CARTOGRAPHIC DESIGN:
Theoretical and
Practical Perspectives

edited by

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Gestalt Theory Applied to Cartographic Text

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To anyone who decides to spend part of their career training others to become working cartographers, it rapidly becomes obvious that we have two different groups concerned with cartography and very little contact between them. Most available published material on the field is produced by the academic group, who seem largely preoccupied with developing cartography as a science. They have produced a large number of theories, formulas, tests, and studies of all kinds. In the graphic and design areas of cartography, there are extensive perception and psychological studies and large numbers of tests on simple graphic images, often using university students as the subjects. Relatively little of this large volume of material ever seems to be used in a production environment.

By contrast, most workers in production cartographic agencies produce their published material using a variety of guides, rules of thumb, standardized procedures, and the experience of observing what seems to work. These aspects can certainly be transmitted to students and even enforced, if you are so inclined, but it is difficult to explain to them the logic behind what is considered to be "normal" or "acceptable". Many people are suspicious that some traditional approaches could be greatly improved, while other approaches may be suspect and even illogical.

The two groups could obviously benefit one another as they are both concerned with the development of better cartographic communication and abilities. It seemed appropriate to attempt the link-up using the well known Gestalt theories, as they are enjoying somewhat of a renaissance with the current interest in desktop publication techniques, which has so enhanced our text manipulation capabilities.

Gestalt theorists were responsible for many advances in the fields of learning and memory. Many modern educators criticize the old-style rote learning and attempt to get their students to think creatively, to achieve insight. This so-called modern and revolutionary set of ideas is actually quite old and originated with the Gestalt psychologists during the first two decades of this century. The attraction is that once you achieve insight you can readily transfer the solution to a related new problem—something not usually true with rote learning. It is the obvious goal of most educators (Rock and Palmer, 1990: 89); it is equally the obvious antithesis of standardized procedures and rigid rules.

Gestalt psychology has had an immense influence on the study of human perception in explaining how we make sense of what we see. It should, therefore, be of

major importance to cartographers. We define ourselves as visual communication specialists. Our products are an integrated mix of graphic and textual techniques.

Gestalt is German for pattern or shape, although most people prefer "organization" as a more accurate interpretation because Gestalt principles are, in fact, principles of organization of the visual image. Its central tenant is well known, but seldom followed: "The whole is different from the sum of its parts". This idea that the nature of a complex whole can not be predicted by simply studying its component parts was first formulated by Wertheimer in 1912 in Frankfurt, in a paper concerned with a visual illusion called apparent motion. This effect is, of course, the one we rely on so extensively in the movies. He indicated that perception of the movement was radically different from the perception of each of the static images (Rock and Palmer, 1990: 84).

Gestalt theory maintains that the parts of an object INTERACT with one another and, in so doing, produce a "whole" which is very different from the sum of the various parts. Gestaltists talk about EMERGENT PROPERTIES produced by the interaction of the various components and give such examples as a melody in music, common table salt in chemistry, which is quite different from its poisonous and corrosive components, and the characteristics of a society which are often widely different from the individuals which comprise it. This is in direct contrast to ELEMENTARISM, a basic structuralist assumption that complex perceptions can be understood by identifying the elementary parts of the experience. The elementarist approach is often referred to as "mental chemistry" because it assumes perceptions can be analysed component-by-component, much as we study each atom, or even parts of an atom (Rock and Palmer, 1990: 84). Does all this sound familiar? It should; it is still common practise today, and many cartographic studies incorporate the notion without considering that it may not be valid.

Emergent properties are critical to Gestalt thinking, to their explanations of why we see the way we do and in a sometimes surprising manner. Gestaltists pointed out that what we "see" is not simply a matter of recording images with your eyes, but very much a result of how the visual system ORGANIZES or GROUPS the incoming information into units. Whole figures are primary—they are seen first and are visually dominant. The effect of the overall design is paramount and is more important than the detail comprising it, even on a highly complex product, and even though we can be shown to be capable of seeing huge amounts of small information. Tests have largely supported these notions; they would seem to be fundamentally true.

