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17 On Written Language in Works of Art and Cartography

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Abstract

In what some have called *the visual turn*, visual imagery has become an increasingly pervasive element of contemporary society. As traditional boundaries between media are being dissolved and the respective roles of creators/users are changing, written language is not simply being replaced, but instead is appearing in new places and fulfilling new roles. The aim in this chapter is to highlight key parallels and differences in recent developments of cartography and art, with particular concern for the use of textual elements. On the cartographic side, influential trends include the paradigm shift from communication to exploration and the increasing recognition of the socially constructed nature of all cartographic artifacts. Meanwhile, over the course of the last century artists have increasingly questioned the role of written language, increasingly integrating it into their works. Some artists have also sought to integrate geographic depictions into their works, including the linguistic codes included on them. Finally, linguistic codes play a role as both cartographers and artists reflect on *space* and *abstraction* as shared concerns.

17.1 Introduction

What role does *text* play in cartography and the visual arts? The aim in this chapter is to illuminate some key parallels and differences in the recent history of these two fields. Specifically, the focus is on the use of text within the products of artistic and cartographic work. To the cartographer, at least one not fundamentally opposed to critical inspection of one's discipline, it would appear that such conflicting aims as truth, clarity, possession, and control can be identified in artifacts from both fields, though means of identifying and considering those aims will differ. Meanwhile,

the artist may be interested in the physical conventions of text as it is employed in cartography and art, and in how these conventions interact with the semantic function of text. The visual nature of written language has subjected it to the scrutiny of artists' examination throughout the history of art. Ever since the invention of the alphabet, when writing became a largely non-pictorial mark-making system, artists have experimented with integrating writing and images in their work. Since the modern period, especially, artists have been using text in visual art, thereby challenging notions of representation, abstraction, the relationship between language and art, and examining how meaning is visually encoded and socially constructed.

We would argue that a successful mapping between these two perspectives could provide insights that are useful to either side. More importantly, the confluence of such powerful forces as global change (incl. climate, economy, etc.), the *visual turn* of society, and an environment increasingly filled with text (e.g., billboards) may demand exactly such exercises at venues like this symposium.

Both of the authors are at the same time creators and consumers of the artifacts of their respective fields, as well as heavily invested in educational activities. In addition to a review of the recent evolution and current state of the treatment of text, the authors will present some of their recent works. On the cartographer's end, there has been a focus on visualising text documents and present them in a form resembling cartographic artifacts on the basis of various geographic metaphors and GIS technology. Meanwhile, the artist has sought to integrate text into works on canvas.

We do not explicitly address the question of whether and to what degree cartography actually is art and vice versa, though that might be a critical issue, even when only the use of text is considered.

17.2 Text in Cartography

Cartographic works have included labels and annotation for millennia. Even the earliest surviving maps already consisted not only of geometric primitives, but also contained annotation regarding the depicted places (together with religious and broader cosmological elements). In fact, those early maps – produced in Mesopotamia – would likely not have been recognised as depicting geographic space, if the names of the early city states had not been included. Meanwhile, the stick charts of Polynesian Islanders include no written labels and the uninitiated would have a difficult time recognising them as highly useful geographic depictions that were derived through careful observation and hands-on experience of geographic phenomena.

The German language has reserved a special term for a map that is deliberately void of labels: *stumme Karte* (mute map), indicating that such a map does not speak to us the way a *normal* map would. Interestingly, such maps are often seen as

particularly useful in elicitation of geographic factoids, where students are expected to come up with the missing elements in order to complete the map. It is as though they are inserting the missing words in a sentence. Such didactic uses of unlabeled maps can, according to Stams (1983), be traced back to the late 18th century.

In the cartographic literature there are plenty of statements pointing towards a special role of text appearing on maps, along the lines of David Fairbairn's proclamation:

> *"Text on a map is indispensable. ... a map without text is impossible, such a product being merely an image or a graphic." (Fairbairn 1993)*

In many ways, text is the easiest map element to illustrate what – at least in our view – constitutes the main characteristic of a map: *deliberate abstraction*. The purpose of a map is not to depict what is visible, but what *is* or *may be* relevant to the map user or the map creator. Of course, many of the items found on geographic maps are in fact visible as part of our experience of geographic space. An indication of this is that such features can now be extracted from satellite and aerial imagery through fairly automatic means. Good examples would be rivers, forests, and streets. Many other map features at first seem hidden from view, but are in fact delineated by visible features. For example, boundaries between municipalities often reveal themselves as rapid changes in land use patterns, due to different zoning ordinances.

Text on cartographic maps is profoundly different. The graphic marks generated by adding labels to a map do not correspond to any geometric feature visible from above. Among the rare exceptions are some encountered during ground travel, when a transportation route crosses a linear feature (like a river) or enters/exits an area feature (like a city). At such locations one finds text markers in situ, e.g. the name of a river indicated by a sign at the apex of a bridge. Interestingly, to a traveler these limited textual imprints are a welcome sight for orientation, together with other textual indicators of geometrical and topological relationships (e.g., road signs). Without them, orientation is much more difficult, as it is when faced with an unlabeled map of an unknown area. Again, in the orthogonal view of a map there are no textual imprints existing in geographic reality that could be delineated.

