# Poster design

## A practical guide for scientists and engineers

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www.design-science.org.uk

**DesignScience**

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BRITISH SCIENCE ASSOCIATION

# Introduction

Good design is a powerful tool for engaging an audience. Created specifically for scientists and engineers, this guide will provide you with an introduction to essential design concepts and help you think about how to create an engaging, eye-catching poster to engage audiences with your work.

Strictly Engineering challenged 30 engineers from across the UK to turn their work into an exciting, eye-catching poster with the support of graphic designers and public engagement specialists.

This guide builds on the design and communication workshops and engineers' suggestions to provide helpful advice to anyone who wants to develop an eye-catching poster about their work.

The Strictly Engineering poster catalogue 2012 could also be used as inspiration.

**Strictly Engineering**
A project that aimed to spark conversation about the implications of engineering in our everyday lives, challenge stereotypes around engineering and draw attention to the world-class engineering going on in the UK. Engineers shared and discussed their area of expertise with the public at the British Science Festival 2012, using posters to attract attention. Strictly Engineering was delivered by the Science in Society team of the British Science Association and was funded by the Royal Academy of Engineering.

**British Science Association**
A charity that exists to advance the public understanding, accessibility and accountability of the sciences and engineering in the UK. Established in 1831, the British Science Association organises major initiatives across the UK to connect science with people, including the annual British Science Festival, National Science & Engineering Week, programmes of regional and local events, and an extensive programme for young people in schools and colleges. The Science in Society team activities aim to share best practice and promote innovation in public engagement.

# 1. Text and typography

# How much text?

'My initial poster designs contained an essay compared to what I ended up with!'
*– Claire Dancer, Strictly Engineering finalist*

The poster is a tool to get people quickly interested in your research, to communicate a gist of your ideas and to invite responses.

Keep your poster uncluttered and use minimal text to keep the message simple and efficient.

You can use bullet points, short sentences and subtitles, but avoid long paragraphs.

People will rarely spend more than a minute or two viewing a poster. Too much text will communicate less information, not more – viewers will switch off if they see excessive reading matter.

A poster with one clear message will communicate more effectively than one with several competing messages. Multiple messages in this context will cancel each other out.

# Typefaces

Choose an appropriate typeface (font).

Try to avoid overly quirky typefaces as they are inappropriate for distance reading.

Don't mix too many typefaces as this will distract the reader from the relevant message of your poster.

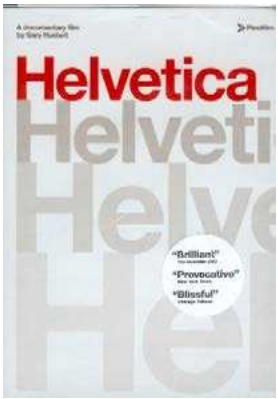
A general rule is to limit the number of typefaces to a maximum of two.

**Typefaces with too much style can be less legible, distracting and communicate unhelpful, subliminal messages**

**Helvetica is a good sans serif typeface**

**Georgia is a good serif typeface**

'Typography is what language looks like'
*Ellen Lupton, designer*




The award-winning 2005 documentary film *Helvetica* is a good introduction to typography, examining how a typeface is used aesthetically, spatially and culturally.
www.helveticafilm.com

# Type sizes

‘Documents have a conceptual structure, made visible by headings, subheadings, paragraphs, lists, tables; all chunks of information. In separating content and presentation, we’re losing art direction.’
*Mark Boulton, designer*

Most posters are read from a distance so text needs to be big and clear.

A well designed poster will attract attention from a distance then will draw viewers in, so it is important to establish a typographic hierarchy.

A typographic hierarchy is the organisation of text into levels of importance. It enables readers to access layers of information at different viewing distances, and helps guide them so they get information more quickly.

Keep variations in typesizes to a minimum – use a maximum of three sizes.

Type size for secondary reading level

Title size

Type size for info details

# Capitalisation

Text set in all capitals is harder to read than text set in upper and lower case.