Given this introduction and quick review, it is very distressing to anyone who must struggle with cartographic design to note how little attention has been paid to overall layouts, proportions, aesthetics, cultural suitability, harmony, balance and coordination of the entire product, except for brief "motherhood" statements about their importance. Layout of a map is, for instance, only mentioned twice in Keates' *Cartographic Design and Production*, and as it is buried on pages 213 and 235 of a 250 page text, you might begin to wonder what you were supposed to be doing up until that point.

The stress on wholeness, integration, unity, consistency and, as the desktop publishers would say, remaining focused on the target, should be basic for cartographers. Everything else should be a means to that end. A map tends to be read in several distinct stages. Firstly, we obtain an OVERALL view of the image and this controls much of our initial reaction to it. We become aware of objects as FIGURES against BACKGROUNDS. We compare hues, values, brightness, size, contrasts, and so forth. As another stage, we then focus in on parts of the map image and buildup the detail by selective attention. The result of these studies is then combined mentally, and our brain tries to make sense of the result. At this point the aspects of memory and experience are introduced and become a major part of the visual system.

The creation of the FIGURE-GROUND relationship is the most essential one in perception and is subject to a huge amount of unconscious selectivity on the part of the brain—it cannot maintain objectivity. That is probably why so many people are surprised when they receive their snapshots back from the processor to discover just how messy the scene appears. The complex background was not seen by them, but was faithfully photographed. How many cartographers have unwittingly created virtually unreadable products because of a similar concentration on small details at the expense of the overall effect?

The classic cartographic illustration of the effects of figure-ground separation is, of course, the task of land and water differentiation, so well shown in Cuff and Mattson's (1982) book *Thematic Maps*. The control of contrast is the best tool we have in manipulating the graphic image and creating a number of visual levels. It is fundamental to text as much as it is to symbols.

The cartographer's task is to design a map that incorporates the user's visual perception to advantage, and not to create problems of detection and discrimination. To do this you must obviously understand the user's visual processes, background and abilities.

The Gestalt "Laws" explain some of the aspects of the complex images we create and help explain some of the techniques we have been using intuitively for years. They are not sufficient to explain everything, but they are a highly useful set of tools.

Psychologists have established that the mind will find the simplest possible meaning to fit the facts. This principle is called the LAW OF SIMPLICITY; it is the same as the LAW OF PARSIMONY in science. It is said that the best scientific explanation is the simplest one that fits the facts. Gestaltists applied this to the field of psychology. Details which are only approximately linear will be seen as a line; those roughly circular will probably be interpreted as forming a circle even though this shape has no bearing on the data being viewed. This means that you tend to see things, not as they are, but as your mind thinks they ought to be! Of course this can cause problems, such as when Schiaparelli "saw" the canals of Mars, touching off a time-wasting hunt that went on for years. It is also the reason why proof reading and marking student projects are such difficult tasks.

This has one result for designers of cartographic products that cannot be over-stressed. It is the familiar symbol and text used in a normal way that is far easier to see and understand than the unfamiliar, exotic or, even worse, the familiar used in an unusual manner. A map is a highly complex graphic form. One must strive for simplicity in all aspects if it is to be read without mental gymnastics and errors on the part of the map user.

The most important of the Gestalt laws is known as the PRAGNANZ PRINCI-PLE, first established by Koffka (1935). Known also as the Laws of Good Figure, the explanation states that, "the visual system converges on the most regular and symmetric perception consistent with the sensory information" (Rock and Palmer, 1990: 88). These laws, shown in Figures 18.1 and 18.2, include the individual laws of Good Continuation, Closure and Common Fate. Brief explanations and the most common text book illustrations are shown on the figures.

