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Smithsonian Guidelines for Accessible Publication Design

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Introduction

The purpose of a publication is to communicate. If it doesn't effectively convey information to a reader, the publication fails. How the text is written and what it expresses are major contributors to a publication's success. Equally important is the publication's design. If the design is "cutting-edge," but dysfunctional for its readers, the publication flounders in its mission. On the flip side, if the design is functional but ugly, the publication is unlikely to be read in its entirety. If any one element of writing and design miscarries, the publication loses its audience.

The Smithsonian Guidelines for Accessible Publications Design attempts to bridge the perceived chasm between the "wow" design and the design that works for those of us who never or no longer fit the mold of "average." That un-average group includes people with disabilities as well as those who are older adults, those learning English as a second language, those trying to read brochures in darkened galleries, and those in family groups reading with children. The *Smithsonian Guidelines'* aim, then, is to inform writers and designers of the requirements of this large and growing audience and to indicate which elements of content and design appropriately meet those requirements. The elements that perform well are far greater in number than those that do not, especially when put into the hands of creative individuals. So, the goals of the *Smithsonian Guidelines* are to **change** choices, not necessarily to limit them – and, to prove that content and design for the other-than-average works as well for those who are just-average.

For the past several years, the Smithsonian's Accessibility Program and people with disabilities have worked with the Institution's publication writers and designers to make these guidelines feasible, palatable, and, most important, useful. Informally publication staffs have adopted many of the requirements, tinkered with some, revised others, and dismissed a few. The Smithsonian's guidelines were rewritten numerous times before they became what is presented here. And they'll continue to be modified. Writing and design trends change; these guidelines must do the same.

As publication staffs invent new tools and discover approaches for creating scintillating publications, they need to think about how these innovations affect the accessibility of the final product. Together writers, designers, people with disabilities, and the Accessibility Program can keep the Smithsonian's guidelines on the cutting edge – for everyone.

An Important Note:

Federal accessibility laws require that museums and other public accommodations provide **effective communication** of programs, materials, and resources to people with disabilities. In order to provide such access to Smithsonian printed publications, Institutional policy requires all units offer the following formats:

- **Well-written, organized text in a readable, clean, attractive design**, planned according to the following publication guidelines to benefit an audience of diverse abilities, including older adults and people with learning disabilities.
- **Braille** formats of publications, primarily for people who are blind or have low vision
- **Audio tape and computer disk** (e.g., ASCII) formats of publications, primarily for people who cannot read standard print due to disability (e.g., people with vision loss, learning disabilities, mobility limitations that preclude independent page turning or opening complicated folds of brochures)
- **Large-print** (16- to 18-point type) formats, primarily for people who have low vision

The Accessibility Program produces audio and braille formats of Smithsonian publications for organizations within the Institution. The Program is also available to assist Smithsonian units in creating accessible designs for new publications. Contact the Accessibility Program for more information at 202/786-2942 (voice); 202/786-2414 (TTY); 202/786-2210 (fax).

Smithsonian Guidelines for Accessible Publication Design

These guidelines, when followed in their entirety, will enable publication developers to produce materials that are accessible to audiences with diverse abilities.

Design

A. Typography

In an accessible publication the main body of text is set in a 12-point (minimum) typeface with a large x-height (the height of the lowercase “x”).

- Twelve- to fourteen-point, well-proportioned typefaces serve a range of people who have learning disabilities that affect reading skills or who are older and have moderate vision loss. Twelve-point type, however, does not meet the accessibility requirement for large print: large-print publications are set in 16- to 18-point type. Using a minimum size of 12-point type in Smithsonian publications improves overall access to much of the population; but, for people with more severe vision loss, a large-print version may still be necessary.
- For character proportions, slab-serif and sans-serif faces most often meet the requirements for accessible type.

The typeface used for main text information is either sans serif (e.g., Arial), slab serif (e.g., Clarendon), or from a limited selection of simple oldstyle, serif faces (e.g., Bookman).

