



THE CONCEPT AND IMPORTANCE OF STYLE IN CARTOGRAPHY

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Abstract. The paper outlines the concept of cartographic style that is applicable to practically every type of maps. The structure of the style is rather complex and can be influenced by geographic space, time and culture. The purpose of cartographic stylistics is to assure that all the elements of visualization consistently support an appropriate perception of map information by the target group. Three largely independent criteria, that can be separately applied to different map components on the one hand and combine composition and other aspects into one system on the other, are specified as decorativeness, expressiveness and originality. Four major groups of styles have been defined by a general degree of the graphic enhancement of visualised data: 'minimal', 'standard', conventional and conspicuous. Within conventional and conspicuous stylistic groups, more concrete style types such as laconic, constructive, expressive, lightsome, aggressive, soft, antique, luscious, extravagant and artistic are defined.

Keywords: map, cartography, style, stylistic analysis, visualization

1. Introduction

In one of his essays, Evelyn Waugh has pointed out clarity, elegance and individuality as three essential elements of style and provided a simple definition: 'Style is what makes the piece memorable'. Thus, how many memorable pieces could be found within the stacks of maps used daily by almost everyone? We suppose, perhaps only a few, including the historical ones or containing successful imitations as well as maps with exceptional content and unconventional representations. Besides, in the majority of cases it is only due to the uniqueness of the product not due to the exclusive elegance of its design.

We have to admit that elegance is practically indefinable quality. Nevertheless, it somehow reflects itself in the overall harmony of visualization and contents. Due to this quality, some old maps look surprisingly modern while most of modern maps do not.

Almost everybody sufficiently involved in the production or use of maps will agree that a concept of style is in one or another sense applicable to a map. Confusion begins when we try to define what map style really means. A style is usually defined as a specific manner of expression and quality that characterizes belonging to a particular period of time, school or group (Gant and McIver Lopes 2005). Such quality is present in different means of communication such as verbal communication, music and communication related to the sense of sight to which maps belong as well as paintings do. However, everything is different when style is mentioned in the IT

context. The first association conjured up will likely be Cascading Style Sheets, or, if closer to geographic information and maps as its visualizations, Style Manager or some similar tool of GIS software. Finally, there is also a common understanding of style as a fashion usually associated with good taste and refinement. Thus, which of the introduced three meanings are we dealing with in cartography?

Among a variety of publications where *cartographic* style has been referred to, we have not managed to discover a systematic approach that would be also practically applicable for classification and further stylistic analysis. Thus, we have tried to outline the main parameters that can be used to determine, evaluate and/or implement a consistent map style. The goal of this paper is to propose a structured framework for the identification of modern cartographic styles. It is represented as a 'coordinate system' containing only three largely independent parameters. The proposed framework and definitions of particular styles are based on a cartiosemiotic analysis of several hundreds of modern printed and electronic (Viliuvienė 2006) thematic maps and appears to be exhaustive.

2. Manifestation of Style in Cartography

Style in modern cartography can be defined as a loose framework that organizes all cartographic expression devices, is used distinctively and can be identified as belonging to a particular region, cartographic edition and/

or map producer. It is only possible to speak of style when the parameters of such framework can be described and have the same or similar values in at least several maps. *The absence of style* in this context means that the method of using different graphic attributes¹ is rather haphazard and varies across the analyzed series of maps.

Style is not only perhaps the most important concept of map aesthetics but also a factor that significantly impacts on the quality of cartographic communication (Pravda 1977; Bertin 1979; Лютый 2002). It is the result of the evolution and augmentation of cartographic visualization.

The structure of style is rather complex and can be influenced by geographic space, time and culture.

Historical maps usually reflect the general art styles of corresponding *epochs*. Traditional (baroque, Renaissance) graphic design styles can be easily identified not only by the graphic devices of the map image but also largely by the ornaments, composition and elements of layout. Digital technologies open new graphic and interaction possibilities thus marking a new epoch in cartography. However, not only the mainstream art style but also prevailing designers' approach to cartographic communication (Fig. 1) forms the epoch-specific styles of maps.

Geographically, *national and regional* cultures have to a certain extent made impact on cartographic representations, especially on the historical ones. Nowadays, it is not so easy to identify a map designed in a particular country or region, but in some cases, reasonable assumptions can be made.