Cartographic labeling involves the following main steps:

1. Choice of elements to be labeled;
2. Determination of label content;
3. Label design; and
4. Label placement.

Successful labeling depends on a consideration of all of these steps. Unfortunately, when it comes to the scientific cartographic literature, labeling is mostly addressed as a label placement problem, and sometimes a typographic design problem, but questions of what to label and what the content of those labels should be – both of which precede placement – is rarely, if ever, addressed by those involved in the creation of

maps. While text appearing on maps may be the easiest indicator of power relationships and social constructs (e.g., reflecting colonial and post-colonial histories), that has had limited impact on actual mapping practices. As a result it, cartographers have likewise failed to inform the broader realm of scientific and information visualisation, in which geographic and non-geographic maps are produced mostly by non-cartographers. Issues of feature choice and determination of label content are also where cartographic labeling could potentially meet up with certain tasks found in data mining, such as when labels of *n*-dimensional clusters are to be determined in an interactive setting. However, such pursuits are dependent on developing deeper conceptual understanding of the complete process by which labels eventually appear on a map. Such conceptualisation may also be a prerequisite for meaningful dialogue between cartographers and those artists interested in incorporation of text.

17.2.1 From Lettering to Typography and Beyond

Explicit concern over textual elements appearing on maps has changed over the years and so has the language used to describe language in maps. *Lettering* used to be the dominant term applied to the process of putting text elements on maps. This reflected the most common technological approaches. Whereas the spatial arrangement of text in a book is characterised by a regular pattern, line-by-line, cartographic text is distributed more unevenly and frequently curved to follow the shape of geographic features being labeled. Historically, this meant that cartographers had to carefully consider the placement of every single letter. Only in the last twenty years has fully electronic label placement become a reality, such that labels can be placed and iteratively adjusted on a computer monitor. Labels can be associated and placed alongside elongated features or stretched to fill the extent of area features; true-type fonts can be scaled to any size without pixilation effects; variations in color and such effects as drop shadows can be easily introduced. Consequently, one now encounters the term *typography* much more frequently when cartographic text is discussed.

To investigate the treatment of text by cartographers more thoroughly, we surveyed some of the leading cartographic textbooks of the last sixty years, beginning with Erwin Raisz' "General Cartography" (1948). The results are summarised in *Figure 17.1,* with a special focus on the relative amount of coverage devoted to text issues. For every book, the percentage of pages dealing with text was determined. Around 1950 we found significant variation ranging from 3.1% in Raisz (1948) to more than 30% in Arthur Robinson's map design monograph "The Look of Maps" (Robinson 1952) (not shown in *Figure 17.1).* During the 1960s and 1970s the various volumes of Robinson's "Elements of Cartography" and Raisz' updated volume, now called "Principles of Cartography" (Raisz 1962) showed remarkable consistence, with coverage of text issues taking up between five and six percent of the total page count. After 1990, text books began to incorporate more and more

of the results of cartographic research produced in the 1970s and 1980s, including such emerging topics as animation and interactive maps. Borden Dent's book is a bit of an exception, with 4.8% still devoted to typographic issues (Dent 1999). Interestingly, among traditional, print-focused cartographers this remains a favorite textbook. Meanwhile, the last edition of Robinson's book, now involving a total of five co-authors (Robinson et al. 1995), covered cartographic text with only 3.26%. Those cartographers [and other geovisualisers] looking for coverage of emerging, computer-based techniques tend to turn to the book project headed by Terry Slocum, in which coverage of typographic and labeling issues is limited to around 1% (Slocum 1999, Slocum et al. 2005, 2009)! Meanwhile, Cynthia Brewer (2005) dedicates almost 1/3 of her book to text issues, in recognition of the potential power of GIS and a growing user base that is however not cartographically trained (see also *Section 17.3.1).*

As already mentioned, cartographers tend to focus on the typographic design and placement of labels. In terms of design, standard semiotic rules are extended from the traditional concerns over point, line, and area geometry towards driving the appearance of text labels on maps. For example, differences in terms of hierarchy and quan-

