

Cartographic communication: Text variables on maps

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Abstract: Our focus in cartography is on communication, usually in a geo-related context. Text plays a major part in the effectiveness of this communication: adding names identifying features, and information on themes. Graphic templates are easy to design on simple backgrounds; but design becomes more difficult on the visually complex backgrounds of mountain topography. A wealth of digital fonts is now available, many with more variables than are practical for mapping, and some with distracting characteristics. Jacques Bertin’s visual variables (2010) aid font selection by providing a framework for integrated design.

It is hoped that this paper will stimulate critical appraisal of our work, personal experiment, and discussion to further improve cartographic communication.

Keywords: text variables, typography

1. Background

When we create a map, most of us call on digital data, a structured resource that someone has created for some other more general purpose (Figure 1). Its potential for your purpose may be limited, but it may be the only source available.

For a defined area of interest, we select points, lines, and polygons which have position and characteristic attributes. Prior to styling, these are very difficult to separate visually, and it is hard to make any geographic sense from the undifferentiated lines.

To these we add a previously developed graphic template for this type of mapping, using Bertin’s principles and a minor nod to convention. This separates the lines into a

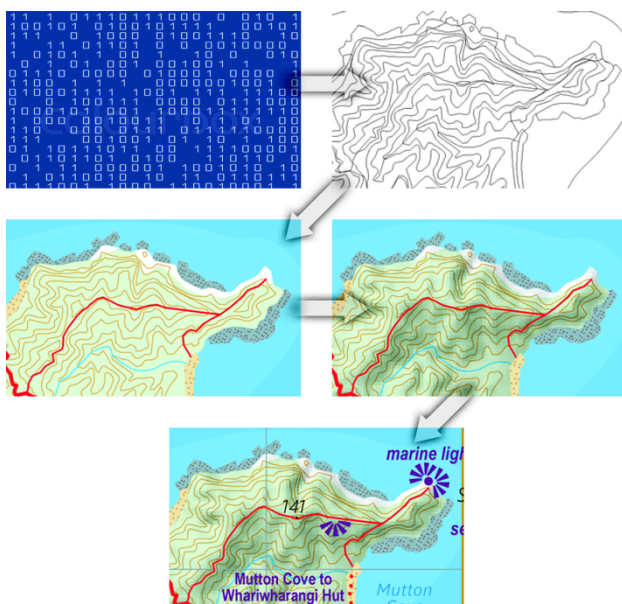


Figure 1. Stages in the preparation of a map.

visual hierarchy, giving more meaning to the data and a level of comprehension to the map user.

Then we add relief shading to coordinate the visual elements and accentuate the form of the landscape. The relief image has the clarifying effect of unifying the terrain elements cohesively.

Once we have the terrain image as we want it, we finally add text to name-and-claim, identify, and explain; this clutters the terrain image, but hopefully adds value to the communication focus. This action needs to be carefully managed to retain the balance between landform interpretation and text legibility.

Legibility is key to textual communication. The background to the text—the terrain representation—is complex and often saturated with lines, colour, and shade. Designing a text template which enables legibility under diverse conditions is not easy and is never perfect in all geographic contexts.

2. Text considerations

Although much can be left to personal preference in font selection, depending on theme and context, there have been guidelines offered which assist these considerations. Each of these guidelines or statements is thought-provoking and adds value when evaluating a family of fonts with harmonious features, or a contrasting font used for emphasis.

Back in 1955, the American typographic expert and publicity manager for the Monotype Corporation, Beatrice Warde, laid out her now-classic crystal goblet principle of effective typography. Just as a beautifully clear glass allows a drinker to fully appreciate the wine it contains, a typeface should only ever “reveal the beautiful thing which it was meant to contain”—i.e., the content (Warde 1955). A typeface shouldn’t draw attention to itself but should communicate the intent of the author.

Fortunately for cartographers and other graphists, Bertin's *Semiology of Graphics* (2010; originally published in 1967 in French, 1983 in English) assembled and consolidated knowledge on the visual variables of graphic elements, which enabled consistent and rational thought on graphic expression and improved cartographic practice. Bertin identified six main categories of visual variables: size, shape, value, colour, orientation, and texture. These variables have since been expanded in number by various cartographers and other authors (Monmonier, MacEachren, etc.). Almost all of these variables can be applied in combination to text: e.g., in a font that is sans serif, narrow, bold, sloping, and in colour. Some of the more recent variations can only be applied in on-screen applications and are unlikely to be considered in mountain cartography.

Sheelagh Carpendale (2008) quotes John Fiske (1991): "Communication is too often taken for granted when it should be taken to pieces." Carpendale explores and explains Bertin's variables in a total graphic context but does not demonstrate their application to text.