Pragnanz talks about a somewhat vague notion of a "good" figure, one which has a high degree of internal redundancy and for which any given part is predict-able from previously seen parts. Recent testing has shown that the amount of infor-mation is critical to the perception of "goodness". Good figures contain relatively little information—they are simple and very basic—they can be matched more quickly (map legends), remembered better (map reading), and described more accurately (map interpretation) than poor ones. Poor figures are complex and hard to identify (Rock and Palmer, 1990: 88). Obviously, from a text viewpoint, the sim-pler the better—typefaces with complexities, decorations, or nonstandard propor-tions are defined here as "bad". We already know that they are difficult to read; here is the theoretical justification for that stand. Obviously we must avoid text with flourishes, complex serifs, high contrast letter forms, or erratic proportions. (Please, let us finally kill off Olde English!). The printer's maxim, "if you can't read it a glance, it's never read at all", is given some justification. The standard carto-graphic tradition of only using a single sans serif face on the map and a single, simple, low contrast, serif face for the surround and virtually everything else, seems appropriate.

The design of symbols, too, must follow the same principle. In fact, the whole idea of a symbol is to simplify the subject down to the basic, fundamental shape, removing all unnecessary detail. By its very nature, a symbol must be a good fig-ure; the simple representation reminds us of what it represents, clearly and easily. A good symbol will illustrate its topic even to unsophisticated or inexperienced readers. In this it is similar to the work of an artist or cartoonist who can suggest a subject with only a few lines or a simple shape. This concept should make us avoid abstract or contrived symbols wherever possible. Because it is read by the same people at the same time with all the same habits, strengths and weaknesses, a sym-bol and a text label should be designed and used in a similar manner. This will also provide a consistency of approach which we now know to be highly important. One example of the visual link between text and symbols is shown on Figure 18.3, where the importance of the top half of both a letter and a symbol to its perception are illustrated. Once again it is our familiarity and competence with text that con-trols much of how we read a graphic symbol.
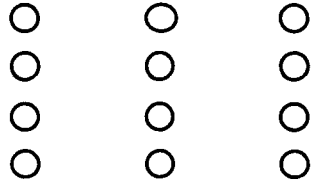
GESTALT "LAWS"

Proximity —Similarity—Continuity—
Common Fate—Closure

PROXIMITY:

Visual groups are formed from elements which are spatially or temporally close to one another.
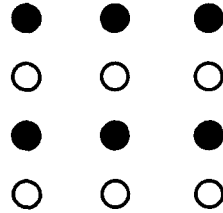
This example is seen to have three vertical rows of data because the vertical spacing is less than the horizontal.

SIMILARITY:

Groups are formed from the elements which are similar to one another.

Here we see horizontal rows because, although the dots are equally spaced, the horizontal ones are similar and the vertical ones are not.

GOOD CONTINUATION:

A trend in a set of elements will determine the direction in which the next element is seen.

The direction at the "cross-roads" obviously follows the trend already established.
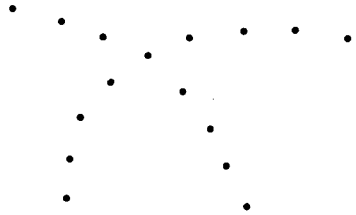
CLOSURE:

Parts of a figure not present will be filled in visually to complete the figure.

The eye completes the figure—this also explains how we see lines of dots as a continuous shape.

COMMON FATE:

Objects which move or change together are seen as a unit or with a common fate. It reflects the great power of relative movement as an organizer for perception.

Here only one possibility of several is actually seen by the reader.
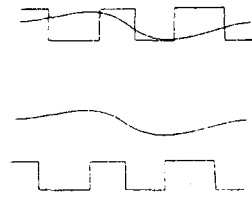
Figure 18.1 Gestalt "Laws" of proximity, similarity, continuity, common fate, and closure.

Gestalt breakdown

GROUPING LAWS

> The visual system spontaneously
> organizes elements into larger groupings

Similarity

Good Continuation

Proximity

Common Fate

LAWS OF GOOD FIGURE

(Pragnanz Principle)

> Visual systems converge on the most
> regular and symmetric perception
> consistent with the information

Good Continuation

Closure

Common Fate

Today these "laws" are viewed as descriptions of perception, rather than scientific laws of perception.