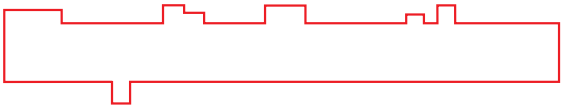
We read in words, not letters, so what helps us recognise a word is its shape.

Using all capitals makes all words the same shape to the eye (rectangular) and therefore reduces legibility.


Road signs are usually set in upper and lower case for maximum legibility

Capitalisation

CAPITALISATION



# Typesetting


Reza Ghaffari

Consistently left aligned text

## TEXT ALIGNMENT

Avoid justified text – this creates uneven and gappy word spaces and makes the text harder to read. Use unjustified, left aligned text setting, with even word spacing

Avoid mixed text alignments (left aligned, right aligned, centred).

Mixed text alignments confuse viewers and impair legibility.

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Justified text impairs readability Justified text impairs readability. Justified text impairs readability Justified text impairs readability. Justified text impairs readability Justified text impairs readability. Justified text impairs readability Justified text impairs readability. Justified text impairs readability Justified text

Consistent left aligned text is easiest to read.

Consistent left aligned text is easiest to read consistent left aligned text is easiest to read. Consistent left aligned text is easiest to read consistent left aligned text is easiest to read. Consistent left aligned text is easiest to read.

‘Typography is a hidden tool of manipulation within society. All schools should be teaching typography.
*– Neville Brody, designer*

# Typesetting

## LINE LENGTHS

Having the right amount of words on each line is key to the readability of your text.

Never stretch text to fill a width!

The optimal line length for body text is considered to be 10–12 words per line. For posters with short amounts of text line lengths can be shorter.

If a line of text is too long the viewer will find it difficult to link the start of each new line with the end of the preceeding line.


Claire Dancer

Don't be afraid of space – text does not need to fill the full width of the page. Space also helps direct the viewer's eye.

Very long line lengths are difficult to read and offputting to viewers. Very long line lengths are difficult to read and offputting to viewers. Very long line lengths are difficult to read and offputting to viewers. Very long line lengths are difficult to read and offputting to viewers. Very long line lengths are difficult to read and offputting to viewers. Very long line lengths are difficult to read and offputting to viewers. Very long line lengths are difficult to read

Very long line lengths are difficult to read and offputting to viewers

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Fewer words per line are good for poster text

The term ‘leading’ is derived from the pre-digital days of metal typesetting, when lines of lead were added between lines of words to create spaces between them when printed.

## LINE SPACING AND LETTER SPACING

Correct letter and word spacing are crucial for clear legibility.

Line spacing (leading) should be wider than word spacing to ensure your eye moves along the lines not down the lines.

8pt text on 6pt leading. 8pt text on 6pt leading. 8pt text on 6pt leading. 8pt text on 6pt leading. 8pt text on 6pt leading. 8pt text on 6pt leading.

Too tight (8pt text on 6pt leading)

8pt text on 15pt leading. 8pt text on 15pt leading. 8pt text on 15pt leading. 8pt text on 15pt leading. 8pt text on 15pt leading. 8pt text on 15pt leading. 8pt text on 15pt

Too wide (8pt text on 15pt leading)

8pt text on 15pt leading. 8pt text on 15pt leading. 8pt text on 15pt leading. 8pt text on 15pt leading. 8pt text on 15pt leading. 8pt text on 15pt leading. 8pt text on 15pt

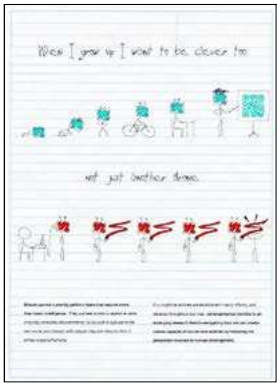
Good line spacing (8pt text on 11pt leading)

**over tracking**
**undertracking**
**correct tracking**

The technical terms for letter spacing are ‘kerning’ and ‘tracking’. Kerning is the adjustment of space between pairs of letters. Tracking is the uniform adjustment of space between all letters in a range of text.

