POINTS OF VIEW

Negative space

Negative space, also known as whitespace, refers to the unmarked areas of the page. Collectively, it is the margins and the gaps between text blocks and images. Whitespace is as much a part of a composition as the titles, words and pictures. The Swiss typographer Jan Tschichold calls whitespace 'the lungs of a good design'[1]. In addition to giving elements breathing room, judicious use of whitespace can dramatically improve the visual appeal and effectiveness of figures, posters and slides.

The term whitespace stems from the printing practice in which white paper is generally used. Margins and gaps that separate blocks of text make it easier to access written material because they provide a visual structure. Well-planned negative space balances the positive (nonwhite) space and is key to aesthetic. Asian art makes wide use of negative space to create harmony and to add dimension to flat silkscreen prints.

The openings in and between objects can inform us about the objects themselves. A protein and the negative space masked in black are shown in **Figure 1**. Note how the reverse image implies and defines the shape of the protein (**Fig 1b**). It gives us almost as much information as the original image.

In science communication, unfettered empty space is rare. Presentations tend to be densely packed. Whitespace is a commodity we need to put to good use. Some people see whitespace as expendable and even as an indication that there is insufficient content to fill the page. After all, whitespace carries no information, so what is the harm in filling it up? The harm is that overcrowded slides and posters are taxing to comprehend. Usually this is due to the irregularity of the negative space.

A focus on the spacing of elements can help us create layouts with meaningful structure. One approach I find useful is to enclose images and text in boxes either literally or by visual estimation. Doing so makes the distribution of positive and negative spaces clear. A typical scientific poster not dissimilar to those we see at conferences is shown in **Figure 2a**. A study of spaces reveals a labyrinth of shapes (**Fig. 2b**). The goal is to unify the whitespaces into regularly shaped contiguous blocks. This can be achieved by aligning the boxes vertically or horizontally to create visual divides that inform the grouping of information. For example, we might use larger gaps to differentiate sections but thinner gutters to separate items within a section (**Fig. 2c**). In this way, the negative space can telegraph to readers the hierarchy and organization of content.

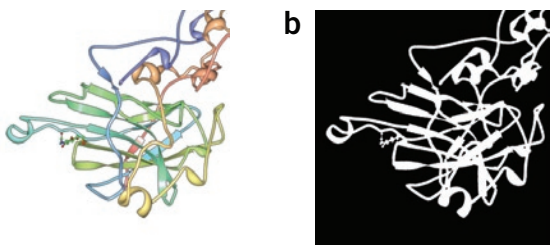

Figure 1 | Empty space defines the shape of an object. (**a**,**b**) Ribbon diagram of a protein (**a**) and with the negative space masked in black (**b**).

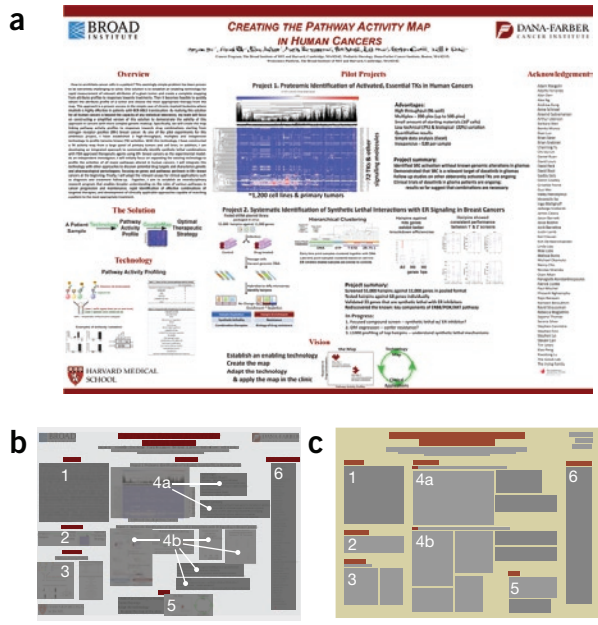

Figure 2 | Whitespace can be used to structure content. (**a**) An example of a scientific poster. (**b**) A space study reveals that contents in sections 1–6 are scattered and whitespace is fragmented. (**c**) An example of consolidated whitespace organizing contents.

The approach described above requires us to manipulate many elements. It can be a challenge to size and tile the parts to fit a prescribed layout. Luckily modern software makes layout work fluid. We are constrained to scale images proportionally. However, we can radically alter the shapes and sizes of text blocks to make them conform to the available space. Text allows us to adjust the spacing between letters, the length of the lines and the spacing between those lines.

Additionally, whitespace offers one of the most effective ways to attract readers' attention. In congested environments, applying brighter colors or special typographical styles such as capitalization or boldface may not be enough to get certain content noticed. In these situations, try surrounding the content to be emphasized with relatively more of the available whitespace. The generous framing will usually draw the eyes to that part of the page.

In the last six columns, I have discussed ways to visually encode data (color coding, design of data figures and salience) and methods for organizing elements on the page (Gestalt principles and negative space). Next month, I will review these ideas and apply the concepts to real-world examples.

Bang Wong

1. Ambrose, G. & Harris, P. *The Layout Book* (AVA Publishing, Lausanne, Switzerland, 2007).

Bang Wong is the creative director of the Broad Institute of the Massachusetts Institute of Technology and Harvard and an adjunct assistant professor in the Department of Art as Applied to Medicine at The Johns Hopkins University School of Medicine.