**Typeface Accessibility Guideline Draft v0.7**

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The process of choosing a suitable typeface or font for a website or mobile application comes with risk as a poor choice can significantly undermine readability, legibility and comprehension greatly reducing the effectiveness of other design accessibility considerations such as; [**Captions**](https://www.w3.org/TR/WCAG21/#captions-prerecorded)1.2.2, [**Colour Contrast**](https://www.w3.org/TR/WCAG21/#contrast-minimum) 1.4.3**,** [**Resizing of Text**](https://www.w3.org/TR/WCAG21/#resize-text) 1.4.4**,** [**Images of Text**](https://www.w3.org/TR/WCAG21/#images-of-text) 1.4.5**,** [**Contrast**](https://www.w3.org/TR/WCAG21/#contrast-enhanced) (enhanced)1.4.6**,** [**Visual Presentation**](https://www.w3.org/TR/WCAG21/#visual-presentation) 1.4.8**,** [**Images of Text**](https://www.w3.org/TR/WCAG21/#images-of-text-no-exception) (no exception) 1.4.9**,** [**Text Spacing**](https://www.w3.org/TR/WCAG21/#text-spacing) 1.4.12 and [**Reading Level**](https://www.w3.org/TR/WCAG21/#reading-level) 3.1.5

are the foundation of an accessible visual reading experiences, so choosing a performant typeface that enhances legibility and readability for people with poor vision, learning disabilities, aphasia, dyslexia and low adult literacy is paramount.

More readable and legible typefaces also reduce visual fatigue, which can have a positive impact on people that suffer from eyestrain or migraines.

The design elements proposed in this document forms a baseline for significant accessibility improvement. In combination with the other existing WCAG guidelines listed above, these elements will have a profound impact on both website and mobile app accessibility for a wide range of users.

These are not the only considerations for typeface accessibility as there are more complex attributes that can significantly further improve performance. These need careful consideration before distilling into a guideline, and will eventually form a framework allowing for meaningful on-screen user testing with mixed ability of groups of users.

Test the candidate typeface/font choices both comparatively and in situ with audiences who will be most impacted as well as mainstream users and aim for an equivalent positive outcome for all users. Use the users preferred equipment or technology set-up and never perform the testing on paper, unless the product will include a printed output.

***Note:*** *Any accessibility claims made by the designer of a typeface/font has to be backed up by statistically significant data insights or proven insight. Research that we identified for existing “accessible fonts” was in every case performed after the fact to prove accessibility rather than informing it.*

## BBC Reith

When developing and testing [BBC Reith](https://www.bbc.co.uk/gel/articles/introducing-bbc-reith), the design team included neuroscientist, Dr Alessia Nicotra MD, PhD Neurology and Neurophysiology, who was involved from the start of the project as an expert advisor. The design team also drew on multiple sources of proven scientific research and Reith underwent several rounds of legibility and preference testing in comparison with industry benchmark typefaces; Arial and Helvetica, as well as the BBC’s incumbent typeface Gill Sans.

The user groups in the research included people with moderate to severe vision impairment, dyslexia and people who didn’t identify with any related condition. In each instance Reith significantly outperformed Arial, Gill and Helvetica in every test.

Something that is widely recognised by the scientific and typographic community is that readability continually improves through on-going exposure to any single typeface.

Reith was the only typeface the users hadn’t had an on-going learning experience of, but this did not impact significantly on its performance during the tests. As such the BBC’s users become more familiar with Reith its readability and legibility will continue to improve beyond the test results.

## Proposal

The following considerations, in combination, can inform typeface or font choices that are more legible, readable and therefore accessible to people whom either have a learning disability, visual impairment, aphasia or dyslexia, whilst retaining the brand integrity of any organisation’s website or application.

Dyslexia is not a visual but rather a developmental neurological condition that affects the processing of word sound and comprehension. There are a number of other cognitive traits or conditions such as letter mirroring, Irlen syndrome or visual discomfort that affect a significant percentage of the population. These traits and conditions are not experienced by all dyslexic people and can also be experienced by people without the condition. It is also worth noting that the occurrence of dyslexia is significantly impacted by the transparency or opaqueness of language.

Some of these traits are better served through the provision of lower contrast colour schemes or specific colour combinations that support specific visual processing needs.