# 2. Colour

# Colour legibility




James Law

Try to use simple colour schemes – too many colours can be overwhelming and may impair legibility

Legibility is affected by the perceived contrast between text and background.

Colour perception is affected by physiological factors such as ageing and colour-blindness; and environmental factors such as display settings and room lighting.

Avoid using color combinations that make it difficult for users to distinguish foreground from background due to either a) low-contrast typography, eg. red text on a pink background, or b) jarring colours, eg. green text on a red background.

| | | |
|---|---|---|
| POOR | POOR | POOR |
| GOOD | GOOD | GOOD |

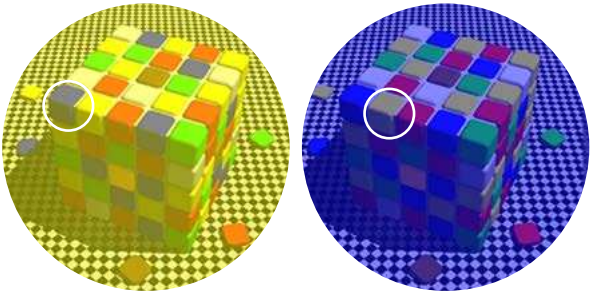
# Colour associations

Colours carry meaning so use them intelligently to reinforce the message in your poster.

Be aware that colours may be interpreted differently by people from different cultural backgrounds.

The cultural basis for colour symbolism can be powerful so colour is a key criteria in design communication.


Goethe's symmetric colour wheel with 'reciprocally evoked colours', from his *Theory of Colours* (1810).
www.colormatters.com



Left: context is key when it comes to what we see. The 'blue' tiles on the top of the left cube, and the 'yellow' tiles on the top of right cube appear very different in colour. But in reality they are the same – 'grey' in both cases.
www.lottolab.org

Image by R. Beau Lotto at www.lottolab.org

# Colour in print versus on screen


The PMS (Pantone Matching System) is an alternative to CMYK printing. Pantone colours are comprised from nine basic colors, including white. From the specific combination of these nine colors PMS can produce over 700 exact pure colors including florescents and metallics.

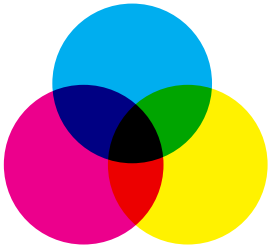
Colours look different on screen than in print so it is advisable to a) use CMYK colours while developing your poster and b) make a printed test proof of your poster.

Computer monitors emit colour as RGB (Red, Green, Blue) light, which is similar to the way the human eye sees colour.
This system is additive: colours are added to a black background on the monitor.

Whereas monitors emit light, inked paper absorbs or reflects specific wavelengths.

Printing processes use CMYK (Cyan, Magenta, Yellow, blacK) inks. The CMYK system is considered a subtractive color system.

Red, Green, Blue (RGB) – additive colours on screen



Cyan, Magenta, Yellow (CMY) – subtractive colours in print

# 3. Imagery

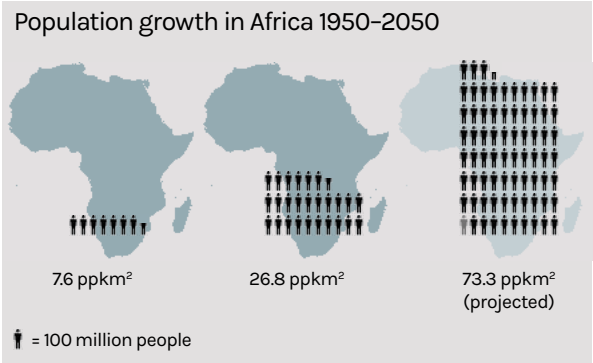
# Data visualisation

The image of the doublehelix structure of DNA was inspired by Francis Crick's wife, Odile Crick, who was a sculptor. It is not a true representation of what DNA looks like but it plays a crucial role in facilitating science communication, both within and beyond the science community.

Information graphics can help communicate complex or large data sets.

Avoid over-technical and/or illegible information graphics – posters are viewed quickly so must communicate at least one level of information right away.