The culture of an organization, company or author can form its individual style that reflects its values, goals and other specific features of thinking. It takes a lot of time and efforts to develop a good individual style. That is the reason why smaller cartographic companies often follow or simply imitate² a style of maps published by the reputed companies.

The importance of style in cartography is hardly disputable. There are three major fields where the presence of style improves map quality.

- **Identification.** Style allows for a positive identification of the author and culture.

¹ The term 'graphic attributes' in this paper replaces the still more popular term 'graphic variables', which is not precise from the author's point of view. A variable is perceived as an independent object whereas an attribute is a characteristic of some object that can not exist without the object, which is always the case with graphic 'variables', for example, thickness (of a line) or brightness (of polygon's fill colour).

² There is a considerable difference between *following the style* (a good practice of accepting some general stylistic framework and developing it to match own vision) and *imitating the style*. Imitating is copying entire sets of values of graphic attributes used by other author that is in principle copyright violation. Unfortunately, we do not know about any practical method to distinguish between deliberate imitation and choice of the same values by coincidence. Choice of particular values, such as green or blue colour, has never been considered as subject to copyright that makes the problem of protection of entire design / style even more difficult.

- **Information.** A significant part of stylistic devices are not neutral but carry additional social, emotional and aesthetic messages that maps can convey. Besides, style allows making assumptions concerning map target group. On the other hand, if the style is actually compatible with the perception specifics of the target group, it improves map communication. Whereas the reading and interpretation of common map information takes some time, style is evaluated immediately and can give a user a good idea about the value of the map.
- **Integration.** A well thought-out style makes a general idea of the map to reflect on its every detail thus serving as a strong organizing framework. It guarantees the wholeness of the product.



a) map as a piece of art



b) map as a plain information source



c) user-friendly modern map



d) map as a unenhanced database visualisation

Fig. 1. Reflection of the cartographer–user relationship on the style of a map

Modern designed maps, stored and often used in digital form, still do not have specific stylistic tradition. This paper concentrates on digital representations that surrender to the limitations of various displays on the one hand and have almost unlimited possibilities of animation, interaction and other qualities on the other (MacEachren 1994, 2001).

These qualities of digital maps require a different approach and the new extensions of traditional (in case it exists in cartography at all) stylistic analysis. Thus, we will concentrate on static representations (printouts or raster images) and try to define the main characteristics that allow for identifying such representation as belonging to one of the general visualization styles.

More formally, style is a *set of parameters*, a part of which are determined by the map scale, theme and general purpose, whereas the rest of them are subject to the designer's free choice.

The purpose of *cartographic stylistics* is to assure that all the elements of visualization consistently *support an appropriate perception* of map information by the target group. It is worth mentioning that 'appropriate' does not necessarily mean 'correct' or even 'most efficient' but rather that the user's mental image of the map is close to the mental image the cartographer intended to convey. Maps often carry emotional contents. They are sometimes designed with a purpose to distract attention from particular objects of geographic reality they represent or to create a false impression about the correctly represented phenomena in other ways. Obviously, such differences between the represented reality and mental image is normally not the case with topographic maps, charts or other maps the principal purpose of which is to accurately portray the features of the earth's surface. However, regardless of high standardisation, such maps can significantly differ (Figure 2). There is a general trend that more and brighter colours and lighting/shading effects are applied to modern maps. Unfortunately, older maps, although less eye-catching, often are stylistically more consistent and pleasant to use for a longer time. Apparently, the importance of style grows in proportion to the diversity of graphic attributes and the number of their values applied for cartographic visualization.

Assuming that the divergence of styles directly depends on the allowed level of the freedom of graphic expression, it can be stated that there are two large groups of maps that require a different approach of stylistic analysis.