- Serifs change the shapes of words by changing the shapes of letters. They can extend bases and can connect together letters in ligatures. People with limited vision need predictable shapes and can find typefaces with large serifs confusing and illegible.
- Substantial difference in line stroke width within a single typeface can be difficult to read because the thinner strokes may receive insufficient ink and degrade

during the printing process, making them break or disappear. When this occurs, those with low vision find that letters appear to change shape and identity. For example, **H** begins to resemble **II** and **e** becomes **c**.

- Examples of accessible typefaces: Arial, **Arial Black**, Bookman Old Style, Clarendon, Gill Sans, Folio, Formata, **Franklin Gothic**, **Futura**, Helvetica, **Korinna**, Memphis, Myriad, New Century Schoolbook, NewsGoth, Optima, Palatino, Syntax, Univers

The main body of text is set in a combination of uppercase and lowercase letters.

- Most people read the shapes or footprints of words, not the individual letters. **Ascenders** (the parts of letters that rise above the midline, as in **d**, **h**, and **k**) and **descenders** (the lower parts of letters that extend below the line, such as **g**, **y**, and **p**) give words their shape. Words set in all uppercase letters have no distinct, recognizable shapes and so are less legible.
- Typefaces with large and small uppercase letters provide unexpected footprints for words and do not assist in decoding text.
- Decorative initial capitals in paragraphs are confusing. Readers have difficulty determining which words on which lines are connected to that initial letter. If an initial capital is used, its lower edge should be on the same line as the word with which it connects.

The typeface has distinctly different shapes for letters and numbers (e.g., clear differences between n and h; 3 and 8).

- Some typefaces are designed so that letters like **c**, **o**, and **a**, look the same to people with limited vision. The same similarities in design also apply to numbers, such as **3**, **5**, **6**, **8**, and **9**. Typefaces that make it difficult to distinguish between particular letters or numbers should be avoided.

Extended or condensed typefaces are avoided for main text.

- Extended and condensed typefaces distort letter and word shapes. They should be limited to headlines, with headline information repeated in the text.

Italic type styles are used only for foreign words and publication

citations. Other graphic options (e.g., color, quotation marks, another typeface) should be used for quotations, captions, and exhibit titles.

- Italics change the shape of words and frequently are lighter weight and more decorative than the roman form of the typeface. These three factors combine to make italics much more difficult for people to read. If it is essential to use italics, choose the oblique version of a sans serif type as it distorts less the roman letter shape. If italic type is used in headlines, the information should be repeated or paraphrased in the text, using an accessible typeface.

No more than two different typefaces are used on a page.

- People who have difficulty reading due to disability require limited distractions so as not to further complicate the struggle. Many different typefaces require continual readjustment to letter and word shapes.

Bold face can be beneficial.

- Bolding the text can make reading easier for people with low vision to see and read. However, if the typeface is small and heavy, characters that are then put into bold face become distorted and difficult to read (e.g., lower case “e” becomes indistinguishable from an “o;” lower case “h” becomes indistinguishable from a “b”).

Leading, the space between lines (measured from baseline to baseline), is at least 25% greater than the x-height of the typeface used.

- Lines of type that have widely spaced words become particularly difficult for people with low vision to read when there is limited space between lines.
- The greater the x-height of a typeface (e.g., with sans serif faces), the more leading a typeface requires.
- Lines of type with more than 60 characters need more leading so that the eye can move more easily from the end of one line to the beginning of another. Without that additional leading, people with vision or reading difficulties may jump one or two lines.
- Some individuals with low vision prefer to read text that is light on a dark background. If light type is presented on a dark background, more letter spacing and leading should be used with sans serif typefaces. Otherwise, too much light is reflected at the reader and a strobing effect occurs. This makes reading much

more difficult for people with low vision and with learning disabilities.

Paragraphs have consistent letter spacing and word spacing.

- Letters that are close together are difficult to read because the individual shapes of the letters and words become less distinct for people with low vision.

Underlining does not connect with the bases of the letters.