Be wary of 'attractive' visuals that may distort the message. Information graphics should be clear about what is certain and what is not.




Source: World Population Prospects, 2012, United Nations

# Visual metaphors

Engineering research that is conceptual is not always easy to visualise.

Visual or verbal metaphors can be an effective means of communication, ie. where unfamiliar concepts can be explained by making comparisons with familar ones.

It is crucial to choose these metaphors carefully so as not to confuse, distract or patronise the reader.

Excessive visual distraction can be counterproductive to communicating your message.

Remember that text can be used as a visual device as well as pictures.


Rebecca Ward

Visual or verbal metaphors can help communicate abstract concepts

# Communicating uncertainty


Alastair Macleod

Engage viewers by involving them in the communication process.

Communication is uncertain, ambiguous, context-dependent and two-directional (or multi-directional).

One way to manage this is to allow viewers to participate in the communication process, rather than simply subject them to predetermined decisions.

Communication by participation can also be an effective way of gaining and sustaining viewers' attention.

# Process visualisation

Communication of ideas can be helped by revealing parts of the research process. This can aid understanding and can help assure viewers that complex underlying mysteries are not being held from public view.

Handmade graphics can be a good way of achieving this, and can help draw attention by standing out in the context of our increasingly digital environments.

'Hand drawing your images gives a certain freedom to design. It allows you to focus on the core concept rather than on the images you have available. It helps to reveal personality and break down the barrier between the audience and your idea'
*– Ellie Cosgrave, Strictly Engineering finalist*


Natasha Watson


Ellie Cosgrave

# Image quality and copyright

Images that look sharp on screen may look poor in print. On screen a resolution of 72dpi/ppi (dots/pixels per inch) is sufficient. For print the requirement is 300dpi/ppi.

Ensure images are used at scales where they communicate – avoid complex images at postage stamp sizes.

Avoid images that are too obscure to be understood by your audience. It can sometimes be better to use words.

Images may be used freely for private study, research or non-commercial purposes. Otherwise you will need to gain permission which may include a fee: www.copyrightservice.co.uk

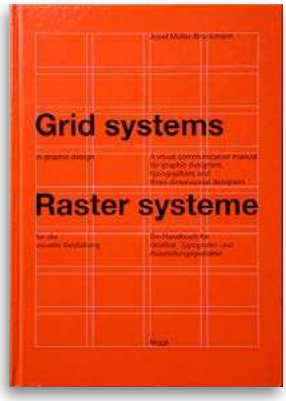
High resolution image at 300dpi in print

Low resolution image at 72dpi in print

Complex images can become illegible at small scales

# 4. Layout

# Space




Müller-Brockman's *Grid systems in graphic design*, 1961 is a useful handbook for explaining the use of space in design.

White space, or negative space, is an important aesthetic element of all design.

The primary purpose of these 'blank spaces' is to help visually organise the graphical/ typographic and so to define and enhance the overall message.

A grid is a useful design device used in the design process for helping to organise the elements of the posters strategically

'The grid system is an aid, not a guarantee. It permits a number of possible uses and each designer can look for a solution appropriate to his personal style.
*– Josef Müller-Brockmann, designer*

# Image and text integration

Image and text are the two main elements of visual communication. Their integration is perhaps the most important aspect of poster design.

A balance must be achieved between legibility, and creative ways of achieving a clear connection between visual and verbal.

‘In graphic design no word, no sentence, no photograph is a single thing’
– *Ken Garland, designer*


Avoid type conflicting with image


Hayley Smith

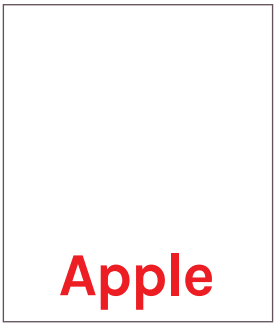
Aim for closely integrated visual / verbal relationships

# Communication efficiency

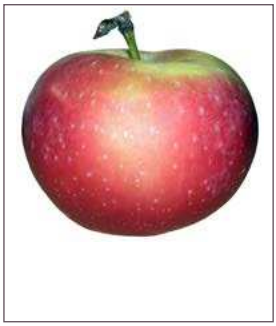
A poster will be viewed for a short amount of time, so it should include the minimal information required to communicate the message.