Figure 18.1 continued

The laws of continuation and closure have very obvious applications to name placements on maps. One major change that has occurred is the avoidance of extreme letter spacing, and sometimes of virtually any letter spacing at all. Much of this derives from studies that showed just how difficult letter spaced names are to read. Indeed, many older maps were essentially unreadable in the way they presented area names. Our explanation is obviously that they are no longer seen as a continuous unit. Some older maps allowed for the use of staggered names. These are likely to be a problem since we don't normally read this way and the visual link will probably not be established.

The law of common fate would seem mostly applicable to linear symbols, but it does explain nicely the visual link we create when we flow names together with complex lines, such as rivers, roads, railways, and boundaries. It shows the great power of relative movement as an organizing force in perception. It provides the vehicle for the major exception to our rule that lettering should be as normal (horizontal) as possible. Curved names on curved lines are seen as a single unit. If the trends are not very similar, a visual break is established and no obvious relationship

Gestalt samples of
name placements

HALIFAX
Yarmouth Road
COUNTY

Split sections and simple alignments

GOOD CONTINUATION

All alignments must be simple and spacings consistent; any parts of a single name must be seen obviously as a single, continuous structure without visual effort.

Modern text usege minimizes the number of times letter-spaced names can be used - the internal spacing must always be less than the spacing to other non-related text.

WINDSOR   RAVINE

Simple and continuous curves

Paradise
Annapolis
Bridgetown   Kingston
A   Middleton

Letter-spaced, but visually unified

CLOSURE

Text which is placed over map detail and which covers part of it must be located so that the missing element can be inferred with accuracy and ease. Only place text over straight lines or very simple curves.

Hantsport   Badville
Hellfire
Oxford

Boundary obvious   Boundary missing

COMMON FATE

Names which are close to a symbol and flow in a visually similar manner will be seen as part of that symbol. Used a great deal for roads, contours, rivers and boundaries.

River
Branch

Similar alignment

Figure 18.2   Gestalt samples of name placements.

Gestalt samples of name placements

SIMILARITY

Most often used with symbols and to establish patterns and trends.

In type usage, similarity is a normal tool for the classification of names into categories. Similar type styles, colours, sizes or treatment are used to infer similar classification.

Conversely, a change in type appearance may be read as a change by the reader, even if you didn't intend it.

Note: this is an area where GRAPHIC REDUNDANCY is vital—change two aspects of the type (e.g. size and style) to clearly indicate an intended change.

M

T

k
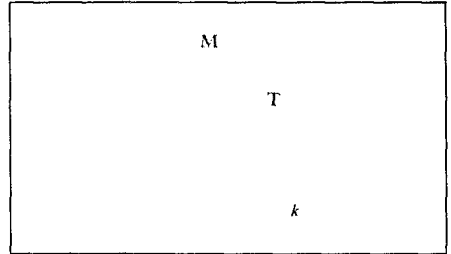
Classification clear and obvious—
at least two graphic variables
involved each time.

PROXIMITY

A major graphic tool for text placement.

It is essential that text be visually associated with its location. Point symbols must be very close to their own text, and separated visually by large amounts of space from non-related material.
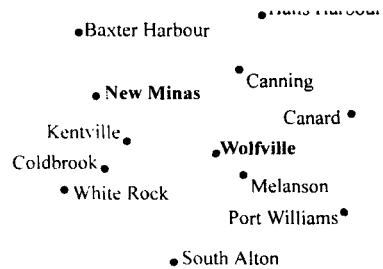

•Baxter Harbour

•⋯⋯ ⋯⋯⋯⋯⋯

• New Minas   •Canning

Kentville•

Coldbrook•

•White Rock   Canard •

•Wolfville

•Melanson

Port Williams•

• South Alton

Figure 18.2 continued

is noted. Even here we must strive to be as simple and as normal as possible, and obviously any name that approaches the horizontal is to be preferred over one at an extreme angle. Upside down lettering is obviously to be avoided totally—it simply won't be seen or understood, and will vanish into the "background". Upside down lettering is never experienced in day-to-day reading; we have no familiarity or competence with it, and there has never been a good justification for using it, despite the habits of some mapping agencies.