- When underlining connects with the letters it can be visually confusing. It may cause blurring between the letters and the line, obscuring the individual letters and changing the appearance of the word.

Words are presented in straight, horizontal lines; they do not form shapes such as circles, stars, or waves.

- Many desktop publishing programs allow publication designers to "fit words to a path," meaning that words can be used to form shapes. While this might be graphically interesting, it is also difficult to read. People with limited vision or learning disabilities need predictable, dependable formats to aid in discriminating words. If used, the "fit-to-path" option should be accompanied by a redundant presentation of the words in traditional format.

B. Page Layout

Page layout, the visual organization of information on the page, can help the reader find information efficiently. Good page layout will provide the reader with visual clues about the hierarchy and location of information.

There is minimal visual clutter and maximum white space.

Organization of text on the page is straightforward.

- Reading print can be a daunting task for people who have low vision or learning disabilities. The cleaner the presentation, the easier the task and the more likely they are to read and comprehend it.

There is a maximum of 60 characters per line.

- Some people with learning disabilities have difficulty tracking lines that are too long or too short. Such lines may make it difficult for readers to find the

beginning of each subsequent line, or to keep their place within a block of text.

- Maintaining a standard line length between 40 to 60 characters per line improves legibility. Consistent pattern of layout creates a visual plan, and gives the reader the confidence to find the information that is available. Repetition of pattern lets the viewer know how information is organized. Some people with vision loss will benefit substantially from a consistent line length. Clear organization of page layout may allow people with vision loss to find information without having to read every word that is printed.

The margins are flush left and ragged right unless right justification can be accomplished without resulting in exaggerated spacing within the text line.

- Uneven spacing between words (which can be caused by full justification) can disrupt the flow of reading and confuse those with reading difficulties.
- Flush left margins assist those with learning disabilities and low vision to find the next line by providing a predictable beginning location.
- Extra-wide binding margins are helpful in books and other bound material because they make it easier to hold the volume flat. Many people with vision loss use visual devices, such as stand- and video-magnifiers. These are easiest to use on a flat surface.

Little or no hyphenation is used at the ends of lines.

- Hyphenation breaks up the flow of reading and understanding. When hyphenation occurs at the ends of lines, readers are forced to hold a fraction of a word or phrase in their minds until their eyes are able to find the next line. This is difficult for people who are reading word by word and already struggling with comprehension or having difficulty with short-term memory. It is important to minimize the amount of work that readers must do to understand the text.

It is easy to fold and unfold a brochure, and the design makes the text as comfortable as possible to read.

- Folding should be simple and intuitive. Ideally, it should be possible to open and re-fold the publication with one hand: some readers have use of only one hand.

Thicker papers are more easily manipulated by people with arthritis or other disabilities that affect fine motor coordination.

- Complicated folding patterns make opening and closing a publication confusing and frustrating for someone with a cognitive disability.
- The standard book fold, which allows the reader to see only one panel at a time, limits visual distractions for people who cannot filter stimuli well. This is the functional equivalent of limiting overlapping sound in an exhibit space.
- Other accessible folding techniques include:
 - Gate Fold: Left and right flaps open up to reveal a message inside.
 - Z-Fold: The piece opens up like an accordion.
 - French Fold: The paper is folded in half and then in half again.
 - Step Fold: The pages have slightly increasing widths. The result is a series of tabs that can be imprinted with neatly indexed subheads. It is important with this technique to design facing pages as if they are a single unit, to minimize the visual clutter as all the pages can be viewed at the same time.

C. Foreground vs. Background

People who have visual impairments benefit from high color contrast between text and background. Visual impairments make reading difficult in a variety of ways. Some reduce the amount of light that enters the eye. Others blur the retinal image. High contrast between foreground and background is one way to improve the accessibility of information for people with different visual impairments.

The color contrast of type to background is high (a minimum 70% color contrast is recommended for signs by the Standards for Accessible Design, in the Americans with Disabilities Act). Some people with vision loss and other reading-related disabilities prefer light on dark; some prefer dark on light.