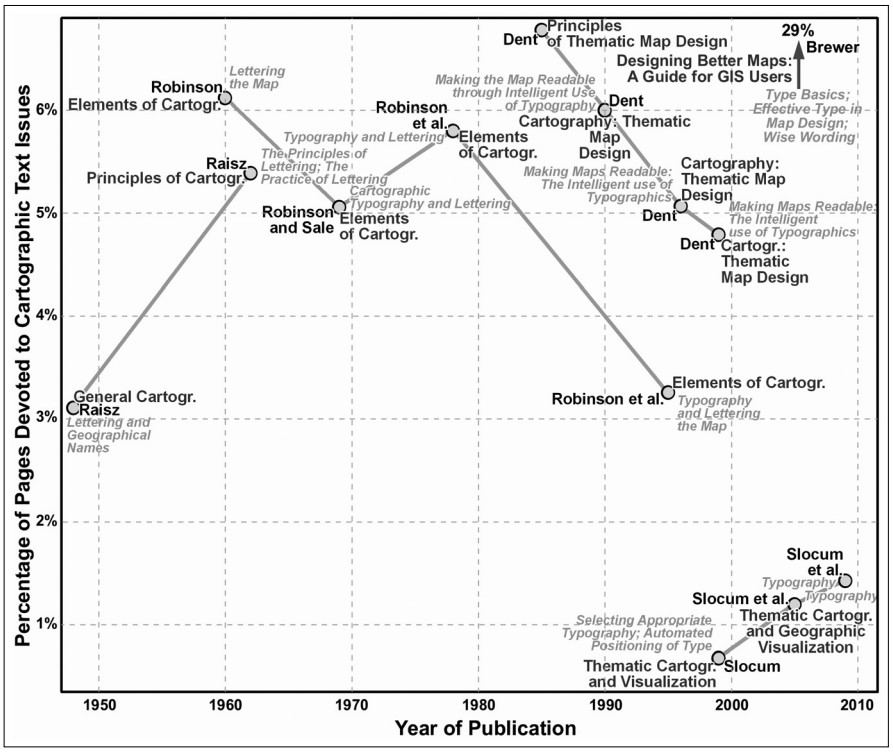

Fig. 17.1. Coverage of cartographic text in leading textbooks. Listed are authors, book titles, and headings of chapters or sections devoted to text issues.

tity have traditionally been expressed through such graphical differentiation as size or color value. These are usable with cartographic text as well, such as variation of font size or font color. However, text affords a number of additional variables to work with, including letter spacing and case *(Figure 17.2)* (Kraak and Ormeling 1996).

As far as label placement is concerned, the main difficulties encountered hark back to our earlier argument of text not being found inscribed in geographic reality. On one hand, cartographic labels should be unequivocally associated with the features they refer to. On the other hand, they must conflict neither with other labels nor with the variety of other content found in a map, i.e. labels should not obscure actual feature geometry. Meanwhile, the text strings that will become labels vary tremendously in length, which adds complexity. For example, country names can be as short as "China" (and in that case be associated with a very large geographic feature) or as long as "Swaziland" (a very small country).

One sometimes underappreciated aspect of cartographic labels is that they convey much more than simply the name of a feature. First of all, to give something a name is a far less innocent operation than is sometimes thought (see the following section for more on that). In addition, quality label solutions are able to convey far more than the mere name of a feature. The shape of a label can mirror the shape of its respective feature, e.g. the name of a river running alongside it. Sometimes, the label can be used to indicate the geometry on its own, e.g. when "Mid-Atlantic Ridge" snakes its way across the space between South America and Africa, without any other indication of the location of the referenced feature. Another example for the intricate role of labels is the common rule of placing the name of a coastal city in the ocean, while a city near but not at the ocean is supposed be labeled on land. In other words, intelligent labeling can help to convey important geometrical and topological aspects of geographic space.

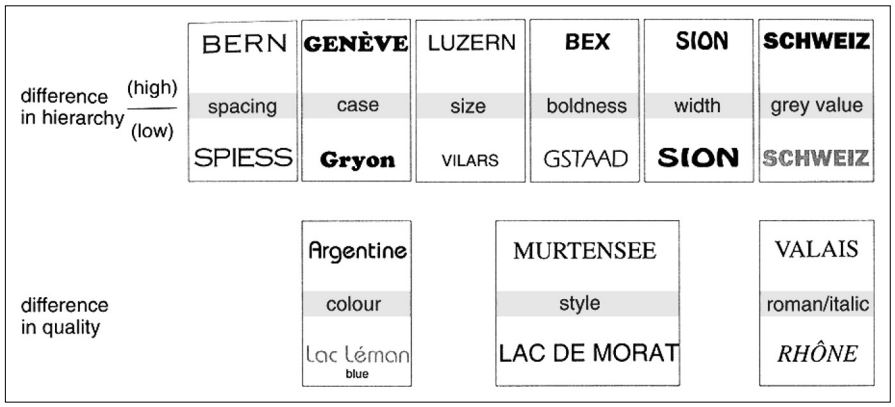

Fig. 17.2. Semiotic principles applied to text labels for cartographic maps (from Kraak and Ormeling 1996; courtesy of Menno-Jan Kraak)

17.2.2 What's in a Name?

Maps were for the longest time thought of as mere depictions of geographic space. Granted that abstraction was always seen as necessary – due to the reduced scale of a map – but cartographers thought of themselves mainly as faithful servants of geographic reality. There was much talk of selecting map projections that served the purpose of the map, to choose source data providing the best available geometric accuracy, and of other concerns conveying a sense of responsibility and innocence. However, powerful arguments put forward during the last two decades have undermined many of our most basic assumptions about maps and mapping. Postmodern critics have charged that maps are reflective of and, more importantly, instrumental in shaping relationships characterised by differences in power and control. While in-depth reflection on postmodern, postpositivist, feminist, and related positions on the role of maps is beyond the scope of this chapter, labels are in fact an element that lends itself most easily to such critique, because, compared to other cartographic content, they are such explicit expression of its creators' viewpoint.