The contents in this document are intended to either inform the development of a new guideline or be a development to [**Visual Presentation**](https://www.w3.org/TR/WCAG21/#visual-presentation) 1.4.8

1. [**Use a font style that is appropriate to your audience.**](#_1._Use_a)
2. [**Minimise the occurrence of imposter letter shapes that are designed to be very similar to other letter shapes as part of the typeface’s visual style.**](#_2._Avoid_Imposter)
3. [**Minimise the occurrence of mirroring letter shapes.**](#_3._Ensure_There)
4. [**Letters should be easily distinguishable from one another.**](#_4._Letters_Should)
5. [**Humanist typefaces are generally more legible at smaller sizes than grotesque typefaces**](#_5._Humanist_Typefaces)**.**
6. [**Ensure the typeface has adequate letter spacing.**](#_6._Ensure_The)
7. [**There should be a visible difference between capital height and ascenders.**](#_7._There_Should)
8. [**Test the suitability of any typeface/font in context**](#_8._Test_the)**.**

**Note:** In the examples given a red ✗ next to the name of the typeface denotes failure and a green ✓is a pass.

## 1. Use a Typeface that is Appropriate to Your Audience and The Organisation’s Brand.

For Children or Adults who are learning to read or have a low reading ability, the less complex shapes of sans serif typefaces can help with character recognition. Serif style typefaces can enable more fluid readability for advanced readers due to the additional disambiguated letter shaping. Serifs form word shapes to enable more fluid readability however sans serif can aid individual character recognition for less advanced readers.

Longer reading experiences can benefit from serifs which enable better saccadic flow of reading, reducing user fatigue and increasing reading speeds and comprehension.

For the youngest readers, adults with low literacy or for people with more profound learning difficulties the single storey ‘a’ (Example in Comic Sans) can be easier to recognise than its double storey variant.

This and the more casual visual style in Comic Sans is popular with organisations that focus on communicating with children or about children. This choice however can undermine an organisation where the tone should be more formal or fashionable, and undermine the organisation’s brand integrity.

**Higgs Boson Discovery Announcement Made In Comic Sans**

<https://www.huffingtonpost.co.uk/2012/07/04/higgs-boson-discovery-comic-sans_n_1648494.html>

For advanced readers a single storey ‘a’ can be a distraction to the smooth reading experience because of its similarity to other letter shapes such as ‘o’ or ‘c’, or ‘d’ even. Once learned, a double storey ‘a’ provides a better differentiation and aids reading flow.

The other issue with the single storey ‘a’ is that for advanced readers they can hinder the flow of reading because their similarity to other letter shapes such as ‘o’ or ‘c’. Recognition of the double story ‘a’ when learned enables better character differentiation and aids reading flow.

As children develop their reading ability develops. They start by learning the individual character shapes and associated sounds, then they move to recognising groupings, full words and eventually move to reading in saccades. During a saccade the eye/brain fixates on a single character picking up two to three characters to the left and three to four characters to the right, and eventually jumps to the next fixation point, approx. seven characters ahead. Please be mindful of your intended audience as not everyone may have acquired the same proficiency levels of saccadic reading.

In some instances typeface/font accessibility might be treated as an ‘alternative’ the user can switch to or as with BBC Reith, there are additional characters or font variations so the default can be optimised for children or display in difficult contexts such as a condensed version for data tables.

## 2. Avoid Imposter Letter Shapes that are Designed to be Very Similar to Other Letter Shapes as Part of the Typeface’s Visual Style.

Some typefaces have letterform designs that are virtually identical for multiple letters.

The letters “I1l” (upper case ‘i’, the number one and lower case L in Gill Sans) are a good example of this issue.

To avoid this problem choose a typeface or font with distinct features on both the top and/or the bottom of the capital ‘I’ and a short but noticeable arm on the top of the number ‘1’.