Sometimes pictures communicate better than words; sometimes vice versa. Sometimes a combination is best.

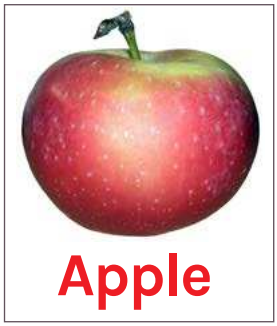
The decision must be made by you, but avoid combinations of pictures and words that repeat the message exactly.




Efficient



Efficient




Inefficient!

# 5. Context

# Environment

Your poster will usually appear alongside other posters or designed material, so the surrounding area will be visually busy with other, competing messages.

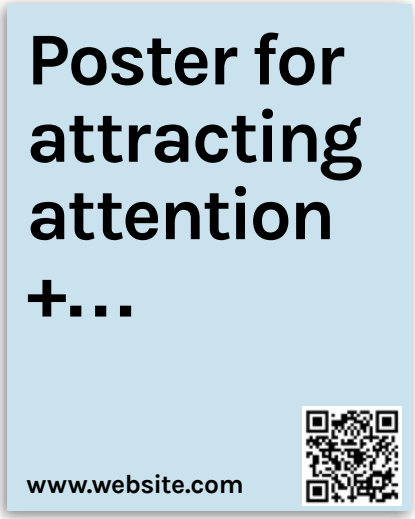
Your poster is more likely to stand out if the design is simple, with a reduced rather than full colour, and with minimal but bold typography.


Posters shown at the British Science Festival 2012

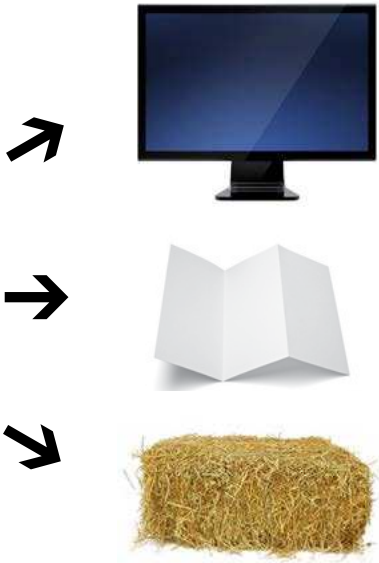
# Mixing media

The nature of research and knowledge means that no single medium is uniquely effective for transmitting your ideas.

It can be helpful to back up your poster by multi-modal means of communication to lead to better, more engaging, communication.




Include web addresses and/or QR codes to link to digital media



Digital, other types of printed media and physical objects can help reinforce your poster

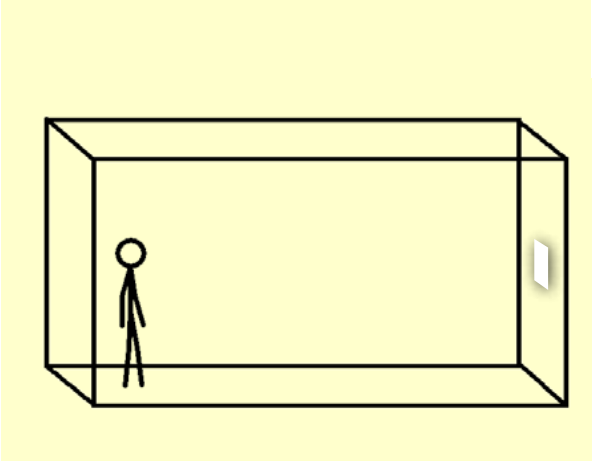
# Evaluation

'A great tip I had was to print a document with different font sizes in it – just write:
*This is font size 48*
*This is font size 24..etc*
Put each line in the right font then view your screen from a distance. That way you can figure out what size to use without having to print your poster.'
*– Claire Dancer, Strictly Engineering finalist*

Designing on screen for print is deceptive. A poster design on your computer screen is likely to be much smaller than that of your printed poster.

