods (e.g. latex allergy), be certain to not use those materials in the book.

Basics

- Brailleable labels or sheets for adding braille (available from APH)
- High quality, long-lasting adhesive (glue, double-sided tape, hot glue, adhesive backed “dots”)
- Sturdy paper, poster board—white, black, or colored*
- Three-ring binder or other means of binding text and tactile illustrations

*If the child has usable vision, select materials with bright colors and contrasting, solid backgrounds.

Materials/Tools for Creating Tactile Illustrations Using Real Objects

Attach objects to page using:

- High quality adhesive suitable for the item you are attaching
- Elastic, sturdy yarn or string for tying items to the page
- Tyvek™ (plastic fiber “paper”) envelopes or pouches to glue or staple to the page to hold items
- Zip lock sandwich bags to glue or staple to the page to hold items

Materials/Tools for Creating Tactile Illustrations Using Thermoformed Images of Objects

Thermoform equipment and supplies (*available from American Thermoform Corporation*)



Materials/Tools for Creating Raised Shapes for Illustrations

Cut shapes from:

- Cardboard/ corrugated cardboard (pre-cut shapes available)
- Carpet
- Cork
- Fabric (various textures and colors)
- Felt
- Foam paper (sheets and pre-cut shapes available)
- Magnetic sheet material (pre-cut shapes available)
- Needlepoint canvas
- Paper (thick, textured papers and card stock) (*available from APH*)
- Plastic
- Sandpaper
- Styrofoam
- Velour paper
- Wood (pre-cut shapes available)

Draw shapes with:

- Fabric paint/puff paint or glue
- Felt tip pen on Quick Draw paper (sponge paper; *available from APH*)

Mold, form, or assemble shapes using:

- Modeling compound (Crayola Model Magic)
- Pom pom balls—soft, colorful balls in various sizes can be glued to the page
- Popsicle sticks
- Puzzle pieces

Materials/Tools for Creating Raised Line Illustrations

Draw lines with:

- Blunt pen or stylus—lay paper over carpet, a folded towel, computer mouse pad, or corrugated cardboard; poking holes with the pen or stylus produces a raised dotted line on the reverse side of the paper
- Crayon and screenboard—window screening stapled over a wooden board, drawing on paper placed over the screenboard leaves a rippled, waxy line that can be felt
- Draftsman Tactile Drawing Board—drawing board used in conjunction with a plastic film and stylus instantly produces raised line drawings (*available from APH*)

- Fabric paint or thick glue
- Quick-Draw Paper—flat, dry sponge “paper” swells as you draw on it with a water soluble marker; markers of different widths produce lines of different widths (*available from APH*)
- Raised-line drawing kit—features a thin plastic sheet attached to a clipboard with a rubber backing; writing on the plastic sheet with a blunt tool
- Spur wheel—lay paper over carpet; roll spur wheel to produce a raised dotted line on the reverse side of the paper (*available at craft stores*)
- Swail Dot Inverter—special stylus allows dots to be embossed upwards by puncturing the paper on the downstroke (*available from APH*)
- Swell-Form Machine, Swell Touch paper (*available from American Thermoform Corporation*)
- Tactile Marking Mat—textured mat functions like a screenboard when paper, laid over the mat, is written upon with a waxy crayon (*available from APH*)

Shape and adhere to page to form lines:

- Fabric tape, bric-a-brac, Velcro® tape—apply to page to form raised lines and outlines
- Graphic Art Tape—thin, adhesive-backed tape can be used to make straight lines and manipulated to form curved lines and outlines; available in several widths (*available from APH*)
- Pipe cleaners
- Wikki-Stix—bend and cut into any desired shape; due to their tacky texture, they will stick to almost any surface—and are also easy to remove
- Wooden or plastic “stir sticks”
- Yarn/string—glue in place to form a raised outline or line

Multi-sensory Additions

- Audio sound file (use sound chips from commercially published children’s’ books or record your own sound effects on a small digital recording device like those available from APH, catalog number 6-77505-00)
- Jingle bells
- Scented markers
- Scratch and sniff stickers
- Small scented soap
- Perfume (spray onto an absorbent cloth or paper)
- Vibrating equipment (e.g. cell phone)
- Zip lock bag of crunchy candy or food to smell, taste, and hear



APH Products for Creating Tactile Illustrations and Displays

Brailleable Labels and Sheets (various sizes:

8.5 x 11 sheet; 3.87x 0.95 label, 3.875 x 1.75 label)

Braille Paper, White (various sizes: 8.5 x 11; 11.5 x 11; unpunched and punched for ring binding)

Braille Paper, Manila Transcribing (various sizes, unpunched and punched for ring binding)

Chang Tactual Diagram Kit (Catalog # 1-03130-00)

Crafty Graphics: Stencil Embossing Kit (Catalog #: 1-08844-00)

Crafty Graphics II (Catalog #: 1-08852-00)

Draftsman Tactile Drawing Board (Catalog #: 1-08857-00)