1. *General reference maps* that provide extensive close-up detail. An accurate and homogeneous representation of the real world objects, a large scale and a high level of standardization are the typical examples of these maps. Topographic maps, charts and some large scale thematic maps (e.g. geological) certainly belong to this group.
2. *Thematic maps* that contain specific information about particular locations and/or spatial patterns. Such maps usually are compiled at a smaller scale, do not have strict visualization standards and often contain the sets of conspicuous objects (an element of advertising).



a) Canada, 1958



b) Canada, 2002



c) Lithuania, 2005

Fig. 2. Fragments of 1:50,000 topographic map sheets

It is evident that stylistic elements vary much less and are more difficult to identify within the first group. However, it does not mean that map stylistics should be limited to thematic mapping. As topographic maps utterly and metaphorically represent the state, their stylistic quality is important at national level.

Unfortunately, there is a general lack of studies on map stylistics as well as of consistent practical recommendations for the improvement of cartographic style.

In the best case, single chapters or paragraphs by various authors have touched this subject and mainly discuss the impact of epoch style on historical maps or the impact of modern technology on the modern ones.

Perhaps the most consistent ideas on map stylistics can be found in works of Lithuanian cartographer M. Dumbliauskienė who has examined style as a component of cartographic design within the framework of cartographic communication (Dumbliauskienė 2002; Dumbliauskienė and Kavaliauskas 2004). Unfortunately, only a small part of this research has been published in English. She has developed a set of purpose-dependent stylistic criteria that can be used for evaluating the communicative quality of individual maps: level of cartographic expression, level of generalization, level of regulation, expressiveness and strength of emotional impact. Even though we do not completely agree with all her ideas, our hereafter presented model is related to at least some of the above proposed criteria.

3. Factors Influencing Map Style

Maps are the products of science, technology and art. The concept of style applies to map design usually associated with the 'artistic' part of this triad. It allows for a stylistic analysis of maps as of pieces of art. Nevertheless, map design is closely related and often largely determined by technology used to make the map and by the specificity of data represented on the map.

It is possible to outline some objective factors that restrict the use of possible stylistic solutions. Therefore, we will put to work a simple but comprehensive framework for cartographic visualization that has been suggested by H. Schlichtmann (Schlichtmann, 2002). It is based on three main functions of cartographic transcription and embrace signification, clarification and emphasis. Signification indicates a correct visual representation of map information, especially of hierarchies or other complex systems. Clarification makes visualization easy and convenient to use. Emphasis means that a part of map information may serve as a background for some objects of particular interest that are graphically highlighted.

Purpose. The map purpose influences not only the choice of map contents but also the projection, scale and level of generalization and layout. For example, nautical charts are usually designed using Mercator projection that preserves direction and shapes. However, it would not be a good choice for a purpose that includes a correct representation of size (e.g. general political map). Metro maps do not require consistent scale and are not split into sheets in contrast to inventory maps. Maps that must first of all convey a large volume of precise data necessarily contain many various objects and almost all graphic devices are employed to convey significant information (attributes and relationships), thus leaving no freedom for additional expression and not much space for decorations. On the other hand, maps designed to be specifically noticed or memorised require expressive design.

There are several general purposes that differently influence map style.

1. **Inventory and navigation maps.** Due to characteristic standardization and accuracy requirements, this purpose allows very little freedom of stylistic expression. Unusual, extravagant graphic solutions are not acceptable. Within this group, signification function prevails.
2. **Orientation maps.** This is a large group of maps with a strong clarification function. Clarity is an important issue. Nowadays, when maps are already so complex and become increasingly interactive, the ease of reading is likely the best thing a cartographer can give to the user. It is often said that the better the design is, the less it draws attention to the design itself. Clarity means that the map reader can easily move along, picking the information s/he needs not bothering about what s/he does not want at the moment but having it conveyed when s/he wants more, avoiding confusion. Decoration and emotional involvement are subordinate to the function that must dictate the form. An excessive use of graphic devices is not desired unless they are necessary to emphasize particular entities or to prevent from possible interpretation errors.
3. **Thematic maps with a primary purpose of visual communication.** In this case, emphasis plays an important role and good style means that the methods of putting emphasis are regular and uniform over all the map or map series. More sophisticated graphic solutions are often appropriate. This very large set of maps can be roughly split into three smaller groups corresponding to *informing*, *training* and *advertising* missions. *Correspondingly, the importance of attractive emphasis is higher for each of these subgroups. Nevertheless, good style always remains functional and this rule should never be forgotten.