- Exaggerate lightness differences between foreground and background colors. Avoid using colors of similar lightness adjacent to one another, even if they differ in saturation or hue.

- Choose dark shades of the colors with hues from the bottom half of the hue circle (blue, violet, purple and red) against light shades of the colors from the top half of the circle (blue-green, green, yellow, orange)

The color contrast within drawings or other illustrations -- the main foreground figures or information against background color or image – is as high as the type contrast.

Type or illustrations are not printed over other designs, photographs, graphics, or text.

- Solid background is essential for legibility; patterned backgrounds distract and reduce legibility for people with visual and learning disabilities.
- Some paper stock comes with graphics, such as imitation woodgrain or marbleizing. Even these backgrounds can present distractions for those with disabilities that affect the ability to read print.

D. Photographs and Illustrations

Photographs and illustrations can be highly valuable tools for improving the accessibility of publications because they provide alternative ways for people to gather information. It is essential, however, that the quality of these graphics be examined carefully. Poor quality graphics and/or poor quality reproduction of graphics increases the frustration level for people already having difficulty reading print.

Photographs meant to convey information have a wide range of gray scale variation.

- People with low vision will find it easier to view photographs that are reproduced with a wide range of gray scale variation. Monochrome photographs, which are all close to the same scale of gray, present more difficulties in discriminating details.

Line drawings and floor plans are clear and bold, with only necessary detail and with captions in a minimum 10-point type with large x-height.

- Line drawings and other illustrations are only useful if they are readable and understandable. Complex drawings with a great deal of information make details too small to read and may lose their quality during the final reproduction process.

Simple drawings with bold lines and minimal, essential information best assist those with low vision.

- Icons should be limited to those that are readily understood by the majority of people. Even those listed as recognized international symbols (e.g., the people in a box = an elevator) may be unknown and incomprehensible to many.
- Icons should be large enough and clear enough to be read by people with low vision. Icons on a floor plan are frequently illegible to people with less than average vision. Consider using a key as a supplement or replacement for icons.

E. Paper Selection

Paper selection is often overlooked as a factor in designing accessible publications. It is important to note that the wrong paper can greatly decrease the level of legibility of both text and graphics.

The paper surfaces are matte. Coated stock should be matte, not glossy; dull coated stock is acceptable.

- Paper with a glossy finish can lessen legibility because many people who are older or who have partial sight also have problems with glare. Glossy paper often has a glare regardless of how readers hold the paper or try to manipulate the glare.

The paper has sufficient weight to avoid the shadow of type or illustrations showing through from the opposite side.

- The weight of the paper refers to its density. Text that is printed on thin, low density paper may be seen through the other side of the page. When text is printed on both sides of the page, readers may be able to see the text that is printed on the front and the back at the same time. The "show-through" of text has the same effect as printing text over a graphic -- it makes the text unreadable to people with learning disabilities or with low vision.

The paper is suitable for printing text, line art, and photographs.

The paper is smooth, allowing type to be printed undistorted and unbroken.

- Hand-made and natural papers are often irregular in texture and can cause distortion of text. Readers who are reading the footprints of words, especially those who have low vision or cognitive disabilities, will have difficulty with readability on these papers.
- Stock can be coated stock as long as the surface is satin or matte.

F. Final Production of a Publication

The final production method maximizes the legibility of the text and the graphics.

- Accessibility is achieved by close attention to detail. Careless production can ruin an accessible design. Ensure that the person doing the printing understands what the designer is trying to achieve with the publication design.

Ink coverage is dense and lines are clean.

- Quality production of image and text (high density of ink and clean lines) is critical because no matter how clean the layout is, a poor reproduction will still be illegible.

G. Alternative Formats

The following alternative formats must be available for all Smithsonian publications: audio tape, braille, computer disk, and large print. The printed version of the publication must advertise the availability of the alternative formats.