Ellen Lupton in her excellent treatise *Thinking with Type* (2010, 54) suggests that "combining typefaces is like making a salad. Start with a small number of elements ..." This visual analogy suggests a basis for creating a text template with broad, comfortable consistencies for basic information with opportunities to emphasize specific text for focus.

In their April 2020 newsletter, **MyFonts.com** lists "Five Rules of Type and Colour" to aid understanding, emphasise focus, and clarify the ranking of information—improving communication.

1. Plan the use of colour from the start, grouping like features, adding value.
2. Use less colour rather than more. Too much colour creates "graphic noise," reducing communication.
3. Use colour consistently, reinforcing the grouping of like features.
4. Make large areas pale and small areas bright, adding variety and balance within graphic complexity.
5. Use colour friendly fonts. Again, legibility is key in complex visual environments. Black often provides the best contrast but should not be over-used.

More recently, in May 2021, *The Economist's 1843 Magazine* published an article titled "How the pandemic made fonts friendlier" (House 2021). Though focussed on advertising media, it does illustrate how the development and selection of font styles is influenced by fashion and culture. The visual appearance of national mapping products, and in particular the font selection for these, clearly reflects graphic traditions and cultural norms.

Remembering thematic focus and the twin design objectives of legibility and balance, we must make careful choices of which visual variables to accentuate to

maintain that balance in the many complex and contrasting visual environments that occur on maps as background to the text.

However "perfect" a map we create, we can only attempt to influence the map user's reading and perception. The map is an imperfect transfer of geographic information—but the most efficient that we have—and we should manage the communication to best suit the intended audience.

3. Choices

Changes in map production and dissemination technologies have provided opportunities for font confusion in some cases, but limitations in others. A judicious choice from options readily available is not always optimum, and sometimes the downloading of alternative fonts may provide better choices for variety and legibility.

Daniel Huffman (2018) wrote a useful note about "Cartographer's Preferred Typefaces" on his blog *somethingaboutmaps*. Huffman had consulted 40 cartographers and listed eight of their most popular fonts with some personal notes. Unsurprisingly, only two were serifed fonts. Serifed fonts were designed for legibility in sentences and blocks of text, as found in books, rather than for isolated words as found in map names.

Choice of font may be limited by mapping systems, institutional availability, and budget—though there is now a sufficiently large library of free fonts to make reasoned selection a challenge with a steep learning curve.

As previously stated, Bertin's visual variables provide a stimulus and framework to explore the management of balance between the background contrasts and complexity, and the selection of font styles which enhance the map focus.

Additional to the issue of legibility within a varied graphic context, the importance of the information to the perceived audience, emphasising for thematic focus and de-emphasising background locational text, must be thought through, creating a visual hierarchy which enhances the communication.

Variants within a font family need to be explored within the context of the proposed graphic template. Many fonts do not have sufficient variants to be useful, even in simple mapping. For example, these two common fonts differ in the number of italic versions they offer:

<u>Segoe:</u>		<u>Arial:</u>
<i>Wangapeka River</i>	<i>light</i>	<i>Wangapeka River</i>
<i>Wangapeka River</i>	<i>semi-light</i>	
<i>Wangapeka River</i>	<i>normal</i>	<i>Wangapeka River</i>
Wangapeka River	<i>semi-bold</i>	Wangapeka River
Wangapeka River	bold	Wangapeka River
Wangapeka River	<i>black</i>	

This exploration will enable subtle choices to be made to maintain legibility and clarity of communication on

backgrounds of varying colour and graphic complexity, and will ensure sufficient visual contrast is maintained between items in the same theme. Compromise is inevitable.

Often, consideration must be given to the availability of language diacritics and other special characters within the font family if these are required for language or scientific reasons.

In some situations, spacing between letters (tracking) will assist feature identification for lineal and areal features.

Cynthia Brewer, in Chapter 5 of her very thorough publication *Designing Better Maps* (2016), offers several ways to enhance text with colour, outline, shadow, highlight and halo. These are tools that can be adapted and utilised for specific maps or series to enhance legibility and emphasis, and thus communication effectiveness.

Development of a graphic template, including all aspects of font selection, is an iterative process and requires adjustment as map production progresses and different graphic complexities are encountered.

Font choice may also be influenced by the selection and density of features to be shown.

4. Application

Each map, or series, develops its own style and character, often with national or cultural influences. These, together with the map data, mapping technology, and the intended audience, will influence the content and its graphic presentation.

Default text positioning from GIS systems almost always needs manual adjustment to improve legibility compensating for the complexity of the underlying features. This visual-manual process is relatively quick, improves communication by reducing conflict, and reveals instances not previously considered, where the graphic template needs specific modification. Brewer gives excellent advice on text placement.

The previous map reading experiences of potential users will flavour the basic design of the background to provide a platform from which to develop emphasis and focus. Local conventions may colour users' expectations and influence these decisions.