Geographic names are also often more volatile than other geographic and therefore map features, and reveal much about a region's development as well as about the cartographer's disposition. For an example, consider how dramatically labels can sometimes change in editions of the same atlas published at different moments in time. Such is the case with the map "Africa – Southern" appearing in *Goode's World Atlas* in 1960 versus 2005 (Espenshade 1960, p. 166; Veregin 2005, p. 232). Geometric elements, expressed as point, line, and area symbols are virtually identical in both editions. It is only in the labels that the enormous political, economic, and social changes in this region are hinted at. "Bechuanaland (British Protectorate)" becomes "Botswana," "Southwest Africa" becomes "Namibia," and so forth. Yes, names and labels are important signifiers and they seem to operate quite differently from other geographic features. Changing the name of a country (e.g., from Burma to Myanmar) is seen as relatively unproblematic, but changing the geometry of a country's outline – remember that label placement is based on this – is typically referred to as *war!*

17.3 Text in Contemporary Visualisation

Increased concern about the use of text seems warranted not just in the light of postmodern critiques of mapping approaches, but also due to recent advances in the underlying concepts and technologies. The technology of mapping has changed dramatically in recent decades, beginning with the development of GIS and digital geographic databases and leading up to such current trends as Google mash-ups. One result has been that more and more people are actively engaged in mapping activities. On a conceptual level, the most fundamental change has been a shift in

the dominant cartographic paradigm from *communication* to *exploration*. The goal of cartography has thus shifted from the creation of *the perfect map* to *the perfect interface* allowing users to discover patterns and generate new insights. This is one of the contextual elements behind the apparent lack of attention paid to labeling. If the map seizes to be the primary geographic database – which had been its main purpose for many centuries – and instead becomes something much more fleeting, ephemeral, then the role of the label is bound to change as well.

17.3.1 Geographic Information Systems

Based on much of the survey presented in *Section 17.2.1* one might think that cartographers have all but lost interest in how cartographic text is generated. To a classically trained cartographer, labeling is frequently reduced to issues of typographic design and label placement. As we've argued in *Section 17.2.2,* that is a somewhat naïve view, with respect to the very nature of attaching labels to geographic features. However, the fact that cartographers may feel quite comfortable with producing quality labeling solutions (e.g., using desktop publishing software, like Adobe Illustrator) obscures the fact that novices can feel overwhelmed by the complexities of label design and placement. That never used to be an issue, since only cartographers had simultaneously access to geographic source data and to the various technology solutions for data transformation, cartographic design and production. The "only" element cartographers had to add was their knowledge regarding what constitutes good map design.

All that has changed with the advent and maturation of geographic information systems (GIS), together with huge volumes of geographically referenced data now being easily obtainable. As a result, for the last decade or so, non-cartographers have been able to create visual output from geographic data. One hesitates to attach the label "cartographic" to much of what has been produced in this manner. GIS users were for many years able to violate even the most basic conventions of cartographic design, many of which had been derived from or supported by extensive research by cartographers, cognitive scientists, and psychologists. Not surprisingly, cartographers were for the longest time extremely apprehensive about GIS technology, basically associating them with "bad maps." In recent years this has begun to change. For example, the commercial software ArcGIS (www.esri.com) now enforces many of the fundamentals rules regarding the link between data and symbols that had been followed by cartographers for several hundred years and were finally formalised by Jacques Bertin (1967/1983).

Text labeling is a logical part of these efforts towards formalisation and algorithmisation of cartographic expertise by academia and industry alike. However, given the inherent complexity laid out earlier, automated labeling turns out to be quite complicated. Most labeling software approaches address only some portion of the

labeling issue, e.g. point feature labeling, but there are very few examples of true integration of labeling within a comprehensive mapping system. One of the few exceptions is the Maplex extension to ArcGIS, which gives GIS users access to many of the methods used by traditional cartographers. *Figure 17.3* illustrates how the concerns and, frankly, tricks of cartographers are turned into parameters, which are then driving the automated placement of potentially very large numbers of labels. For example, the visualisation shown on *Figure 17.4* was generated in that manner.

Modern GIS software may provide the tools necessary to create impressive labeling solutions, but their effective use still depends on the operator having a fair amount of understanding of map design concepts. That largely explains the extensive coverage that Brewer (2005) dedicates to cartographic text.