- The information must be available on audio tape. Audio tape is the most popular alternative format as it serves both people with low vision and those with learning disabilities. However, it requires playback equipment, which makes it less portable. For those materials available on demand in the museum (e.g., general information and exhibition brochures), two copies must be available where the print versions are located. It is not expected that the site will have playback equipment available; however, such availability is encouraged. Materials ordered by phone or letter are audio taped on request and sent out within a month of the request.

The audio-tape version meets all of the following criteria:

- a. The audio-tape version presents clear, high-quality sound.
 - b. Readers articulate carefully, pronounce words correctly, and have pleasant voice quality.
 - c. Images used in the print version are described on the audio version. Descriptions are concise and objective.
 - d. The audio-tape version is tone-indexed for easy reference of key information on the tape. Tone indexing involves inserting “beeps” at the ends of sections, chapters, and subheadings to allow audio scanning of the taped information (e.g., 3 beeps may bring the reader to the 3rd chapter). While this sound is only heard on four-track players, which are made available to individuals who use the services of the National Library Service for The Blind and Physically Handicapped, Library of Congress, the sound is are very useful to those having the proper equipment.
- The printed material is available in Grade 2 braille. Braille is used primarily by people who have lived with vision loss since an early age. It is more portable than audio tape as it requires no equipment; and, it is the preferred format by many who are blind. It is, however, expensive to produce and must be done by an expert. Braille versions are made available on request from users and sent out within a month of the request.
 - The printed material is available on computer disk in a word-processing format. Text in this format can be read by computers that translate print into speech or braille; some software programs can highlight sections of the text to aid comprehension. Currently it is most likely read at home rather than at the site. For those materials available on demand in the museum (e.g., general information brochures), two copies must be available where the print versions are located. Those materials ordered by phone or letter are put on disk on request and sent out within a month of the request.
 - The large-print version of a print publication serves people with substantial vision loss as well as those with learning disabilities. Large-print formats must meet all of the following criteria:
 - a. 16- to 18-point type with a large x-height
 - b. Sans-serif or slab-serif typeface
 - c. Leading at 25% of the type x-height
 - d. Main body of the text set in capitals and lower case letters
 - e. Maximum of 50 characters per line
 - f. No oblique or italic typefaces
 - g. Underlining not connected to the letters
 - h. No broken letters

- i. Dense ink coverage
- j. High color contrast of typeface to background--either dark on light or light on dark (a 70% contrast is recommended)
- k. High color contrast within drawings or other illustrations
- l. A wide range of gray scale variation in photographs
- m. Clear and bold line drawings and floor plans, with limited detail and minimum 10-point type with a large x-height
- n. No type or illustrations printed over other designs, photographs, graphics or text
- o. Off-white or natural paper stock with matte finish (maximum paper size is 8 ½ x 11 inches)
- p. Sufficient weight of paper to prevent seeing the shadow of letters from the opposite side of the paper
- q. Flush left and ragged right margins
- r. Little or no hyphenation at ends of lines
- s. Gutter margins at a minimum of 7/8 inch; outside margin no less than ½ inch
- t. Flexible binding on document; preferably one that allows the publication to lie flat

Content

A. Readability

Text is written in clear, concise English.

- Those who write publications must be aware of the diversity of their audience. It is important to use language that is understood by the widest range of readers. If technical or subject-specific language must be used, it is important to include definitions or a glossary so that all readers will be able to understand the text.
- People deaf since birth and who use American Sign Language may have learned English as a second language. Their reading levels may not be as high as those of some hearing people who learned to read English first. For all people who use English as a second language, it is important to consider the simplicity of the grammar, the vocabulary chosen, and the clarity of the text.
- Tiered information – presenting key information in the first one or two sentences – is very helpful for people who read one word at a time (due to vision loss) or who have difficulty reading even moderate lengths of type.

Pictorial information supports the text.

- People learn in different ways. Many people, including those with cognitive disabilities, find that illustrations and other pictorial information provide a useful complement to text.
- Illustrations are particularly beneficial when used with written directions for an activity.

B. Information and Word Choice

Information on accessible accommodations available to people with disabilities is integrated into other service information.