Test a full-size printed version of your poster from a distance before printing the real thing. It should be readable from 2m away.

If you can't do a test print because of time or not having a working printer, set your document magnification to 100% and view it from the same distance.



# 6. Production

# PowerPoint 2010 tutorials

Professional design programs
Adobe InDesign
Adobe Illustrator
Adobe Photoshop
QuarkXpress

Free / affordable design programs
Keynote (for Macs)
PowerPoint
Microsoft Publisher
Microsoft Word
Paintshop pro
Corel Draw
LaTex
Paint.net

Our selection of Microsoft tutorials can help you design your poster with PowerPoint. Unfortunately Powerpoint only allows you to use RGB so your printed poster might not have the exact colours you chose. Contact your printers and ask for their advice.

**Font**
To add a new font to PowerPoint to use on your poster have a look on eHow tips.

**Typesetting**
Learn how to space your text lines on the PowerPoint 2010 – work with indents and line Spacing video. If you want to change the letter spacing, Character spacing in PowerPoint 2010 shows you how.

**Images**
Insert an image or picture in PowerPoint 2010 is quite easy. You can also watch this video. You want your images to be high resolution so you have to make sure PowerPoint is not compressing your pictures.

# PowerPoint 2010 tutorials

**What is a picture resolution?**
You can think of resolution as the level of detail within the picture. It's measured in dpi or ppi (dots/pixels per inch). The standard for printing is 300 dpi. The resolution will affect the maximum size of the image. As a rough rule a large image for a poster needs to be at least 2 megabytes (Mb) in size.

**How do I know the required image resolution?**
You can use the following approximation:

$$\text{Max picture size (inches)} = \frac{\text{size in pixels (dimension)}}{300}$$

For example, say you want an image for your poster that is 10 × 10, then the image needs to be at least 3000 × 3000 pixels
(ie. 10 inches × 300 dpi = 3000 pixels).

Check the resolution of the pictures before you add them to your poster. You can find out the dimensions of your picture by right-clicking the file in explorer and clicking on 'properties'.

**Layout**
To help layout your poster, use gridlines on your slide.

# Printing

Printers require your poster to have a bleed. Bleed is a 3mm 'overlap' around your artwork to ensure any design or background goes right to the edge of the poster avoiding ugly white borders. Of course if your poster has a white background you don't need to worry about this!

You have to set up the document so that there is an extra 3mm on each side (so in total an extra 6mm of height and width).

You can change the size of the slide by clicking on the 'design' tab and clicking on 'page setup' and change the width and height from there.

Another thing to remember is to avoid having diagrams or text too close to the edge of your design.

To print your poster, convert PowerPoint to a pdf file.

# References

## Web resources

*Text and typography*
thinkingwithtype.com
typarchive.com
typocircle.com/learn
typographica.oeg – type reviews

*Font foundries and retailers*
adobe.com/type
fontbureau.com
fontfeed.com
fonthaus.com
fonts.com
fontshop.com
fontsmith.com
google.com/webfonts
typekit.com
typotheque.com/fonts

*Free typeface sources*
*(beware of the majority that are bad!)*
dafont.com
fontsquirrel.com
freetypography.com

*Colour*
Basic colour theory

*Imagery*
Getting started with paint.NET
– a free image and photo manipulation application
Infographics tips and examples
Examples of data visualisation

*Layout*
Designing with grids
The Swiss grid system

*Others*
Developing posters resources
– National Co-ordinating Centre for Public Engagement

## Organisations and institutions

aiga.org
designcouncil.org.uk
St Bride Foundation

## Design journals / magazines

Eye magazine
Creative Review
Design Week

**Books**


Apollonio, U. *Futurist Manifestos*, Viking

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Font Conference on Zapf Dingbats
Michael Bierut on Helvetica
Chip Kidd: Designing books is no laughing matter. OK, it is

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