Feel 'n Peel Stickers: Point Symbols (Catalog #: 1-08846-00)

Graphic Art Tape (Catalog #: 1-08878-00)

Picture Maker: Wheatley Tactile Diagramming Kit (Catalog #: 1-08838-00)

Quick-Draw Paper (Catalog #: 1-04960-00)

Swail Dot Inverter (Catalog #: 1-03610-00)

Tactile Graphics Kit (Catalog #: 1-08851-00)

Tactile Graphics Starter Kit (Catalog #: 1-08839-00)

Tactile Marking Mat (Catalog #: 1-03331-00)

Textured Paper Collection (Catalog #: 1-03275-00)

Appendix B

Related Products from APH

On the Way to Literacy Handbook

A handbook for parents and teachers, the second edition of *On the Way to Literacy: Early Experiences for Children with Visual Impairments*, suggests ways to use everyday events to support a child's learning in key areas that support early literacy. It contains extensive information on selecting and reading aloud from a wide variety of appropriate books, including books for story boxes. It discusses writing and illustrating tactile experience books, and the importance of providing opportunities for a child to use the tools for writing in braille and for making tactile drawings.

Second edition of *On the Way to Literacy: Early Experiences for Children with Visual Impairments*, 2007; Print edition and CD of accessible files—Catalog no. 8-77520-00

On the Way to Literacy Storybook series

Children's storybooks in the *On the Way to Literacy* series are intended to be used as part of an overall approach to providing young children with visual impairments with skills and experiences that form a foundation for literacy. The storybooks offer parents, teachers, and young children with visual impairments and their peers opportunities to share an enjoyable, read-aloud story by combining braille and large print text with tactile illustrations that can also be seen by children with low vision. All books were designed for and evaluated with children with visual impairments from 2 ½ to 5 years of age.

On the Way storybooks illustrated with real objects and textures:

Geraldine's blanket, Catalog no. 6-77501-02

Giggly-wiggly, snickety-snick, Catalog no. 6-77502-05

That's not my bear, Catalog no. 6-77501-01

Something special, Catalog no. 6-77500-05

On the Way storybooks illustrated with thermoform images (molded plastic images):

Gobs of gum, Catalog no. 6-77500-08.

Jennifer's messes, Catalog no. 6-77500-06

Roly-poly man, Catalog no. 6-77500-07

Jellybean jungle, Catalog no. 6-75502-01

Thingamajig, Catalog no. 6-77502-04

On the Way storybooks with raised-line drawings:

The blue balloon, Catalog no. 6-77501-03

The gumdrop tree, Catalog no. 6-77502-03

The caterpillar, Catalog no. 6-77500-02

Bumpy rolls away, Catalog no. 6-77500-03

Silly squiggles, Catalog no. 6-77500-09

That terrible, awful day, Catalog no. 6-77500-04

The littlest pumpkin, Catalog no. 6-77504-00

The longest noodle, Catalog no. 6-77500-01

On the Way book to customize:

Book about me, Catalog no. 6-77500-10.

Moving Ahead Tactile Graphic Storybook series

Moving Ahead: Tactile Graphics Storybooks are designed to be the next step for preschool and kindergarten students who have had experience with the tactile illustrations used in *On the Way to Literacy* storybooks. Each read-aloud book invites the child to have fun while listening to the story and exploring its tactile illustrations and print/braille text. *Moving Ahead* storybooks introduce symbolic representation, more complex raised-line illustrations, and an increased emphasis on text. Children have the opportunity to track varying types of lines, encounter tactile symbols, simple keys, and maps, and discover key braille words in the illustrations and text.

Goin' on a bear hunt, Catalog no. 6-77903-00

Splish the fish, Catalog no. 6-77902-00

Rolling Into Place

Rolling Into Place is an interactive storybook that is both visual and tactile. It is intended for children aged 3 years and older. As the Velcro® ball is rolled into its final “surprise” destination; hand skills and basic directional concepts are learned and reinforced. Also included is an assortment of Velcro® face pieces and suggested activities.

Rolling into place, Catalog no. 1-08450-00

The Rolling Into Place Construction Kit allows teachers and parents to construct books similar to *Rolling Into Place* using the accordion-folded panel that forms the book itself, Velcro® pathways and accessory items (drillable sheets, adhesive dots). A User's Guide provides story suggestions.

Rolling Right Along Construction Kit, Catalog no. 1-08451-00

Tactile Graphic Training Materials and Games from APH

Setting the Stage for Tactile Understanding: Making Tactile Pictures Make Sense; for 5 years and up (Catalog no. 1-1-08853-00)

Squid Tactile Activities Magazine (multiple issues available; for 5 years and up)

Tactile Treasures (Catalog no. 1-08842-00)

Tactual Discrimination Worksheets (Catalog no. 1-08810-00)

Teaching Touch (Catalog no. 1-08861-00)

Scattered Crowns Tactile Attribute Game; for 5 years and up (Catalog no. 1-08462-00)

Web Chase Game (Catalog no. 1-08460-00)