17.3.2 Virtual Globes

It may be time to ask whether the role of cartographic abstraction is changing in the light of the kinds of geographic visualisations people are now surrounded by. The various implementations of digital globes (e.g., *Google Earth*, Microsoft *Virtual Earth*, NASA *World Wind*) are focused on what's visible through an orthogonal view from above. On one hand, the selective processes involved in generation of abstraction *seem* deemphasised, with so much of the display occupied by highly textured imagery. Some of the general attraction of digital globes are likely due to

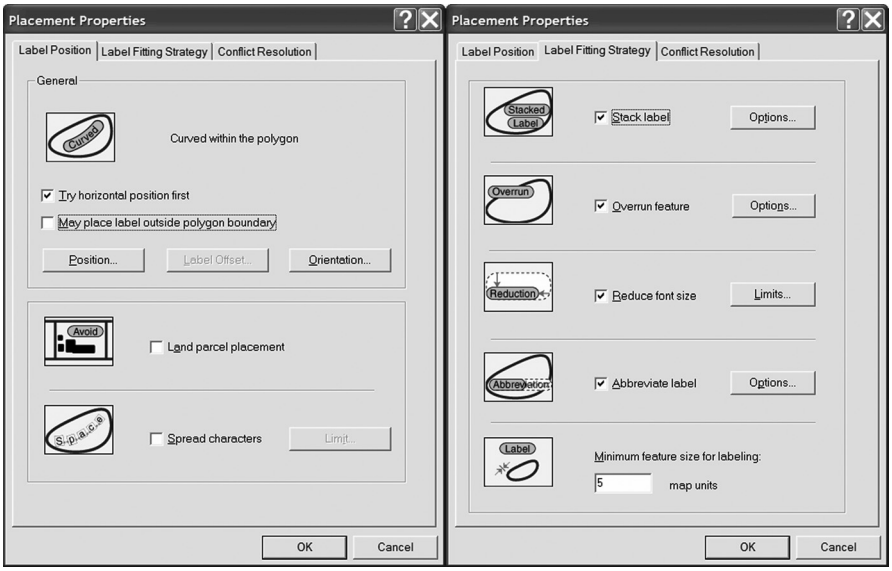

Fig. 17.3. Labeling controls in the Maplex® extension of the commercial GIS software ArcGIS®

the perception of a live depiction of reality, notwithstanding actual heterogeneity in spatial, temporal, and thematic characteristics. On the other hand, recent versions of such software have increasingly included more overtly abstract elements, and text is among them. In other words, the emergence of virtual globes is forcing us to pay more attention to text in visual displays as a subset of the broader issue of abstraction. What, when, and how to label in a virtual globe environment ought to be a major area of concern for cartographers.

17.3.3 Information Visualisation

In *information visualisation* – which deals with abstract data – there is a pronounced focus on generating novel geometries. All matters of rectangular, circular and network layouts of abstract data have been proposed (Card, Mackinlay, and Shneiderman 1999), but text elements are typically added as an after-thought, out of sheer necessity. Labeling is seen as something to be made available only on request, like when a user clicks on a geographic feature. Meanwhile, the broader cartographic view of labels as able to convey much more than just the name of a feature is largely ignored.

Naturally, text labels receive more attention where text documents themselves are visualised, such as in knowledge domain visualisation (Börner, Chen, and Boyack 2002; Skupin 2002). There is even a place for GIS software, once *n*-dimensional document vectors are projected into two dimensions. For example, the first author has used ArcGIS and the aforementioned Maplex extension to generate large-format knowledge domain maps involving thousands of text documents and, ultimately, hundreds of labels *(Figure 17.4)*.

17.4 Text in Art

Writing and pictures are essentially two ways of visual representation on a flat surface. Artists who have combined elements of text and imagery in their work have explored ways in which these two systems of representation differ or correspond to inform perception and cognition.

17.4.1 Coexistence of Text and Image

Among the types of image-text relationships identified by Simon Morley are "multi-medial" (Morley 2003) relationships, in which either the text accompanies the image, in support or contradiction, or the image accompanies the text. In both cases, image and text remain distinct from each other. Examples of this kind of relationship include René Magritte's 1929 painting "The Betrayal of Images,"

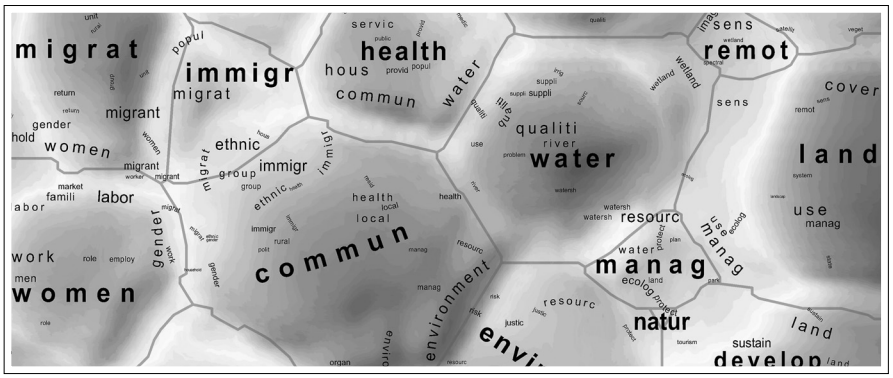

Fig. 17.4. Detailed portion of a visualization of the geographic knowledge domain. André Skupin, In Terms of Geography, 2005