    Heider took the basic idea of Pragnanz further and developed ideas that should be of interest to cartographers and any other graphic workers. He developed the

TEXT AND SYMBOL DESIGN

Remember - when readers study or use a graphic
their habits were established by reading text material.

abcdefghijklmnopqrstuvwxyz

Visually the top half is dominant and identifies the symbol.

abcdefghijklmnopqrstuvwxyz — 9 ascenders
5 descenders

Ascenders are more numerous and more important.

ABCDEFGHIJKLMNOPQRSTUVWXYZ

The top is visually far more important than the bottom.

In symbols the most easily seen usually have the critical shape at the top.

Those with symmetrical or low designs are somewhat more difficult to separate visually.

Figure 18.3   Some considerations for text and symbol design.

concept of BALANCE; the idea that individuals actually prefer HARMONIOUS relationships and actively seek them out (Rock and Palmer, 1990: 89). The contrasting function of map image and map textural material control its composition. Clarity is dependent on legible and well placed letters, and text placement requires that we create harmonious proportions and balances. Once again we see the importance of an integrated, overall design approach. Perhaps it will provide some pause for those people who suffer from "desktop fever" and are itching to try out those 600 typefaces that came with your latest software. In a word, don't! Neither should you approach the task of labelling a map on a piece-by-piece method—we are creating a single, integrated graphic communication, not a patchwork quilt!

The second group of Gestalt laws are known appropriately as the GROUPING LAWS, and they overlap the laws of good figure, as you might expect from a philosophy that is built around the notion of an integrated whole. Included once again is good continuation and common fate, while the concepts of PROXIMITY and SIMILARITY are added. Here we see how human perception attempts to organize data into simple and meaningful shapes from small, numerous elements. Note that a common control mechanism is spacing of the elements and another is similarity. Both are vital in the use of text on any publication.

Spacing of text and the use of consistent type styles has always been a major concern in the publishing industries as well as in cartography. Much has been published on how to achieve good communication by text manipulation, and information continues to arrive with the current popularity of desktop publishing. Some systems are highly complex; they are often contradictory in what they recommend. We have always needed a precise and easy to apply system.

Probably the most simple and useful system of achieving consistent and highly readable text material was developed by the late Newman Bumstead of the National Geographic Society in Washington for use in their publications. I am not aware if this was ever published, but it has proven so useful that it has been taught to a full generation of my students and greatly simplifies the design and analysis of the projects. Bumstead's system does not mention Gestalt, but the entire structure is based on Gestalt-like relationships.

The system is known as BUMSTEAD'S RULES, and after a brief introduction all students are assumed to use it consistently on everything, unless they can express an overpowering design constraint that forces them not to. Evaluation is equally simple—the expression "Bumstead violated" is attached to any type spacing error and no other explanation is necessary. Poor Bumstead by now must be the most violated human in history, but his memory certainly lives on, and he has been responsible for more competent projects being produced than anyone else.

Bumstead's laws, especially those concerned with the "surround space", are the simplest method we have found of controlling the figure/ground separation of text. They ensure the visual unity of a planned single topic and the visual separation of all non-related material. The basics of the system are shown on the accompanying Figures 18.4, 18.5, and 18.6. Hopefully it needs little explanation beyond what is shown there.

Bumstead's Rules

**Rules of spacing relationships between
text elements on any kind of graphic**

1. The visual appearance of the space between letters of all words of the same style and size must be the same.

    Thus, all systems of mechanical or measured letter spacing are not acceptable. Courier and similar typewriter styles are to be avoided.

2. The space between letters must be seen to be less than the space between words.

    In order to create only the words intended, the separation of letters into visual groups by increased spacing is vital. Word space must be consistent and relatively small.

3. The space between words must be seen to be less than the space between lines of text in the information unit in which they appear.

    Word spacing must be seen to be less than that between lines in a paragraph, title, address etc.