I1l Arial ✗

I1l BBC Reith Sans ✓

I1l BBC Reith Serif ✓

I1l Calibri ✓

I1l Cambria ✓

I1l Helvetica ✗

I1l Helvetica Neue ✗

I1l Microsoft Sans ✗

I1l Verdana ✓

I1l Public Sans ✓

I1l Trebuchet MS ✓

I1l Tahoma ✓

I1l Franklin Gothic ✗

## 3. Ensure there is no Mirroring in the Letter Shapes.

The typeface should not contain flipped letter shapes for b and d or p and q as these can be highly problematic for many people with specific developmental cognitive traits. All sighted children horizontally flip letters as part of their early neurological development. At around the age of six years old, however, this neurological trait resolves itself as part of ongoing physiological development, however in some children this development stage doesn’t occur and accordingly letter flipping effect is lifelong. In extremely rare occasions the mirroring effect may also be re-introduced because of brain trauma. As such d, b, q, p should be obviously unique in shape and have no ambiguous characteristics.

db qp Arial ✗

db qp BBC Reith Sans ✓

db qp BBC Reith Serif ✓

db qp Calibri ✗

db qp Cambria ✓

db qp Franklin Gothic ✗

db qp Helvetica ✗

db qp Helvetica Neue ✗

db qp Lucida Sans ✗

db qp Microsoft Sans ✗

db qp Public Sans ✗

db qp Tahoma ✓

db qp Trebuchet MS ✗

db qp Verdana ✗

## 4. Letters should be Easily Distinguishable From One Another.

For people with moderate to more severe vision impairment the characters o, c, e, a or a can be easily confused, which in turn makes words harder to identify.

If the shapes are too closed, or their counters are too small, then they can begin to look very similar.

Typefaces with tight apertures can cause the counter to appear fully closed to many readers with moderate to severe vision impairment or lower reading ability.

Conversely more open counters within the letterforms themselves can increase legibility by better emphasizing the unique shape, and are therefore preferable.

C O e o c Arial ✗

C O e o c BBC Reith Sans ✓

C O e o c BBC Reith Serif ✓

C O e o c Calibri ✓

C O e o c Cambria ✓

C O e o c Franklin Gothic ✗

C O e o c Helvetica ✗

C O e o c Helvetica Neue ✗

C O e o c Microsoft Sans ✗

C O e o c Public Sans ✗

C O e o c Tahoma ✓

C O e o c Trebuchet MS ✓

C O e o c Verdana ✓

## 5. Humanist Typefaces are Generally More Legible at Smaller Sizes than Grotesque Typefaces

Humanist typefaces tend to have more varied character widths. This aids with disambiguated letter shaping, and thus aids in particular with quick and accurate letter recognition. The visual clues of varied character widths aid character recognition for people with all types of eye condition and aids character recognition for users with reading or learning disabilities.

Helvetica (Grotesque) vs Verdana (Humanist)

Typography (Helvetica 6pt)

Typography (Verdana 6pt)

Typography (Helvetica 8pt)

Typography (Verdana 8pt)

Typography (Helvetica 10pt)

Typography (Verdana 10pt)

Typography (Helvetica 12pt)

Typography (Verdana 12pt)

Typography (Helvetica 14pt)

Typography (Verdana 14pt)

### Humanist ✓

Arial

BBC Reith

Calibri

Lucida Sans

Tahoma

Trebuchet MS

Verdana

### Grotesque ✗

Avenir

Cambria

Frankin Gothic

Helvetica

Helvetica Neue

Microsoft Sans

Public Sans

## 6. Ensure The Typeface Has Adequate Letter Spacing

The tighter the letter spacing is the less people with even mild vision impairments are able to identify the individual characters. Letters can become adjoined such as “ol”, “lo” or “vv”, or simply make the individual letter shapes within tight groupings harder to decode. Tight letter spacing is also causes reduced readability for people with good vision and reading proficiency.

In particular people with vision impairment, reading difficulties or cognitive disabilities struggle with tight letter spacing as it creates visual crowding which can make the job of focusing on and recognising an individual character difficult.

Inadequate letter spacing is demonstrated with the following examples.