where the words "Ceci n'est pas une pipe" are painted below an image of a pipe and Barbara Kruger's "I shop therefore I am," 1989, in which Kruger combines a caption reminiscent of advertising with a black-and-white photograph of a hand. From a formal perspective, an important issue arises in instances like these. It is impossible for text, being a flat medium that exists right on the surface of the picture plane, to co-exist with an image depicting 3-D realism, without disturbing the illusion of depth and the adherence to perspective in the composition. The combination of text with imagery resembling reality exposes the fact that the imagery in the painting or photograph is no closer to reality than are the words that we use. Pictures and words are therefore presented as two kinds of signs used to represent reality. By appropriating the look of commercial communication and advertising techniques, Kruger specifically comments on the use – and commodification – of both language and image as signs in contemporary society.

17.4.2 Text as Image

Instances in which the distinction between text and image is blurred, and where parts, or all, of one becomes the other, fall within what Morley terms "mixed-media" and "inter-media" relationships (Morley 2003). Examples include Robert Indiana's piece where the four letters spelling "LOVE" constitute the entire composition, and Ed Ruscha's gunpowder-drawing "Optics," in which the rendering of the word "Optics" makes it appear suspended and voluminous in space. Both of these examples take a single word as their main compositional element and subject it to formal treatment: Indiana by, amongst others, the unconventional arrangement of the letters and focus on the positive and negative spaces formed by the letters in this arrangement. Ruscha's drawing creates an optical illusion through his rendering of the image, which has the effect of making the word look like it is made of ribbon or

bent paper. There is thus a deliberate play by the artist with the connection between the presentation of the word and its content. It could be argued that the relationship between the presentation and meaning of the word is more confrontational in Indiana's "LOVE," with a profound and enigmatic concept being presented in a very orderly and simplified manner.

17.4.3 Language as Art

Another use of text in art can be found in examples like Joseph Kosuth's "Titled (Art As Idea As Idea)" from 1967, and Jenny Holzer's series of "Truisms," started in 1977. These two examples differ from previous ones in that the content of the words, or the ideas encapsulated by the words, is the art. The presentation often consists of nothing else than the legible text in the form of standard-looking printed (or photocopied) words on paper. The artist Sol LeWitt's statement that "ideas alone can be works of art" (Harrison 2001) explains the aim of conceptual artists like Kosuth to change the very nature of art by making it more about thinking than about seeing. One way conceptual artists achieved this was by replacing the art object with language. Kosuth presents a photocopy of the dictionary definition of the word "art" on the gallery wall, while Jenny Holzer presents her "Truisms" statements in public spaces, like phone booths, as well as in galleries and museums.

17.4.4 Maps in Art

Artists have at various times incorporated elements of cartographic maps into their works. In this chapter, our interest lies with those to whom the role of text in such depictions was particularly important. The following two examples fit that requirement nicely.

In the case of the futurists of the early 20th century, it was imperative to escape from the structures imposed by linear text. That was exemplified by their motto "Parole-in-Libertá" (Words in Freedom). The futurists deliberately emulated structural elements of geographic space – especially urban space – and its cartographic depiction, including the use of visual hierarchies expressed through font size and spacing *(Figure 17.5)*. The creators as well as the audiences seem to have clearly understood these as maps, such as when Tristan Tzara refers to them as "cartes-poemes géographiques futuristes" (futurist geographic map poems) (Tzara 1920). Incidentally, the view of two-dimensional space and mapping as providing a movement towards freedom, as an escape from the rigid structure of the traditional written word, should be worth further investigation in the light of current views on mapping as a mechanism of appropriation and control.

As a final example from the world of art informed by maps, consider "Nordrhein" by Guillermo Kuitca, 1992, in which the artist copied a portion of a map of Germany

