

POINTS OF VIEW

Simplify to clarify

In the past two columns I have focused on making information accessible. I discussed ways to avoid color and shift color hues to make them discernible by individuals with color vision deficiencies. In this column I focus on ways to make information apparent by simplifying its presentation.

Simplification can lead to greater clarity. In the marketplace, simplicity is the capital used to develop clear brand identity. Apple prides itself on making things simple and on offering products that are easy to use. In science, value is placed on communications that are accurate and concise. Edward Tufte wrote about the data:ink ratio as a call to reduce the proportion of a graphic that is used for decorative purposes or that can be erased without loss of data information¹.

The best way to simplify is to reduce the number of elements on the page. Every picture and bit of text stimulates the visual senses and contributes to the intricacy of the presentation. The aim is to use the fewest possible 'marks' to convey the message without sacrificing sophistication. Our general tendency is to fill white space with more information. Thus, the judicious removal of material is typically not a natural part of the authoring workflow. But the opportunity lost from including less is gained in greater emphasis on what is shown.

I find it helpful to focus on the primary goal of a figure or slide as a guide to pare it down to its constituent parts. I assess every component against this measure to create a hierarchy of information, eliminating extraneous elements and refining the remainder to support the message. In **Figure 1**, an inversion event that results in two fusion genes is shown. The process as initially illustrated is unnecessarily complicated (**Fig. 1a**). The diagram can be simplified by combining the first two steps of the process and using fewer arrows to indicate movement (**Fig. 1b**). These modifications effectively improve the communication by simplifying the design.

Simple should not be mistaken for simplistic. By simplifying, we take advantage of the way people see and process information. The Gestalt psychologists favored the theoretical approach that

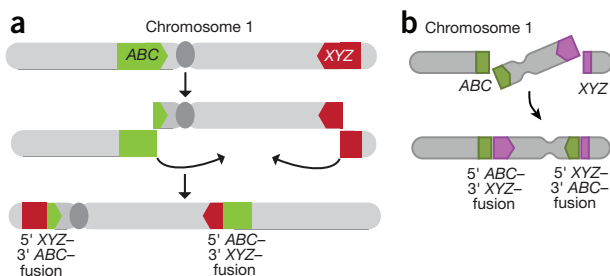


Figure 1 | Simplifying illustrations. (a) Initial diagram shows chromosomal inversion in three steps with the distal chromosomal ends exchanging places as indicated by arrows. (b) A simplified version of the diagram in a with fewer steps and a single arrow depicting the rotation of the center part of the chromosome.

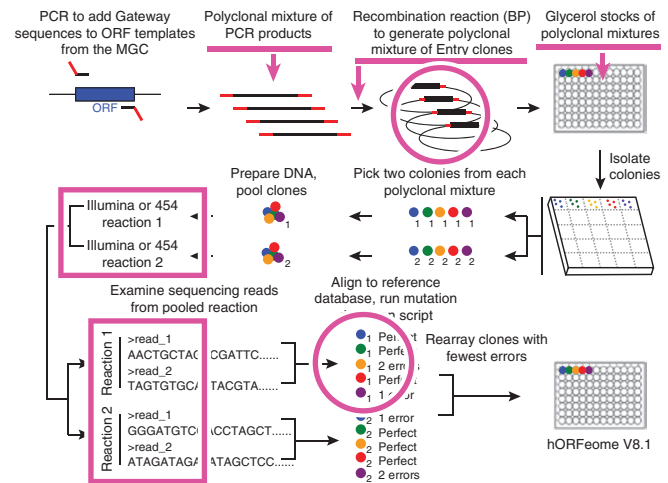


Figure 2 | Reducing redundant elements. Words repeated in several labels (magenta boxes) can be pulled out as headers. Using the smallest number of examples to convey a concept will make ideas easier to understand (magenta circles). Grouping labels that describe transformations between steps with arrows and starting or ending products with images (magenta arrows) will add meaningful structure to layouts. Reprinted from *Nature Methods*².

explains phenomena of perceptual organization in terms of maximizing simplicity. Simplified presentations with well-ordered layouts and clean lines are more engaging to read and are likely better understood.

Eliminating redundant elements is another way to trim extra material from a presentation. It is common to see repetition in figure labels indicating a series, for example, 'reaction 1' and 'reaction 2' (**Fig. 2**). In these cases, extracting the word in common between the labels to use as a header will generally tidy the appearance. Moreover, authors will occasionally show a variety of experimental constructs to capture the underlying diversity (**Fig. 2**). In these situations, try to use the minimum number of examples required to demonstrate the concept. Including more examples than necessary may actually confuse readers.

Simplicity can also be achieved by systematically organizing the elements that remain. By grouping we can make a system of many independent parts appear to have fewer elements. Deciding what goes with what is the first step to create structure. Labels that describe an action or transformation from one step to the next should be placed with the progression arrows; object descriptions should be placed next to the images (**Fig. 2**). Also, layouts that are neat and orderly appear simpler. In addition to grouping, align elements to a few imaginary horizontal and vertical lines appropriate to the presentation, paying attention to the negative space to create clear boundaries between groups.

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1. Tufte, E. *The Visual Display of Quantitative Information* (Graphic Press, Cheshire, Connecticut, USA, 2007).
2. Yang, X. *et al. Nat. Methods* **8**, 659–661 (2011).

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