Target group. The maps of the same purpose require different style for different audience. Visually impaired people and children are typical examples. While the former need specific colour solutions, the latter need decorations, attractive and recognizable objects.

Media. Even though modern publishing and presentation technologies are quite flexible, technological limitations still exist. To make a complex map look aesthetic (and in many cases simply avoiding information loss), black and white, greyscale and colour outputs may be designed in different styles. Very small fonts, thin lines or pale subtle colours would not be readable on maps and presented exclusively on computer screen. A map with only a few large objects, that may appear rather stylish on a large screen, would be very inconvenient to use for mobile devices. By the way, not only limitations but also additional space for stylistic variations is due to modern technologies. Three-dimensional, interactive, animated maps require an extended stylistic framework, connecting a style of traditional graphic devices with, for example, a style of 3D lighting or a style of map objects behaviour (MacEachren and Kraak 2001).

4. Stylistic Criteria and Parameters

Considering different styles, we will try to eliminate the impact of the factors listed in the previous chapter. Partially for this reason and due to the unavoidable subjectivity of evaluation, the values of stylistic criteria will not be absolute but relative to two neighbouring reference standards of each purpose-oriented group (Fig. 3):

1. 'minimal map' as database visualization using common schemes, i.e. stylistically indifferent sample;
2. 'standard map' is designed using minimum graphic enhancement necessary to meet the basic criteria of communicative quality, i.e. one step ahead of the 'minimal' map.

According to M. Dumbliauskiene, stylistic criteria include graphic expressiveness, generalisation, standardisation, illustrativeness and the strength of emotional impact. Also composition is described as a specific group of criteria that includes scale, proportions, colour scheme, accentuation and general layout.

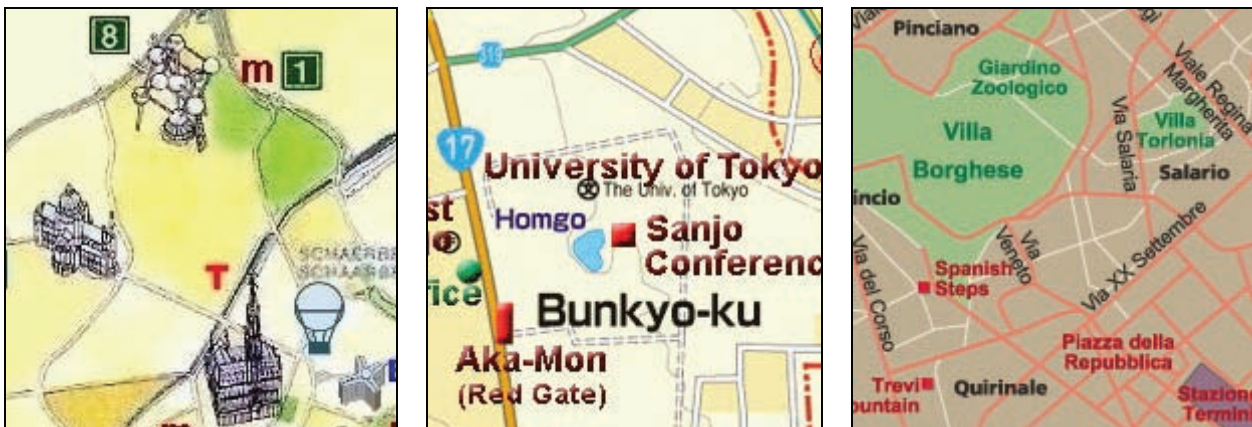
From our point of view, some of these abstract criteria cover same aspects of map stylistics (for example,

the use of a particular colour scheme results in accentuation or deviations from standards) and some, such as 'emotional impact' or 'general layout' are too abstract to be evaluated. Therefore, the identification of map style requires a set of more formal and more independent parameters. We propose only three basic largely independent criteria that can apply to different map components separately, but on the other hand, combine composition and other aspects into one system (Fig. 4).