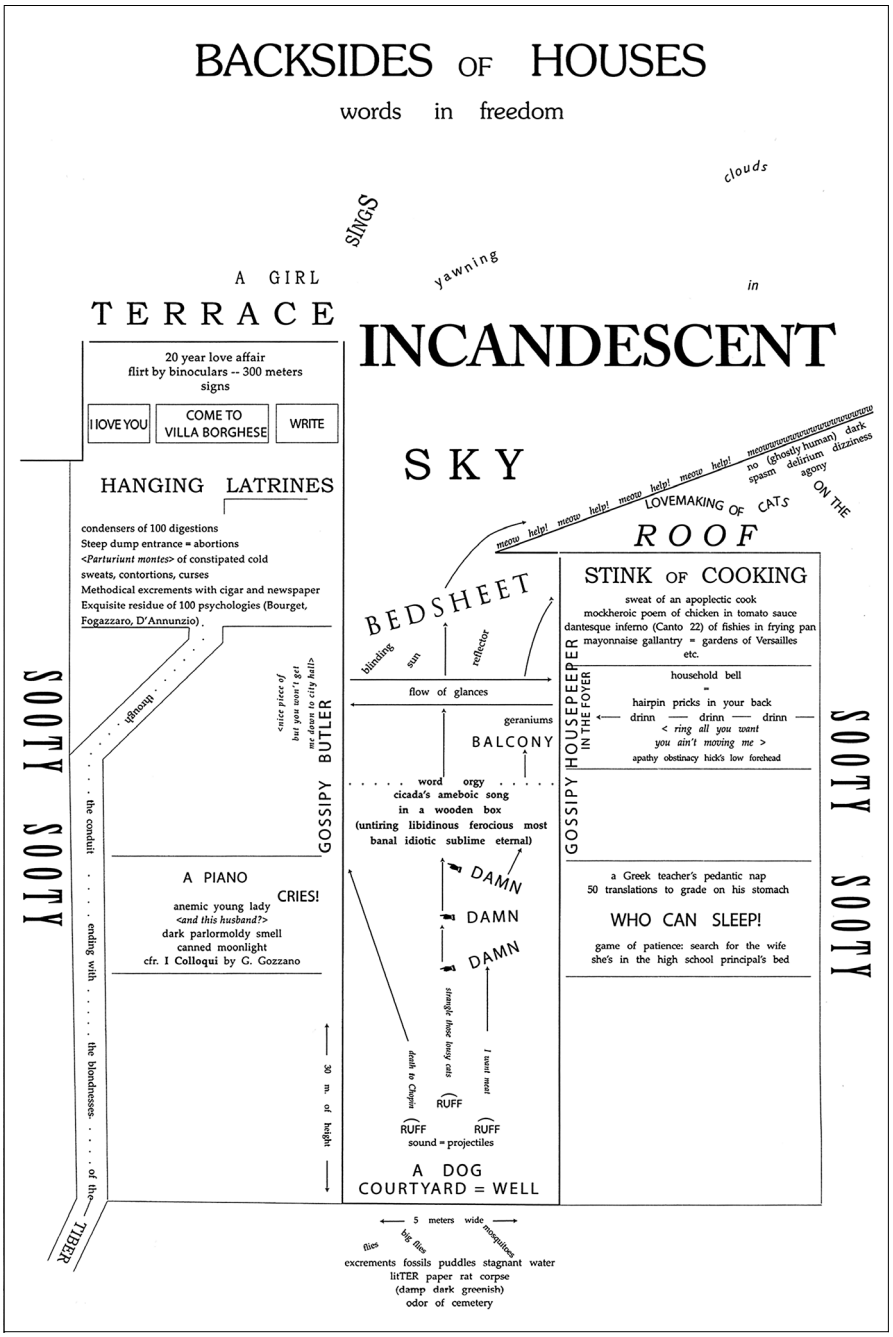

Fig. 17.5. Futurist geographic map poem. Vincenzo Volt, Deretani di Case, 1916 (Translation and translation design by The Getty Research Institute; Copyright Research Library, The Getty Research Institute, Los Angeles, California)

by painting it on a mattress. Kuitca, who is Argentinean, deliberately picked a map of an area with which he was completely unfamiliar, thereby reducing the labels and features to a maze of incomprehensible signs, and the map to a visual form devoid of geographic meaning. Keep in mind that, similarly, Magritte's complex message in "The Betrayal of Images" or the original version of Vincenco Volt's map poem *(Figure 17.6)* would be lost on anyone not able to read French or Italian, respectively.

17.4.5 Seeing Geographic Space in Art

A major intent of this chapter was to capture elements of the dialogue between the two authors, the cartographer and the artist, on the role of text in their respective fields. Any successful conversation depends on a certain amount of shared understanding and shared language and to that end, much of this chapter consisted of the authors exposing their own views of the role of text. We hope that readers from either field will find the result interesting. However, at this point not much of a synthesis of the two perspectives is contained. In order to give some hint at the direction of our conversation and collaboration, consider finally the differences between *Figure 17.6* and Peter Davies' 1998 work "Fun With the Animals: Joseph Beuys Text Painting" (http://www.saatchi-gallery.co.uk/artists/artpages/peter_davies_fun_with_animals.htm).

Davies constructed what one would typically call a semantic network. Starting with the artist Joseph Beuys, Davies linked together one concept/person/characteristic from the field of art history after another, in a playful manner. In the end, the work includes connections such as "De Kooning" to "Pollock" via "drinking."

Figure 17.6 contains recent work by the second author, aimed at deconstructing the appearance of language by exploiting the individual letter as its most basic primitive. Focusing solely on the appearance of letters, new arrangements are created, guided by visual effect, but nonetheless evocative of spoken and written language.