**All the following examples are 14pt:**

Lollipop, balloon, community - Arial ✗

Lollipop, balloon, community - Avenir ✓

Lollipop, balloon, community - Avenir Book ✓

Lollipop, balloon, community - BBC Reith Sans ✓

Lollipop, balloon, community - BBC Reith Serif ✓

Lollipop, balloon, community - Calibri ✓

Lollipop, balloon, community - Cambria ✓

Lollipop, balloon, community - Frankin Gothic ✗

Lollipop, balloon, community - Helvetica ✗

Lollipop, balloon, community - Helvetica Neue ✗

Lollipop, balloon, community - Lucida Sans ✓

Lollipop, balloon, community - Microsoft Sans ✗

Lollipop, balloon, community - Public Sans ✓

Lollipop, balloon, community - Tahoma ✗

Lollipop, balloon, community - Times New Roman ✗

Lollipop, balloon, community - Trebuchet MS ✓

Lollipop, balloon, community - Verdana ✓

## 7. There Should be a Visible Difference Between Capital Height and Ascenders

Ambiguity can impact character recognition and, accordingly, the quick and correct decoding of characters (legibility). Raising Ascenders above capital heights and other features can greatly improve individual character recognition.

**All the following examples are 36pt:**

Illustration Arial ✗

Illustration BBC Reith Sans ✓

Illustration BBC Reith Serif ✓

Illustration Calibri ✓

Illustration Cambria ✓

Illustration  ✗

Illustration Helvetica ✗

Illustration Helvetica Neue ✗

Illustration Lucida Sans ✓

Illustration Microsoft Sans ✗

Illustration Public Sans ✓

Illustration Trebuchet MS ✓

Illustration Tahoma ✓

Illustration Verdana ✓

## 8. Test the Suitability of any Typeface/Font in Context

When selecting a typeface/font for use in a website or an app, test readability and legibility in comparison with other candidates. The characteristics in recommendations 1 to 7 provide a starting point for discussion and expert review. However these, like all accessibility guidelines, are of technical nature, and usability and effectiveness can only be measured by testing with a broad range of people with and without impairments or disabilities who are affected by the choice of a typeface design. Recommended conditions to be focused on with the user group are people with Dyslexia, Moderate to Severe Vision Impairment, Aphasia and Learning disabilities, and naturally people without any impediments at all.

Testing is recommended to be done in isolation as well as in situ to ensure that the combination of typeface/font, along with it’s design application, does not negatively impact your reading audience, and that the choice is based on a performant type foundation as well as type application.

This can be approached in a number of ways and function should be measured in combination of preference and performance to establish.

**This testing should be done in combination with the following presentation related guidelines:** [**Captions**](https://www.w3.org/TR/WCAG21/#captions-prerecorded)1.2.2, [**Colour Contrast**](https://www.w3.org/TR/WCAG21/#contrast-minimum) 1.4.3**,** [**Resizing of Text**](https://www.w3.org/TR/WCAG21/#resize-text) 1.4.4**,** [**Images of Text**](https://www.w3.org/TR/WCAG21/#images-of-text) 1.4.5**,** [**Contrast**](https://www.w3.org/TR/WCAG21/#contrast-enhanced) (enhanced)1.4.6**,** [**Visual Presentation**](https://www.w3.org/TR/WCAG21/#visual-presentation) 1.4.8**,** [**Images of Text**](https://www.w3.org/TR/WCAG21/#images-of-text-no-exception) (no exception) 1.4.9**,** [**Text Spacing**](https://www.w3.org/TR/WCAG21/#text-spacing) 1.4.12 and [**Reading Level**](https://www.w3.org/TR/WCAG21/#reading-level) 3.1.5

## Glossary of Terms:

**Ascenders:** the topmost point of a vertical stem on some lowercase letters, such as h and b, that extends above the x-height is the **ascender**.

**Capital (Cap) Height:** the height of a capital letter above the baseline for a particular typeface. It specifically refers to the height of capital letters that are flat such as H or I, as opposed to round letters such as O, or pointed letters like A.

**Counter:** the area of a letter that is entirely or partially enclosed by a letter form or a symbol. Letters containing closed **counters** include A, B, D, O, P, Q, R, a, b, d, e, g, o, p, and q.

**Descenders:** The portion of some lowercase letters, such as g or y, that extends or descends below the baseline is the **descender**. The length and shape of the **descender** can affect readability.

**Font:** a specific size and style of a **typeface.**

**Grotesque:** Typefaces where the **stroke** contrasts are minimal, the letter spacing is uniform, and apertures tend to be closed in.

**Humanist:** Typefaces that tend to have varied letter spacing and more pronounced **stroke** contrasts characterized by the presence of the hand.