1. **Decorativeness.** Roughly speaking, this parameter describes the amount of work applied for making a map or its component specifically beautiful. Decorativeness manifests in eliminating the imperfections of visualisation (for example, hydrograph line work is approximated by splines, a position of letterings is adjusted manually, polygons made transparent etc.) and in adding graphic devices that normally do not convey additional information, except for subjective impressions generated by associations. For example, Greek or baroque patterns can be used for map frames. However, the three-dimensional drawings of buildings in city plans or of other spatial structures



Fig. 3. 'Minimal', 'standard' and 'stylish' (from the left) map samples



a) decorativeness

b) expressiveness

c) originality

Fig. 4. Samples of street maps with one prevalent stylistic parameter

should be classified as decorative even though they mainly serve for the purpose of clarification. This parameter covers the illustrativeness, (partly) standardisation and the strength of emotional impact and accentuation from M. Dumbliauskie-nė set.

2. **Expressiveness.** This parameter describes the components intentionally designed as conspicuous (not necessarily beautiful). Both graphic expressiveness and the strength of emotional impact from the previous set are directly related with this parameter, whereas scale, proportions, colour scheme and generalisation largely depend on it. Expressiveness manifest in bright colours, interesting patterns, images, large texts and signs, thick lines and excessive generalisation.
3. **Originality.** The amount of unusual visualisation solutions (they can either increase or decrease decorativeness and expressiveness) is strongly related with style. Originality means the degree of deviation from standard visualisation schemes for a particular map type. It can be observed in the entire map (e.g. oval layout), its objects (inverse colours, distorted shapes, unexpected fonts, artistic effects) as well as in cartographic base components such as a grid of unusual map projection, inverse orientation, varying scale etc. Nevertheless, it is difficult to formalize a graphic solution

as once seen or described, loses its uniqueness. The parameter of originality is related with all of the abstract criteria.

The criterion of *stylistic consistency* must be added to this system for the verification and identification of the case when emphasis plays a significant role and big differences in parameter values across the components do not mean the absence of a uniform style. It corresponds to the abstract criterion of accentuation. Strong emphasis is used, for example, in advertising maps and thus makes it difficult to identify their style. Therefore, we exclude this group as well as maps designed to meet the needs of specific target groups from further analysis in this paper. In general, the methods and styles of accentuation require separate analysis.

The inconsistency of manifestations of the first three parameters usually means that the style is not sustained and higher parameter values are sporadical.

The framework connecting these stylistic parameters with standard map components oriented to classical media (printed or non-interactive screen image) and the main indications for each parameter are presented in Table 1.

If a consistent use of graphic expression is observed, it is possible to identify the type of map style. The following table (Table 2) shows a tentative relationship between the possible combinations of ranged parameter values and the strength of stylistic expression.

Table 1. Stylistic parameters and their indications

Parameters Components	Decorativeness	Expressiveness	Originality	Consistency (applies to each parameter)
Lines	<ul style="list-style-type: none"> • resembling natural shapes and patterns (associative) • decorated 	<ul style="list-style-type: none"> • generalised • thick • vivid patterns • shadows • artistic effects 	<ul style="list-style-type: none"> • unexpected patterns 	<ul style="list-style-type: none"> • consistent • background/highlights
Colours	<ul style="list-style-type: none"> • harmonious • nuanced • contrasting 	<ul style="list-style-type: none"> • pronounced • dark • contrasting • discordant 	<ul style="list-style-type: none"> • inverse • unexpected 	<ul style="list-style-type: none"> • consistent • background/highlights
Textures	<ul style="list-style-type: none"> • transparent • artistic effects 	<ul style="list-style-type: none"> • irregular • rough 	<ul style="list-style-type: none"> • unexpected effects 	<ul style="list-style-type: none"> • consistent • background/highlights
Conventional signs	<ul style="list-style-type: none"> • associative • decorated 	<ul style="list-style-type: none"> • prominent • sketchy • 3D effects 	<ul style="list-style-type: none"> • unexpected associations 	<ul style="list-style-type: none"> • consistent • background/highlights
Lettering	<ul style="list-style-type: none"> • decorated • artistic effects 	<ul style="list-style-type: none"> • prominent • unusual orientation • 3D effects 	<ul style="list-style-type: none"> • unique fonts • unconventional orientation 	<ul style="list-style-type: none"> • consistent • background/highlights
Supplementary components (title, grid, frames, scale, north arrow)	<ul style="list-style-type: none"> • decorated 	<ul style="list-style-type: none"> • prominent • sketchy 	<ul style="list-style-type: none"> • unconventional • unique 	<ul style="list-style-type: none"> • consistent • background/highlights
Composition	<ul style="list-style-type: none"> • balanced • decorated 	<ul style="list-style-type: none"> • asymmetric • simplified 	<ul style="list-style-type: none"> • unconventional 	<ul style="list-style-type: none"> • consistent • background/highlights