- The general public, as well as targeted audiences, include people with disabilities. Service information, if included, should be integrated for all readers. Service information includes:
 - * the locations of accessible entrances, restrooms, telephones, TTYs, and elevators
 - * the locations of alternative formats of printed publications
 - * the availability of accessibility accommodations for programs
 - * the contact telephone and TTY numbers for more information
- The International Symbol of Accessibility should be used to designate only those facilities that are fully accessible. If the facilities are not fully accessible, the symbol should be used with a telephone/TTY number for more information on the level of accessibility.

As with cultural and gender equity, where appropriate, information about the life experiences of people with disabilities is included in the content.

- Include people with disabilities in the content through photographs and a presentation of their perspectives.
- Information regarding people with disabilities must be expressed using acceptable terms and phrases.

Example from *Smithsonian Guidelines for Accessible Exhibition Design* (Text courtesy Arthur M. Sackler Gallery):

The Professional Basket Maker

When he was three years old, Hiroshima Kazuo dislocated his hip, an injury that was considered untreatable and left him with a permanent limp. Kazuo was therefore unable to help his parents and seven siblings work their fields, which were terraced along a mountainside; neither, as the second son, would he inherit any land. And so he became an apprentice to a local basket maker at fifteen, taking up the life of an itinerant basket maker three years later.

Language that appropriately describes persons with disabilities

Appropriate	Not Appropriate
People with disabilities	the handicapped, the disabled
People who are deaf or hard of hearing	the hearing impaired, deaf-mute
People who use wheelchairs	those confined to wheelchairs, wheelchair bound
People with mobility limitations	the crippled, the lame
People with cognitive disabilities	the retarded, the mentally deficient
People with mental illness	schizophrenic (as a generic), the insane
People with learning disabilities	dyslexic (as a generic), the retarded

Checklist: Planning an Accessible Publication

For accessibility to be effective, seamless, and attractive, it must be included as a design and production priority throughout the entire process -- from the initiation of planning to the distribution of the publication. It's all too easy to make a change here and another there and suddenly have an inaccessible publication. As you develop your material, use this list to check regularly that you're staying on the access track.

1. **When defining the audience for the publication**, remember that people with disabilities are in any audience that you will consider. Start to design for accessibility and then refine the design to meet the "Wow!" or "a one-time look" or "a reference piece" qualifications.
2. **When planning the budget**, place high on the list of essentials the need for adequate paper size (for minimum 12-point type) and paper stock, high-quality images, and alternative formats.
3. **When planning the schedule**, allow sufficient time for alternative formats to be created and to be available at the same time as the print format. Allow time for an accessibility review by an accessibility expert early in the development and then mid-way through the process.
4. **When editing text**, think about its readable and concise presentation.
5. **When choosing images and writing captions**, think about how much the images convey by themselves or with the headlines to a viewer who cannot read all of the text. Consider also how much information the captions will provide to a reader who is listening to the publication on audio.
6. **When organizing the panels and folding scheme for a brochure**, give the publication an intuitive logic, substantial white space, and line lengths that are approximately 40 characters long. Remember that large-print brochures are generally **not** folded.
7. **When deciding the flat and finished size of a brochure**, make it large

enough for 12-point type, but not too unwieldy to be manipulated with one hand.

8. **When presenting a rough mock-up to curators and writers**, show it also to a design expert who can review it only for accessibility.

9. **When choosing a typeface**, find one that is readable as well as fitting to the topic and design.

10. **When choosing backgrounds**, think about their contrast to the type and image for readability along with its complement to exhibition colors and how it will stand out from other publications around it.

11. **When choosing colors**, select those that will provide type and image contrast for readability.

12. **When selecting paper**, order stock that will produce clear, sharp type and images (on both sides of the paper) without glare.

13. **When selecting a printer**, make sure the company understands the requirements for accessible publications.

14. **When you think you're finished**, remember to prepare alternative formats (large print, word processing disk, braille, and audio tape).

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