4. The space between lines of a single text unit must be seen to be less than the space between lines separating units.

    Line spacing used within a paragraph, or any other closely related piece of information, must be seen to be less than the space used to separate paragraphs, different classifications, or other different information.

5. The space between lines separating different units of information must be less than the space that surrounds that textual information.

    The WHITE SPACE that surrounds the textual information must be seen to exceed any space used within that block. Don't cramp borders close to text blocks. Visually separate a text block from any other information that may surround it.

Figure 18.4 Bumstead's Rules of spacing relationships between text elements for graphics.

Bumstead's Rules

spacing appears same

VISUAL

MECHANICAL

1. The visual appearance of the space between letters of all words of the same style and size must be the same.

2. The space between letters must be seen to be less than the space between words.

good spacing

badspacing

3. The space between words must be seen to be less than the space between lines of text in the information unit in which they appear.

Normal reading is from left to right, and if you provide the correct line spacing, you ensure this.

You probably see this vertically

4. The space between lines of a single text unit must be seen to be less than the space between lines separating units.

CLASS 5 - Soils in this class have severe limitations that restrict the range of crops or require special conservation practices.

CLASS 6 - Soils in this class are capable of only producing perennial forage crops.

5. The space between lines separating different units of information must be less than the space which surrounds that textural information.

SURFICIAL GEOLOGY
Annapolis County

Figure 18.5   Applications of Bumstead's Rules on spacing relationships between text elements for graphics.

Spacing (Bumstead) Problems
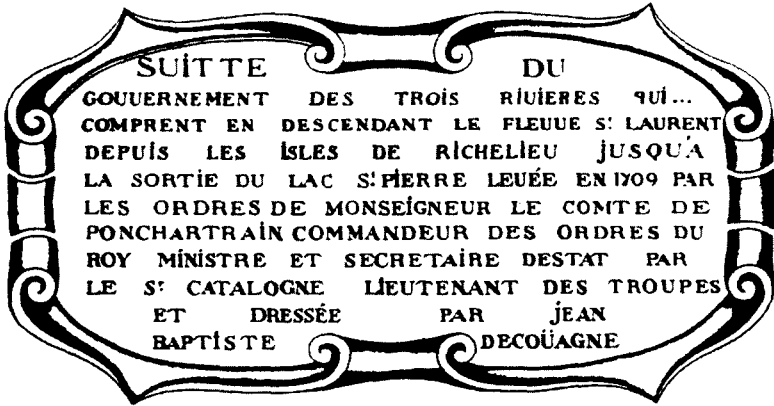
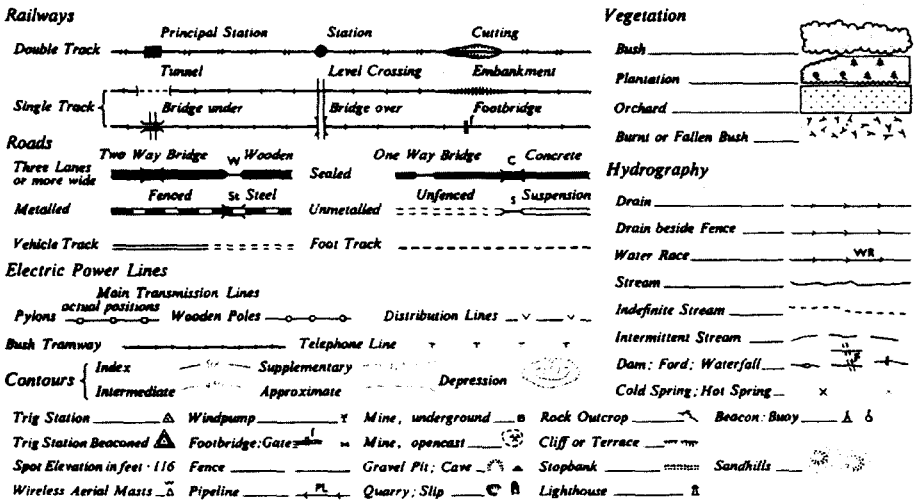**Title block for a map of Seigniorial Settlement in 1709, Lake St. Peter, Quebec.**

Note: Word spacing larger than line spacing; erratic word spacing; continuity of text destroyed by border; capital letters make message hard to read; border detracts from title message.