Table 2. Stylistic parameters and stylistic expression of maps

Parameters Visualisation types	Decorativeness	Expressiveness	Originality
Minimal (automated)	None	None/Colours only	None
Standard (regulated)	Low	None	None
	Low	Low/Colours only	None
Conventional style	Low	Moderate	Negligible
	Moderate	Low	Negligible
	Moderate	Moderate	Negligible
Conspicuous style	Any	Any	Present
	Low	High	Negligible
	Moderate	High	Any
	High	Low	Any
	High	Moderate	Any
	High	High	Any
	Any	Any	Definite

‘Minimal’ maps themselves are not of interest for stylistic analysis. They are identified mainly by the absence of any graphic enhancement and inadequate generalisation. A possible presence of expressive details in this case is due to ready-made visualisation schemes or simply incidental. The only rare case when it is sensible to speak of ‘minimal’ style is when it is intentionally applied to invoke ‘technocratic’ associations.

The presence of even a few components of original design or recognizable decorations and/or accents separates ‘standard’ maps with a little freedom of graphic enhancement from the maps with a larger freedom of expression.

For *Standard* visualisations that basically correspond to topographic (inventory) and navigation maps, more ranks or types of the manifestation of decorativeness and expressiveness within the *Low* category must be used for the identification of their specific style.

A much bigger number of different styles can be detected within the next two groups of maps. *Conventional*

and *Conspicuous* style groups are approximately separated by the presence of the *High* values of either parameter. The main practical difference between these two groups lies in a much bigger diversity of clearly different styles among the highly decorative or expressive maps.

Originality is the strongest style-defining criterion. Even though the uniqueness of visualisation is usually achieved by the use of decorative and/or expressive devices, it allows separating out not a group but a particular individual style.

Additional *refining criteria*, such as contrast, harmony, promiscuity etc. must be used for defining particular styles within a group. Style can be also named after associations it activates: historical, political, social, cultural, emotional etc

5. Modern Map Styles

In the space formed by the above mentioned three criteria, it is possible to tentatively identify several common map style types that are grouped and discussed below (Table 3). They are also shown in Fig. 5.

Table 3. Frequent stylistic groups of modern maps

Parameters Style types	Decorativeness	Expressiveness	Originality
Laconic	Low	Low	Present
Constructive	Low to moderate	Low to moderate	Negligible
Expressive	Low to moderate	High	Negligible
Lightsome	Low to moderate	Moderate to high	Present
Aggressive	None to low	Very high	Negligible
Soft / lyric	Moderate	Low	Present
Antique	High	Low to moderate	Present
Luscious	Very high	Moderate to high	Negligible
Extravagant	Low to high	High	Definite
Artistic	Any	Any	Definite