The conversation between the authors revealed that Davies' "Fun With the Animals …" and *Figure 17.6* generated quite different ideas regarding the degree to which elements of geographic space were recognised. It turned out that earlier conversations regarding the so-called *First Law of Geography* were crucial in this context. Long held as a fundamental underpinning of how geographic space operates, it claims that everything is related to everything else, but closer things are more closely related (Tobler 1970).

The artist-author was reminded of geographic space in how Peter Davies had managed to visualise the interrelatedness of diverse elements. Meanwhile, the cartographer-author felt that the space Davies had generated and visually depicted looked far different from what one might expect in geographic space. One issue was that it was not clear whether planar enforcement was present or not, i.e. whether lines were ever crossing other lines or nodes without an actual link. The closest geographic

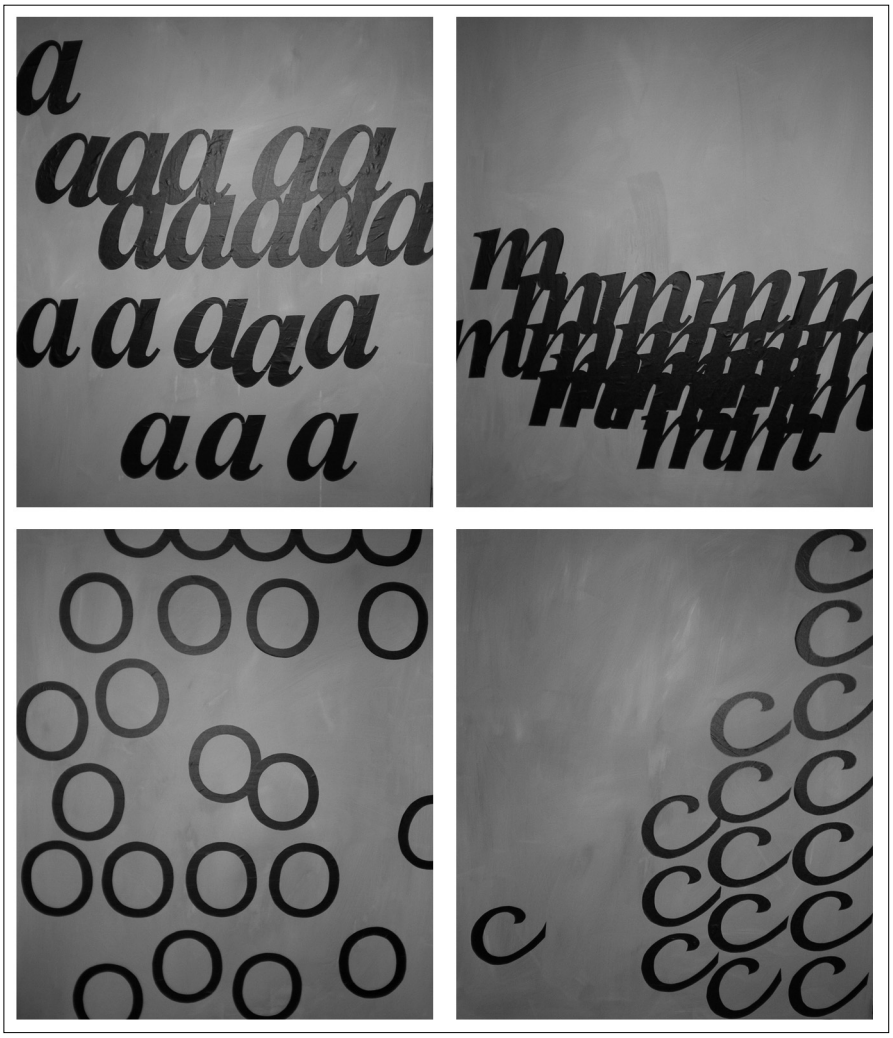

Fig. 17.6. Seeing geographic space in art: Marinta Skupin, Letter Paintings, 2007

network that this may resemble is that of an airline network. However, the distinct hub-spoke structure of today's airline network is absent. The cartographer-author also was [mistakenly] looking for meaning in the size and color of individual nodes.

Instead, *Figure 17.6* triggered in the cartographer a much stronger recognition of some elements of geographic space, quite unintended by the artist. Numerous structures reminiscent of geographic space appear to exist in the arrangement of letters, with distinct spatial distributions across the four canvasses. None of the paintings contains a regular distribution of letters. The "m-painting" shows not only pronounced clustering, but overplotting of multiple symbols (like is often found

when plotting geocoded crime locations over long time periods). In the other letter paintings, there are other cluster structures, such as the apparent crowding of c's towards the right edge of that painting. Overall, it was the *diversity* of spatial patterns that reminded the cartographer of the diversity encountered in geographic space.

Much more could be said about the subjective nature of the dialogue attempted in this chapter. There clearly is no such thing as "the artist" or "the cartographer," and neither can claim to speak for a whole discipline. Instead, both authors found the value of this exercise to lie in generating fresh perspectives on each other's fields and, ultimately, in informing their own scientific and/or creative ventures.

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