Part of legend from older O.S. 6 inch series (ink drawn)

Note: Spacing problems create tendency to read across columns; italics in volume are difficult.

Figure 18.6   Examples of violations of Bumstead's Rules.

This is a simple set of spacing relationships designed to ensure that information that should be visually linked is done so easily, and information that is distinct is visually separated. In so doing it incorporates the grouping laws as fundamental. It controls the white space or negative space surrounding each item. It conforms to normal reading techniques and the daily experience of readers. Of course, there is little that is new here; many designers do this quite intuitively in cartography and other applied arts. It is the simplicity and consistency of the system that makes it so useful. If followed carefully, it results in highly acceptable and, most importantly, highly readable graphic products. Our own normal teaching techniques include showing and obtaining samples from published advertising where Bumstead appears to be followed and others where his principles are violated. It is amazing how many very expensive ads by major corporations that don't seem to work well when first seen can be found to have a fundamental spacing flaw when analysed.

From an instructional and use standpoint, it has another decided advantage over many more complex systems. There are no formulas, no mathematics and no measurements required. The entire system is visual; if it seems to work it does, if it looks wrong it is. This is very much a reader-based application. It trains students very early on to look at their work and that of others critically, instead of following a formula approach. They learn to place themselves in the position of the map user instead of the map constructor; they become very critical, very quickly.

An example of poor spacing and several Bumstead violations are seen in Figure 18.6, the title block of a map on the Seigniorial Settlement of 1792 in the Lake St. Peter Region of Quebec. Notice how difficult this is to read, how inconsistent the spacing is, and how cramped the title itself is against the decorative borders. Do not think that this could not happen today. If you have "justification" set on many of our modern desktop software packages you can easily get word spacing that is even worse. It has another common error that is still seen today—a title that is far too long and lettered in all capitals. It is unreadable by all except the most dedicated user, guaranteed to put most of us to sleep before we've ever figured out what the map is all about.

One of the cartographic areas where spacing and unity problems often occur is in the design of legends, mostly because these items are overly complex, and the designer attempts to fit too much information into too small a space in the map surround. A common solution is the employment of multiple columns, where a symbol and its explanation are then followed on the same horizontal line by another symbol with another explanation. All too often the visual space between one explanation and the next symbol is less than the internal space used for a single item. The result is visual confusion—which symbol belongs to what explanation? People should not have to figure out this kind of puzzle. It is our job as designers to ensure that there is only one way to read the work—the correct way. The above example violates the grouping laws and violates Bumstead. It runs counter to one of the oldest guides in the printing business, which is to avoid 'Tombstoning", the unintentional reading across from one column to the next one. And yet we continually see this sort of thing in cartographic products.

Some national map series still don't pay much attention to the readability of their publications. An example is taken from one of the old style Ordnance Survey 6-inch plans. The conventional sign sheet shows lines visually running into one another and some potential confusion. It is not acceptable to say that people can figure this out in some short period, nor is it acceptable to say that experience limits this effect. With a very small change in design by the people who are supposed to be good graphic communicators, these potential errors or aggravations would not occur. The more people who can use our products easily, the more will use them and the more we will sell—it's simply good business not to antagonize the customers. This same legend illustrates another common habit of many cartographers. Why on earth would all the text in such a complex area be done in an italic face? Italics are designed to be poor communicators; that's how they draw attention to themselves when used for emphasis in a book. They should never be used for extensive amounts of reading; they simply don't work well, just as all capitalized legends are equally difficult to read.