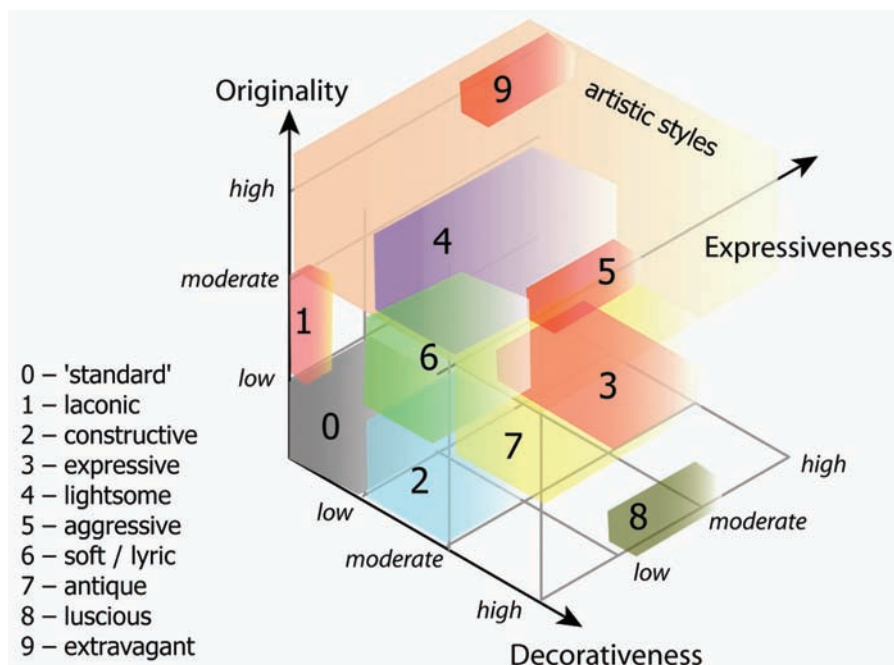


Fig. 5. Samples of conventional styles

5.1. Conventional styles

Laconic style manifests in very simple but to some extent original graphic design along with the minimised number of graphic objects and devices without additional geometrical simplification. It suits well to the maps with a clearly expressed clarification function (Fig. 6, a).

Constructive style is the most common example of good cartographic design practice. It means harmony between the map contents and graphic design as well as attractive, balanced and unobtrusive visualisation and is emotionally neutral or slightly positive (Fig. 6, b).

5.2. Expressive styles

Expressive style manifests in the intense and contrasting colours and sizes of the objects as well as a daring use of patterns and graphic effects such as lighting and shadows, lack of nuances, rhythmical composition. Objects are often stylised or even distorted in order to attract attention and stimulate perception (balanced clarification and emphasis).

Lightsome style is a version of expressive style, specifically figurative and picturesque. It is elaborated to raise interest, evoke positive emotions and associations always preserving the function of clarification.

Aggressive style can be seen as the extreme case of expressive style. Dissonant blatant colours immediately attract attention and often boost memorizing map information. Due to simplified, sketchy design and generally negative emotional impact, it is rarely applied as a consistent visualisation manner but often chosen to highlight the parts of advertising maps thus supporting the function of emphasis often at the expense of clarification and signification.

The samples of expressive styles are shown in Fig. 7.



a) laconic



b) constructive

Fig. 6. Samples of conventional styles

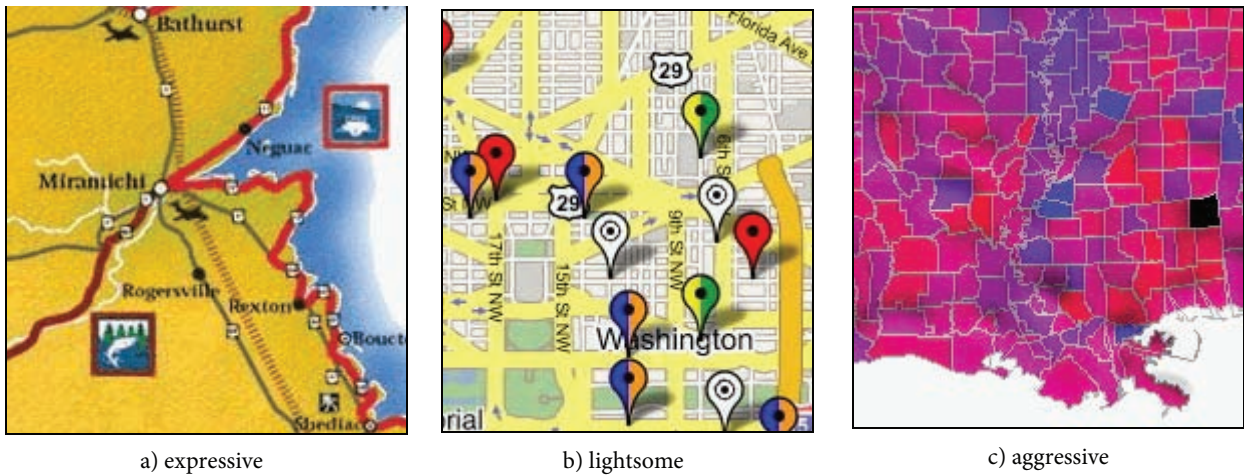


Fig. 7. Samples of expressive styles

5.3. Artistic styles

In these styles, the aesthetic function usually prevails over clarification and signification.