**Legibility:** the speed and accuracy by which individual characters or word shapes can be recognised.

**Readability:** the smoothness and speed of reading an entire passage of text.

**Stroke:** Any main portion of a character, irrespective of its thickness or direction. Strokes can usually divided into stems (thicker parts) and hairline (thinner parts). In Latin type the strokes have a vertical bias, meaning the stroke tends to be vertical, the hairline horizontal. Diagonals have a down- (thick) and up- (thin) stroke definition

**Serif:** a serif is the little extra stroke found at the end of main vertical and horizontal strokes of some letterforms.

**Sans-Serif:** a letterform is one that does not have a **serif.**

**Typeface:** a set of one or more fonts each composed of glyphs that share common design features.

**X-Height:** the distance between the baseline of a line of type and tops of the main body of lower case letters (i.e. excluding **ascenders** or **descenders**).

## Academic Papers, Web Articles and Blogs

**A Practical Handbook on Accessible Graphic Design**

Association of Registered Graphic Designers, Canada

<https://www.rgd.ca/resources/accessibility/access>

**Anatomy of the Brain**

Mayfied Clinic

https://mayfieldclinic.com/pe-anatbrain.htm

**A Ventral Visual Stream Reading Center Independent of Visual Experience**

Lior Reich, Marcin Szwed, Laurent Cohen and Amir Amedi

<https://www.sciencedirect.com/science/article/pii/S0960982211000637>

Department of Medical Neurobiology, Institute for Medical Research Israel-Canada

The Edmond and Lily Safra Center for Brain Sciences The Hebrew University of Jerusalem

ICM Research Center NeuroSpin Center, Commissariat à l’E ́nergie Atomique

Department of Neurology, Assistance Publique–Hôpitaux de Paris, Groupe Hospitalier Pitié -Salpêtrière

Published online: February 17, 2011

**BBC Reith - Dalton Maag**

<https://www.daltonmaag.com/work/bbc-reith>

**BBC’s New Typeface BBC Reith is Designed to Improve Legibility on Screen**

[Lucy Bourton](https://www.itsnicethat.com/authors/lucy-bourton)

<https://www.itsnicethat.com/news/bbc-reith-typeface-graphic-design-110817>

**Get To Grips With Accessible Web Typography**

Phil Garnham, Netmag

<https://www.creativebloq.com/features/master-accessible-web-typography>

**Introducing Reith – the new face of the BBC**

David Bailey, BBC

<https://www.bbc.co.uk/gel/articles/introducing-bbc-reith>

**It’s About Legibility**

Allan Haley, Monotype

<https://www.fonts.com/content/learning/fontology/level-4/fine-typography/legibility>

**Legibility and Readability, What’s the Difference?**

Ilene Strizver

<https://creativepro.com/legibility-and-readability-whats-the-difference/>

**Reading in the Brain**

Stanislas Dehaene

<https://readinginthebrain.pagesperso-orange.fr/intro.htm>

**ISBN** 9780143118053

**The Dyslexia Debate (Cambridge Studies in Cognitive and Perceptual Development)**

Julian G. Elliott, Elena L. Grigorenko

**ISBN:** 9780521135870

**Typeface Legibility for Visually Impaired Readers**

Sophie Beier

<https://sofiebeier.dk/>

**The Science of Word Recognition**

Kevin Larson, Microsoft<https://docs.microsoft.com/en-us/typography/develop/word-recognition>

**The Effect of Type Design and Typesetting on Visually Impaired Readers**

Eleni Beveratou, Dalton Maag

<https://www.researchgate.net/publication/309749121_The_effect_of_type_design_and_typesetting_on_visually_impaired_readers>

**Why do some children learn to read without explicit teaching?**

By Jennifer Buckingham & Anne Castles

<https://www.nomanis.com.au/post/why-do-some-children-learn-to-read-without-explicit-teaching>

## Adult Literacy Reports for the UK and US

**Specifying a Reading Age for Web Content**

by [Sarah Richards](https://contentdesign.london/author/sarah-richards/)

<https://contentdesign.london/reading/specifying-a-reading-age-for-web-content/>

**Adult Education Survey**

Department for Education

<https://www.gov.uk/government/publications/adult-education-survey-2016>

**Understanding the Basic Reading Skills of U.S. Adults: Reading Components in the PIAAC Literacy Survey**

John Sabatini, Educational Testing Service

<https://lincs.ed.gov/professional-development/resource-collections/profile-896>