A point-by-point analysis of all the various rules and guidelines used in the various mapping agencies and companies is obviously beyond the capabilities of what is supposed to be a short paper on the subject. It would be the size of a large text and would also be quite repetitive. Each mapping organization should investigate its own guidelines and standards to see if readability can be improved and consistency attained. This may not be a short task even at a single location. The guides for name placement given to students at the College of Geographic Sciences, for example, originated with the published articles on lettering by Imhof (1975), were supplemented by material from Keates (1982, 1989) and Robinson et al. (1978), and then rewritten. They have been expanded and changed virtually every year since. When a student or an instructor notes a problem that is not covered, a guide is developed to fit the situation. Much of the rewriting takes place in an attempt to maintain some sense of consistency and logic, hence the thrust of this chapter. Currently we have some 32 detailed guidelines for map face type alone, and each student receives some 10 pages of closely written sheets to which they are expected to adhere. We probably still have quite a way to go before this material can be considered comprehensive and integrated.

Figure 18.7 shows a few examples of considerations necessary for map face type. It includes a version of diagrams accompanying Imhof's original article on name placement from the *American Cartographer*, which we now believe to be in error. Some of our own ideas may prove to be erroneous, but that should only encourage us to look critically at what we do and take each opportunity to improve our techniques. Also, we must realize that cartography is one small branch of cultural communications. Styles and what is considered acceptable inevitably will change, and we must reflect that in much of our work. It is probably inevitable that ideas on how to communicate with text will remain fluid and the subject of endless discussion for the foreseeable future. It is to be hoped that this chapter can be considered a contribution to simplifying and bringing a sense of logic to a highly complex subject.

Study of some name placement conventions

```
3   1    Halifax  Halifax
  •
4   2    Halifax  Halifax
```

Preferred Locations for spot names

Position #1 has capital and symbol very close, both designed to attract attention, therefore unity maintained. Bottom of text is more linear than top, therefore a preferred location. Proximity clearly better to right than to left. Position #4 clearly the worst option.

```
Halifax
   •
Halifax
```

Two (less desirable) locations

Possible but not recommended. Proximity and unity problems because of visual separation between symbol and capital letter. Lower position is again usually the poorer choice.

Alternative, curved locations

Possible locations but effectiveness decreases rapidly with increased angle from horizontal and amount of curvature. Similarity and continuation both become a problem at distinct angles. Normal reading rarely calls for alignments distinct from the horizontal. The more variations used on a product the less unified it seems. Curves must be few, moderate and consistent.

Good   Poor   Poor

Imhoff's curved text recommendations

Imhof avoids extreme curvature which is effective, but he allows text to go past a vertical position which must be the limit for readability of any kind. Note how in the first diagram only the last word can be read at all without distinct effort. All three of these options should be considered to be poor. Upside down lettering is to be avoided even on only partial words.In most cases re-positioning of names can avoid these problems.

Figure 18.7   Some name placement conventions.

REFERENCES

Birch, T.W. (1968). *Map and photo reading*. London: Edward Arnold.

Cuff, D., and Mattson, M. (1982). *Thematic maps, their design and production*. New York: Methuen.

Haber, R.N., and Hershenson, M. (1973). *The psychology of visual perception*. New York: Holt, Reinhart and Winston.

Imhof, E. (1975). Positioning names on maps. *The American Cartographer*, 2(2), 128-144.

Karssen, A. (1980). The artistic elements in map design. *The Cartographic Journal*, 17(2), 124-127.

Keates, J.S. (1981). *Understanding maps*. London: Longmans.

Keates, J.S. (1989). *Cartographic design and production*. London: Longmans.

Koffka, K. (1935). *Principles of Gestalt psychology*. New York: Harcourt, Brace and Co.

Robinson, A., Sale, R., and Morrison, J. (1978). *Elements of cartography*. New York: John Wiley and Sons.

Rock, I., and Palmer, S. (1990). The legacy of Gestalt psychology. *Scientific American*, 263(6), 84-90.

Trudel, M. (1973). *Atlas of New France*. Laval, Quebec: Les presses de L'Universite Laval.

Yasui, H. (1989). *Desktop publishing: Technology and design*. Eden Prairie, Minnesota: Paradigm Publishing International.