Antique styles, that imitate the design of the historical maps of different or mixed epochs, are perhaps the best known of the modern artistic styles. They are distinguished for static drawing-like visualisations, the presence of additional drawings, geometric or floral ornaments, a limited number of natural pale fill colours, cursive scripts or calligraphic fonts, the textures of old parchment paper etc. They are mostly emotionally neutral but invoke associations with a particular period or culture.

Soft/lyric style is formed by the subtle aquarelle-like gradations of colours, a temperate use of gradients, shadows, elegant fonts and ornaments. Contour lines are very fine or absent as well as unnecessary map objects. For its perfect clarity, this style can be examined as a more sophisticated case of laconic style.

Luscious style is rather rare and manifests in an extensive use of the different types of ornaments, mannered fonts, both contrasting colours and nuances and static composition.

Extravagant style is both very expressive and original. It creates strong impression due to unexpected composition, unconventional decorations, unusual, dissonant colour schemes and original visualisation manner (for example, mystical, minimalistic, rough).

Some samples of artistic styles are shown in Fig. 8.

A great variety of other artistic styles are also characterized by the originality of design but in a more conventional manner and with a different purpose than pure extravagant style. The imitations of modern ink, charcoal or crayon drawings and paintings may be good examples. *Artistic styles*.

6. Conclusions

The concept of cartographic style is applicable to every type of maps, however, to a different extent. Stylistic differences are less significant among topographic and other highly standardised maps. They play a moderate role for general thematic maps and are crucial for tourist, media and advertising maps.

Decorativeness, expressiveness and originality are the main parameters that allow to tentatively define map style. However, any stylistic evaluation must take into ac-

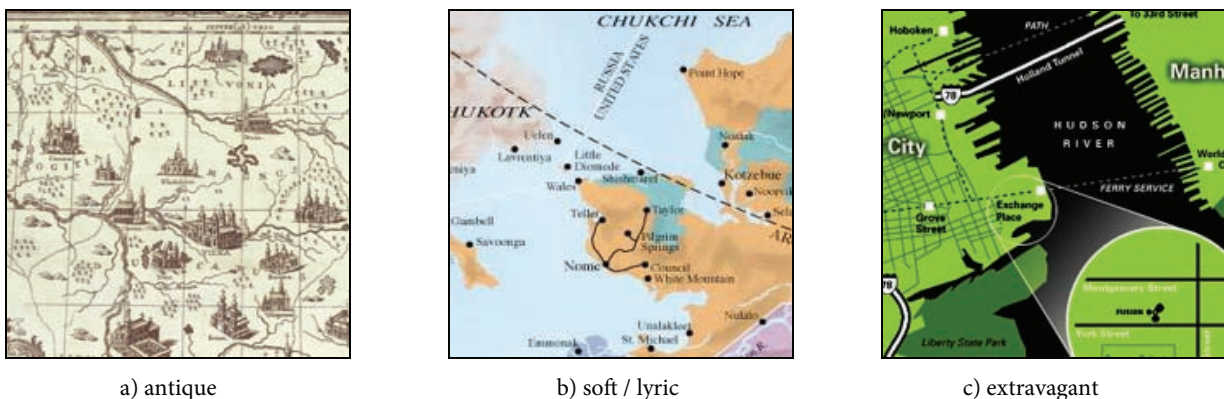


Fig. 8. Samples of artistic styles

count the map's purpose, target group and media as well as possible intentional inconsistency due to the specific means of graphic emphasis.

Four major groups of styles can be defined by a general degree of the graphic enhancement of visualised data: 'minimal' (no enhancement, 'standard' (small-scale enhancement), conventional (moderate enhancement, a few sub-groups) and conspicuous (significant enhancement, a great variety of individual styles). Within the last two groups, some more concrete style types such as laconic, constructive, expressive, lightesome, aggressive, soft, antique, luscious, extravagant and artistic can be defined. They serve as principal reference areas in a hypothetical three-dimensional space of map stylistics.

Additional parameters such as contrast, harmony, promiscuity, invoked historical or cultural associations etc., must be used for defining particular styles within a group.

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