The reason for producing a map always needs clear definition. A map's emphasis and focus are inextricably tied to this purpose and, to be effective, the map content must have good contrast and balance, including imagery and locational text. It should be clear that font selection is an integral part of the total graphic template and cannot be considered in isolation. There are limits to the emphasis that is available for text, and delicately lightening the background colours and tones may be necessary to maintain balance.

In mountain mapping, the varying visual situations provide challenges to the effectiveness of legibility and communication. Mountain tops and ridges, with close contours, scree, and possibly rock drawing and relief shading, will require a different approach from situations

on the valley floor where accommodation and development are often clustered around road ends and access points. Often, more than one solution needs to be developed to provide consistent legibility of the text. For example, this may mean varying the colour of halos depending on background.

Inspiration from other peoples' maps can be helpful as a starting point. The reverse is equally true—there will be examples that are instructive in a negative sense.

Development of an integrated graphic template—including a selection of text fonts—will not always meet with immediate success, but will offer opportunities for creative thinking and experiment.

5. References

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6. Appendix

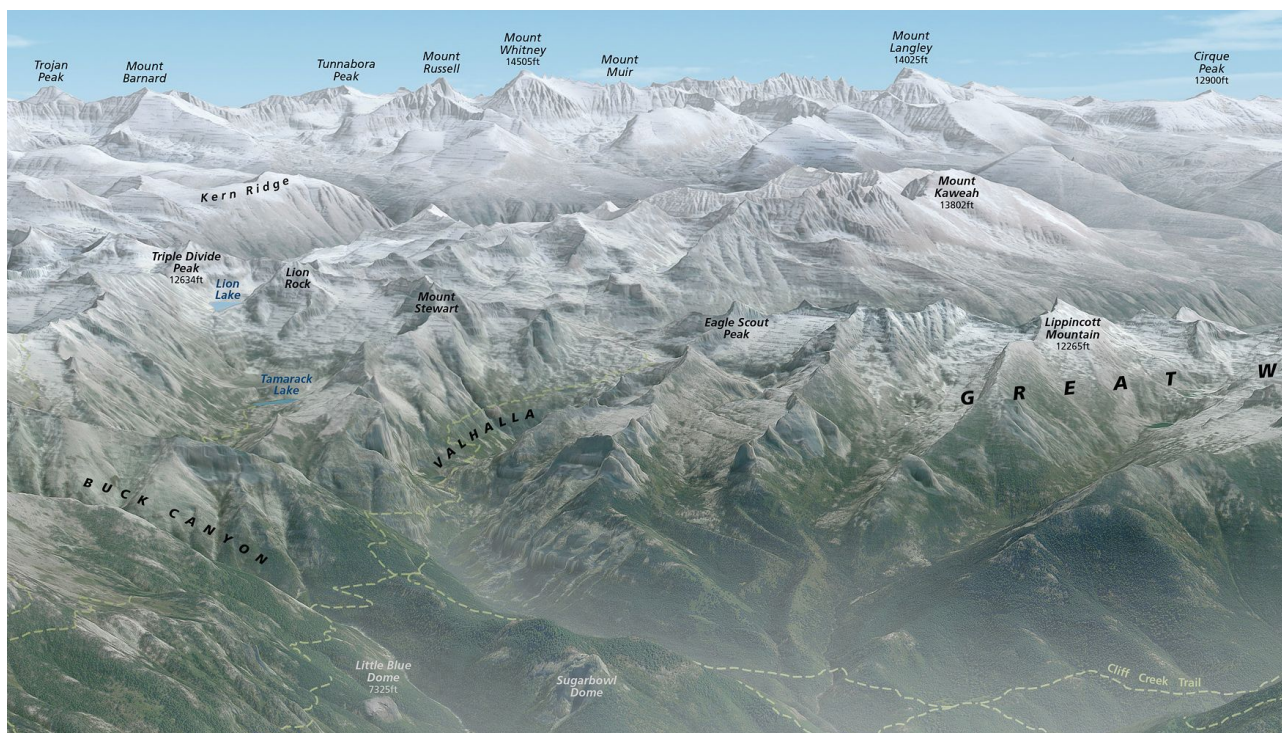
Map 1 by Roger Smith (Geographx) and Map 2 by Tom Patterson (formerly US NPS) illustrate contrasting examples of successful solutions to differing situations. Labelling features on panorama maps requires compromise in selection and focus. In Map 3, this map extract (from the US NPS Harpers Ferry Center) illustrates solutions to a variety of these issues.



Map 1. Innovative background with complementary text. Roger Smith, Geographx NZ.



Map 2. Classic clarity with balance. Tom Patterson, formerly US NPS.



Map 3. Naming features on panoramas. NPS Harpers Ferry Center.