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List of Topics

- Tactual Perception
- Tactile Graphics Basics
- Design Principles
- Planning and Editing
- Proofreading
- Resources
Reading Tactile Graphics
Visual Perception

- Whole-to-Part
- Simultaneous observation
  - all parts of an object in its totality
  - relationship to other objects
- Objects can be identified despite different rendering styles.
Tactual Perception

- Part to Whole
- Sequential perception
  - Only part of an object can be felt at a time.
  - The entire image has be “built-up” from components
  - Relationship to other objects can be lost entirely.
- Less detailed information
- Depth is lost
Tactile Graphics

- A tactile graphic is a representation of pictorial information in a relief form to convey information to be interpreted by touch.

- A graphic that is easily interpreted visually will not necessarily be tactually meaningful.
Interposition
Relative Size and Linear Perspective
Tactile Graphics

- A tactile graphic has to be specifically designed for reading by the fingertips.
- A tactile graphic is rarely a straight reproduction of the print graphic, or a tactile “photocopy” of the original.
- The concept and content of the graphic are represented by a set of tactile symbols selected to be easily read and understood.
Tactile Graphic Symbols

- Tactile graphics are composed of four types of symbols:
  - Areas (Textures)
  - Lines
  - Point Symbols
  - Braille labels
Areas

- Represent regions of extent, e.g. bodies of water or continents in a map
- An area is to explore
- Factors to recognition
  - Variation in heights
  - Difference in the density or texture of the patterns
  - A line or white space between areas
Lines

- Represent linear information, e.g. rivers, routes, or outlines
- A line is to follow.
- Bold solid, dashed, or dotted lines are easier to follow.
- Irregular shapes, e.g. zigzag, dash-dot-dot-dot-dash, double track are more difficult to follow.
- Thin dashed line is easier to read than thin solid line: rough line vs. smooth line
Point Symbols

- Represent specific locations, e.g. a city, point in a line graph
- A point is to locate.
- Easier to recognize: ■ ▲ ●
- More difficult to identify: ✗ ★
- Minimum size: 1/4 inch
Braille Labels

- Labels should be placed in the most appropriate location
  - on or in the symbol
  - next to the symbol (1/4-1/8 inch away)
  - near the symbol, connected by lead line
- Label may be used to represent an area or point.
- Long labels should be substituted with key.
Arrows

- An arrow is a linear symbol with direction.
- Arrow indicates a movement, process, or direction.
- Do not use block arrow
- Should not be used as lead line.
- Should not be used to show measurements, e.g.
Measurements

- In print, measurements are often shown as double headed arrow, brace, or bracket.
- In tactile, use short bars to indicate the beginning and end of the segment being measured, and a line across for the reader to trace: |----------|
- Does not break the line to insert label. Label on the outside the measurement indicator.
- Line used for measurement should be different from the structure or shape to be measured.
Key to Readability

- Simplicity
- Variation in heights
- Contrast between textures
- Sufficient empty space around each component: 1/8 inch rule
- Large enough area for the fingers to move within that area to gain tactual perception
Readable and Unreadable Tactile Graphics

- Circle
- Radius
- Diameter
Selection Criteria

- Choose the graphics that carry critical information to be included in tactile
  - Is it a repeat of the text?
  - Would it be more meaningful in text form?
  - Does it require visual discrimination?
  - Is it needed to understand the concept, answer a question, etc.?
Design Principles

- Preserve the original purpose.
- Keep the graphic simple and clear.
- Keep the user in mind: age, grade level, experience with tactile, etc.
- Minor changes are allowed without distorting proportion.
- Design specifically for reading by the fingertips, not eyes.
Simplicity is the Key

- What is the main purpose of the graphic?
- What is simplest way to convey this purpose?
Planning and Editing

- Identify the contents to be included.
- Choose distinct symbols to represent them.
- A Tactile Graphics Planning Sheet can be helpful.
Techniques

- Simplification
- Elimination
- Consolidation
- Distortion
- Separation
- Changing view
- Modifying size, position, scale, or layout
Directions: Circle things that begin with /m/. Then make an /m/ picture.
Visual Discrimination

- Tasks requiring visual discrimination or visual identification are not appropriate for braille reader
APPLYING THE GEOGRAPHIC THEMES

- **Location** Mexico is the northernmost country in Latin America and shares a border with the United States.
- **What river forms more than half of the Mexico–United States border?**
- **Based on relative location, would you expect northern Mexico or southern Mexico to be more strongly influenced by United States culture? Explain.**
Simplify, eliminate, consolidate

- Eliminate unnecessary parts (map scale, compass rose, small rivers, some cities, etc.)
- Consolidate the elevations (green, yellow, and orange regions)
- Smooth out the coastlines
Focus on the purpose

- Radiation: heat travels through space
**Lines of Latitude and Longitude**

**Lines of Latitude**
- North Pole
- 80° N - Arctic Circle
- 60° N
- 40° N
- Tropic of Cancer 20° N
- 0° Equator
- 20° S - Tropic of Capricorn
- 40° S
- South Pole

**Lines of Longitude**
- North Pole
- 80° E
- 40° E
- 20° E
- 20° W
- 40° W
- 0° Prime Meridian
- South Pole

**Map Study**

1. **LOCATION** What is the latitude measurement of the equator?

2. **LOCATION** What is the longitude measurement of the prime meridian?
Change view from 3-D to 2-D
Comparison of seeds and leaves

- Separate the overlapping seeds and leaves
- Simplify the shape and detail of the leaves
- Change the viewing angles
  - Seeds as cross section
  - Leaves flattened and straightened
- Add extra labels to identify the items
Three Layers of Skin

- Epidermis
- Dermis
- Fatty layer
- Hair
- Pore
- Oil gland
- Sweat gland
Proofreading

- Equally important as proofreading text.
- Two things to check when proofreading:
  - The crucial information is represented
  - The tactile graphic is tactually readable and understandable.
- Feel your graphics. If it is confusing to your fingertips, it probably will be confusing to the fingertips of the braille reader.
List of Resources

- *Guidelines for Mathematical Diagrams* (with supplement and addendum), BANA (distributed by NBA)
- *Tactile Graphics*, by Polly Edman (AFB Press)
- *Guidelines for Design of Tactile Graphics*, APH
- *Tactile Graphics Guidebook*, by John Barth
- Workshop materials available at NBA
- NBA *Bulletin* Articles
- CTEBVI (formerly CTEVH) *Journal* Articles
List of Resources

- **Tactile Graphics Planning Sheet**

- **Standard Abbreviations**
  - [http://www.iso.org/iso/english_country_names_and_code_elements](http://www.iso.org/iso/english_country_names_and_code_elements)
  - [http://www.postescanada.ca/tools/pg/manual/PGaddress-e.asp#1380608](http://www.postescanada.ca/tools/pg/manual/PGaddress-e.asp#1380608)
List of Websites

- Lucia Hasty’s Tactile Graphics
  - http://www.tactilegraphics.org
- National Braille Association, Inc.
  - http://www.nationalbraille.org
- Texas School for the Blind and Visually Impaired
  - http://www.tsbvi.edu/Education/tactile-graphics.htm
- National Centre of Tactile Diagrams
  - http://www.nctd.org.uk
- Canadian Braille Authority
  - http://www.canadianbrailleauthority.ca